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The median-voter hypothesis, income inequality, and income redistribution: an empirical test with the required data

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Abstract

The median-voter hypothesis has been central to an extensive literature on consequences of income redistribution. For example, it has been proposed that greater inequality is associated with lower growth, because of the greater redistribution that is sought by the median voter when income distribution is less equal. There have however been no proper tests of the median-voter hypothesis concerning redistribution, because of previous absence of data on factor-income distribution (that is, incomes before taxes and transfers) across households, and thus on the gains by poorer households from redistribution. The study reported in this paper is based on the required data, with 79 observations drawn from household budget surveys from 24 democracies. The results strongly support the conclusion that countries with greater inequality of factor income redistribute more to the poor. This is so even when we control for the share of the elderly in the population and for pension transfers. The evidence that the median-voter hypothesis adequately describes the collective-choice mechanism is however considerably weaker. Although middle-income groups gain more/or lose less through redistribution in countries where initial (factor) income distribution is more unequal, this regularity is all but lost when, by excluding pensions, we

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look only at explicit redistributive social transfers from which middle classes contemporaneously gain little. This leaves us searching for an alternative explanation: do middle-classes gain from transfers in the long run even if not contemporaneously?; or is the median-voter hypothesis, based on direct democracy, a proper representation of the mechanisms of collective decision making in representative democracy?

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1. Setting the problem: the link between inequality and redistribution

A key relationship in the literature on inequality and growth (see Perotti, 1992, 1993; Persson and Tabellini, 1994; Bertola, 1993; Alesina and Rodrik, 1994; Alesina and Perotti, 1994) concerns the link between market-generated income inequality and the extent of redistribution. In Perotti's (1996, pp. 151) extensive empirical review of the theories linking growth, income distribution, and democracy, this relationship appears under the title of an ''endogenous fiscal policy approach''. This approach includes two components or structural equations. The first component is a political mechanism through which greater income inequality leads to greater redistribution, and thus, more distortionary taxation. The second component is an economic mechanism through which the distortionary taxation reduces growth. The conclusion is that greater income inequality slows growth. In this paper, I will be concerned only with the first of these components involving the political mechanism.

When individuals are ordered according to their factor (or market) incomes,[1] the median voter (the individual with the median level of income) will be, in more unequal societies, relatively poorer. His or her income will be lower in relation to mean income. If net transfers (government cash transfers minus direct taxes) are progressive, the more unequal is the income distribution, the more the median voter has to gain through joint action of taxes and transfers, and the more likely he

[1] Factor income is income before government fiscal redistribution (via cash social transfers and personal income taxes). Factor (i.e. market) income includes wages and bonuses, property income, self-employment incomes, gifts and remittances, home consumption, etc. I will use the terms ''factor'' and ''market'' income interchangeably.

or she is to vote for higher taxes and transfers.[2] With the median voter as decisive, more unequal societies will therefore choose greater redistribution.

This approach assumes that (1) voters' decisions on transfers and taxes are determined solely by their position in the income distribution, (2) preferences of voters are single-peaked, and (3) all (or almost all) individuals vote.

The last assumption implies that the relationship between market-generated inequality and redistribution should be more pronounced in democracies than in authoritarian regimes where governments can decide to ignore the preferences of the poor (see Perotti, 1996, p. 171; Alesina and Perotti, 1994; Alesina and Rodrik, 1994, p. 478).

Previous research has not included a structural equation for the underlying median-voter political redistribution mechanism. What almost all researchers have done in their empirical analysis is to estimate the reduced form equation in which inequality in the distribution of *disposable* income is used as a regressor to explain the growth rate over a period of time (see Persson and Tabellini, 1992, 1994; Alesina and Rodrik, 1994; Alesina and Perotti, 1994; Easterly and Rebelo, 1993). They do this because the data required to estimate the structural equation are difficult to obtain; factor-income distribution was, until recently, unavailable, and, without data on factor-income distribution, one cannot calculate the extent of redistribution.

Thus, neither the extent of redistribution nor the mechanism by which it occurs — the median-voter hypothesis — has been tested directly.

There are, however, qualifications to this observation. Perotti (1993, 1996), Easterly and Rebelo (1993, p. 436) and Bassett et al. (1999) estimate a structural equation of the type

$$T = f(\mathrm{Id}, Z) \tag{1}$$

where T denotes taxes or social transfers as shares of GDP, or as in Perotti (1996), the marginal tax rate. Id is an index of inequality of *disposable* income, and Z denotes other relevant variables (e.g. a democracy dummy variable, or a percent of population over 65 years of age, since a larger share should imply greater transfers for pensions). Perotti's 1996 paper presents the most detailed test. He finds lack of a significant relationship between the equality variable (''middle-class share'' defined as the combined income shares of the third and fourth quintiles of the population ranked according to *disposable* income) and the marginal tax rate in various formulations: this is so whether the share of the middle class alone is included in the equation, or is interacted with a democracy dummy. Even in a sample of democracies alone, the coefficient has the right sign but is not

[2] As Alesina and Perotti (1994, p. 360) observe: ''in the fiscal channel [explanation], the level of government expenditure and taxation is the result of a voting process in which income is a main determinant of a voter's preferences: in particular, poor voters will favor high taxation''.

significant (Perotti, 1996, p. 170; Table 8). When, instead of the marginal tax rate, Perotti uses, on the left-hand side, social security and welfare, or health and housing, or education expenditures (each as a share of GDP), greater inequality in disposable income is associated with greater social transfers only in the case of democracies, and for social security and welfare alone. Perotti concludes (p. 172) that

> ...there is...very little evidence of a negative association between equality and fiscal variables in democracies. It is true that the political mechanism [the variable that interacts the share of the middle class and democracy] has the expected negative sign in four cases out of six, but social security and welfare is the only type of expenditure for which it is significant.

Bassett et al. (1999) re-estimated these relationships using three redistribution proxies: (i) public transfers, (ii) social security transfers, and (iii) social security and education as shares of GDP, and the share of the middle quintiles in *disposable* income as the inequality proxy. They too, find that the coefficient on the median voter either has a ''wrong'' sign (a higher share of the middle class increases transfers) or is not statistically significant. Moreover, their results are highly unstable.

Thus, in the only two direct empirical tests of the median-voter hypothesis, the hypothesis is found wanting.

The above approach is, however, doubly unfortunate, since both the left-hand side and the right-hand side variables are misspecified. On the right-hand side, there is *disposable* income inequality, which is inequality *after* both taxes and transfers. However, people's voting decisions about redistribution are based on their incomes *before* redistribution.[3] It is methodologically incorrect to explain people's decisions about their optimal level of taxes and transfers as depending on the distribution that emerges as a *consequence* of these decisions.

The approach thus has a time-sequencing problem. In reality, people first receive their factor incomes, and then decide how much they are willing to redistribute through taxation and social transfers. The methodologically correct approach is to specify the decision regarding the extent of redistribution as depending on the distribution of *market* or *factor* (*pre*-transfer and *pre*-tax) incomes.

It is also incorrect to use as the dependent variable the share of government transfers in GDP or the marginal tax rate. It is not the share of GDP that matters here, but a measure of the extent of redistribution through transfers and taxes. A society with high taxes and transfers may have contributors and beneficiaries who are the same people. Looking at the share of transfers or taxes in GDP would then

[3] For example, Alesina and Rodrik (1994) are aware of that, because they model a person's decision on the level of taxation on his capital/labor income ratio, that is, on his factor incomes.

give the mistaken impression that the society has chosen substantial redistribution when the reality is exactly the opposite and redistribution is minimal. Corporatist societies of continental Europe (Austria, Germany) are often considered to follow predominantly such policies (see Esping-Andersen, 1990). Le Grand (1982) has similarly argued that most transfers are given to the middle class. The essential point is that the size of transfers is in itself an imperfect indicator of the extent of redistribution. A correct approach investigates how much the bottom groups in the population according to factor income increase their share in disposable income as a consequence of redistribution. That is, a correct approach estimates the income gain of the poor.

The relationship that we should test is

$$R = f(\mathrm{Im}, Z) \tag{2}$$

where R is an index of redistribution and Im is an index of inequality of *factor* incomes. Eq. (2) specifies the extent of redistribution as a function of the initial inequality with which factor incomes are distributed.

This formulation is flexible. Voters may choose small but very redistributive policies or a series of extensive, but less redistributive programs. Each type of policy may reduce equally the initial inequality.

There are two hypotheses present here. The first hypothesis is that countries with more unequal initial incomes redistribute more. The second hypothesis proposes one explanation for why this may be so — the median-voter hypothesis. These are two distinct hypotheses. The first is purely empirical. The second is about a specific political mechanism.

Observe that both sides of the correct specification (2) differ from (1). This is because both sides of (1) are proxies for the ''true'' variables: the share of transfers in GDP or the marginal tax rate is a proxy for redistribution; and inequality in the distribution of disposable income is a proxy for the inequality in distribution of factor income.

As I have noted, previous researchers have used Eq. (1) rather than Eq. (2) because the information on factor-income inequality indispensable for both sides of Eq. (2) has, for most countries, been unavailable. The income distribution statistics that have been available have, almost without exception, concerned disposable or gross (market *plus* transfers) income. It is only recently that the Luxembourg Income Survey (LIS) database has provided factor-income distributions for a number of countries.

The LIS data enable us to observe changes in income distribution as one moves from pure market-determined incomes to incomes that include government cash transfers (gross income), and finally, to disposable income (gross income *minus* direct personal taxes).

Moreover, since almost all countries in the LIS database are democracies, the two hypotheses can be tested precisely for the countries where they are supposed to hold the most.

The paper is organized as follows. Section 2 describes the database. Section 3 considers the relationship between factor-income inequality and redistribution. Section 4 tests the median voter hypothesis. Section 5 concludes the paper.

2. Description of the database

I used data for 24 countries that were, with two exceptions, democracies at the time of the surveys.[4] Most of the countries were long-established democracies — with at least 20 years of uninterrupted democracy prior to the survey. Several had only a few years of democracy prior to the survey (e.g. Spain in 1980, Russia in 1992, the Czech republic and Slovakia in 1992, Hungary in 1991, Taiwan in 1991). We define as established democracies (EDs) all countries with the exception of transition countries (Russia, Czech republic, Slovakia, Poland, and Hungary) and Taiwan.

The LIS standardizes countries' own household income surveys[5] by making the definitions of variables (e.g. pension income, factor income, remittances, etc.) as similar as possible. LIS is the only such source of standardized individual unit record data for developed market economies. I have used all the data that LIS had as of fall 1999.[6] There are altogether 79 country observations. For each observation, we have the average per capita income in local currency by decile for the following six distributions:

1. The distribution of factor income (which ranks individuals by household per capita factor income).
2. The distribution of factor income P, which is equal to factor income (1) *plus*

[4] The exceptions are Poland in 1986 and Taiwan in 1981 and 1986. The following country data sets are included: Australia 1981, 1985, 1989 and 1994; Belgium 1985, 1988 and 1992; Canada 1975, 1987, 1991 and 1994; Czech Republic 1992; Denmark 1987 and 1992; Finland 1987, 1991 and 1995; France 1979, 1981, 1984 and 1989; West Germany 1973, 1978, 1981, 1984, 1989 and 1994; Hungary 1991; Ireland 1987; Israel 1979, 1986 and 1992; Italy 1986, 1991 and 1995; Luxembourg 1985, 1991 and 1994; the Netherlands 1983, 1987, 1991 and 1994; Norway 1986, 1991 and 1995; Poland 1986, 1992 and 1995; Taiwan (Province of China) 1981, 1986, 1991 and 1995; Russia 1992 and 1995; Slovakia 1992; Spain 1980 and 1990; Sweden 1967, 1975, 1981, 1987, 1992 and 1995; Switzerland 1982; UK 1969, 1974, 1979, 1986, 1991 and 1995; US 1974, 1979, 1986, 1991, 1994 and 1997.

[5] The list of the exact individual country surveys used by LIS to generate its database can be found at the website http://dpls.dacc.wisc.edu/apdu/lis_chart.html.

[6] There are four ''waves'' of data: from mid-1970s and early 1980s; from the second half of the 1980s; from the late 1980s and early 1990s; and from mid-1990s up to 1997.

pension transfers (which ranks individuals by household per capita factor income *P*).
3. The distribution of gross income (which ranks individuals by household per capita gross income).
4. The distribution of disposable income (which ranks individuals by household per capita disposable income).
5. The distribution of *disposable* income (which ranks individuals by household per capita *factor income*).
6. The distribution of *disposable* income (which ranks individuals by household per capita *factor income P*).

Factor income is defined as pre-transfer and pre-tax income, and includes wages, income from self-employment, income from ownership of physical and financial capital, and gifts.[7] Factor income *P* includes, in addition, public pensions. This is a factor income definition specially created for this study.

The reason for including pensions along with the usual factor incomes is that pensions are specific transfers that do not respond to current contingencies, and are not paid with the objective of redistributing income. Pensions are, of course, deferred wages, with some redistribution component. By treating pensions as factor income, we can better focus on other social transfers such as unemployment benefits, family allowances, and social assistance that have a clearer redistributive function.

Gross income is equal to factor income *plus* all government cash transfers. Disposable income is equal to gross income *minus* direct personal taxes and mandatory employee contributions.[8]

For each type of distribution data listed above, we can calculate indicators of inequality as well as indices of redistribution. Table 1a and b shows the average Gini coefficients for the four concepts of income (factor, factor *P*, gross, disposable). Gini coefficients for individual countries are shown in Appendix A.

[7] The exact definition of factor income, using LIS notation, is as follows. Our factor income is equal to LIS-defined factor income [FI = net wage and salary income ($V1$) + farm self-employment income ($V4$) + non-farm self-employment income ($V5$) + cash property income ($V8$)] *plus* private pensions ($V32$) *plus* occupational public pensions ($V33$) *plus* alimony received ($V34$) *plus* other regular private income ($V35$) (household transfers) *plus* other cash income ($V36$). Factor *P* income is equal to factor income *plus* cash social security benefits for old age or survivors ($V19$).

[8] The exact definitions are as follows. Gross income is equal to factor income *plus* social insurance transfers (sick pay, disability pay, social retirement benefits, child or family allowances, maternity pay, military or veterans benefits, and other social insurance) *plus* social assistance transfers (means-tested cash benefits and near-cash benefits). Gross income *minus* mandatory employee contributions *minus* income tax equals disposable income. See the LIS variable definitions at http://lissy.ceps.lu.summary.htm.

Table 1

	Mean	Standard deviation	Maximum (country year)	Minimum (country year)
(a) Inequality: descriptive statistics for all countries				
(1) Factor-income Gini	46.3	5.8	62.0 (Russia 95)	31.4 (Taiwan 86)
(2) Factor income *P* Gini	39.8	5.6	53.2 (Ireland 87)	30.0 (Czech 92)
(3) Gross income Gini	38.5	6.7	56.4 (Russia 95)	24.8 (Slovakia 92)
(4) Disposable-income Gini	32.2	5.3	48.8 (Russia 95)	20.9 (Slovakia 92)
Reduction of inequality (1)−(4)	14.1	5.3	24.9 (Sweden 92)	−0.5 (Taiwan 81)
Reduction of inequality (2)−(4)	7.6	3.7	15.5 (Ireland 87)	0.3 (Italy 86)
(b) Inequality: descriptive statistics for established democracies				
(1) Factor-income Gini	46.6	4.2	55.8 (Ireland 87)	36.4 (Finland 87)
(2) Factor income *P* Gini	40.2	5.0	53.2 (Ireland 87)	32.2 (Finland 87)
(3) Gross income Gini	36.9	6.1	53.8 (US 97)	28.5 (Belgium 85)
(4) Disposable-income Gini	32.1	4.7	42.3 (US 97)	23.3 (Finland 97)
Reduction of inequality (1)−(4)	14.5	4.2	24.9 (Sweden 92)	7.1 (Switzerland 81)
Reduction of inequality (2)−(4)	8.1	3.3	15.5 (Ireland 87)	0.3 (Italy 86)

Each concept focuses on a different underlying reason for inequality. Factor-income inequality reflects the distribution of human, physical and financial assets, as well as the relative prices of these assets. This is the distribution of income in the absence of government intervention.[9] Gross income shows how much government cash transfers alter factor income distribution. Finally, the distribution of disposable income — which is commonly used — shows differences in purchasing power among individuals.

An example demonstrates how the different concepts highlight different aspects of distribution. Consider Sweden and the US in the mid-1990s. In terms of disposable-income inequality, these two countries are very different: the Gini for Sweden is 26, while the Gini for the US is much higher — actually the highest among all established democracies — at 42.3 (in 1997). Yet, the two countries are almost identical in terms of factor-income inequality, or in other words, in terms of the underlying asset distributions. Sweden's factor-income Gini in the 1990s was 51–52, while the US' Gini ranged between 50 and 53.

Using the data from (5) and (6) [when income concept and the ranking criterion differ], we can calculate precisely the extent of gain realized by lower-income groups through government transfer and tax systems.

On average, government transfers and taxes reduce factor-income inequality by more than 14 Gini points (Table 1a and b). Almost a third of factor-income

[9] This is simplification, because, if the government were truly absent, there would be, for example, more private pensions, and the factor distribution would be different.

inequality is thus removed by government. Most of the reduction (7.8 Gini points for the entire sample, or 9.7 Gini points for the established democracies) is achieved through cash transfers. Reductions of 6.3 and 7.8 Gini points, respectively, are due to direct personal taxes.

It is also apparent that differences among the countries' Ginis, particularly among the established democracies, are small. This is consistent with the expectations for countries that have similar income levels, political systems, and age structure of their populations. The unweighted coefficient of variation of disposable-income Gini coefficients is about 0.15 — which contrasts with the world coefficient of variation of about 0.35 (see Milanovic, 1999).

Table 1b also shows that, while Ireland has the highest factor-income inequality among EDs, it is overtaken by the US as the country with the highest gross and disposable-income inequality. At the opposite end of the spectrum, we find Finland — the only West European country with the factor-income Gini below 40, and the only one that comes close to Taiwan — and Sweden. Finland and Sweden have disposable-income Ginis around 25. For the full sample though, Slovakia and the Czech republic have the lowest disposable-income Ginis.

Who benefits from redistribution in the move from factor to disposable-income? Table 2a and b shows the average share gain for each of the bottom five deciles (defined according to their factor incomes). We define the ''share gain'' as the difference between the share of a given decile in factor and disposable income. For example, if the bottom decile receives 2% of total factor income, while the same people receive 8% of total disposable income, the share gain is 6 percentage points. The share of the bottom decile (formed according to factor income) increases, on average, by 5.7 percentage points in the entire sample, or by 5.8 percentage points in EDs (going from, respectively, 0.3% and 0.2% of the total factor income to 6% of disposable income). The persons in the second decile, according to factor income gain, on average, 4.0 (the entire sample) or 4.2 (EDs only) percentage points. Their share increases from 1.9% and 1.8% of factor income to 5.9% or 6% of disposable income.[10] The share gain decreases with the level of (factor) income, and becomes practically nil for the fifth decile. The combined poorest 50% of people by factor incomes have a share gain of 12.4 percentage points (in the entire sample) or 12.9 percentage points (for EDs only). The people in the upper half of factor-income distribution are losers in redistribution.

[10] Note that the same disposable income share of the people who are in the bottom or the second decile according to factor income shows that, on average, it does not matter whether one is among the bottom or in the second decile according to factor income.

Table 2

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
(a) Redistribution (sharegain) by decile for all countries (from factor to disposable income)[a]				
Bottom decile	5.7	2.4	9.9 (Slovakia 92)	0.1 (Taiwan 81 and 86)
Second decile	4.0	2.1	9.0 (Belgium 85), 8.9 (W. Germany 84)[b]	0.1 (Taiwan 81 and 86)
Third decile	1.9	1.4	8.7 (Belgium 85), 5.1 (Sweden 92)	0.1 (Taiwan 81, 86, 91)
Fourth decile	0.7	0.6	2.8 (Sweden 95)	−0.3 (Italy 86)
Fifth decile	0.1	0.4	0.8 (Sweden 95)	−0.9 (Netherlands 94)
Bottom one-half (cumulative five deciles)	12.4	5.4	27.3 (Belgium 85), 23.5 (Poland 95)	0.3 (Taiwan 81)
(b) Redistribution (sharegain) by decile for established democracies (from factor to disposable income)[a]				
Bottom decile	5.8	2.0	9.7 (Luxembourg 1985)	2.9 (Sweden 1967)
Second decile	4.2	2.0	9.0 (Belgium 1985), 8.9 (W. Germany 1984)	1.2 UK (1969)
Third decile	1.9	1.4	8.7 (Belgium 1985), 5.1 (Sweden 1992)	0.2 (Germany 1973)
Fourth decile	0.8	0.6	2.8 (Sweden 1995)	−0.3 (Italy 1986)
Fifth decile	0.1	0.4	0.8 (Sweden 1995)	−0.9 (Netherlands 1994)
Bottom one-half (cumulative five deciles)	12.9	4.7	27.3 (Belgium 1985), 22.5 (Sweden 1992)	5.7 (Switzerland 1982)

[a] Deciles formed according to household per capita factor income. The increase in the share shows the difference between the factor income share of people who are in the bottom (second, third, etc.) decile according to factor income and their share in disposable income.

[b] Data for Belgium 88 and 92 show zero or almost zero income for the bottom two deciles according to factor income. If these zeros are inaccurate, redistribution may be overestimated. This is why a maximum redistribution country other than Belgium is shown as well.

Table 3

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
(a) Redistribution (sharegain) by decile for all countries (from factor P income to disposable income)[a]				
Bottom decile	2.8	1.8	7.8 (Spain 80)	0.1 (Taiwan 81)
Second decile	1.4	0.9	4.5 (Norway 79)	0.1 (Taiwan 81)
Third decile	0.9	0.5	2.3 (Sweden 95)	0.0 (Italy 86)
Fourth decile	0.6	0.4	1.4 (Sweden 95)	−0.2 (Germany 73)
Fifth decile	0.3	0.3	0.9 (Sweden 81)	−0.5 (Spain 80)
Bottom one-half (cumulative five deciles)	6.0	3.1	12.7 (Norway 79)	0.3 (Taiwan 81)
(b) Redistribution (sharegain) by decile for established democracies (from factor P income to disposable income)[a]				
Bottom decile	3.0	1.7	7.8 (Spain 80)	0.5 (Italy 86)
Second decile	1.5	0.9	4.5 (Norway 79)	0.1 (Italy 86)
Third decile	0.9	0.5	2.3 (Sweden 95)	0.0 (Italy 86)
Fourth decile	0.6	0.4	1.4 (Sweden 95)	−0.2 (Germany 73)
Fifth decile	0.3	0.3	0.9 (Sweden 81)	−0.5 (Spain 80)
Bottom one-half (cumulative five deciles)	6.4	2.8	12.7 (Norway 79)	0.7 (Italy 86)

[a] Deciles formed according to household per capita factor P income. The increase in the share shows the difference between the factor P income share of people who are in the bottom (second, third, etc.) decile according to factor P income and their share in disposable income.

Table 4
Redistributional gain of the bottom quintile and bottom half of factor-income distribution (in percentage points). Note: countries ranked by the gain of the bottom half

Country, year	Gain of the bottom quintile	Gain of the bottom half
Belgium 85	17.86	27.32
Poland 95	17.04	23.52
Belgium 88	17.15	22.88
Sweden 92	14.44	22.50
Sweden 95	13.43	21.74
Sweden 81	15.69	21.16
Sweden 87	15.55	20.44
Belgium 92	13.74	19.49
France 89	14.99	19.37
France 84	14.24	18.90
Germany 84	16.90	18.07
Slovakia 92	14.08	17.91
Germany 94	14.37	17.90
Hungary 91	12.31	17.83
Denmark 92	12.52	17.46
France 84	13.72	17.28
Czech republic 92	14.64	17.22
Denmark 87	13.72	17.05
Netherlands 87	13.87	17.05
Sweden 75	13.06	16.55
Netherlands 83	12.58	16.39
Germany 89	14.36	16.03
Luxembourg 94	14.25	15.53
UK 86	10.30	15.27
France 79	12.59	15.23
Germany 81	13.06	14.55
Italy 95	12.70	14.53
Ireland 87	9.72	14.35
Norway 95	10.73	14.27
Luxembourg 85	13.47	13.82
UK 95	8.78	13.73
Luxembourg 91	13.25	13.57
Italy 86	13.22	13.08
Italy 91	12.62	13.04
Finland 95	8.50	12.90
Norway 79	11.47	12.73
Norway 91	9.93	12.58
Poland 92	11.13	12.50
Netherlands 91	10.26	12.46
Spain 90	11.46	12.45
Germany 83	10.46	11.84
UK 91	8.24	11.78
Germany 78	10.87	11.76
Norway 86	10.19	11.35
UK 79	9.31	11.22

Table 4 (*continued*)

Country, year	Gain of the bottom quintile	Gain of the bottom half
Australia 94	8.25	11.13
Canada 94	7.81	11.09
Russia 95	7.24	11.02
Netherlands 94	10.63	10.92
Sweden 67	7.60	10.90
Canada 91	7.07	10.01
Finland 87	7.00	9.94
Israel 92	6.21	9.69
Israel 86	6.01	9.65
Finland 91	6.60	9.64
Spain 80	9.62	9.62
Australia 89	7.66	9.60
Australia 85	7.45	9.41
Poland 86	9.86	9.33
Australia 81	7.58	9.02
US 94	5.39	8.60
Germany 73	8.76	8.44
US 91	5.33	8.43
Canada 87	6.24	8.41
Russia 92	6.43	8.28
US 97	5.25	8.18
Israel 79	5.28	8.11
US 79	5.34	8.06
US 86	4.97	7.56
US 74	5.44	7.06
Canada 81	5.13	6.75
UK 69	5.76	6.74
Canada 75	4.97	6.67
UK 74	5.36	6.27
France 81	4.58	6.00
Switzerland 82	5.24	5.70
Taiwan 95	0.92	1.37
Taiwan 91	0.42	0.65
Taiwan 86	0.23	0.43
Taiwan 81	0.16	0.34
Average	9.75	12.44
Standard deviation	4.19	5.39

The extent of redistribution is often overestimated when we look at the share gain between factor and disposable income (as in Table 2a and b). Consider the following. For many pensioners, state pensions are often the only, or at least, the most important source of income. According to factor income, pensioners will tend to be ranked in lower — often the lowest — income decile. Once we move from factor to gross and disposable income, their position dramatically improves

Table 5
Redistributional gain of the bottom quintile and bottom half of factor *P* income distribution (in percentage points). Note: countries ranked by the gain of the bottom half

Country, year	Gain of the bottom quintile	Gain of the bottom half
Norway 79	11.47	12.73
Denmark 87	10.26	12.35
Sweden 95	7.77	11.89
Denmark 92	8.74	11.88
Ireland 87	8.01	11.77
Netherlands 86	10.19	11.35
Poland 95	8.07	10.64
Netherlands 87	9.10	10.58
Finland 95	6.76	10.56
UK 86	6.70	9.96
Spain 80	9.62	9.62
Sweden 92	6.76	9.58
UK 95	6.77	9.46
Sweden 81	5.47	9.11
Netherlands 83	7.34	8.86
Belgium 92	5.79	8.79
Sweden 75	4.77	8.37
Australia 94	5.89	8.31
Germany 73	8.56	8.30
Slovakia 92	5.83	8.10
Sweden 87	4.81	7.78
UK 91	5.49	7.55
Israel 92	4.60	7.42
Norway 95	5.51	7.40
Hungary 91	4.88	7.32
Finland 91	4.48	7.26
Australia 89	5.10	7.08
Finland 87	4.23	7.07
Netherlands 91	6.01	7.01
Israel 86	3.90	6.82
Canada 94	4.42	6.75
UK 79	4.29	6.55
Norway 91	4.54	6.41
Netherlands 94	6.13	6.35
Canada 91	4.12	6.35
Australia 85	4.02	6.24
Czech 92	4.13	6.11
Australia 81	4.19	5.96
France 89	3.80	5.95
Israel 79	3.34	5.94
Belgium 88	5.15	5.90
Germany 94	3.68	5.89
Belgium 85	4.83	5.80
France 84	3.13	5.58
Germany 81	3.69	5.47

Table 5 (*continued*)

Country, year	Gain of the bottom quintile	Gain of the bottom half
France 79	3.01	5.34
Sweden 67	1.99	5.22
Canada 87	3.23	5.16
US 79	2.96	5.08
France 81	3.32	4.90
Germany 89	2.69	4.85
Germany 84	2.74	4.66
US 91	2.47	4.43
US 94	2.36	4.36
Canada 75	2.76	4.29
Canada 81	2.71	4.20
US 97	2.16	4.09
Luxembourg 94	3.21	4.04
US 86	2.13	3.94
Luxembourg 85	3.61	3.84
Germany 83	2.50	3.77
Poland 86	3.47	3.69
UK 69	2.32	3.45
US 74	1.98	3.37
Spain 90	3.07	3.33
Luxembourg 91	2.81	3.23
Germany 78	1.80	3.08
UK 74	1.84	2.93
Switzerland 82	1.28	2.07
Poland 92	1.41	1.97
Italy 95	1.60	1.85
Russia 92	0.79	1.51
Italy 91	1.05	1.16
Russia 95	0.48	0.95
Taiwan 95	0.53	0.78
Italy 86	0.59	0.67
Taiwan 91	0.30	0.54
Taiwan 86	0.21	0.41
Taiwan 81	0.14	0.32
Average	4.25	6.00
Standard deviation	2.57	3.12

simply because they have received a significant income source — a pension.[11] Everything else being the same, a country with many pensioners (i.e. with an older

[11] This is particularly noticeable for the East European countries. Pensioners there have scarcely any other source of income than pensions. Factor income shows them to be very poor, and since pensions are relatively high, the share gains are large. Similarly, factor-income Gini is high. However, once we include pensions with other factor incomes, the ''new poor'' are not nearly as poor (factor P income Gini goes down a lot), and share gains are much less.

population) will tend to show much larger redistribution: the share gain will be greater.

If we take the view that pensions are not primarily a redistributive transfer and include pensions together with other factor incomes in factor *P* income, we can recalculate the share gain as in Table 3a and b. The extent of redistribution is now halved. The share gain of the bottom half of the population goes down from more than 12 percentage points to 6 percentage points for the whole sample, and 6.4 percentage points for the EDs. Observe that the average share gain is about halved for the first three deciles, and stays about the same for the fourth decile, but *increases* for the fifth decile.

Table 4 shows the extent of redistribution by country measured by the increase in the share of the persons who are in the bottom quintile and bottom half of the factor-income distribution. For simplicity, we shall refer to the bottom 20% and 50% of the population *ranked according to factor income* as ''the very poor'' and ''the poor'', respectively.

The countries are ranked by the gain in the share of the bottom half. Belgium 85 and 88, and Poland 95 show the largest redistribution both to the lowest quintile and lowest half of the population.[12] In Poland, pensions, which have increased compared to wages since the beginning of transition, are the principal reasons for the extensive redistribution.[13]

As expected, Sweden, Germany and France have extensive redistribution, with the bottom half gaining between 18 and $22\frac{1}{2}$ percentage points (between 1 and almost 2 standard deviations above the mean), and the bottom quintile gaining between 14 and 17 percentage points (more than 1 standard deviation above the mean).

Redistribution is the smallest in Taiwan, Switzerland, UK in the 1970s, and the US. In the US 97, for example, the bottom half gains about 8 percentage points (almost $1\frac{1}{2}$ standard deviation less than the mean); in Switzerland 82, 5.7 percentage points (almost 1 standard deviation below the mean).

The table shows the unique position of Taiwan. This is of particular interest since Taiwan is the only non-Western country in the sample.[14] Taiwan has, by far, the lowest factor-income inequality, a Gini of 31 as against the mean sample Gini of 46. But, perhaps, precisely because factor-income inequality is low, redistribution is nil. Neither the poor nor the very poor gain practically anything in their disposable income share (the bottom half gains between 0.3 and 1.4 percentage points).

[12] For the reasons mentioned above (Table 2), the Belgian data may exaggerate the extent of redistribution.

[13] This can be seen from Table 5 where the rankings are based on redistribution from factor *P* income: Poland 95 slips from the second most redistributionist position to the seventh.

[14] The ''non-Western'' means non-European, or of non-European settlement (like Australia, Canada or the US).

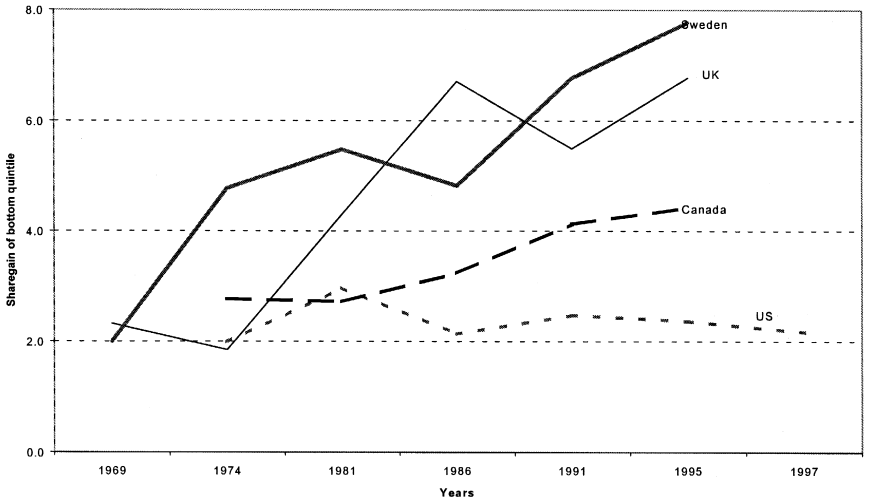

Fig. 1. Sharegain of the very poor, mid-1970s–mid-1990s (using factor *P* income).

The complete data on shares and gains by decile and by country are given in Appendices B–E.

Table 5 shows the same thing as Table 4 except that factor income now is defined to include pension transfers. Both the extent of redistribution and the rankings of recipients change (e.g. pensioners are no longer often among the poor). The most redistributive are the Nordic countries: among the top five countries, four are Nordic; among the top 10 countries, six are Nordic.[15]

Also, once we eliminate pensions, the ranking of countries that have large transfers (most of which are often pensions) such as Germany, Italy and France, and which appear very strongly redistributionist according to factor income (Table 4), slip significantly. In Germany, in the 1980s, the poorest quintile gained only 3–4 percentage points when pensions are combined with other factor incomes as against 14–17 percentage points when they are not. Italy is shown to be among the least redistributionist countries: the bottom quintile and the bottom half gain between 1 and 2 percentage points, even though according to factor income, Italy is more redistributionist than average.

The data in Tables 4 and 5 allow us also to observe how redistribution in individual countries has evolved through time. To illustrate, we look in Fig. 1 at four countries, and focus on the most redistributionist measure: share gain of the bottom quintile using the factor *P* income. We see that, although during the

[15] Although the concept of transfers is narrower in Table 5 than in Table 4, the share gain (for any given data point) need not be smaller. This is because the ranking of recipients changes and these new recipients (that constitute the bottom quintile or half of the distribution) can be poorer and their gain can be greater even if the concept of transfers is more limited.

Thatcher period, social transfers in the UK declined as a percentage of GDP, the share gain of the very poor improved significantly. The same outcome is shown in the case of Sweden and Canada, but not in the US, where the share gain of the very poor in 1997 was the same as quarter of a century previously, and was far smaller than in the other three countries.

3. Testing the redistribution hypothesis

As pointed out in Section 1, the relationship that we should test is Eq. (2).

We shall use two variables to indicate the extent of redistribution: how the share of (i) the bottom half and of (ii) the bottom quintile (ranked by factor income or factor P income) increases when we move from factor (or factor P) to disposable income — the variables displayed in Tables 4 and 5.[16] We denote these variables as *sharegain50* and *sharegain20*, respectively.

Our hypothesis throughout is that both *gain* variables are positively related to factor (or factor P) income inequality (Im). Several variables can be used as indicators of factor-income inequality: the Gini coefficient of factor income (Gm); the share of the bottom half (*share50MM*); or the share of the bottom quintile (*share20MM*) in factor income, where the double suffix *MM* indicates that we are dealing with (i) the distribution of factor (= market) income and (ii) that the recipients are ranked by their factor (= market) income.

Table 6a and b shows the results for the two definitions of factor income. In the version using the standard definition of factor income, we control for the share of population over 65 years of age.[17] This is not necessary in the factor P formulation because pensions are included as part of factor P income. Each table combines two indicators of redistribution against three indicators of factor-income inequality.

We look first at the full-sample regressions at Table 6a. The coefficients indicating that greater factor inequality is associated with greater gain of the poor and the very poor, have everywhere the correct sign, and are throughout significant at the 1% level. However, the age variable is barely significant in a few formulations and insignificant in others.

Consider the expected gain of the poor: each Gini point increase in factor inequality is accompanied by a 0.65 percentage point gain of the poor (Eq. (1.1)). If factor-income inequality rises by one standard deviation (5.8 Gini points; see Table 1a), the share of the poor in disposable income would, thanks to redistribu-

[16] Note that gain is defined across the *same* people. We do not compare the share of the bottom half ranked according to factor income to the bottom half of the distribution ranked according to disposable income.

[17] An income control (either as mean dollar income from income surveys or GDP per capita) is statistically insignificant in all formulations.

Table 6
(a) Redistribution as function of factor inequality (using factor income) fixed effect regressions

Independent variables	All countries		Established democracies	
	(1)	(2)	(3)	(4)
	Dependent variable			
	Sharegain50	Sharegain20	Sharegain50	Sharegain20
(1) Gini for factor incomes	0.694 (9.58)	0.357 (6.01)	0.647 (7.66)	0.367 (4.95)
Age over 65 (%)	0.437 (1.67)	0.152 (0.66)	0.463 (1.68)	0.170 (0.70)
Constant	−23.31 (−6.38)	−8.76 (−2.74)	−23.64 (−5.36)	−9.34 (−2.42)
R^2 (F)	0.44 (62.1)	0.26 (23.1)	0.36 (39.8)	0.14 (15.5)
(2) *Share50MM*	−1.00 (−10.41)	−0.551 (−6.30)	−1.00 (−8.47)	−0.564 (−5.25)
Age over 65 (%)	0.300 (1.19)	0.078 (0.34)	0.33 (1.23)	0.096 (0.40)
Constant	28.04 (6.41)	19.44 (3.97)	27.54 (5.63)	19.57 (3.48)
R^2 (F)	0.47 (72.2)	0.26 (25.0)	0.39 (47.6)	0.14 (17.2)
(3) *Share20MM*	−2.25 (9.74)	−1.39 (−7.38)	−2.14 (−7.59)	−1.39 (−6.16)
Age over 65 (%)	0.56 (2.2)	0.168 (0.81)	0.556 (2.0)	0.169 (0.78)
Constant	10.06 (2.8)	10.63 (2.82)	9.54 (3.90)	10.5 (3.37)
R^2 (F)	0.65 (60.9)	0.54 (33.3)	0.61 (39.2)	0.43 (22.9)
Number of observations	79	79	67	67

(b) Redistribution as function of factor inequality (using factor P income) fixed effect regressions

Independent variables	All countries		Established democracies	
	(1)	(2)	(3)	(4)
	Dependent variable			
	Sharegain50	Sharegain20	Sharegain50	Sharegain20
(1) Gini for factor incomes	0.432 (8.7)	0.348 (7.0)	0.427 (7.27)	0.359 (6.06)
Constant	−11.21 (−5.7)	−9.55 (−4.8)	−10.74 (−4.5)	−9.87 (−4.1)
R^2 (F)	0.19 (75.9)	0.09 (49.0)	0.09 (52.9)	0.06 (36.8)
(2) *Share50MM*	−0.696 (−9.38)	−0.564 (−7.51)	−0.694 (−7.99)	−0.586 (−6.62)
Constant	22.67 (12.65)	17.83 (9.81)	22.85 (11.09)	18.43 (8.78)
R^2 (F)	0.21 (88.0)	0.11 (56.4)	0.11 (63.9)	0.07 (43.9)
(3) *Share20MM*	−1.10 (10.9)	−0.929 (−5.97)	−1.08 (9.29)	−0.958 (−8.31)
Constant	11.25 (22.0)	8.77 (12.3)	11.47 (20.47)	9.02 (16.31)
R^2 (F)	0.39 (118.0)	0.32 (87.4)	0.29 (86.4)	0.26 (69.1)
Number of observations	79	79	67	67

Note: t-values between brackets. *Share50MM* = share of total factor income received by the bottom half of the population ranked by factor income. *Share20MM* = share of total factor income received by the bottom quintile of the population ranked by factor income. All R^2's are overall.

tion, increase by about 3.8 percentage points, e.g. instead of getting 20% of disposable income, they would receive 23.8%. The share of the very poor would increase by 2.1 percentage points (0.357 from Eq. (1.2) *times* 5.9).

The same results are obtained if, instead of the Gini coefficient, we use the share of the bottom half of the population in market income (*Share50MM*) or

Share20MM (see also Figs. 2 and 3). The results are even stronger with the factor shares as controls (R^2 and the *t*-values are greater).

For the same equations over the sample of established democracies, we expect to find that the redistributional regularity holds even more strongly. We see that all coefficients again have the right sign and are statistically significant at the 1% level. The values of the coefficients hardly change at all.

On average the gain of the very poor is a little over one-half of the gain of the poor (the coefficients on *sharegain20* is between $\frac{1}{2}$ and 0.6 of the coefficient on *sharegain50*). Eqs. (2.1) and (2.3) show that a percentage point decrease in the factor-income share of the poor (*Share50MM*) increases the poor's share in disposable income by 1 point. The coefficient of unity indicates that redistribution exactly compensates for the initially lower share of the bottom half of the population. In other words, the poor in a country with lower factor-income share would still end up with exactly the same disposable income share than the poor in a more factor-equal country.

This is not the case for the very poor. The redistribution coefficients in Eqs. (3.2) and (3.4) are throughout greater than 1. For the very poor, in effect, redistribution *more than compensates* for their initially lower factor share. Each percent point drop in their factor-income share *increases* the poor's share in

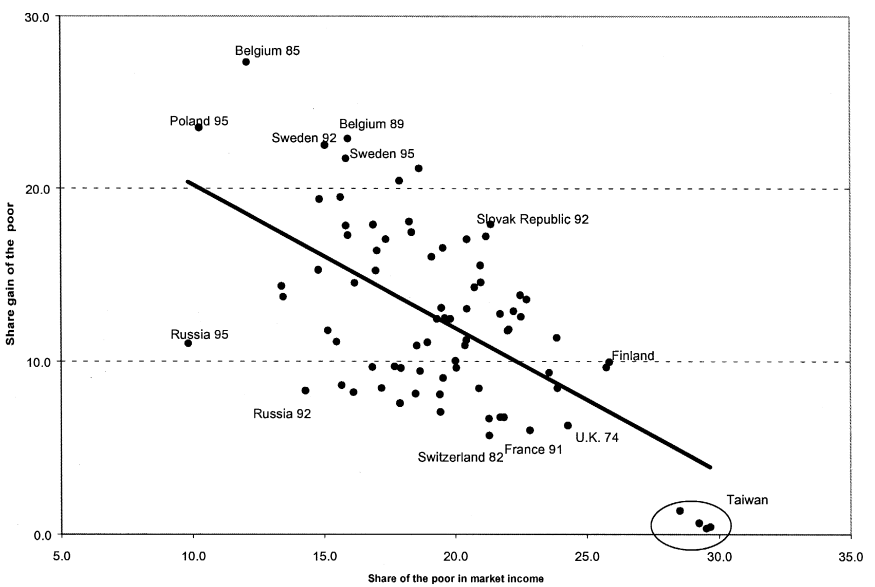

Fig. 2. The poor's gain as function of their share in factor income.
Note: Share gain of the poor is the difference between the share of the bottom half of the population in disposable income and factor income. The bottom half of the population is the 50% of the people with the lowest per capita factor income.

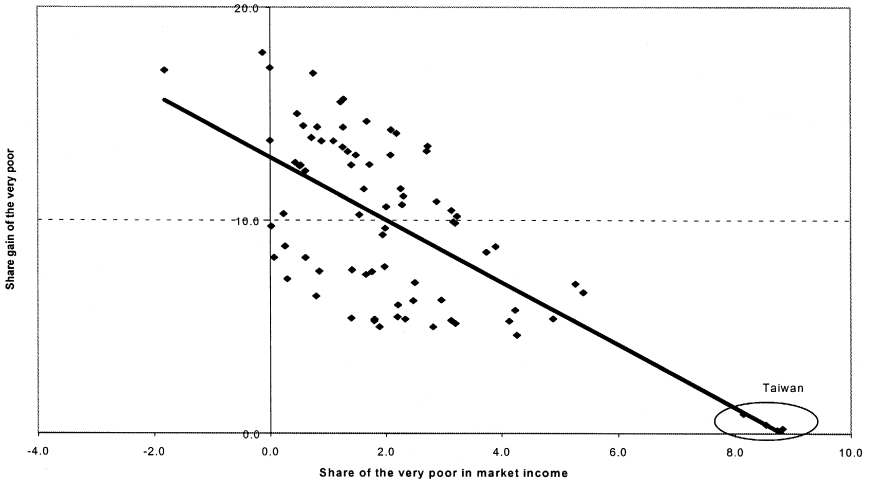

Fig. 3. The very poor's gain as function of their share in factor income.

disposable income by 1.39 percentage points (both in EDs and in full sample). Ironically, the poor are eventually better off if they start worse off!

Table 6b reports the same regressions as in Table 6a except that factor income is now replaced by factor *P* income. *age65* is no longer needed as control variable. The redistribution coefficients again have the right sign and are all highly significant. However, the R^2 are significantly lower. They increase, though, as we move from Eq. (1) (factor Gini as control) to Eq. (3) (*share20MM* as control). Once pensions are not part of social transfers, the redistribution that we capture reflects transfers directed to the very poor. These transfers therefore offer a superior explanation of the effects on the very poor, as in Eq. (3). They matter much less for the rest of the population.

The most interesting regressions are 2.1 and 2.3 for the poor, and 3.2 and 3.4 for the very poor. The poor's gain is now about 70% of what it was in earlier regressions when pensions were not part of factor income. For the full sample, the redistribution coefficient goes down, in absolute value, from 1 (Eq. (2.1) in Table 6a) to 0.696 (Eq. (2.1) in Table 6b). Similarly, for the very poor, the redistribution coefficient decreases from 1.39 (Eq. (3.2) in Table 6a) to 0.93 (Eq. (3.2) in Table 6b).

Clearly, much redistribution simply occurs as result of pension payments. However, there is more to redistribution than that. It is not simply that once pensions are included as part of factor income that total transfers (and redistribution) are less. There is also a re-ranking effect. By not considering pensions as part of factor income, we treat many households who depend on pensions for the large part of their income as poor or very poor. Once pensions are included in factor income, many such households are no longer poor.

Table 7
Extent of redistribution (fixed effect regressions)

	With factor income			With factor P income	
	(1)	(2)	(3)	(4)	(5)
	Share50DM	*Share20DM*	*GiniDD*	*Share50DM*	*Share20DM*
Share50MM	−0.005 (−0.05)			0.304 (4.09)	
Share20MM		−0.389 (−2.1)			0.071 (0.45)
GiniMM			0.400 (6.26)		
Age over 65 (in %)	0.30 (1.2)	0.167 (0.8)	−0.620 (−2.51)		
Constant	28.0 (6.4)	10.63 (3.78)	21.61 (6.27)	22.67 (12.65)	8.77 (17.4)
R^2 (F)	0.27 (0.9)	0.20 (3.4)	0.53 (19.6)	0.41 (16.8)	0.08 (0.5)
Number of observations	79	79	79	79	79

Note: t-values between brackets.
Share50DM = share of total disposable income received by the bottom half of the population ranked by factor (market) income. *Share50MM* = share of total market income received by the bottom half of the population ranked by factor (market) income. All R^2's are overall.

Thus, with the factor *P* definition, not only is redistribution, by definition, less, but both poor and very poor households are different. And transfers shorn of pensions capture much better what happens among the ''new poor'' (not pensioners).

How large is redistribution? We have seen that societies that begin with a more unequal distribution of factor income are likely to exhibit greater redistribution. The gain is less — although it persists — when we move from the standard definition of factor income to the definition that includes pension transfers.

Now we can ask the question: will redistribution be so large that the share of the poor will be independent, in terms of disposable income, of their starting position?

Results in Table 7 report the extent of the gain. The share of disposable income received by the very poor, *Share20DM*, is not significantly related to their share in factor income whether we use the standard definition of factor income or factor *P* income (see Eqs. (2) and (5)). The situation is less clear-cut when we look at the poor. Their share in disposable income does *not* depend on how much they receive in the form of factor income (note the very small and statistically not significant coefficient in Eq. (1)), but is positively related to their share in factor *P* income (Eq. (4)).

The final position of the poor in three cases out of four does not depend on what their initial shares in factor and factor *P* income are. The implication is that

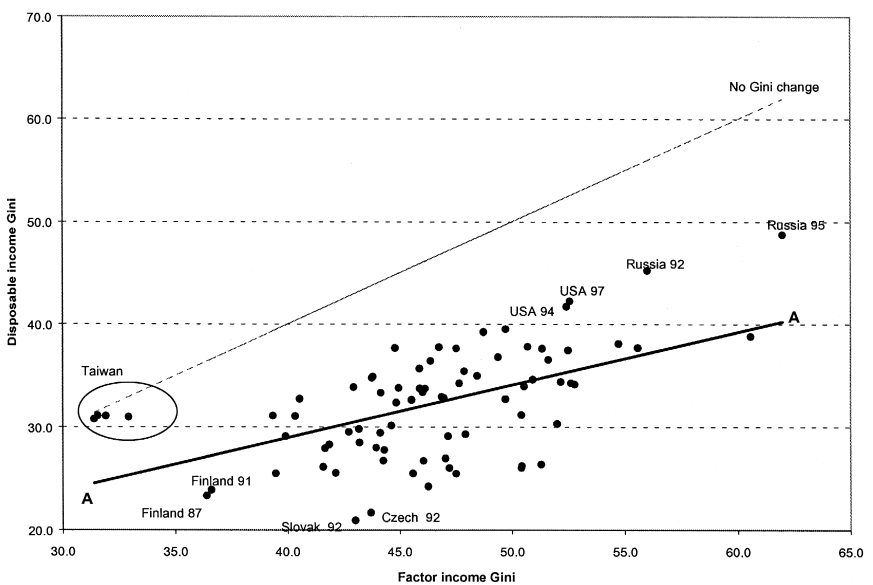

Fig. 4. Reduction in inequality (Gini) as a function of initial factor inequality.

redistribution fully or (in one case, significantly) compensates for the differences which might exist between countries at the factor income level. Redistribution is therefore greater in societies that start by being more unequal, and it is almost as great as to make the position of the poor and the very poor independent of their initial shares.

If we use Gini coefficients to compare the two (factor and disposable income) distributions, we note that higher factor Gini still results in a higher disposable income Gini but that 60% of the difference is lost through redistribution (see the coefficient of 0.4 in regression 3). As shown in Fig. 4, although redistribution reflected in the distance between the two lines-increases in factor Gini, the slope of the line AA is still upward sloping-indicating that greater factor inequality still results, on average, in higher disposable-income inequality.[18]

4. Testing the median-voter hypothesis

Our results so far suggest a process of redistribution that is positively associated with initial inequality in factor incomes. This is simply an empirical finding. The further question is why such particular redistribution should occur? The median-voter hypothesis provides one possible explanation. This hypothesis, in its most abstract version, posits that, if preferences are single-peaked, the median voter will decisively determine the level of redistribution, by selecting the tax rate, and thus, the amount of transfers (taxes are equal to transfers) that is optimal for him or her. With the average tax rate increasing in income and transfers flat, the poorer is the median voter relative to the mean (or more generally, the lower his or her position in income distribution), the greater is the incentive of the median voter to vote for higher taxes, and thus, for higher transfers.

It is important to be very clear about what the hypothesis says. First, it says that the median voter must gain from the process of redistribution; the transfers received by the median voter must be greater than the taxes he or she pays, for otherwise, the optimal tax rate for him would be zero (Corollary 1). Second, the median-voter hypothesis does *not* say that the median voter will necessarily gain more than any one else: we expect the very poor to gain more than the median voter through the transfers received and their low taxes (Corollary 2). Third, the median-voter hypothesis implies that the poorer in relative terms is the median voter, the larger his gain (Corollary 3). We shall look at how each of the three corollaries performs empirically.

Let us place the median voter in the fifth and sixth decile of factor-income distribution. We have already seen that the *sharegain* of the fifth decile (and even more so, of the sixth decile) is negative, regardless of which definition of factor

[18] Note, however, that regressions correct for country effects, while the figure does not.

Table 8
Net tax as percentage of disposable income

	Average	Standard deviation	Minimum (country)	Maximum (country)
Fifth decile	3.6	13.6	−43.1 (Poland 95)	33.2 (Netherlands 94)
Sixth decile	9.8	12.9	−32.9 (Poland 95)	36.2 (Netherlands 94)
Average	5.7	13.1	−36.5 (Poland 95)	28.2 (Israel 79)
Memo:tax-transfer ratio	1.6	0.7	0.2 (Russia 92)	3.4 (UK 74)

Deciles formed according to household per capita factor income.

income we use. The same is true of these deciles' absolute (dollar or local currency) gain. This is illustrated by Table 8, which shows that, with a standard definition of factor income, the fifth decile, on average, loses 3.6% of its disposable income through redistribution, and the sixth decile, almost 10%. Both are thus, on average, net taxpayers. Out of 68 countries,[19] the fifth decile is a net taxpayer in 49 countries, and gains in 19;[20] the sixth decile is a net taxpayer in 54 countries, and gains in only 14. A typical relationship between cash transfers and taxes is shown in Fig. 5. The bottom three deciles gain; everybody else loses. Therefore, Corollary 1 does not seem to hold: *the median voter would be better off with a zero tax rate*.

This conclusion is not fully warranted because our data take into account cash transfers only. Overall, cash transfers in our database are in most cases (58 out of 68), less than the taxes.[21] On average, direct taxes are 1.6 times greater than cash transfers (Table 8). For example, in the case of the Netherlands and the US shown in Fig. 5, the tax-to-transfer ratio is, respectively, 1.8 and 2.5. If we were to add to cash transfers transfers-in-kind (health, education, public administration, etc.) that are also financed out of taxes, overall transfers would increase, and it is quite likely that, under some reasonable apportioning of benefits from the transfers-in-kind, the median voter may come out as net beneficiary. Our database does not allow us to test this hypothesis. We thus have to move to a weaker formulation of the median voter hypothesis, that is, to test Corollary 3.[22]

[19] For some countries, the data on gross income (and thus, on transfers) are not available, so the sample size decreases.

[20] The countries where the net taxes of the fifth decile are negative (as the theory would predict it) are an interesting group: Sweden in 1992 and 1995, Russia in 1992, Taiwan in 1991 and 1994, Ireland in 1987, Israel in 1992, Italy in 1986, Luxembourg in 1986, France in 1979, 1981, 1984 and 1989, and Czech republic in 1992.

[21] Note that taxes include both mandatory employee contributions and direct taxes.

[22] Corollary 2 is satisfied in all cases (see Appendix B and C).

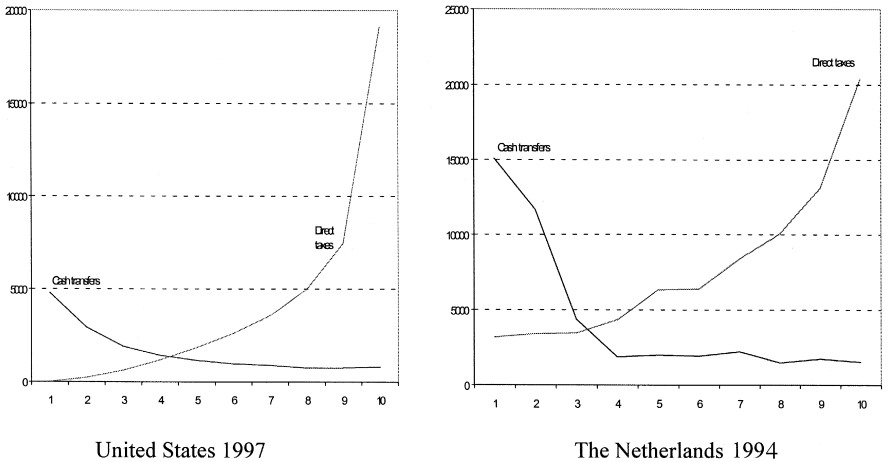

Fig. 5. Cash transfers and direct taxes by decile (deciles formed according to factor income).
Note: Amounts on the vertical axis in local currency.

We test Corollary 3 by looking at the relationship between R, the share gain of the middle class (fifth and sixth decile according to factor income), and μ, the position of the median voter (at the factor income level), and other variables Z, in:

$$R = f(\mu, Z) \tag{3}$$

Similar to the *sharegain* definitions above, we define the share gain of the middle class as the change in the percentage of total income received by the fifth and sixth decile as we move from factor to disposable income (*sharegain5060*). μ is alternatively defined as the factor-income share of the middle class (*share5060MM*), and median income expressed as percentage of mean income. In both formulations, we expect that an improvement in the relative position of the middle class in the distribution of *factor* income will reduce its share gain. The regressions are for both definitions of factor income (factor income, and factor P income).

The variable *sharegain5060* is in *all* cases negative (see Appendix F). The mean *sharegain5060* is -6 percentage points, and the range is from -12.1 (Belgium 1985) to -1.3 (Sweden 1995). The situation is the same if *sharegain* is defined with respect to factor P income. The mean *sharegain5060* is then -4.5 percentage points and the range is from -14.5 to -1.1. But we expect that the *sharegain* will be greater in countries where the position of the middle class before taxes and transfers ''kick in'' is worse.

Table 9 gives the results. A percentage point decrease in the factor-income share of the middle class is associated with a 0.4 point increase in middle class share gain. The coefficient is significant at the 1% level in both formulations. However, the R^2's are much lower than in the test of the redistribution hypothesis.

Table 9
Middle class gain as function of initial position of the median voter

Independent variables	Using factor income		Using factor P income	
	All sample	Established democracies	All sample	Established democracies
	(1)	(2)	(3)	(4)
	Sharegain5060	*Sharegain5060*	*Sharegain5060*	*Sharegain5060*
(1) Middle class share (*share5060MM*)	−0.443 (−5.08)	−0.417 (−3.76)	−0.389 (−2.81)	−0.444 (−2.86)
Age over 65 (%)	0.081 (0.59)	0.094 (0.67)		
Constant	11.14 (2.51)	9.78 (1.83)	11.67 (2.02)	14.09 (2.16)
R^2 (F)	0.09 (15.4)	0.13 (8.3)	0.16 (7.9)	0.01 (7.9)
(2) Mean-to-median ratio	12.94 (4.66)	13.01 (3.59)	12.04 (2.56)	13.33 (2.52)
Age over 65 (%)	0.093 (0.66)	0.101 (0.7)		
Constant	−23.05 (−6.88)	−23.32 (−5.3)	−19.09 (−3.36)	−20.44 (−3.19)
R^2 (F)	0.08 (13.4)	0.13 (7.7)	0.01 (6.6)	0.01 (6.4)
Number of observations	79	67	79	67

Note: t-values between brackets. *Share5060MM* = share of total factor income received by the fifth and sixth decile of the population ranked by factor income (= middle class). *Sharegain5060* = middle class gain as one moves from factor to disposable income. All R^2's are overall.

The result that the coefficient is less than 1 implies that redistribution does not fully ''compensate'' the middle class in a more unequal country for its lower factor-income share.

Regressions 2.1 and 2.2 (Table 9) test the same hypothesis using the mean-to-median ratio as a proxy for the position of the middle class at the factor income level. With factor income, we see that a 10% increase in the ratio — that is, a less favorable position of the middle class — raises the *sharegain* of the middle class by 1.3 percentage points.

When we use factor P income, the values of the coefficients are about the same but their level of significance decreases and R^2 becomes practically zero. This means that once we eliminate pensions from cash transfers, the middle classes' gain or loss in redistribution is independent of the initial (factor) distribution. This is explained by the fact that middle classes receive little in the form of non-pension cash transfers such as unemployment benefits, social assistance and even family allowances. Thus, the median voter hypothesis fails when we focus on the truly redistributive transfers only.

5. Conclusions

The purpose of this study has been twofold: (1) to test the hypothesis of an inverse relationship between inequality in distribution of factor income and redistribution, and (2) to test one possible explanation for redistribution, the political collective-choice mechanism through the median-voter hypothesis.

The approach taken in the paper is novel, in that, for the first time, both the median-voter hypothesis and the dependent and the independent variables in the redistribution equations are correctly specified. The dependent variable is the extent of redistribution — the income share gain of the lower half of income distribution according to factor income (''the poor''), or of the bottom quintile (''the very poor''), or the middle class (fifth and sixth decile). The independent variable is the inequality of factor incomes or the position of the middle class in factor-income distribution. Neither of these two variables was used in previous research, because they have not been readily available. The data used here are for a sample of 24 countries, with a total of 79 observations.

The results show strong support for the redistribution hypothesis. More unequal factor-income countries redistribute more toward the poor and very poor. A country A with exactly the mean characteristics of the sample would have a factor Gini coefficient of 46.3, and the bottom half of its population (''the poor'') would receive 19.4% of the total factor income. When we move to disposable income distribution, that is, include all government cash transfers and personal taxes, the same average country would have a Gini of 32.2, and the *same people* would have increased their share to 32.1% of the total disposable income. The poor will therefore have gained a 12.7 percentage point share.

Consider another country B, more unequal in terms of its factor-income distribution. Let the poor's factor-income share be 1 point less than their share in country A. Now, the redistribution in a more unequal country would be greater and the sharegain for the poor in country B would reach 13.7 percentage points, exactly 1 point more than in country A. The poor in both countries would therefore end up with the same share of disposable income. For the very poor (the bottom quintile), redistribution is even stronger making their position in terms of disposable income share negatively related to their starting position (factor-income share).

The effects of redistribution become more muted when pensions are taken out of transfers and treated as factor income. The negative sign between the poor's share in factor income and share gain persists, and the coefficient remains statistically highly significant throughout, but is much smaller. Now, redistribution compensates for only 70% of the poor's initial shortfall in a more unequal country (i.e. the poor in country B will no longer be able to ''catch up'', in terms of disposable income, with the poor in country A), and for a little over 90% of the very poor's shortfall.

While the evidence supports the link between the extent of pro-poor redistribution and factor-income inequality, the evidence that redistribution takes place through the median voter channel is much weaker. The data — based on cash transfers only — do not allow us to conclude that the middle class is a net beneficiary of redistribution. Comparing cash transfers and taxes only, the middle-income groups appear invariably to be losers.

However, it is likely that, if we included transfers in kind, the middle classes may turn out to be net beneficiaries. When we test a weaker formulation of the median voter hypothesis — namely that lower factor-income shares of the middle class are associated with a greater share gain — we find that the relation holds when pensions are included among cash transfers. When pensions are excluded, there is much less evidence that the middle classes starting from a less favorable factor income position redistribute more in their own favor.

The median voter hypothesis thus fails when we focus on the truly redistributive transfers. The middle classes *contemporaneously* gain little from these transfers. This leaves us looking for explanations.

First, since those poorer than the middle classes contemporaneously gain, perhaps the decisive voter is at a level income lower than the median? This seems implausible. Recent research has, if anything, moved in the direction of the conclusion that the decisive voter at a level higher than the median (see Bassett et al., 1999).

Second, the absence of contemporaneous middle-class gain may mask a long-run middle-class gain from redistributive programs. Those currently in the middle class may not profit from current social transfers. They may, however, be willing to finance the transfers as insurance for themselves (they for example, receive transfers if they become unemployed).

Third, and most problematically for previous studies, the median-voter hypothesis may not be the appropriate collective-decision making mechanism to explain redistribution decisions. The median-voter hypothesis is based on direct voting. Other than in Switzerland (and in various degrees amongst cantons; see Feld and Kirchgässner 2000), collective decisions are made with institutions of representative democracy rather than direct democracy. Since direct voting does not take place on every issue, the median-voter hypothesis applied to voters does not describe the collective decision-making rule. There is therefore a question whether, and to which extent, policy outcomes for an issue under representative democracy reflect the preferences of the median voter. The results that are reported in this paper suggest broad-ranging outcomes where the institutions of representative democracy do not result in the redistribution that would be sought by the median voter.

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Appendix A. Gini coefficients

Gini coefficients calculated on per capita basis.

Countries, years	Factor income	Factor *P* income	Gross income	Disposable income	(4) − (1)
Australia 81	46.0	41.9	37.7	33.4	−12.6
85	47.7	43.4	39.3	34.3	−13.4
89	48.5	45.1	39.7	35.0	−13.5
94	51.6	48.1	41.0	36.6	−15.1
Belgium 85	54.6	34.0	26.7	26.7	−27.8
88	50.0	34.4	26.9	26.9	−23.1
92	50.4	38.0	31.8	26.0	−24.4
Canada 75	43.8	40.8	37.2	34.8	−9.0
81	42.9	39.8	36.5	33.9	−9.1
87	44.2	40.4	36.6	33.3	−10.8
91	45.5	41.5	36.4	32.6	−12.9
94	47.0	42.2	36.9	32.9	−14.1

Countries, years	Factor income	Factor *P* income	Gross income	Disposable income	(4) − (1)
Czech Republic 92	43.7	30.0	24.0	21.7	−22.0
Denmark 87	44.3	38.0	30.7	27.8	−16.5
92	47.2	40.3	30.5	26.0	−21.2
Finland 87	36.4	32.5	28.5	23.3	−13.1
91	36.6	33.5	28.5	23.9	−12.7
95	42.1	39.2	30.2	25.5	−16.6
France 79	50.9	42.8	38.1	34.6	−16.3
81	40.5	39.3		32.7	−7.8
84	52.2	42.8	37.9	34.4	−17.8
France (b) 89	52.8	42.1	35.9	34.2	−18.6
W. Germany 73	40.3	40.2	32.5	31.1	−9.3
78	43.2	33.9	32.1	29.8	−13.4
81	44.1	34.8	31.4	29.4	−14.7
83	42.7	34.2	31.7	29.5	−13.2
84	47.9	35.5	33.1	29.3	−18.6
89	47.2	35.7	33.8	29.1	−18.0
94	50.4	39.4	35.9	31.2	−19.3
Hungary 91	52.0	39.2	30.3	30.3	−21.7
Ireland 87	55.6	53.2	41.7	37.7	−17.9
Israel 79	47.5	45.0	41.9	37.7	−9.9
86	50.7	47.7	43.2	37.8	−12.9
92	49.4	46.8	41.4	36.8	−12.6
Italy 86	46.1	34.0		33.7	−12.4
91	44.9	33.7	32.4	32.4	−12.5
95	51.3	39.8	37.6	37.6	−13.7
Luxembourg 85	41.7	32.6		27.9	−13.8
91	41.9	32.2	28.3	28.3	−13.6
94	44.0	33.1	28.0	28.0	−16.0
Netherlands 83	50.5	44.7	36.8	34.0	−16.6
87	49.7	44.3	35.6	32.7	−17.0
91	46.9	41.4	34.1	32.9	−13.9
94	45.0	40.0	34.0	33.8	−11.2
Norway 79	43.2	43.2	32.6	28.5	−14.7
86	39.5	39.5	29.0	25.5	−14.0
91	41.6	34.4	30.0	26.1	−15.5
95	44.3	36.5	30.5	26.7	−17.5
Poland 86	39.9	33.5		29.1	−10.8
92	45.9	36.3	33.8	33.8	−12.1
95	60.6	50.9	38.7	38.8	−21.7
ROC Taiwan 81	31.6	31.6	31.5	31.1	−0.5
86	31.4	31.4	31.3	30.8	−0.6

Countries, years	Factor income	Factor *P* income	Gross income	Disposable income	(4) − (1)
ROC Taiwan 91	31.9	31.8	31.6	31.0	−0.9
95	32.9	32.1	31.4	31.0	−2.0
Russia 92	56.0	47.2	45.4	45.2	−10.8
95	62.0	50.0	48.8	48.8	−13.2
Slovak Republic 92	43.0	32.0	23.0	20.9	−22.1
Spain 80	45.9	45.9	35.7	35.7	−10.2
90	46.0	37.4	33.7	33.7	−12.4
Sweden 67	47.9	42.5	40.3	35.4	−12.4
75	45.6	35.6	31.1	25.5	−20.1
81	46.3	33.7	28.2	24.2	−22.0
87	47.5	34.1	29.2	25.5	−22.0
92	51.3	38.2	29.5	26.4	−24.9
95	50.4	40.5	29.9	26.2	−24.2
Switzerland 82	44.8	40.1	39.2	37.7	−7.1
UK 69	43.8	40.0	37.6	34.9	−8.9
74	39.3	34.9	33.8	31.1	−8.2
79	44.6	38.5	33.0	30.1	−14.5
86	52.6	46.6	37.5	34.3	−18.3
91	52.5	47.6	40.4	37.5	−15.0
95	54.7	50.0	41.2	38.1	−16.6
USA 74	46.8	42.7	41.1	37.8	−9.0
79	46.4	43.4	40.7	36.4	−9.9
86	48.7	45.0	43.1	39.2	−9.5
91	49.7	45.8	43.4	39.5	−10.2
94	52.4	48.3	45.9	41.7	−10.7
97	52.6	48.4	46.4	42.2	−10.3
Mean	46.4	39.8	35.0	32.2	−14.2
Standard deviation	5.9	5.6	5.5	5.3	5.5

Appendix B. Gain in shares (in percent; using factor income)

Countries, years	First	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Australia 81	4.5	3.1	1.0	0.4	0.1	9.0
85	4.2	3.3	1.2	0.6	0.2	9.4
89	4.2	3.5	1.3	0.5	0.2	9.6
94	4.0	4.2	2.0	0.7	0.2	11.1

Countries, years	First	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Belgium 85	8.8	9.0	8.7	1.5	−0.8	27.3
88	8.6	8.5	3.7	2.3	−0.3	22.9
92	8.9	4.8	4.4	1.2	0.1	19.5
Canada 75	3.3	1.7	1.0	0.5	0.2	6.7
81	3.5	1.7	1.0	0.5	0.2	6.8
87	4.1	2.2	1.3	0.7	0.2	8.4
91	4.4	2.7	1.7	0.9	0.3	10.0
94	4.8	3.0	1.9	1.0	0.4	11.1
Czech Republic 92	9.2	5.4	2.0	0.7	−0.2	17.2
Denmark 87	8.0	5.7	2.9	0.8	−0.4	17.1
92	6.6	6.0	3.3	1.5	0.1	17.5
Finland 87	4.4	2.6	1.6	0.9	0.4	9.9
91	4.1	2.5	1.6	1.0	0.4	9.6
95	5.1	3.4	2.2	1.5	0.8	12.9
France 79	8.5	4.1	1.5	0.8	0.3	15.2
81	3.3	1.2	0.8	0.4	0.2	6.0
84	8.0	5.7	2.1	1.0	0.4	17.3
France (b) 89	7.8	7.2	2.9	1.3	0.2	19.4
W. Germany 73	6.0	2.8	0.2	−0.2	−0.4	8.4
78	6.2	4.7	1.0	0.1	−0.3	11.8
81	8.7	4.4	1.3	0.6	−0.4	14.6
83	6.0	4.5	1.3	0.3	−0.2	11.8
84	8.0	8.9	1.6	0.0	−0.4	18.1
89	7.7	6.6	1.8	0.2	−0.3	16.0
94	7.9	6.4	2.7	0.9	0.0	17.9
Hungary 91	7.0	5.3	3.0	1.8	0.7	17.8
Ireland 87	4.9	4.8	3.0	1.3	0.4	14.3
Israel 79	3.6	1.7	1.1	1.0	0.8	8.1
86	4.2	1.8	1.5	1.4	0.8	9.6
92	4.2	2.0	1.5	1.1	0.8	9.7
Italy 86	7.5	5.7	0.6	−0.3	−0.4	13.1
91	6.5	6.2	0.7	0.0	−0.3	13.0
95	6.4	6.4	2.1	0.2	−0.5	14.5
Luxembourg 85	9.7	3.8	0.7	0.2	−0.5	13.8
91	8.6	4.7	0.6	0.3	−0.5	13.6
94	8.8	5.4	1.0	0.6	−0.3	15.5
Netherlands 83	5.7	6.9	3.7	0.5	−0.3	16.4
87	7.1	6.8	2.6	0.7	−0.1	17.1
91	5.1	5.2	1.9	0.3	0.0	12.5
94	6.1	4.6	1.3	−0.2	−0.9	10.9

Countries, years	First	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Norway 79	7.0	4.5	1.3	0.2	−0.3	12.7
86	6.5	3.7	1.0	0.2	−0.1	11.3
91	6.0	3.9	1.8	0.7	0.2	12.6
95	5.8	4.9	2.5	1.0	0.0	14.3
Poland 86	7.9	2.0	0.2	−0.2	−0.5	9.3
92	7.6	3.5	1.3	0.3	−0.2	12.5
95	9.9	7.2	3.8	1.9	0.7	23.5
ROC Taiwan 81	0.1	0.1	0.1	0.1	0.0	0.3
86	0.1	0.1	0.1	0.1	0.1	0.4
91	0.3	0.1	0.1	0.1	0.1	0.6
95	0.7	0.3	0.2	0.2	0.1	1.4
Russia 92	4.3	2.1	0.9	0.6	0.3	8.3
95	4.7	2.5	1.9	1.1	0.7	11.0
Slovak Republic 92	9.9	4.1	2.3	1.2	0.3	17.9
Spain 80	7.8	1.9	0.5	−0.1	−0.5	9.6
90	7.8	3.6	1.2	0.2	−0.4	12.4
Sweden 67	2.9	4.7	1.8	0.9	0.5	10.9
75	7.2	5.9	2.4	0.9	0.2	16.6
81	8.3	7.4	4.2	1.2	0.0	21.2
87	8.4	7.1	3.6	1.3	0.0	20.4
92	7.5	6.9	5.1	2.4	0.6	22.5
95	7.4	6.1	4.7	2.8	0.8	21.7
Switzerland 82	3.7	1.5	0.6	−0.1	0.0	5.7
UK 69	4.5	1.2	0.5	0.3	0.1	6.7
74	3.8	1.6	0.7	0.2	0.0	6.3
79	5.3	4.0	1.4	0.5	0.0	11.2
86	5.2	5.1	3.4	1.3	0.3	15.3
91	4.2	4.0	2.3	1.0	0.2	11.8
95	4.5	4.3	3.1	1.5	0.4	13.7
USA 74	3.4	2.0	0.9	0.5	0.2	7.1
79	3.3	2.1	1.4	0.8	0.6	8.1
86	3.1	1.9	1.3	0.9	0.4	7.6
91	3.2	2.2	1.5	1.0	0.6	8.4
94	3.1	2.2	1.5	1.0	0.6	8.6
97	3.2	2.1	1.4	0.9	0.6	8.2
Mean	5.7	4.0	1.9	0.7	0.1	12.4
Standard deviation	2.4	2.1	1.4	0.6	0.4	5.4

Appendix C. Gain in shares (in percent; using factor *P* income)

Countries, years	First	Second	Third	Fourth	Fifth	Five (deciles) (cumulative)
Australia 81	2.8	1.4	0.8	0.7	0.3	6.0
85	2.6	1.4	1.0	0.8	0.4	6.2
89	3.3	1.8	1.0	0.6	0.3	7.1
94	3.4	2.5	1.3	0.7	0.3	8.3
Belgium 85	3.7	1.1	0.7	0.3	−0.1	5.8
88	3.9	1.2	0.6	0.2	0.0	5.9
92	3.9	1.9	1.3	0.9	0.7	8.8
Canada 75	1.8	1.0	0.7	0.5	0.3	4.3
81	1.7	1.0	0.7	0.4	0.4	4.2
87	2.1	1.1	0.8	0.7	0.4	5.2
91	2.6	1.5	1.0	0.7	0.5	6.3
94	2.8	1.6	1.0	0.8	0.5	6.8
Czech Republic 92	2.7	1.4	0.8	0.6	0.5	6.1
Denmark 87	7.6	2.6	1.5	0.6	0.0	12.3
92	5.7	3.0	1.9	1.0	0.3	11.9
Finland 87	2.5	1.7	1.3	1.0	0.6	7.1
91	2.7	1.8	1.4	0.9	0.5	7.3
95	4.4	2.4	1.8	1.3	0.8	10.6
France 79	1.6	1.4	1.0	0.7	0.5	5.3
81	2.1	1.2	0.8	0.6	0.2	4.9
84	1.6	1.5	1.1	0.8	0.5	5.6
France (b) 89	2.3	1.5	1.0	0.7	0.4	6.0
W. Germany 73	5.8	2.7	0.3	−0.2	−0.4	8.3
78	1.2	0.6	0.5	0.4	0.3	3.1
81	2.6	1.0	0.8	0.5	0.5	5.5
83	1.8	0.7	0.5	0.4	0.3	3.8
84	2.0	0.8	0.9	0.6	0.4	4.7
89	1.7	1.0	0.7	0.7	0.7	4.9
94	2.5	1.2	0.9	0.7	0.7	5.9
Hungary 91	2.9	2.0	1.6	0.7	0.2	7.3
Ireland 87	4.3	3.7	2.3	1.1	0.4	11.8
Israel 79	2.2	1.1	1.0	0.9	0.7	5.9
86	2.4	1.5	1.2	0.9	0.8	6.8
92	3.0	1.6	1.2	1.0	0.7	7.4
Italy 86	0.5	0.1	0.0	0.1	0.0	0.7
91	0.9	0.1	0.1	0.0	0.0	1.2
95	1.1	0.5	0.2	0.1	0.0	1.8

Countries, years	First	Second	Third	Fourth	Fifth	Five (deciles) (cumulative)
Luxembourg 85	3.0	0.6	0.2	0.1	−0.1	3.8
91	2.2	0.6	0.4	0.0	0.0	3.2
94	2.4	0.8	0.5	0.2	0.1	4.0
Netherlands 83	4.9	2.4	1.1	0.5	0.0	8.9
87	6.9	2.2	0.6	0.6	0.2	10.6
91	4.4	1.6	0.6	0.3	0.1	7.0
94	4.8	1.4	0.1	0.1	0.0	6.4
Norway 79	7.0	4.5	1.3	0.2	−0.3	12.7
86	6.5	3.7	1.0	0.2	−0.1	11.3
91	3.3	1.3	0.9	0.7	0.3	6.4
95	3.8	1.7	1.0	0.6	0.3	7.4
Poland 86	2.9	0.5	0.2	0.1	0.0	3.7
92	0.9	0.6	0.3	0.1	0.1	2.0
95	5.7	2.3	1.4	0.9	0.2	10.6
ROC Taiwan 81	0.1	0.1	0.1	0.1	0.0	0.3
86	0.1	0.1	0.1	0.1	0.1	0.4
91	0.2	0.1	0.1	0.1	0.1	0.5
95	0.4	0.1	0.1	0.1	0.1	0.8
Russia 92	0.5	0.3	0.3	0.3	0.1	1.5
95	0.2	0.3	0.2	0.2	0.1	1.0
Slovak Republic 92	3.8	2.1	1.3	0.7	0.3	8.1
Spain 80	7.8	1.9	0.5	−0.1	−0.5	9.6
90	2.5	0.6	0.3	0.0	0.0	3.3
Sweden 67	0.7	1.3	1.2	1.1	0.9	5.2
75	2.7	2.1	1.7	1.1	0.9	8.4
81	3.7	1.8	1.6	1.1	0.9	9.1
87	2.9	1.9	1.4	1.1	0.5	7.8
92	4.3	2.5	1.7	0.9	0.2	9.6
95	4.9	2.9	2.3	1.4	0.4	11.9
Switzerland 82	0.9	0.4	0.3	0.2	0.3	2.1
UK 69	1.7	0.6	0.5	0.4	0.3	3.4
74	1.2	0.7	0.5	0.3	0.2	2.9
79	3.0	1.3	1.2	0.7	0.3	6.6
86	4.2	2.5	1.5	1.3	0.5	10.0
91	3.6	1.9	1.2	0.6	0.2	7.5
95	3.8	2.9	1.6	0.8	0.3	9.5
USA 74	1.2	0.8	0.6	0.5	0.3	3.4
79	1.9	1.1	0.8	0.7	0.6	5.1
86	1.3	0.8	0.7	0.6	0.5	3.9
91	1.5	1.0	0.8	0.7	0.5	4.4

Countries, years	First	Second	Third	Fourth	Fifth	Five (deciles) (cumulative)
USA 94	1.4	0.9	0.8	0.7	0.6	4.4
97	1.2	0.9	0.7	0.6	0.6	4.1
Mean	2.8	1.4	0.9	0.6	0.3	6.0
Standard deviation	1.8	0.9	0.5	0.4	0.3	3.1

Appendix D. Factor-income shares (in percent)

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Australia 81	0.1	1.7	4.3	6.0	7.5	19.5
85	0.1	1.6	4.1	5.7	7.2	18.7
89	0.0	1.4	3.8	5.6	7.2	17.9
94	−0.5	0.5	2.9	5.2	7.3	15.5
Belgium 85	−0.1	0.0	0.0	4.6	7.7	12.1
88	0.0	0.0	4.3	4.3	7.3	15.9
92	0.0	0.0	2.1	5.7	7.9	15.6
Canada 75	0.2	2.6	4.6	6.2	7.6	21.3
81	0.4	2.8	4.7	6.2	7.6	21.7
87	0.4	2.6	4.5	6.0	7.4	20.9
91	0.2	2.3	4.3	5.8	7.4	20.0
94	0.1	1.9	4.0	5.7	7.3	18.9
Czech Republic 92	0.0	1.7	4.7	6.6	8.2	21.2
Denmark 87	−0.3	1.4	4.3	6.6	8.5	20.5
92	−0.3	0.8	3.5	6.1	8.2	18.4
Finland 87	1.5	3.8	5.5	6.9	8.2	25.9
91	1.5	3.9	5.5	6.8	8.1	25.7
95	0.7	3.0	4.7	6.2	7.6	22.2
France 79	−0.2	1.6	3.6	5.2	6.8	17.0
81	0.8	3.5	4.8	6.2	7.6	22.8
84	−0.4	1.2	3.4	5.0	6.6	15.9
France (b) 89	0.0	0.5	2.7	4.9	6.8	14.8
W. Germany 73	0.5	3.4	5.4	6.7	7.9	23.9
78	0.4	2.5	5.0	6.4	7.7	22.0
81	0.0	2.1	4.8	6.3	7.8	21.0
83	0.5	2.7	4.9	6.3	7.7	22.1
84	0.0	0.7	3.9	6.0	7.6	18.3
89	0.0	1.2	4.2	6.1	7.5	19.1

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
W. Germany94	0.0	0.8	3.3	5.5	7.2	16.9
Hungary 91	0.0	0.6	2.7	5.3	7.2	15.9
Ireland 87	−0.4	0.4	2.4	4.5	6.4	13.4
Israel 79	0.7	2.4	3.7	5.0	6.6	18.5
86	0.2	2.0	3.4	4.8	6.4	16.9
92	0.2	2.2	3.7	5.0	6.5	17.7
Italy 86	0.0	1.3	4.3	6.2	7.7	19.5
91	0.1	1.6	4.7	6.2	7.8	20.5
95	−0.5	0.9	3.2	5.4	7.1	16.2
Luxembourg 85	0.0	2.7	5.1	6.6	8.0	22.5
91	0.1	2.6	5.3	6.6	8.1	22.7
94	0.0	2.1	4.8	6.3	7.7	21.0
Netherlands 83	0.0	0.5	3.4	5.9	7.3	17.0
87	0.0	0.7	3.8	5.7	7.1	17.4
91	0.0	1.5	4.4	6.1	7.3	19.3
94	0.0	2.0	4.7	6.2	7.5	20.4
Norway 79	−0.1	2.3	5.0	6.6	7.9	21.7
86	0.4	2.9	5.4	7.0	8.3	23.9
91	0.5	2.7	5.0	6.5	7.9	22.5
95	0.3	2.0	4.4	6.3	7.8	20.8
Poland 86	0.2	3.0	5.3	6.8	8.3	23.6
92	0.2	2.1	4.2	5.8	7.4	19.6
95	−2.1	0.2	1.8	4.1	6.2	10.3
ROC Taiwan 81	3.7	5.0	6.0	6.9	7.8	29.5
86	3.7	5.1	6.0	6.9	7.9	29.7
91	3.5	5.0	6.0	6.9	7.9	29.2
95	3.3	4.8	5.8	6.8	7.8	28.5
Russia 92	−0.2	1.0	2.9	4.5	6.1	14.3
95	0.0	0.3	1.4	3.1	5.1	9.8
Slovak Republic 92	0.0	2.2	4.6	6.5	8.1	21.4
Spain 80	0.0	2.0	4.3	6.1	7.6	20.1
90	0.0	1.7	4.3	6.2	7.7	19.8
Sweden 67	0.0	0.8	4.0	6.1	7.6	18.5
75	0.0	1.5	4.2	6.1	7.8	19.6
81	−0.1	1.4	3.7	6.0	7.7	18.6
87	0.0	1.2	3.3	5.7	7.6	17.9
92	−0.3	0.9	2.4	4.9	7.1	15.1
95	0.0	1.3	2.8	4.9	6.9	15.9
Switzerland 82	0.9	3.2	4.6	5.6	6.9	21.3
UK 69	0.8	3.5	4.8	5.8	7.0	21.9

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
UK 74	1.4	3.5	5.2	6.5	7.7	24.3
79	0.1	1.9	4.5	6.2	7.8	20.4
86	−0.2	0.4	2.5	5.0	7.0	14.8
91	0.0	0.6	2.8	4.9	6.8	15.2
95	0.0	0.3	2.0	4.5	6.7	13.5
USA 74	0.0	2.2	4.2	5.8	7.2	19.4
79	0.1	2.2	4.1	5.7	7.3	19.4
86	0.1	1.8	3.7	5.4	6.9	17.9
91	0.1	1.7	3.5	5.1	6.8	17.2
94	0.0	1.4	3.1	4.8	6.4	15.7
97	0.1	1.7	3.3	4.8	6.3	16.1
Mean	0.3	1.9	4.0	5.8	7.4	19.4
Standard deviation	0.9	1.2	1.1	0.8	0.6	4.0

Appendix E. Shares in factor *P* income (in percent)

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Australia 81	0.6	3.3	5.0	6.1	7.4	22.4
85	0.6	3.3	4.8	5.8	7.1	21.7
89	0.3	2.7	4.5	5.8	7.1	20.3
94	−0.4	1.7	4.0	5.7	7.2	18.1
Belgium 85	1.1	4.5	6.0	7.3	8.6	27.5
88	1.0	4.5	6.0	7.3	8.6	27.4
92	0.8	3.8	5.5	6.8	8.0	24.9
Canada 75	0.9	3.5	5.1	6.3	7.6	23.3
81	1.1	3.7	5.2	6.4	7.5	23.9
87	1.0	3.6	5.1	6.3	7.5	23.5
91	0.8	3.3	5.0	6.3	7.5	22.9
94	0.6	3.1	4.9	6.3	7.5	22.4
Czech Republic 92	3.0	5.3	6.6	7.5	8.4	30.7
Denmark 87	0.5	3.9	5.4	6.9	8.3	25.0
92	0.0	3.2	5.4	6.7	8.2	23.5
Finland 87	2.6	4.7	5.9	7.0	8.2	28.5
91	2.4	4.6	5.9	6.9	8.1	27.9
95	1.1	3.7	5.3	6.5	7.7	24.3

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
France 79	1.4	3.3	4.6	5.9	7.2	22.4
81	1.2	3.6	4.9	6.3	7.7	23.7
84	1.2	3.3	4.6	5.9	7.3	22.2
France (b) 89	0.8	3.3	4.8	6.2	7.6	22.6
W. Germany 73	0.6	3.4	5.4	6.7	7.9	24.0
78	3.0	4.8	5.8	6.7	7.7	28.1
81	2.3	4.6	5.8	6.7	7.7	27.2
83	2.7	4.7	5.8	6.7	7.8	27.7
84	2.2	4.5	5.6	6.7	7.8	26.8
89	2.3	4.5	5.7	6.6	7.7	26.8
94	1.3	4.0	5.4	6.5	7.5	24.6
Hungary 91	0.9	3.5	5.4	6.8	8.1	24.7
Ireland 87	−0.4	0.8	3.1	4.9	6.7	15.1
Israel 79	1.4	3.0	4.0	5.2	6.7	20.2
86	0.8	2.6	3.8	5.2	6.6	18.9
92	0.7	2.7	4.0	5.3	6.7	19.4
Italy 86	2.6	4.6	5.7	6.8	7.8	27.5
91	2.5	4.6	5.8	6.9	8.1	27.8
95	1.1	3.7	5.0	6.3	7.7	23.9
Luxembourg 85	2.2	4.8	6.0	7.1	8.2	28.4
91	2.6	4.8	6.0	7.3	8.2	28.9
94	2.4	4.6	5.8	7.1	8.3	28.1
Netherlands 83	0.0	2.6	5.0	6.3	7.4	21.2
87	0.0	2.7	5.0	6.2	7.4	21.4
91	0.2	3.6	5.4	6.4	7.5	23.2
94	0.4	3.9	5.4	6.5	7.6	23.9
Norway 79	−0.1	2.3	5.0	6.6	7.9	21.7
86	0.4	2.9	5.4	7.0	8.3	23.9
91	2.1	4.6	5.8	6.9	8.0	27.4
95	1.4	4.3	5.7	6.8	7.9	26.2
Poland 86	1.8	4.6	5.9	7.2	8.4	27.9
92	2.1	4.1	5.4	6.6	7.9	26.0
95	−2.1	2.0	4.0	5.7	7.3	16.9
ROC Taiwan 81	3.7	5.0	6.0	6.9	7.8	29.5
86	3.7	5.1	6.0	6.9	7.9	29.7
91	3.6	5.0	6.0	6.9	7.8	29.3
95	3.5	5.0	5.9	6.8	7.8	29.0
Russia 92	1.1	3.2	4.2	5.3	6.5	20.2
95	0.4	2.2	3.8	5.3	6.5	18.2
Slovak Republic 92	2.0	4.7	6.2	7.5	8.7	29.0

Countries, years	Bottom decile	Second	Third	Fourth	Fifth	Five deciles (cumulative)
Spain 80	0.0	2.0	4.3	6.1	7.6	20.1
90	1.4	4.1	5.6	6.7	7.8	25.6
Sweden 67	0.1	3.2	5.1	6.4	7.6	22.4
75	2.4	4.4	5.3	6.5	7.7	26.3
81	2.0	4.7	5.8	6.9	8.0	27.5
87	2.0	4.6	5.8	6.9	8.1	27.3
92	0.7	3.6	5.3	6.7	8.1	24.4
95	0.4	3.0	5.0	6.5	7.9	23.0
Switzerland 82	2.4	4.1	5.0	5.9	7.0	24.4
UK 69	1.9	4.0	5.1	6.1	7.1	24.2
74	2.7	4.6	5.7	6.6	7.7	27.2
79	1.2	4.1	5.3	6.4	7.6	24.6
86	−0.2	2.0	4.5	5.8	7.2	19.3
91	0.0	2.2	4.1	5.4	7.0	18.8
95	0.0	1.1	3.7	5.3	6.9	17.1
USA 74	0.8	3.3	4.8	6.1	7.3	22.3
79	0.6	3.0	4.6	6.0	7.4	21.5
86	0.6	2.7	4.3	5.7	7.1	20.5
91	0.5	2.6	4.1	5.6	7.1	19.9
94	0.4	2.3	3.9	5.3	6.7	18.6
97	0.7	2.6	3.9	5.2	6.5	19.0
Mean	1.2	3.6	5.1	6.4	7.6	24.0
Standard deviation	1.1	1.0	0.7	0.6	0.5	3.6

Appendix F. Shares and sharegains of the middle class

Deciles are formed according to factor or factor P income. The first decile (e.g.) consists of the 10% of people with lowest household per capita factor (factor P) income. The share gain is defined as the change in the share of *these* people as income concept changes from factor (or factor P) income to disposable income.

Countries, years	Shares of 5 and 6 decile in factor income	Share gain	Share of 5 and 6 decile in factor P income	Share gain
Australia 81	41.5	−6.7	40.5	−4.4
85	40.1	−6.0	39.3	−4.0
89	40.3	−6.7	39.7	−5.1
94	41.0	−7.4	40.4	−5.5

Countries, years	Shares of 5 and 6 decile in factor income	Share gain	Share of 5 and 6 decile in factor *P* income	Share gain
Belgium 85	44.5	−12.1	46.1	−5.8
88	42.4	−8.3	45.9	−5.8
92	44.2	−7.1	43.8	−2.5
Canada 75	41.9	−5.5	41.5	−4.7
81	41.7	−5.6	41.3	−4.5
87	41.0	−5.1	41.1	−3.9
91	40.9	−4.7	41.1	−3.5
94	40.8	−4.8	41.2	−3.5
Czech Republic 92	44.7	−6.3	44.0	−1.5
Denmark 87	46.3	−7.4	44.8	−5.4
92	45.4	−5.5	44.4	−4.0
Finland 87	44.4	−3.4	43.9	−2.0
91	43.9	−3.1	43.6	−2.5
95	41.8	−1.8	42.0	−1.4
France 79	38.2	−5.4	39.3	−3.5
81	42.5	−6.5	42.5	−5.7
84	37.9	−5.1	39.9	−3.7
France (b) 89	39.1	−6.3	41.2	−4.0
W. Germany 73	42.6	−7.6	42.5	−7.5
78	42.0	−7.0	41.3	−3.2
81	42.5	−6.8	41.6	−3.0
83	42.2	−6.9	41.8	−3.6
84	42.0	−9.3	41.9	−3.1
89	41.5	−7.8	41.2	−1.9
94	40.2	−6.2	40.8	−2.3
Hungary 91	40.0	−2.4	43.7	−4.1
Ireland 87	37.0	−5.5	38.2	−5.3
Israel 79	37.9	−4.3	38.0	−4.4
86	36.5	−3.0	37.1	−3.3
92	37.0	−3.2	37.4	−3.5
Italy 86	42.5	−9.7	42.6	−5.9
91	42.5	−8.1	43.3	−5.9
95	40.0	−9.5	42.0	−6.7
Luxembourg 85	43.9	−8.0	44.1	−5.9
91	44.1	−8.0	44.0	−5.3
94	42.7	−6.9	44.5	−5.2
Netherlands 83	40.0	−6.7	40.2	−5.0
87	39.7	−5.9	40.4	−4.1

Countries, years	Shares of 5 and 6 decile in factor income	Share gain	Share of 5 and 6 decile in factor *P* income	Share gain
Netherlands 91	40.3	−6.1	40.8	−4.8
94	41.4	−9.7	41.3	−5.7
Norway 79	43.0	−7.0	43.0	−7.0
86	44.9	−6.4	44.9	−6.4
91	43.4	−5.3	43.1	−3.5
95	43.0	−5.2	42.8	−3.7
Poland 86	45.3	−9.3	45.0	−6.0
92	41.0	−7.9	42.9	−6.2
95	36.4	−4.0	40.9	−5.7
ROC Taiwan 81	41.8	−4.6	41.8	−4.6
86	41.9	−4.6	41.9	−4.6
91	41.9	−4.7	41.8	−4.6
95	41.7	−4.7	41.9	−4.9
Russia 92	34.7	−5.9	35.8	−5.4
95	30.4	−5.5	35.9	−5.6
Slovak Republic 92	44.5	−4.2	46.1	−3.3
Spain 80	41.7	−8.7	41.7	−8.7
90	42.2	−8.0	42.4	−6.1
Sweden 67	41.8	−4.1	41.2	−1.3
75	43.0	−5.6	41.7	−1.5
81	43.2	−5.8	43.4	−1.1
87	42.8	−6.1	43.6	−2.3
92	40.8	−3.4	44.0	−4.5
95	39.8	−1.3	43.6	−3.0
Switzerland 82	38.0	−6.9	37.9	−4.4
UK 69	38.2	−5.0	38.3	−3.9
74	41.9	−5.8	41.2	−4.1
79	42.8	−6.6	41.6	−4.0
86	40.0	−6.0	40.1	−3.2
91	38.9	−6.6	39.1	−6.1
95	38.5	−6.0	39.2	−5.8
USA 74	40.3	−6.0	40.2	−4.8
79	40.5	−4.6	40.6	−4.0
86	39.0	−5.2	39.4	−4.5
91	38.8	−4.9	39.5	−5.0
94	36.6	−4.5	37.6	−4.6
97	35.6	−4.2	36.4	−4.1
Mean	41.0	−6.0	41.5	−4.4
Standard deviation	2.7	1.9	2.3	1.5

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