WORKING PAPERS

N° TSE-455

November 2013

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INSTITUT D'ECONOMIE INDUSTRIELLE

Toulouse School of Economics

DISCUSSION PAPER SERIES

No. 9745

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PUBLIC POLICY

Centre for Economic Policy Research

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Available online at: **www.cepr.org/pubs/dps/DP9745.php**

ISSN 0265-8003

AN ALLEGORY OF THE POLITICAL INFLUENCE OF THE TOP 1%

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Discussion Paper No. 9745
November 2013

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CEPR Discussion Paper No. 9745

November 2013

ABSTRACT

An allegory of the political influence of the top 1%*

We study how rich shareholders can use their economic power to deregulate firms that they own, thus skewing the income distribution towards themselves. Agents differ in productivity and choose how much labor to supply. High productivity agents also own shares in the productive sector and thus earn capital income. All vote over a linear tax rate on (labor and capital) income whose proceeds are redistributed lump sum. Capital owners also lobby in order to ease the price cap imposed on the private firm. We solve analytically for the Kantian equilibrium of this lobbying game together with the majority voting equilibrium over the tax rate, and we perform simulations. We obtain numerically that, as the capital income distribution becomes more concentrated among the top productivity individuals, their increased lobbying effort generates efficiency as well as equity costs, with lower labor supply and lower average utility levels in society.

JEL Classification: D72 and H31
Keywords: kantian equilibrium, lobbying, political economy and regulatory capture

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Submitted 08 November 2013

1 Introduction

In the period beginning in 1976 and ending in 2011, the share in national income of the richest 1% of households in the United States increased from 9% to 20%. This large increase was principally concentrated at the very top: for instance, the increase in share of the tranche comprising the 95th to 99th percentile increased only 3% in this period. (See Alvaredo, Atkinson, Piketty, and Saez (2013).)

In this letter, we present an allegory of how the very rich may influence government policy in order to increase their income share. We focus upon deregulation, which has been a characteristic of the US political economy during this period. Ownership of the firm is concentrated among the most highly skilled people in society, with shareholders contributing to a lobbying effort, which will, if successful, allow the (monopolistic) firm to raise its price above the competitive level. We are interested in examining how the income distribution in the economy changes as firm ownership becomes more concentrated.

A distant cousin of this paper is Magill, Quinzii, and Rochet (2013), who show that, in an environment with uncertainty, shareholder value maximization by the managers of a firm can be inefficient, and Pareto improvements are possible if the manager maximizes the total value created by the firm, including producer and consumer surpluses. The mechanisms in the two papers are entirely different, although both may have contributed to the large share of the top 1% described above.

2 The model

The economy consists of a continuum of individuals who differ in their labor productivity s. The distribution of labor productivity is represented by the c.d.f. $F(s)$ over $[0,\infty[$ and the corresponding p.d.f. $f(s)$. All agents exhibit the same quasi-linear quadratic utility function

$$u(x,\ell) = x - \beta\frac{\ell^2}{2},$$

where x measures consumption, ℓ labor supply (expressed as a fraction of total time available) and where $\beta > 0$ is a scaling parameter affecting the disutility from supplying labor.

The productive side of the economy is summarized by a single firm. The only input used by the firm is labor. We denote by L the aggregate labor supply in efficiency units,

$$L = \int s\ell(s)dF(s),$$

and assume that the production function is linear, so that the amount of output produced by the firm, y, is such that $y = L$. We normalize the wage per efficient unit of labor to one and we denote the market price of the output by p, so that the profit of the firm (in numeraire) is

$$\pi = pL - L = L(p-1).$$

The ownership of the firm is described by the p.d.f. $\theta(s)$. We assume that this ownership is concentrated among the more productive agents: agents up to an exogenous productivity level $\bar{s}$ do not own any share in the firm ($\theta(s) = 0$ for $s < \bar{s}$), while agents above this threshold are such that $\theta(s) > 0$ and that $\theta'(s) > 0$, so that

$$\int_{\bar{s}}^{\infty} \theta(s)dF(s) = 1.$$

The profit from the firm is distributed to shareholders in proportion to their share holding. In other words, agents with $s < \bar{s}$ do no have any capital income, while agents with $s \geq \bar{s}$ have both labor and capital income, with higher productivity agents endowed with a larger share of the firm's profit, and hence a larger capital income. We assume that $\bar{s} > s_m$ where s_m is the median productivity, so that a minority of (highly productive) agents earn capital income.

The government taxes both labor and capital income at the same proportional rate t, and redistributes the tax proceeds as a lump sum amount (demogrant) to all individuals. The utility of an agent with productivity s who is faced with a tax rate of t and a price p is

$$\frac{(1-t)s\ell}{p} + \frac{(1-t)\theta(s)\pi}{p} + B - \beta\frac{\ell^2}{2}. \tag{1}$$

The first term in (1) (resp., the second) is the real value of the after-tax labor (resp., capital) income of the individual. We denote by B the real value of the demogrant, while the last term in (1) reflects the disutility from supplying labor. Since preferences are quasi-linear, the labor-supply behavior of agents is not affected either by the lump sum transfer nor by the capital income he receives (since, with a continuum of agents, his individual labor supply decision does not affect L and thus π). Agents maximize (1) with respect to ℓ, so that

$$\ell(s) = \frac{Qs}{p}, \tag{2}$$

where $Q = (1-t)/\beta$. We then have that aggregate labor supply in efficiency units is

$$L = \frac{Q}{p}\tilde{s},$$

with

$$\tilde{s} = \int_0^\infty s^2 dF(s).$$

The real profit of the firm is then

$$\frac{\pi}{p} = \frac{p-1}{p}Q\tilde{s}. \tag{3}$$

It is is easy to see that the real profit is nil when $p = 1$ (competitive equilibrium), increases with p and reaches a maximum when p equals 2, whatever the value of t. That is, although taxation decreases real profits (since it discourages labor supply, with Q decreasing in t), it affects neither the competitive nor the profit-maximizing price level of p.

The amount of tax proceeds (in numeraire) raised by the government is

$$t(L+\pi) = tLp,$$

so that the real value of the demogrant is

$$B = \frac{tQ\tilde{s}}{p}. \tag{4}$$

We now turn to the determination of the price p and of the tax rate t.

3 The determination of p and t

In our setting, both the price of the output p and the tax rate t are determined simultaneously before the agents take their labor supply decisions. We first study the determination of the output price, before moving to the tax rate and to the interactions between the two.

3.1 Kantian lobbying over the output price

The output price is set according to a price cap formula. Shareholders lobby the regulator in order to increase the price cap level and thus the firm's profit. Firm shareholders of ability s voluntarily contribute the amount $\sigma(s)$ to finance the lobbying effort so that the average contribution $\bar{\sigma}$ in the economy is

$$\bar{\sigma} = \int_{\bar{s}}^{\infty} \sigma(s) dF(s),$$

while the price cap level is given by the CES formula

$$p(\bar{\sigma}) = 1 + k\frac{\bar{\sigma}^a}{a}, \tag{5}$$

with $k > 0$ and $a > 0$ two parameters reflecting the functioning of the lobbying process (which we leave undescribed). In the absence of lobbying ($\bar{\sigma} = 0$), the output price is set at the competitive level ($p = 1$) so that $\pi = 0$, while the output price increases with per capita contribution $\bar{\sigma}$.[1]

The indirect utility of a shareholder who contributes $\sigma(s)$ to the lobbying process is obtained by substituting (2), (3), (4) and (5) in (1), while subtracting $\sigma(s)$ from disposable income:

$$U(t, \sigma(s), \bar{\sigma}, s) = \frac{(1-t)^2 s^2}{\beta p(\bar{\sigma})^2} - \sigma(s) + \frac{tQ\tilde{s}}{p(\bar{\sigma})} + \theta(s)\frac{(1-t)^2}{\beta}\frac{p(\bar{\sigma}) - 1}{p(\bar{\sigma})}Q\tilde{s}. \tag{6}$$

Under classical (Nash) behavior, there would be a free-rider problem among shareholders, who must make voluntary contributions to fund the lobbying to deregulate the price of the good. Some cooperative concept is necessary to solve the shareholders' collective action problem.

[1] It is straightforward that agents with only labor income prefer the competitive price to any larger price and thus have no incentive to contribute to the lobbying effort.

Definition 1 *A Kantian equilibrium is a contribution schedule $\sigma(s) > 0$ for all agents $s \geq \bar{s}$, such that no contributor would prefer that all contributors modify their contributions by any (constant) factor.*[2]

This concept was used in Roemer (2006), in a framework where members of a political party must contribute to the advertising budget of their party. The principal property which motivates its use is that, in many contexts, including the present one, a Kantian equilibrium is Pareto efficient for the class of contributors: there exists no schedule of contributions that every contributor would prefer (see Roemer (2010) which verifies this claim, and for a general discussion of Kantian equilibrium).

I our setting, a Kantian equilibrium is then such that

$$\frac{\partial U(t, r\sigma(s), r\bar{\sigma}, s)}{\partial r}\Big|_{r=1} = 0, \ \forall s \geq \bar{s}. \tag{7}$$

Solving (7), we obtain

$$\sigma(s) = k\bar{\sigma}^a \left[\theta(s)(1-t)Q\tilde{s}\frac{2p(\bar{\sigma}) - p(\bar{\sigma})^2}{p(\bar{\sigma})^4} - \beta p(\bar{\sigma})^{-3}Q^2 s^2 - p(\bar{\sigma})^{-2}tQ\tilde{s}\right].$$

The condition that $\sigma(s) > 0$, $\forall s \geq \bar{s}$, then translates into the following constraint on the distribution of ownership shares:

$$\theta(s) > \frac{\beta Q s^2 + p(\bar{\sigma})\tilde{s}}{(2 - p(\bar{\sigma}))(1-t)\tilde{s}}, \ \forall s \geq \bar{s}. \tag{8}$$

Integrating $\sigma(s)$ over $s \in [\bar{s}, \infty[$, we obtain that

$$\bar{\sigma}^{1-a} = \frac{kQ\tilde{s}}{p(\bar{\sigma})^2}\left[\frac{2 - p(\bar{\sigma})}{p(\bar{\sigma})}(1-t) - t(1 - F(\bar{s})) - \frac{\beta}{p(\bar{\sigma})}Q\frac{\tilde{s} - \hat{s}}{\tilde{s}}\right], \tag{9}$$

where

$$\hat{s} = \int_0^{\bar{s}} s^2 dF(s).$$

Observe that, at $\bar{\sigma} = 0$ (so that $p = 1$), the right hand side of (9) tends toward $1 - t > 0$ when $\bar{s}$ tends toward ∞, while the RHS is negative when

[2] There is always a trivial equilibrium where nobody contributes so that no one wants to vary the zero contribution by any percentage.

$\bar{\sigma}$ is large enough that $p = 2$ (since no one would push p above its profit-maximizing level of 2). Hence, for sufficiently large values of $\bar{s}$ there exists a solution $\bar{\sigma}$ to eqn. (9), and an associated contribution schedule for all shareholders, if the inequalities in (8) hold.

We now study the determination of the tax rate t.

3.2 Majority voting over the tax rate

We assume that all agents vote simultaneously over t, with $\sigma(s), \bar{\sigma}$ and thus $p = p(\bar{\sigma})$ taken as exogenous. We prove the existence of a Condorcet winner (a value of t preferred by a majority of voters to all other feasible values) and characterize it in the next proposition.[3]

Proposition 2 *The Condorcet winning value of t, denoted by t^V, is the one most preferred by the agent with the median productivity s_m, so that*

$$t^V = \frac{p\tilde{s} - s_m^2}{2p\tilde{s} - s_m^2}. \tag{10}$$

We now turn to the simultaneous determination of t and p.

3.3 Nash equilibrium over t and p

Definition 3 *A pair composed of a tax rate t^* and a contribution schedule $\sigma(s)$ is a political economy equilibrium if (1) t^* is a majority-voting equilibrium over t when p is determined by the contribution schedule $\sigma(s)$ according to (5) and (2) the contribution schedule $\sigma(s)$ is such that no shareholder would prefer that all shareholders multiply their contributions by any non-negative factor.*

We now turn to the numerical simulations.

4 Numerical simulations

We have run simulations based on the assumptions of a lognormal distribution of productivities (with $s_m = 50$ and an average productivity of 60,

[3]The proof is available from the authors.

measured in thousand US dollars), where $\beta = 100$ and where the lobbying technology is described by the parameters $k = 0.5$ and $a = 0.5$.

We report in Table 1 the competitive solution with majority voting over t, obtained by setting $\sigma(s) = 0$ for all s so that $p = 1$ and $\pi = 0$ (no capital income). This solution will play the role of the benchmark allocation.

t^V	Average utility	Total wage	Average utility for $s \leq s_m$	$\ell(s_m)$	Average income for s in top 1%
34.11%	22.904	34.156	14.208	0.329	307.917

Table 1: Competitive solution

We report in Table 2 the political economy equilibrium as a function of $\bar{s}$, which we vary from 91st percentile of the productivity distribution to the 99th. Observe that we do not need to specify the distribution of share ownership $\theta(s)$ to compute this allocation (see (9)).

Insert Table 2 around here

We obtain a unique political equilibrium for all reported values of $\bar{s}$. As $\bar{s}$ increases (so that capital income becomes more concentrated among the very top of the income distribution), capital income earners increase their total contribution ($\bar{\sigma}$ increases) which results in an increase in the output price p and in the profit (in real terms). The majority chosen tax rate increases slightly with $\bar{s}$, and is larger than in the competitive equilibrium. Because both the tax rate and the output price are larger than in the competitive allocation reported in Table 1, agents supply less labor and the total wages (in real terms) drop by half as we move from Table 1 to the first numerical row of Table 2, and decrease by a further 25% as we move from $F(\bar{s}) = 0.91$ to $F(\bar{s}) = 0.99$. The sum of (real) wages and profits decreases as $\bar{s}$ increases.

The average utility in society decreases from 22.9 in Table 1 to 17.7 in Table 2 when $F(\bar{s}) = 0.91$, and to 15.3 when $F(\bar{s}) = 0.99$. We can further look at the impact of lobbying and majority voting on the average utility of those whose exclusive source of income is labor income (i.e., $s < \bar{s}$, see fourth column) and those who also earn capital income (i.e., $s \geq \bar{s}$, see fifth column). The former group sees its utility decrease with $\bar{s}$, even though the increase in $\bar{s}$ adds to the group agents with higher productivities and thus higher utility. The average utility of capitalists is multiplied by six as we move from $F(\bar{s}) = 0.91$ to $F(\bar{s}) = 0.99$. To control for the composition effects among the set of workers as we increase $\bar{s}$, we report the average utility of agents in the bottom half of the income distribution (who earn no capital income since $s_m < \bar{s}$). This utility decreases from 10.2 to 8.7 as $\bar{s}$ increases from the 91st to the 99th percentile of the productivity distribution.

The last column in Table 2 reports the integral of the right hand side of the feasibility constraint (8) for the Kantian equilibrium over $[\bar{s}, \infty[$. This constraint has to integrate to less than one for there to exist a distribution of $\theta(s)$ that satisfies the constraint that $\sigma(s) > 0$ for all $s \geq \bar{s}$. We see that this global feasibility constraint can be satisfied, and even becomes easier to satisfy as $\bar{s}$ increases (since the capital income distribution becomes more concentrated among the top earners, so that they have more incentive to lobby to increase real profits).

In a nutshell, what we learn from Table 2 is that, as capital income becomes more concentrated in the top of the productivity distribution, the political equilibrium results in more lobbying, higher output price, lower labor supply and lower utility for most agents, including all those whose only source of income is their labor. Average utility in society also decreases. So, higher concentration of capital income among top earners has both efficiency costs (lower labor supply, lower sum of real wages and profits) and equity costs in our setting.

To go beyond these results and analyze the impact of the political equilibrium on the distribution of income, we introduce a functional form for $\theta(s)$ that satisfies the feasibility constraint (8) for all $s \geq \bar{s}$. We assume that

$$\theta(s) = \delta \frac{g(s)}{f(s)} + \frac{\beta Q s^2 + p(\bar{\sigma})\tilde{s}}{(2 - p(\bar{\sigma}))(1-t)\tilde{s}}, \tag{11}$$

where $g(s)$ is the p.d.f. of the Pareto distribution with parameter α, and where

$$\delta = 1 - \int \frac{\beta Q s^2 + p(\bar{\sigma})\tilde{s}}{(2 - p(\bar{\sigma}))(1-t)\tilde{s}} f(s) ds$$

is computed so that

$$\int \theta(s) f(s) ds = 1, \text{ with } \theta'(s) > 0.$$

We calibrate the value of α to ensure that the top 0.1% of income earners own 62% of the capital income of the top 1% (an estimate we obtain for the U.S. in 2011 from Alvaredo et al (2012)).[4] We obtain that $\alpha = 0.758$.

$F(\bar{s})$	Total income	Labor income	Capital income
0.91	256.514	142.41	114.104
0.93	271.547	132.522	139.025
0.95	298.786	122.695	176.091
0.97	351.519	112.64	238.879
0.99	486.777	101.388	385.39

Table 3: Average income of the top 1%, in thousand U.S. dollars

In Table 3, we report the average income of the top 1% at the political economy equilibrium as a function of $\bar{s}$ (so that we control for composition effects as we increase $\bar{s}$). We see that this average income increases with $\bar{s}$ (from 257 000$ when $F(\bar{s}) = 0.91$ to 487 000$ when $F(\bar{s}) = 0.99$), and that this is due entirely to the increase in capital income (which more than triples from the first to the last row in Table 3) since labor income decreases from 142 000$ to 101 000$ as capital income becomes more concentrated and as lobbying intensifies. The share of capital in total income of the top 1% increases from less than 50% when $F(\bar{s}) = 0.91$ to more than 75% when $F(\bar{s}) = 0.99$.

We now provide graphical illustrations of the income distribution generated at the political equilibrium. Figure 1 plots total after-tax income as a function of productivity s when $F(\bar{s}) = 0.91$. Agents with $s < \bar{s}$ only earn labor income while agents with $s \geq \bar{s}$ also earn capital income. There is a discrete jump in after-tax income at $s = \bar{s}$ since we have given a quantum of shares in the firm to this individual in order to satisfy the feasibility constraint (8).

Insert Figure 1 around here

Figure 2 shows the c.d.f. of after-tax income for three allocations: (1) the laissez-faire allocation, (2) the political equilibrium allocation when $F(\bar{s}) = 0.91$, and (3) when $F(\bar{s}) = 0.99$. We see that allocation (1) Lorenz dominates allocation (2) which itself Lorenz dominates allocation (3). This shows

[4]Their measure of capital income does not include capital gains.

graphically that there is an equity cost from moving away from the competitive allocation (with majority voting over t) to the allocation where lobbying is taking place, and that this equity cost is increasing when capital income becomes more concentrated among the top income earners.

Insert Figure 2 around here

5 Conclusion

Alvaredo et al (2013) list four causes of the increase in the top 1%'s share in the last 40 years: income taxes at the top of the distribution have fallen dramatically during this period; salaries of top managerial personnel have increased dramatically compared to average earnings; the share of capital income in total income has increased; and the correlation between high salaries and large capital incomes has increased. Our allegory concerns only capital income, and only one mechanism whereby the share of capital income in total income may have increased, namely, due to deregulation. There is, by hypothesis, a perfect correlation between high labor and capital incomes in our allegory.

References

[1] Alvaredo, F., T. Atkinson, T. Piketty, and E. Saez (2012), The world top income data base, topincomes.parisschoolofeconomics.eu/#Database:

[2] Alvaredo, F., T. Atkinson, T. Piketty, and E. Saez, 2013. The top 1% in international and historical perpective, J. Econ. Perspectives 27, 3-20

[3] Magill M., M. Quinzii and J.-Ch. Rochet, 2013, A critique of shareholder value maximization, mimeo.

[4] Roemer, J., 2006, Party competition under private and public financing: A comparison of institutions, Advances in Theoretical Economics, 6-1, 1-31.

[5] Roemer, J., 2010, Kantian allocations, Scandinavian Journal of Economics, 112-1, 1-24.

$F(\bar{s})$	t^V	$\bar{\sigma}$	Utility of workers	Utility of capitalists	Average utility	p	Total wage	π/p	Average utility for $s \leq s_m$	$\ell(s_m)$	Feasibility
0.91	39.34%	0.138	12.095	74.535	17.714	1.372	16.704	6.215	10.167	0.221	0.840
0.93	39.73%	0.172	11.832	88.554	17.202	1.415	15.597	6.478	9.839	0.213	0.786
0.95	40.14%	0.215	11.565	113.328	16.653	1.464	14.489	6.716	9.496	0.205	0.708
0.97	40.57%	0.270	11.290	169.661	16.042	1.519	13.345	6.932	9.127	0.196	0.586
0.99	41.07%	0.350	10.997	440.024	15.287	1.592	12.054	7.135	8.688	0.185	0.350

Utility of workers=$\int_0^{\bar{s}} U(t,\sigma(s),\bar{\sigma},s)dF(s)$, Utility of capitalists=$\int_{\bar{s}}^{\infty} U(t,\sigma(s),\bar{\sigma},s)dF(s)$

Feasibility=$\int_{\bar{s}}^{\infty} \frac{\beta Q s^2 + p(\bar{\sigma})\tilde{s}}{(2-p(\bar{\sigma}))(1-t)\tilde{s}} dF(s)$

Table 2: Kantian allocation as a function of $\bar{s}$

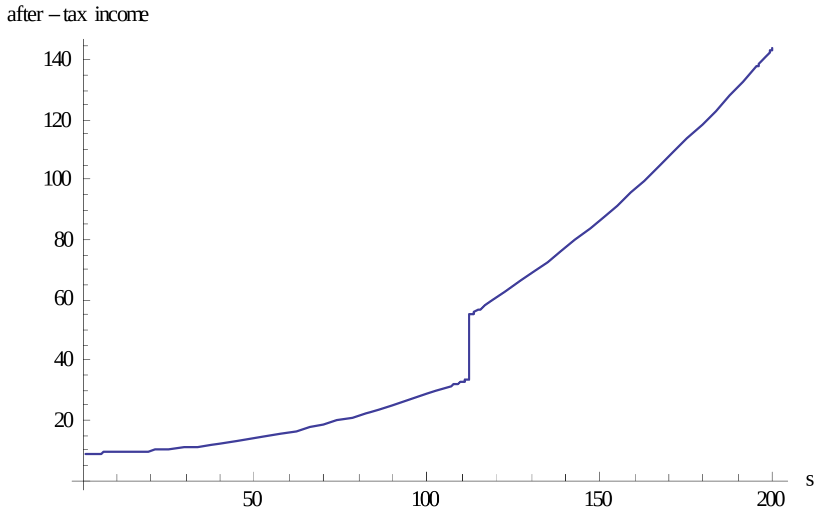

Figure 1: Total after-tax income as a function of productivity s at the political equilibrium when $F(\bar{s}) = 0.91$

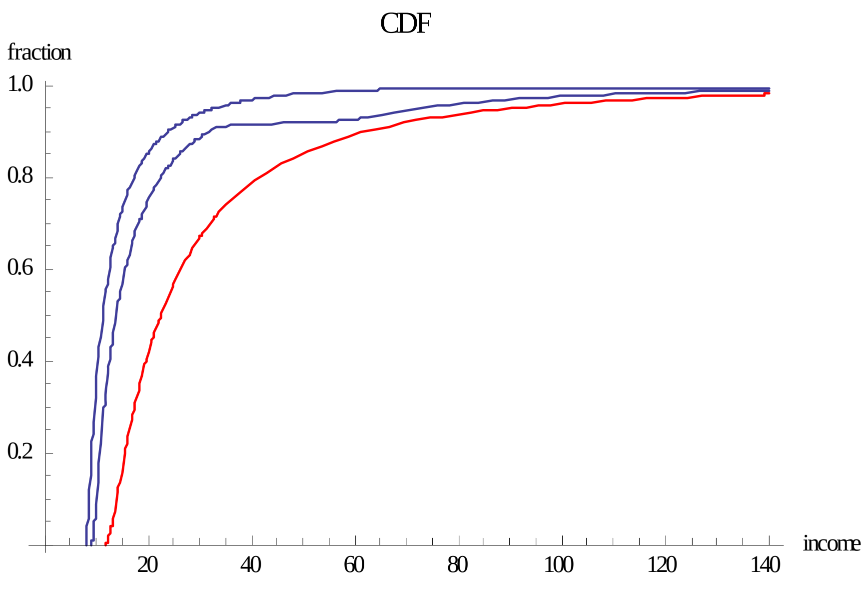

Figure 2: c.d.f. of the total after-tax income distribution for the competitive allocation (in red) and two political equilibrium allocations differing in $\bar{s}$