DOES INCOME INEQUALITY RISE FROM ABOVE OR FROM BELOW? TWO ALTERNATIVE DIFFUSION PATTERNS, THEIR DIFFERENT PROSPECTS, AND EVIDENCE FOR 16 OECD COUNTRIES, 1985-2005

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ABSTRACT. Advanced industrial democracies experience increasing inequalities or at least a new trade-off between equality and growth: liberal welfare states opted for growth and accepted rising inequality, while conservative welfare states tried to hold back inequality, thereby accepting lower growth, and only the social democratic welfare states were partly able to overcome that trade-off. The rise in inequality is widely interpreted with regard to globalization and technological change.

This paper contrasts this interpretation with an alternative based on the argumentation of Kuznets' inverted U-turn which is individually reformulated as the diffusion process of some qualification (which remains unspecified throughout this paper). These two alternative mechanisms which are identical with regard to inequality measured using the Gini coefficient or the standard deviation of logged incomes, can be differentiated through different trend expectations with regard to the skewness of income distributions: In the globalization model, increasing inequality is accompanied first by a fall and later-on by a rise in skewness, while the qualification diffusion model shows the opposite sequence: rising to a maximum and falling back later on. Due to their different position in the inequality-growth rade-off, liberal and social democratic welfare states are assumed to be ahead in this evolution, while conservative welfare states lagging behind.

Based on the Luxembourg Income Study, skewness estimations of logged monetary income distributions form an unbalanced panel with 69 observations from 16 OECD countries. A fixed-effects regression for the skewness time trend in conservative welfare states and the trend difference for the two other welfare state groups shows strong support for the qualification diffusion model.

Key words and phrases. inequality, globalization, diffusion, welfare states, distribution skewness, statistical methods, cross-national comparison, Luxembourg Income Study.

1. Expected distribution moments development in the globalization model

Most of the arguments regarding increasing inequality have an implicit assumption with respect to the direction in which the increase in inequality hits a society. Consider the trade argument (Freeman 1995, Wood 1995, Wood 1994). If inequality grows because things which have been produced by unskilled workers up to now are now imported from overseas, will this result in a constant increase in inequality over the whole distribution?

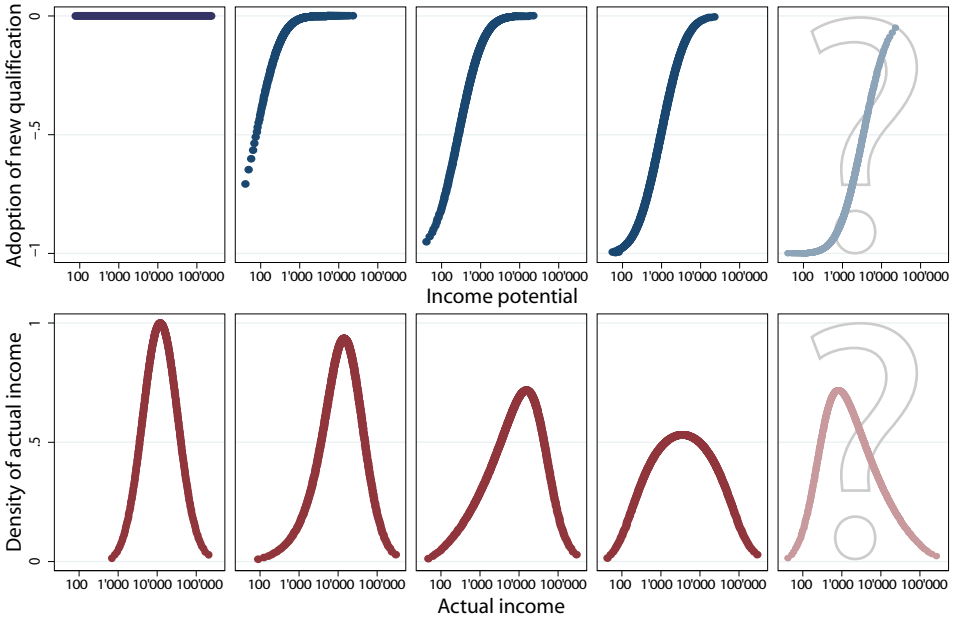
The answer is no, since competition from low-wage countries does not enter the markets uniformly. Instead, low economic positions are expected to have been hit first and harder. When wage inequalities began to rise in the U.S. and Great Britain, low-wage countries were not able to compete on high skill levels. But during the 1980s and 1990s, countries which had formerly exported only raw materials and semi-final products began to enter export markets for end-products, so the competitive pressure entered higher ranks of skills and wage.

The same is the case if globalization does not take the form of trade or foreign direct-investment but of migration. Again, migrants enter their host societies on low skill levels and compete with low-skills locals. But, again, over time their qualifications get better, allowing them to compete for higher-demanding and better-paid jobs.

With minor reservations, the same is true for the mechanism based on rationalization and computerization of work. If technical development begins to transform routinized work into something computerized machines can do, who is hit first? For sure, this will not happen on the upper end of the distribution. The economic logic of transformation of routinized work into computerized production requires that this transformation begins where the relation of transformation cost and saved wages is best. Since routinized jobs have been relatively bad-paid even before computerization processes took place, this process, again, begins on the lower levels of the income distribution.

In all three cases it can be argued that the process may not begin on the lowest levels. The counter-argument works best for the last mechanism described since routinized work took place in manufacturing and required more skills than for example basic service work which cannot get computerized. It is less convincing for the migration mechanism: Even though one can

FIGURE 1. Expected development of distribution in the globalization model



argue that migrants are most often among the better educated youth of a origin country, due to language problems, differences in educational standards and foreclosure they most often start off (respectively started off at times when inequality began to rise) at lower income levels. The same difference between theoretical possibility and empirical competitiveness is true for trade as globalizing mechanism: All countries outside the OECD which started an export-oriented development strategy, began with the production of rather simple export goods. And even if the processes of labor displacement do indeed not start on lowest levels at all, they start on some low level and affect all workers not only on, but as well below that level, since the displaced workers will (at least in the short run) not be able to change to better but only to worse positions, bringing competitive pressure on wages into their new areas.

The processes described can be understood as a kind of 'negative diffusion', leaving clearly distinguishable marks in the evolution of the skewness of (logged) income distribution, as described in Figure 1.

Prior to the process, i.e. in the 'golden age' of the 1950s and 1960s (Marglin and Schor 1990, Esping-Andersen 1996), there is not yet any influence of globalization, symbolized by a line

on zero ‘influence of globalization’ in the upper row of the first first in Figure 1. The resulting income distribution has some baseline form with low baseline inequality and a baseline skewness in the distribution of logged income, as depicted in the lower graph of the first column in this figure.

With the beginning of globalization, a negative relative income effect begins on the lower economic levels, as depicted in column 2 of this figure. Note that for constructing the graphs, income is modeled as the result of some ‘income potential’ which is the result of the Galtonian process with constant influence, and an added negative income influence due to globalization or economic restructuring which spreads out from below. In the upper row of Figure 1, on the x-axis the income potential is plotted which equals actual income before the negative influence starts. In the lower row of the figure, on the x-axis actual incomes are plotted after adding the negative influence.

This negative influence makes the income function of the relative position steeper. Now an additional influence as described above does not have a uniform relative effect over the whole domain any more. Instead, the relative effect on lower income effect gets stronger. Now if a worker on the lower end of the distribution meets some positive influence on his human capital, it has a larger positive relative effect than if a better-equipped worker would meet a similar influence. But on the other hand this means that likewise a negative influence, as e.g. loosing one’s job, has a larger negative impact, too. This change leaves its trace in the density of (logged) actual income as depicted in the bottom row of Figure 1.

The figure describes how the process continues: as globalization continues, more income groups come under pressure. In the situation depicted in column 3, all income groups below the median income are in the area of increasing vulnerability. Here even the density at the modal income has been shrunk significantly, and the skewness of the distribution gets to a negative extreme value.

As globalization continues, the diffusion of its pressure goes on. Column 4 of Figure 1 depicts a situation where being under globalization (or skill-induced restructuring) pressure is an almost linear function of the relative position. Only a lucky few at the very top are completely unaffected, while the underclass has suffered the maximum possible negative effect. Now the whole

distribution has got a rather flat shape, resulting in much higher inequality by any measure, be it the standard deviation of the logged income, be it Atkinson, Theil or the conventional Gini coefficient. Simultaneously, the skewness of the income distribution has sprung back from its negative values to zero.

In this model, it is not yet clear how far the process goes. World system analysis may conclude that the process ends at the stage depicted in column 4, since the elite of the core may remain the global top of power and therefore income distribution. In that case, development might end here. The fact that income distribution in the United States remains on the high level which was obtained already in the late 1980s is an empirical argument for this thesis.

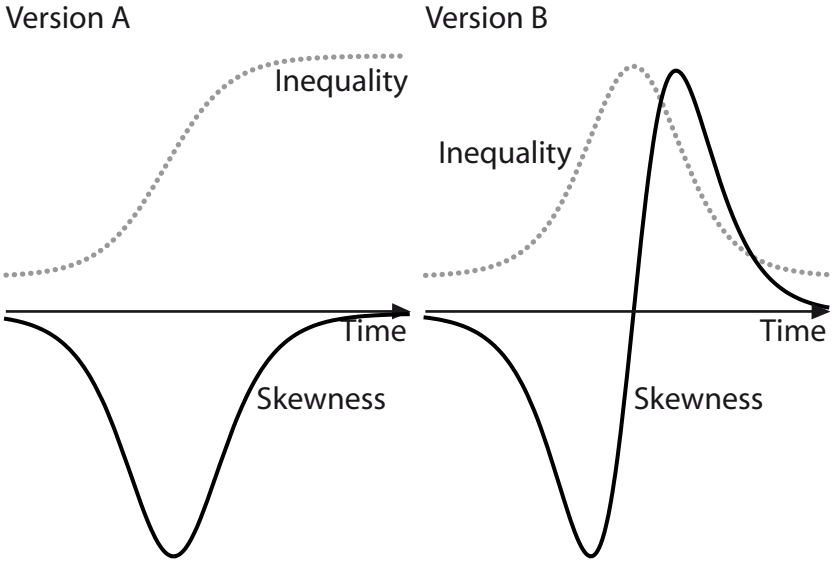
On the other hand, one may argue (even within world system theory, on the basis of challenged hegemony) that globalization pressure sooner or later may go on and threaten even the upper classes in the OECD countries. In this case, the diffusion process would continue as depicted in column 5 of Figure 1. Since in this case the continuation of the diffusion curve would be a point symmetric reflection and the continuation of the density curve would be an axis symmetric reflection of their respective earlier stages, the remaining two subfigures are left out of Figure 1 for simplicity and readability.

At the current point in time, the decision between these two options cannot yet be made, and they have to stay as distinct options side by side.

Condensing what has been said with regard to the evolution of (logged) income distribution skewness, theoretical expectations can be describes as depicted in Figure 2. In this model, skewness behaves rather similar to the derivative of inequality over time (even though its mathematical formulation is rather different): At the beginning of the process, inequality begins to rise, but the skewness of the distribution function rises even faster. It has a maximum when the ‘speed’ of the increase in inequality is highest to, but when inequality itself reaches its maximum and comes to a standstill, skewness as well falls back to zero. This may be a steady state, as in version A in Figure 2, or it may be only a stepping stone in the process towards falling inequality and negative skewness, as in version B.

The time in this model is not uniform, instead it is a form of ‘social time’ within which several steps happen with the same order, but may be lagged against each other; the physical time in

FIGURE 2. Expected distribution moments development in the globalization model

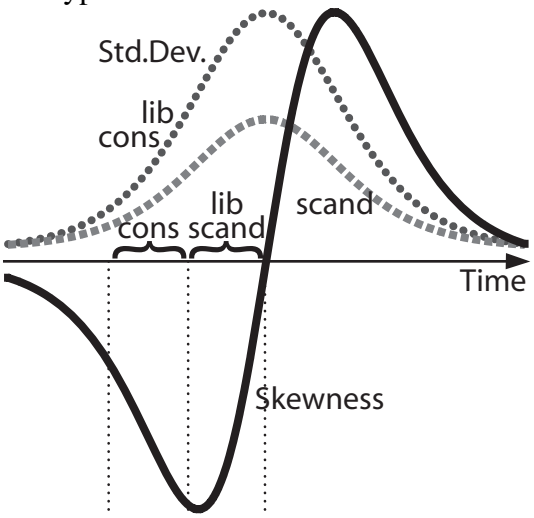


which these steps are completed may vary as well. (Müller 2005) Social time in the modern economic sphere is mostly defined through economic development. Therefore, societies which grow faster are likely assumed to be ahead in 'economic time' while societies with slower growth are assumed to lag behind. From the different self-placements in the inequality-growth trade-off in the 1990s it therefore follows that liberal and scandinavian welfare states opted for a faster development pace on social or financial cost while conservative welfare states opted for a slower development, in the hope that a slower pace might allow to keep social differences small without the high financial burden the Scandinavians were willing to carry.

Hence we assume that in the expected evolution of income distribution skewness conservative welfare states should lag behind. Under the globalization model we assume that conservative welfare states are, within the process depicted in Figure 2, lagging behind the other two types of welfare states.

Data from the Luxembourg Income Study which allow to test this theory (and the competing hypothesis presented in the following section) are available for a broader sample of nations from the mid-1980s onwards. At that time, the developments which succeeded the 'golden age' setting still were on track at least in liberal welfare states — the starting point of rising inequality in the

FIGURE 3. Expected distribution moments development in the globalization model, by welfare state type



United States, for example, dates back not only to the first oil crisis in 1973 but to another year of historical change, namely 1968. Around 2005, at the end of the time range of the data available, inequality in the United States has already arrived on a high plane without a further increase, but as well without signs of a decrease.

Therefore, it may be that liberal and scandinavian welfare states are already in the part of the evolution where income distribution skewness is beyond its negative extremum value and rising again. In any case, we expect that the trend for income distribution skewness for conservative welfare states is significantly negative. For liberal and social democratic welfare states, we estimate the difference of their time trend for income distribution skewness against the trend for conservative welfare states and expect that this difference is either insignificant or significantly positively. The latter case is depicted in Figure 3. But it may be that not all liberal and scandinavian welfare states are already on the upward slope of the skewness curve: in that case we would do a separate test for the United States and the United Kingdom, since these both have yet arrived at the higher saturation level of inequality and therefore would for sure be expected to be on the upward slope of the curve.

2. Expected distribution moments development in the qualification diffusion model

On the other hand, there is a more optimist view which borrows from the idea of Simon Kuznets. (Kuznets 1955) In his model, inequality rose and fell due to the change from agrarian to industrial society, so why shouldn't this be the case again, at the turn from industrial to post-industrial society?

Indeed, the change from industrial to post-industrial society is among the prominent explanations for rising inequality which the literature on that topic provides. At the very invention of the term (and only five years after what we today know was the start of rising inequality in the United States) Daniel Bell predicted that post-industrial society would come along with rising inequality. (Bell 1973) Since then, numerous studies have found an empirical relation between de-industrialization and rising inequality.

Nevertheless, the Kuznetian idea that the change from one social configuration to another will be accompanied not only by rising inequality but, later on, by inequality falling back again, has not yet been adopted. (Bornschier 2002) The main argument against that optimism is that, unlike the industrial sector in the transformation Kuznets studied, the service sector in the current transformation is not a uniform source of better-paid jobs as Kuznets model assumes. (Reich 1991) And indeed, the simple idea that, during a transformation that takes fifty or eighty years, people just move from one sector to another and, only through that job change, get more money, seems not to be very appropriate for the current transformation.

But has this simple notion of Kuznets' inverted U-curve been appropriate even for the first transformation? There has been a lot of critique on Kuznets in the literature, mostly for the fact that his prediction did not hold in the fixed-effects model. (Ahluwalia 1976) We will not go more deeply into that discussion. But there are other arguments for the suspicion that the two-sector transition model may be an over-simplification. From a theoretical point of view, Kuznets' model is insufficient as it does not take into account individual decisions or processes, and for its institution-blindness.

From an empirical point of view, one point of critique is the fact that applying the real sector differences as predictors instead of GDP per capita does not result in better but in worse prediction of the inverted U. (Buchser 2008) Another point is the argument that Kuznets did not take into account the development of intra-sectoral wage differences: For example, on the basis of Peter Howlett's research on the Great Eastern Railway Company, 1870-1913, we see that inequality followed an inverted U even within that firm which s a whole for sure was part of the modern sector. (Howlett 2004, 411)

We turn to a different explanation of the inverted U-curve by explaining it as a diffusion of some qualifications central to the new productive configuration, which spreads from above.

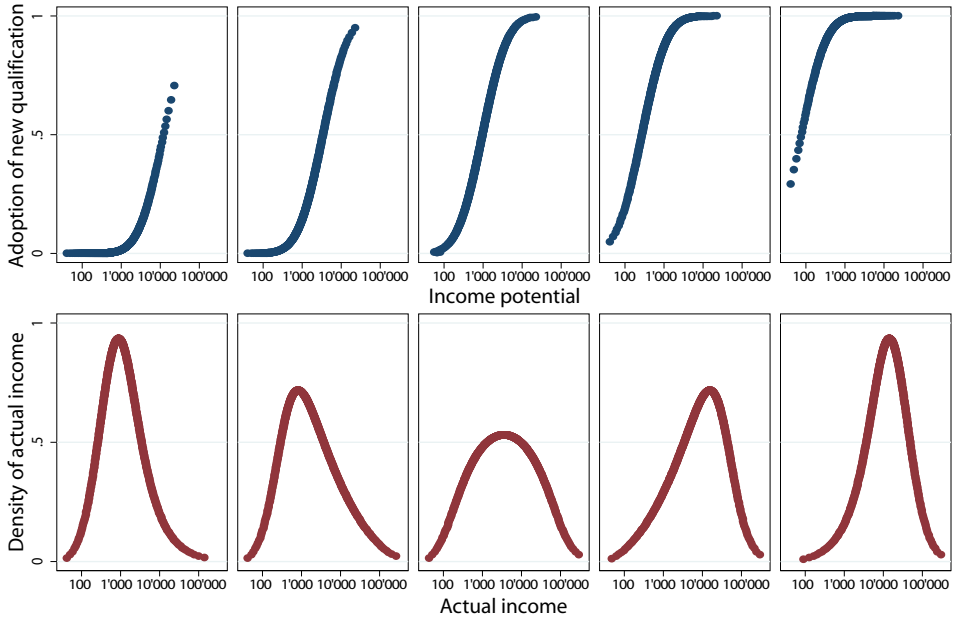
Diffusion is a concept which has been introduced by Griliches in his study on hybrid corn (Griliches 1957), made popular by the book of Rogers (Rogers 1962) and introduced into sociology by Coleman et. al. in their study on medical innovations (Coleman, Katz and Menzel 1966). At first, we borrow just one aspect which was introduced by Rogers, namely the differentiation of adopter categories (Rogers 1962, 22ff.). Potential adopters of an innovation, in this case of a kind of qualification, are differentiated by the stage in which they adopt the innovation, depending on their 'innovativeness' which is defined as a "relatively-stable, socially-constructed, innovation-dependent characteristic that indicates an individual's willingness to change his or her familiar practices" (Braak 2001, 144). Moreover, we assume that this innovativeness is a direct dependent of the resources an individual commands.

Therefore, the new qualification (which has to remain unspecified throughout this section) first appears in the elite as 'innovators', spreads then to the upper class as 'early adopters', to the upper middle class as 'early majority', to the lower middle class as 'late majority', and at last to the underclass as 'laggards', all in terms of the diffusion model.

We model qualification as a variable that varies between 0 and 1 – zero describing the situation before the process starts, without any adoption of the qualifikation, and one describing the situation of full adoption.

With regard to income distribution skewness, this second models behaves like a mirror of the first one, as described in Figure 4. In comparison to Figure 1, the first phase, showing the golden age narrow baseline distribution based on the non-existence of the new qualification is not

FIGURE 4. Expected development of distribution in the qualification diffusion model

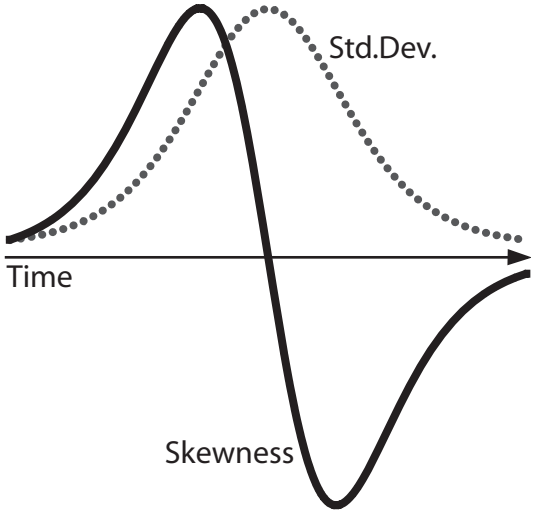


included in the figure. The first column depicts the when innovators have adopted the innovative qualification and early adopters are starting to do so. The logged income density curve begins to lean to the left, which would be measured by a positive skewness.

This process continues through the stage which is depicted in column 2, when the upper class has adopted the new qualification and the upper middle class is in the midst of the adoption process, while the lower middle class is only beginning to cope with the new challenge and the underclass has not yet begun with any adoption. In this stage, the income distribution skewness reaches its highes value.

Column 3 depicts the stage of the process when inequality has reached its highest value. With regard to the adoption-diffusion of the new qualification, the upper middle class has not yet finished the process completely, but is on its way to do so, while the lower middle class just struggles through the first stages of adoption and the lower class is still more or less unaffected by the process, remaining almost completely in old patterns of behavior. Since the stage depicted in column 2, income distribution skewness has seen a sharp decline and has fallen back to zero

FIGURE 5. Expected distribution moments development in the qualification diffusion model

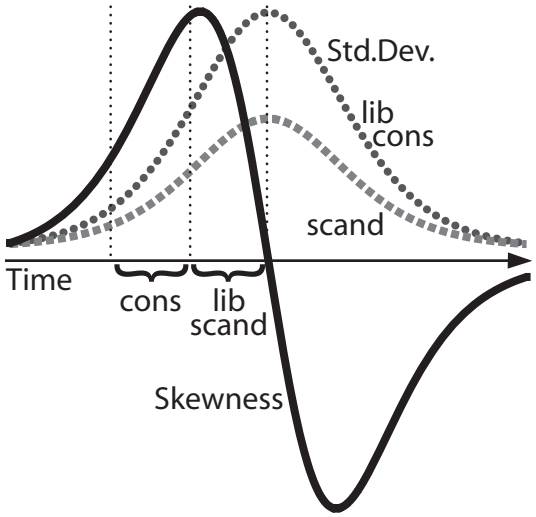


reflecting a symmetrical distribution of logged income, or more generally to its original value if the baseline distribution of logged income was not symmetrical.

Contrasting to the globalization model presented above, there is no reason at first hand to assume that the diffusion process may stop at this medium level. Quite on the contrary, diffusion theory assumes and empirical diffusion studies have substantiated that the adoption rate is highest in this central stage of the diffusion process. (Coleman et al. 1966, Mahajan and Peterson 1985) Therefore the process

As for the model before, what has been said with regard to the evolution of (logged) income distribution skewness can be condensed in a graph as in in Figure 5. Now skewness behaves similar to the derivative of inequality over time: When inequality begins to rise, the skewness of the distribution function rises even faster. It has a maximum when the 'speed' of the increase in inequality is highest, too, but when inequality itself reaches its maximum and comes to a standstill, skewness as well falls back to zero. Afterwards, the process continues towards falling inequality and negative skewness and at the end reaches comes back to a steady state with both inequality and distribution skewness fallen back on their original levels.

FIGURE 6. Expected distribution moments development in the qualification diffusion model, by welfare state type



As for the globalization model as well, we assume time to be uniform only within each country, but with liberal and social democratic welfare states to be ahead and conservative welfare states lagging behind. Hence, for the complete complementarity of this model against the globalization model, time trends for the skewness of (logged) income distribution are as well assumed to be just the opposite as expected in the globalization model. The trend for income distribution skewness for conservative welfare states is expected to be significantly positive under the qualification diffusion model. For liberal and social democratic welfare states, differences of their time trends for income distribution skewness against the trend for conservative welfare states are estimated and expected to be either insignificant or significantly negative. These expectations are depicted in Figure 6.

3. EMPIRICAL RESULTS

The last two sections presented two alternative models of how rising inequality could be understood. They result in clear distinguishable hypotheses which oppose each other. Under the globalization model we assume the time trend for income distribution skewness in conservative welfare states to be negative, while the time trend for income distribution skewness in liberal and

TABLE 1. Theoretical expectations from the competing models

Model	Theoretical expectations: Globalization	Theoretical expectations: Qualification diffusion
Dependent	Distribution skewness	
Time trend for conservative welfare states (as reference)	negative	positive
Time trend difference for liberal welfare states	positive	negative
Time trend difference for social democratic welfare states	positive	negative

social democratic welfare states is assumed to differ positively from the conservative trend. Under the qualification diffusion model, expectations are just the other way round: Here, we assume that income distribution skewness in conservative welfare states is falling over time, while the time trend for income distribution skewness in liberal and social democratic welfare states is assumed to differ negatively from the conservative trend. The competing hypotheses are contrasted in Table 1.

We use data from the Luxembourg Income Study and study a sample of 16 societies over the available period since 1985. The sample covers six liberal welfare states, six conservative, and four social-democratic welfare states. The liberal subset consists of Australia (5: 1985, 1989, 1995, 2001, 2003), Canada (6: 1987, 1991, 1994, 1997, 1998, 2000), Ireland (4: 1987, 1994, 1995, 1996), Switzerland (3 observations: 1992, 2000, and 2002), the United Kingdom (5: 1986, 1991, 1994, 1995, 1999), and the United States (7: 1986, 1991, 1994, 1995, 1997, 2000, 2004). All four scandinavian social democratic welfare states belong to the sample, namely Denmark (5: 1987, 1992, 1995, 2000, 2004), Finland (5: 1987, 1991, 1995, 2000, 2004), Norway (4: 1986, 1991, 1995, 2000), and Sweden (4: 1987, 1992, 1995, 2000). The continental-european conservative subsample consists of Austria (2: 1994, 1997), Belgium (4: 1985, 1988, 1992, 1997), France (2: 1989, 1994), Germany (3: 1989, 1994, 2000), Italy (6: 1986, 1987, 1989, 1991, 1993, 1995), and the Netherlands (4: 1987, 1991, 1994, 1999).

For all these countries and years, the Luxembourg Income Study provides a national sample for which income distribution skewness values were computed separately for disposable income, gross income and market income.

Since the interest of the study is centered on welfare state type-specific trends and not on the average value of skewness for a the particular countries, fixed effects models were estimated. (But see the robustness considerations below.)

The regression model estimated is

$$(1) \qquad s_{c,t} = \beta_0 + \beta_1(t-1995) + \beta_2\delta_c^{\text{liberal}}(t-1995) + \beta_3\delta_c^{\text{social democratic}}(t-1995) + \zeta_c + \varepsilon_{c,t}$$

where t is time (in years), c is country, $s_{c,t}$ is the respective skewness value, and $\delta_c^{liberal}$ and $\delta_c^{socialdemocratic}$ are dummies for liberal and social democratic welfare states. As it is a fixed-effects regression estimation, the model contains a country dummies ζ_c for country-specific skewness levels and an observation-specific error term $\varepsilon_{c,t}$.

Regression results are given, and contrasted against the expectations from Table 1, in Table 2: For disposable income (regression model 1), there are no significant effects. Signs for conservative welfare states and for the trend difference for liberal against conservative welfare states follow the qualification diffusion model, but the trend for social democratic welfare states is positive, too, and t-statistics are far from any significance level.

Nevertheless, disposable income is income after considerable politically induced correction, while we are interested in the dynamics of the economic sphere before redistribution by taxes and subsidies. Therefore the distribution of market income instead of those of disposable income is the relevant category for studying the topic under question. And here the results are rather clear, as model 2 in Table 2 shows: During the period 1985–2005, the distribution of logged monetary income in conservative welfare states moved upwards with a relationship between coefficient and standard error which reduced the remaining error probability under 1%. In the same period, the trends for liberal and social democratic welfare states differed from the conservative trend so considerably negative that the remaining error probability again is lower than 1%.

TABLE 2. Skewness of logged monetary income distributions, trend regression results

	Theoretical expectations		Empirical results		
Model	Globalization	Qualification diffusion	(1)	(2)	(3)
Dependent: Distribution skewness for			disposable income	monetary income	monetary income
Time trend (from 1995; for conservative welfare states as reference)	negative	positive	0.031	0.047	
			(0.995)	(2.738)**	
Time trend difference for liberal welfare states	positive	negative	-0.029	-0.059	
			(0.781)	(2.946)**	
Time trend difference for social democratic welfare states	positive	negative	0.007	-0.065	
			(0.179)	(3.094)**	
Country-specific time trend					1.018
					(4.795)**
Constant			-1.184	-1.938	-1.938
			(16.71)**	(50.16)**	(59.07)**
Observations			69	69	69
Number of countries			16	16	16
R-squared (within)			0.070	0.182	0.307

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

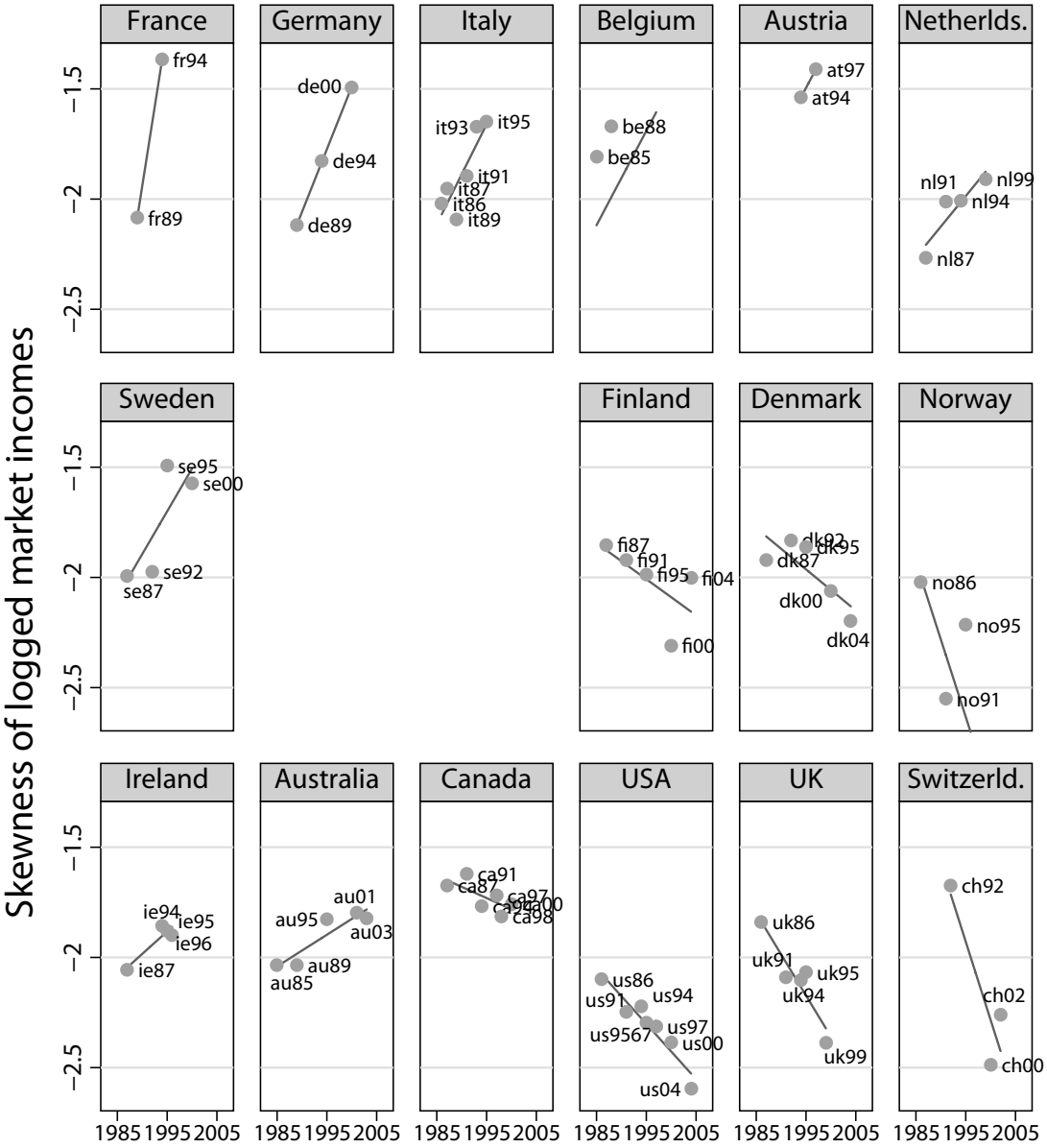
That means that is the qualification diffusion model and not the globalization model which is strongly supported by the data.

These results are robust against a number of specification changes. They hold in a random-effects model which would assume a systematical distribution of the country-averaged skewness values in 1995. They hold in a fixed-effects model which takes welfare state types and not single states as level 2 groups, indicating that the average skewness levels are rather similar among groups. They are robust against against elimination of influential cases.

Nevertheless, the variance explained by the model is relevant (18.2%) but not overwhelming. It can be considerably expanded to 30.7% by replacing the welfare state type-specific time trends by country-specific time trends, as shown in regression model 3.

This clearly indicates that the welfare state types tie together relevant information about the single countries' trends but are no perfect substitute for them. Therefore we study the evolution of logged monetary income skewness over time more in detail, in Figure 7. The figure displays the skewness measures by time and country, organized in three rows for the three welfare state types and within each row by the individual slope of the trend line. Note that values for Belgium 1992 (-3.18) and 1997 (-3.14) as well as Norway 2000 (-.91) are not included in the figure because they are outside of the boundaries of the y-axis.

FIGURE 7. Skewness of logged monetary income distributions



Source: Luxembourg Income Study. Note that values for Belgium 1992 and 1997 as well as Norway 2000 are outside of boundaries.

The figure shows that the country-specific trends are remarkable and that the welfare state type sets cover the trends in their respective elements fairly well. Nevertheless, not all countries fit well into their category. Ireland and Australia show positive skewness trends over time against

their typology as liberal welfare states. Even larger is the difference of Sweden against the other three scandinavian social democratic welfare states — especially irritating since Gøsta Esping-Andersen based his definition of the social democratic welfare state more on Sweden than on any other scandinavian society.

4. Conclusion

It is not the aim of this paper to suggest that globalization or technological change did not have an influence on the development on income inequality. But the skewness data in the Luxembourg Income Study challenge an important prejudice of conventional wisdom: The impression is widespread that in liberal welfare states the middle classes are threatened, leading to a (relatively) positively skewed income distribution with a wide right tail, reflecting a lucky upper class which is away or even benefits from that threat. One the other hand, conservative welfare states are perceived as having preserved the economic situation of their middle class at the expense of excluded outsiders, which would be reflected in a (strong) negatively skewed income distribution with a wide left tail, reflecting the wide difference in the chances of the 'precarious' life in the underclasses.

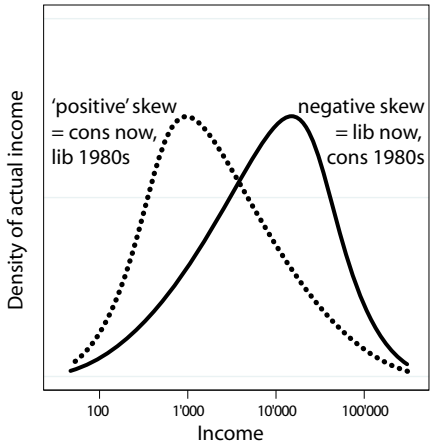
With respect to market income, this common perception is true only with regard to the past, and for the 2000s the opposite is true, as depicted in Figure 8: The LIS data have shown that in conservative welfare states (plus Sweden) inequality differences grew more in the upper half of the distribution, while in liberal and scandinavian (except of Sweden) welfare states the middle class were able to struggle upward.

The liberal and most scandinavian welfare states are the ones which not only opted for growth, hereby accepting the exclusion of outsiders, but preserved the economic chances of their middle classes.

And the conservative welfare states are the ones which have seen a continuous falling apart of the market chances of the middle class from those of a small group in a thick right tail of the distribution which has been able to seize the chances of today's economic development.

This observation could only be combined with the globalization model of external influence if one assumed the conservative welfare states to be the innovators within the twenty years under

FIGURE 8. Two types of logged income skewness



study and the liberal and scandinavian welfare states the late adopters of whatever may have been the dynamic of this era. But this would lead to a contradiction with the growth differences through the 1990s when liberal and social democratic welfare states grew considerably faster than the continental european conservative welfare states.

The only model which is consistent both with the growth-inequality trade-off and with the described evolution of income skewness is the qualification diffusion model. Even though the existence of globalization and technology-induced change is undisputed, there seems to be something which could be learned, first by the upper classes and then by the middle classes, to survive in today's economic environments.

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