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**Information, Social Mobility and the Demand for Redistribution**

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# Information, Social Mobility and the Demand for Redistribution[1]

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This paper studies how heterogeneity in income dynamics affects the POUM hypothesis (the idea that poor people do not support high level of redistribution because they hope to be rich in the future). We consider a setting where individuals evaluate their expected future income using both their current income and observable characteristics such as education, race or gender. We find that the POUM effect could increase or decrease the support for redistribution depending on the parameters of the model. Moreover we find that the POUM effect is independent of a particular shape (the concavity) of the resulting aggregate income transition function. Finally, using data from Italy, we test the model and perform a first empirical estimation of the POUM effect in Italy.

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## *I. INTRODUCTION*

There is empirical evidence that in most countries the income distribution is asymmetric with the median income below the average income; i.e., the majority of the population has an income lower than the average. In this situation, an absolute majority of the population would gain from complete income redistribution. From this observation the natural question arises: why does the poor majority not impose complete income redistribution on the rich minority? Often social mobility has been invoked to give an answer: given that today's poor may be the wealthy of tomorrow, social mobility should affect individual preferences for redistributive policies. This effect is denoted as "Prospect Of Upward Mobility" (POUM) effect.

The first author to use this argument was Tocqueville [1835]. His idea was that the differences between the redistributive policies of Europe and the United States could be explained by presumed differences in social mobility. In recent years, the literature on the relation between social mobility and redistributive policies is scanty. Indeed, there are many papers on the relation between income inequalities, redistribution and growth but they do not consider social mobility to be an important factor. For example, in the models of Alesina and Rodrik [1994] and Persson and Tabellini [1994], the fundamental idea is that redistribution results in a lower growth rate because it discourages investments.

An early research that re-considers the relation between social mobility and redistribution is Hirschmann [1973]. He considers that an individual's welfare depends on his present state of contentment (or, as a proxy, income), as well as on his expected future contentment (or, as a proxy, future income). More recently Piketty [1995] addresses intergenerational mobility to explain heterogeneous preferences towards redistribution.[2] Lastly, a recent paper of Bènabou and Ok [2001b] considers intra-generational mobility to explain the low level of redistribution in modern democracies. The idea is that agents know the true mobility process and maximize the actual value of their expected incomes in future years. Importantly, authors assume that the income mobility process is the same for all individuals in the population. The main result

[2] Other related papers are those that link social mobility and future income prospects. For example, Dardanoni [1993] and Benabou and Ok [2001a] consider mobility as an equalizer of opportunities and assess mobility processes according to the level of inequality in the distribution of expected future incomes. Empirical evidences on the POUM effect are in the papers of Alesina and La Ferrara [2000] and Ravallion and Lokshin [2000]: they show that the social mobility has a negative effect on the demand for redistribution.

is that the POUM effect depends on a particular property of the mobility process: when expected future income is a strictly concave function of current income, the fraction of people with an expected future income below the expected mean income is smaller than the fraction of people with current income below the mean income; in other words, there exists a range of current incomes below the mean where agents have an expected future income above the mean. Finally, they provide support for the empirical relevance of the POUM effect for U.S.A..[3]

In their conclusion Bènabou and Ok [2001b] explicitly warn that the introduction of heterogeneity in the income transition function would cause additional dynamics, especially in an intra-generational context. In this paper we pick up this argument and explore how the heterogeneity in the mobility process affects the POUM effect[4]. The motivation is that the assumption of homogeneity of individuals with regard to the mobility process is, in most of the cases, not realistic. Consider, for instance, the following three types of individuals: employees, self-employed and pensioners. Pensioners have an income determined by law, the income of self–employed individuals depends on market conditions and the employees stay in an intermediate position. If individuals face different income dynamics, their expected future income, as well as the uncertainty on their future, is different. Therefore, individual preferences in the evaluation of the future redistributive policies can change according to the types' characteristics.

The main difference between our paper and Bènabou and Ok [2001b] is that individuals evaluate their expected future income by using not only their current income but also observable characteristics such as age, education, race or gender. Given their characteristics individuals assess their perspectives of social mobility in order to evaluate their expected future income; finally, individuals decide on redistributive policies according to expected future income. By this way we explain differences in redistributive preferences between individuals belonging to different social groups through differences in expected income, even when current income differences explain nothing.

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[3] They use U.S. data compiled by Hungerford [1993]

[4] measured as the difference between the share of individuals with current income below the average and the share of individuals with the expected future income below the average.

To focus our attention on the effect heterogeneity has on the POUM effect, we use simple linear income transition functions that produce no POUM effect in the absence of heterogeneity.[5] In a simple model with two social groups, we show that a POUM effect can exist; moreover we show that this effect can increase or decrease the support to redistributive policies. We pay attention to the slopes of the income transition functions: the flatter is the slope of the income transition function of the poor group in comparison to that of the other group, the smaller is the POUM effect. Then we show that in this setting the POUM effect is independent of the specific shape of the resulting aggregate income transition function (as for example, the concavity). The main insight of this result is that we cannot infer anything regarding the sign of the POUM effect from observing a concave mobility process, unless we know how the income processes differs between individuals. Finally, we propose a measure of the POUM effect in Italy using data from the Bank of Italy Survey on Italian Households Income and Wealth for the period 1989 –2004. We perform estimations of the expected future income distribution for the whole population and for different partitions in social groups (according to some individual characteristics). We find a positive POUM effect for the whole population but a negative one if we divide the individuals into two groups according to their work status. Moreover, we show that these results are sensible to the population's partition; indeed, dividing individuals into two groups according to their sex we find a positive POUM effect.

The paper is organized as follows: in section 2 we present the model; in section 3 we study the change in the size of the consensus for redistribution when individuals consider the mobility process. For this we suggest a simple model where the population is divided into two groups. In section 4 we discuss some implication of this model. In section 5 we offer some empirical analysis to test the predictions of the model. Finally, section 6 concludes. Appendix 1 provides the proofs and appendix 2 reports our estimation results.

## *II. THE MODEL*

We consider an economy populated by a continuum of individuals indexed by $i \in [0,1]$, whose initial level of income, $y$, lies in some interval $Y \equiv [0, \hat{y}]$, $0 \leq \hat{y} \leq \infty$. For our

[5] Although the assumption of linearity of the income transition function is not empirically sustainable, it permits us to highlight the effect of heterogeneity on the POUM effect.

economy, an income distribution function is defined as $F: Y \rightarrow [0,1]$ such that $F[0] = 0$, $F[\hat{y}] = 1$ and the mean income is given by $\int_X y dF = \mu_F$. We assume that $F$ is continuous and strictly increasing. We denote by $\Phi$ the set of all income distributions that satisfy the above conditions. We assume that the population can be divided into two or more groups according to personal characteristics such as age, education, kind of job and so on. In the following we concentrate on the case of two groups, $a$ and $b$. Let $n_a$ be the number of individuals in group $a$ and $n_b$ the number of individuals in group $b$. We denote the income distribution of group $a$ by $F^a$ and its income mean by $\mu_a$. The income of group $b$ is distributed according to $F^b$ with mean $\mu_b$. The mean income of the whole population is denoted by $\mu_F$ and given by $\mu_F = (\mu_a n_a + \mu_b n_b)/(n_a + n_b)$. Without loss of generality we assume $\mu_b > \mu_a$. Finally, we assume the income distributions to be time invariant so that the income mean of each group (and that of the whole population) remains unchanged over periods. This assumption is essential to show that our findings describe not just transitory, short run effects, but stable and permanent ones.

In our economy individuals have to choose, under majority voting, a redistributive scheme that is defined as a function $r: Y \rightarrow R_+$ that associates to each gross income a level of disposable income $r(y; F)$ and preserves total income (there are no losses due to redistribution). As in the vast majority of political economy models, we consider a proportional scheme where all incomes are taxed at a rate $\tau$ with $\tau \in [0,1]$, and the collected revenue is distributed equally to all individuals. This scheme is defined by the following expression:

(1) $$r_\tau(y; F) = (1 - \tau)y + \tau\mu_F$$

In what follows we concentrate on the choice between two different redistributive schemes, absence of redistribution, $r_0$, and complete redistribution, $r_1$.[6] This assumption is not as restrictive as it might appear, indeed the analysis can be extended to any couple of different proportional redistributive schemes.[7] In particular, we note that when voters are maximizing their current disposable income, for any income distribution with median income below the

[6] Given that our interest is in the voter's behavior, we abstract from any consideration about the parties' strategies.
[7] Benabou and Ok [2001b] use the same assumption.

mean, $r_{\tau'}$ beats $r_{\tau''}$ if and only if $\tau' > \tau''$. Indeed, all individuals with current income below the mean will prefer the more redistributive scheme $r_{\tau'}$.

To insert mobility considerations into voters' preferences, we assume that the tax policy must be chosen one period in advance, or more generally, preset for $T$ periods. In this way, individuals' voting behavior incorporates concerns about their future incomes.

A key variable in this economy is the mobility process: expected future income is the only decisive factor to choose today the level of redistribution of tomorrow. We assume that individuals are characterized by uncertainty on their future income; moreover, we assume that they are characterized by an income transition process depending on the group to which they belong. We assume that the transition processes are:

$$y_{i,t+1} = \rho_{0k} + \rho_{1k} y_{i,t} + \varepsilon_{k,i,t} \tag{2}$$

where $i$ denotes the individual, $k \in \{a, b\}$ the group to which individual $i$ belongs, $t$ the time and $\varepsilon_{k,i,t}$ is the error term that is identically and independently distributed among individuals with zero mean.[8] Although the specification of income dynamics most widely used in the literature is a log linear AR(1) model, we choose to use a linear (no log) specification to highlight how heterogeneity affects the POUM effect[9]. Finally we assume that voters maximize their expected disposable income, are rational (no systematic mistakes) and risk neutral; voters know, for each group, the income transition function and the income distribution. Voters know the probability to have at least a given level of income in a future period given the current income and their social group. Voters need to know this information only for themselves and need to know that the system has an invariant distribution over time.[10]

## *III. RESULTS*

To study how income mobility influences the share of the population favorable to redistribution, the case without concerns on income mobility is our benchmark.

[8] Given the assumption of invariant income distributions, we have to assume that income processes are stationary.

[9] Indeed, as shown in Benabou and Ok [2001b], a linear transition function does not produce any POUM effect if the income mobility process is the same for all individuals in the population..

[10] By this last assumption the voters expect that mean income does not change in the following periods.

To eliminate the consideration of mobility, in the benchmark we assume that in every period people vote for a redistribution policy that takes place in the same period. Since we assume that voters have to choose between two policies, $r_0$ and $r_1$, all people with income below the average will prefer $r_1$, while all those with income above the average will prefer $r_0$. In group *a* the fraction of individuals that have a current income below $\mu_F$ is given by $F^a(\mu_F)$, while in group $b$ it is given by $F^b(\mu_F)$. Let $\delta$ be the fraction of people in the whole population who prefer $r_1$. We have that:

(3) $$\delta = \left(n_a F^a(\mu_F) + n_b F^b(\mu_F)\right)/(n_a + n_b)$$

*III. A Two-Period Case*

To study the effect of mobility on the demand of redistribution, we focus on a two-period scenario where voters have to choose at time *t* between redistribution schemes $r_0$ and $r_1$ that will be enacted in *t+1*. Given the assumptions of rationality and risk neutrality, they will choose the policy giving them the greater expected future disposable income. So, all individuals with an expected future income greater that $\mu_F$ will vote against the redistribution, while all other individuals will favour it.

Using the condition of invariant income distributions, we obtain that all individuals in group *k* with current income below (above) $\mu_k$ are characterized by an expected future income that is higher (lower) than the current one.[11] Therefore, since $\mu_a < \mu_F < \mu_b$, individuals with current income equal to $\mu_F$ prefer $r_1$ over $r_0$ if they belong to group *a*, and they prefer $r_0$ over $r_1$ if they belong to group *b.* This happens because individuals in group *b* have better chances to improve their incomes than individuals in group *a* with the same current income. To continue this analysis we need the following definition.

***Definition 1.*** *For any* $F \in \Phi$, *let* $\Omega(F)$ *be the set of linear autoregressive functions of order 1 that have* $F$ *as invariant income distribution.*[12]

In the following proposition we summarize these considerations and define, for each group, the set of voters in favor of redistribution and the one against.

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[11] It is sufficient to solve the inequality $E\left[\rho_{0k} + \rho_{1k} y_{i,t} + \varepsilon_{k,i,t}\right] \geq y_{i,t}$ to obtain that $y_{i,t} \leq \rho_{0k}/(1-\rho_{1k})$. Then it is directly verifiable that the right side is the stationary mean income of group *k*.

[12] Given that all income transition functions in the set $\Omega(F)$ generate the same mean income μ, the parameters have to satisfy the relation $\rho_0 = \mu(1-\rho_1)$.

***Proposition 1.*** *Let $F^a$, $F^b$ such that $\mu_a < \mu_b$. Then for any income transition function in $\Omega(F^k)$, and $k \in \{a, b\}$, there exists a unique threshold $\tilde{y}_k$, given by $\tilde{y}_k = (\mu_F - \rho_{0k})/\rho_{1k}$, such that all individuals with current income in $[0, \tilde{y}_k)$ vote for $r_1$ , while all those with current income in $(\tilde{y}_k, \hat{y}]$ vote for $r_0$.*

The proof is in the appendix 1.

This proposition defines a threshold income for each group which can be greater or smaller than the income mean. Indeed we note that there are individuals in group *a* with current income above the average but expected future income below.[13] These individuals vote for $r_0$ in the benchmark case but to $r_1$ in the two-period scenario. Symmetrically, there are individuals in group *b* with current income below the average but expected future one above[14] who switch from $r_1$ to $r_0$. Therefore the coalition in favour of redistributive policy $r_1$ is changing in comparison to the benchmark case, containing less individuals of group *b* and more individuals of group *a*[15]. In group *b* individuals have better perspectives, indeed to have an expected future income of at least $\mu_F$ it is sufficient to have a current income of $\tilde{y}_b$. By contrast, for individuals in group *a,* a current income of at least $\tilde{y}_a$ is necessary to have an expected future income equal or above $\mu_F$. So our model permits different preferences toward redistribution among individuals with the same current income because of different income mobility processes. We note that in the current income interval $(\tilde{y}_b, \tilde{y}_a)$, individuals with the same current income have different redistributive preferences if they belong to different social groups.

Now we focus our attention on the slope of the income transition function. We note that the slope, capturing the persistence of income shocks, measures the speed of income convergence towards the long-run equilibrium. But, from another point of view, the slope is also a measure of intra-group income mobility in the sense that a flatter transition function implies a greater intra-group mobility.[16] Besides, it is easy to check that in each group, the convergence

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[13] All individuals with current income in the interval $(\mu_F, \tilde{y}_a)$.
[14] All individuals with current income in the interval $(\tilde{y}_b, \mu_F)$.
[15] In group *b* (*a*) the condition that ensures this effect is $\mu_F < \mu_b$ ($\mu_F > \mu_a$); indeed arranging it we find $\tilde{y}_b < \mu_F$ ($\tilde{y}_a > \mu_F$).
[16] If the slope is equal to zero, all individuals have the same expected future income and we interpret this as the maximum level of intra-group mobility.

towards the long-run equilibrium income is always monotonic. In the following proposition we report how the slope affects the income threshold $\tilde{y}_k$.

***Proposition 2.*** *Let $F^a$, $F^b$ such that $\mu_a < \mu_b$. Then for any income transition function in $\Omega(F^a)$, the income threshold for group a, $\tilde{y}_a$, is decreasing in the parameter $\rho_{1a}$. Similarly, for any income transition function in $\Omega(F^b)$, the income threshold for group b, $\tilde{y}_b$, is increasing in the parameter $\rho_{1b}$.*

The proof is in the appendix 1.

As noted earlier, parameter $\rho_1$ indicates the persistency of a deviation from the steady state mean.[17] Therefore the flatter the transition function, the greater the intra-group mobility. This implies a faster income convergence toward $\mu_a$ ($\mu_b$) and a larger share of individuals in group *a* (group *b*) with expected future income below (above) $\mu_F$ and current income above (below). From another point of view, for individuals in group *b*, the flatter the transition function, the lower the current income needed to have an expected future income of at least $\mu_F$. By contrast, for individuals in group *a*, the flatter the transition function, the greater the current income needed to have an expected future income of at least $\mu_F$. So this proposition explains the changes in the value of $\tilde{y}_k$, simply by changes in the income shock volatility, with no assumptions on the returns to scale.

The main insight is that a higher intra-group mobility attaches more importance to the membership to a given group in the formation of preference towards redistribution. This is important to evaluate the empirical evidences: a smaller estimated slope of the income transition function of group *a (b)* could imply a smaller (greater) POUM effect.

The share of population that votes for $r_1$ is given by:

$$\tilde{\delta} = \left(n_a F^a(\tilde{y}_a) + n_b F^b(\tilde{y}_b)\right)/(n_a + n_b) \qquad (4)$$

With respect to equation (3) the arguments in $F^a(.)$ and $F^b(.)$ are different. Given that *F* is strictly increasing (by definition) and that $\tilde{y}_b < \mu_F$, it follows that $F^b(\tilde{y}_b) < F^b(\mu_F)$. Using the same argument, we have $F^a(\tilde{y}_a) > F^a(\mu_F)$. To quantify the effect of mobility concerns

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[17] The maximum persistence is given by $\rho_1 = 1$ (the expected incomes are distributed as the current ones). In case of maximum volatility, given by $\rho_1 = 0$, the expected incomes for groups *a and b* are, respectively, equal to $\mu_a$ and $\mu_b$.

on voting decisions we use the difference in the fraction of the population voting for $r_1$ between the benchmark and the two-period case that is:

$$P = \delta - \tilde{\delta}.$$

Variable *P* is a measure of the POUM effect and represents the share of people in group *b* with current income below the mean and expected future income above, minus the share of people in group *a* with current income above the mean and expected future income below. When *P* is negative, the size of the coalition favoring $r_1$ is larger with mobility concerns than without whereas, if the *P* is positive it is smaller. The sign of *P* depends on the parameters of the system as stated in the following theorem:

***Theorem 1.*** *Let $F^a$, $F^b$ such that $\mu_a < \mu_b$. Then for any function in $\Omega(F^a)$ such that*

$$n_a[F^a(\tilde{y}_a) - F^a(\mu_F)] < n_b F^b(\mu_F) \qquad (5)$$

*there exists a value of $\rho_{1,b}$, denoted by $\hat{\rho}_{1,b}$, such that all the transition functions in $\Omega(F^b)$ characterized by $\rho_{1,b} < \hat{\rho}_{1,b}$ lead to P>0.*

The proof is in the appendix 1.

For a given income transition process for group *a*, (5) is a necessary condition for a positive *P*: The left side says how many people in group *a* vote for $r_0$ in the benchmark case and switch to $r_1$ in the two-period case; the right side is an upper bound of the number of agents in group *b* who vote for $r_1$ in the benchmark case and switch to $r_0$ in the two-period case. Intuitively, given an income transition function for group *a*, it is possible to compute the number of individuals (in group *a*) that change opinion in comparison to the benchmark case. Then, if this number is lower than the number of agents in group *b* with current income below $\mu_F$ (potentially all these agents could change opinion in comparison to the benchmark case with a flat income transition function) , it is possible to find a sufficiently flat income transition function in $\Omega(F^b)$, such that the number of individuals in group *b* who change position with respect to $\mu_F$ is greater than that in group *a*. Therefore, the greater the mobility in group *b* in comparison to that in group *a* the greater the POUM effect. An immediate corollary is the following.

***Corollary 1.*** *Let $F^a$, $F^b$ be such that $\mu_a < \mu_b$. Then for any function in $\Omega(F^a)$ such that $n_a F^a(\tilde{y}_a) < (n_a + n_b)/2$, there exists a value of $\rho_{1,b}$, denoted by $\tilde{\rho}_{1,b}$, such that, for all transition functions in $\Omega(F^b)$ characterized by $\rho_{1,b} < \tilde{\rho}_{1,b}$, policy $r_0$ beats policy $r_1$.*

The proof is in the appendix 1.

The corollary gives necessary and sufficient conditions for policy $r_0$ to beat policy $r_1$. The necessary condition is that the number of individuals in group $a$ with an expected future income below the mean is smaller than half the population. The sufficient condition sets a minimum level of intra-group mobility for the group $b$.

Our model suggests a set of parameters affecting voters' decision. These parameters are the size of the two groups, the gap between their mean incomes and the income shock volatility in the two groups. The effect of the size of the two groups is ambiguous. For example, a rise of $n_b$ can increase the number of individuals with a current income below $\mu_F$ and an expected future income above, but it also causes a rise in $\mu_F$, reducing the size of the interval $(\tilde{y}_b, \mu_F)$. An increase in the gap between the mean incomes of the two groups causes an increase in the size of the intervals $(\mu_F, \tilde{y}_a)$ and $(\tilde{y}_b, \mu_F)$; thus, if the condition $F^b(\mu_F) - F^b(\mu_F - \Delta) > F^a(\mu_F + \Delta) - F^a(\mu_F)$ holds the variable $P$ will be greater. The same effect is caused by a rise in the level of income shock volatility in group $b$ in comparison to that in group $a$ (See proposition 2 and theorem 1).

*III.B Multi-period redistribution.*

In this section we study how the length of the horizon, over which the redistribution scheme is set, affects the support for redistribution. To this end we assume that the redistributive policy chosen at the time *t=1*, is implemented from period *t=2* until period *T*>2. We note that extending the political horizon, the interval of time to evaluate the income perspectives changes. Intuitively this fact is equivalent to keeping fixed the political horizon and rising the level of intra-group mobility.

In this setting individuals consider the present value of their expected incomes in the future *T-1* periods. We assume that individuals discount the future incomes at a discount rate $\beta \in (0,1)$ and that all the previous assumptions are still valid. At time *t=1* individuals vote for a redistributive policy that will be implemented from *t=2* until *t=T*. An individual votes for policy $r_1$ if the following condition holds:

$$\sum_{t=2}^{T} \beta^{t-1} E_1[y_{i,t}] \leq \sum_{t=2}^{T} \beta^{t-1} \mu_F \quad (6)$$

As in proposition 1 we can find for each group $k$ ($k \in \{a, b\}$) a threshold $\tilde{y}_k$: all people with current income below the threshold are voting for the redistributive policy $r_1$. The following proposition states this idea.

***Proposition 3***. *Let* $\beta \in (0,1)$, $T \geq 2$ *and* $F^a$, $F^b$ *such that* $\mu_a < \mu_b$. *Then for any income transition function in* $\Omega(F^k)$ $k \in \{a,b\}$, *there exists a unique income threshold, denoted by* $\tilde{y}_k(T,\beta)$, *such that all individuals in group k with current income in* $\left[0, \tilde{y}_k(T,\beta)\right)$ *vote for* $r_1$ *while all those with current income in* $(\tilde{y}_k(T,\beta), \hat{y}]$ *vote for* $r_0$.

The proof is in the appendix 1.

To prove this proposition it is sufficient to solve condition (6) for $y_{i,1}$. Unlike proposition 1, the income threshold here depends on the political horizon *T* and the discount factor $\beta$. For simplicity we suppress these arguments and write $\tilde{y}_k$ instead of $\tilde{y}_k(T,\beta)$. We note that $\tilde{y}_a > \mu_F$ and $\tilde{y}_b < \mu_F$. Moreover, all individuals in group *k* characterized by $y_i < \mu_k$ have expected future incomes above their current ones. Also, their expected future incomes are strictly increasing over time; that is: $y_{\mathrm{i},1} < E_1(y_{\mathrm{i},2}) < E_1(y_{\mathrm{i},3}) < \cdots < E_1(y_{\mathrm{i,T}})$. By contrast, individuals with $y_i > \mu_k$, have expected future incomes that are below the current ones and strictly decreasing over time. The following proposition describes how a change in the political horizon T affects, in each group, the share of voters in favor (or against) the redistributive policy.

***Proposition 4.*** *Let* $\beta \in (0,1)$ *and* $F^a$, $F^b$ *such that* $\mu_a < \mu_b$. *Then for any income transition function in* $\Omega(F^b)$, *the share of individuals belonging to group b and voting for* $r_1$ *is decreasing in T. Also, for any income transition function in* $\Omega(F^a)$ *the share of individuals belonging to group a and voting for* $r_1$ *is increasing in T.*

The proof is in the appendix 1.

To get an intuition for this result consider an individual in group *b* (group *a*) who has an expected future income of $\mu_F$ in *t+1*. This individual is indifferent between $\mathrm{r}_1$ and $\mathrm{r}_0$ when considering only period *t+1*. However, he will vote against (in favour) of redistribution when he considers period *t+2* because in period *t+2* he has an expected future income above (below) $\mu_F$. Given this, in each group the fraction of individuals voting for a given policy changes monotonically in *T*. We can state now the analog to theorem 1 for the case of multi-period redistribution.

***Theorem 2:*** *Let* $\beta \in (0,1)$, $F^a$, $F^b$ *such that* $\mu_a < \mu_b$. *Then for each given T and for any function in* $\Omega(F^a)$ *such that:*

*(7)* $$n_a[F^a(\tilde{y}_a) - F^a(\mu_F)] < n_b F^b(\mu_F)$$

*there exists a value of $\rho_{1,b}$, denoted by $\hat{\rho}_{1,b}$, such that all the functions in $\Omega(F^b)$ characterized by $\rho_{1,b} < \hat{\rho}_{1,b}$ lead to P>0. Furthermore, if*

(8) $$n_a\big(1 - F^a(\mu_F)\big) < n_b F^b(\mu_F)$$

*then there exists a value of T, say T", such that for all T>T" we get P>0.*

The proof is in the appendix 1.

This theorem states necessary and sufficient conditions for a positive POUM effect. The first part of the result is very similar to theorem 1 and (7) is a necessary condition for a positive *P* and has the same meaning as condition (5). In the second part, (8) is a necessary condition such that *P* is always positive for sufficiently large values of *T*: the number of individuals in group *a* that potentially could switch preferences (on the left side of (8)) has to be smaller than the number of individuals in group *b* that potentially could switch preferences (on the right side of (8)). An immediate consequence of this theorem is:

***Corollary 2.*** *Let $\beta \in (0,1)$, $F^a$, $F^b$ such that $\mu_a < \mu_b$. Then for each given T and for any functions in $\Omega(F^a)$ such that $n_a F^a(\tilde{y}_a) < (n_a + n_b)/2$ there exists a value of $\rho_{1,b}$, denoted by $\tilde{\rho}_{1,b}$, such that for all the functions in $\Omega(F^b)$ characterized by $\rho_{1,b} < \tilde{\rho}_{1,b}$ we find that policy $r_0$ beats policy $r_1$. Furthermore, if $n_a < n_b$, there exists a value of T, say T", such that for any given transition functions for the two groups, $r_0$ beats $r_1$ for all T>T".*

The proof is omitted because it is very similar to the one of theorem 2. While the first part is very similar to corollary 1, the second part tells us that the duration of the policy goes in favor of the preferences of larger group when *T* is sufficiently large.

## *IV. THE EVALUATION OF THE POUM EFFECT*

In this section we study the implications on the measure of the POUM effect when we assume heterogeneous income mobility processes. When the income mobility process is the same for all individuals, the POUM effect is positive if and only if the expected future income is concave in the current income. The next proposition states that the POUM effect is independent of the shape of the aggregate transition function in the presence of heterogeneous income processes.

***Proposition 5.*** *Suppose that the population can be divided in at least two groups characterized by different income mobility processes. Then the concavity of the aggregate income transition function is neither a necessary nor a sufficient condition for a positive P.*

The proof is in the appendix 1.

To prove this proposition we use two numerical examples in which a population is divided in two groups characterized by different income mobility processes. In the first example the aggregate income transition function is convex and the POUM effect is positive; in the second example the aggregate income transition function is concave and the POUM effect is negative. This result has an important operative implication: a social scientist or an econometrician who observes that the mobility process is concave in the aggregate cannot infer anything regarding the sign of the POUM effect without knowing: *a)* how individuals discriminate different income processes according to (observable) social characteristics; *b)* the characteristics of the mobility process in each group.

A second implication of our model regards the effect of a larger political horizon *T*. When the income mobility process is the same for all individuals, then the larger the political horizon *T*, the larger the POUM effect in absolute value. Assuming heterogeneous income mobility processes, we note that in each group the share of individuals voting for a given policy changes monotonically in *T*, but considering the whole population, the variable *P* can change non-monotonically on *T* depending on the slopes of the income transition functions and on the income distributions. For example, when the income transition function for group *b* is very flat and the respective transition function for group *a* has a slope close to 1, then we observe an increasing POUM effect for low values of *T* and a decreasing effect for high values. Then an extension of the horizon has an ambiguous effect (depending on the underlying parameter values). The next proposition states that POUM effect is not monotonic in the political horizon.

***Proposition 6.*** *Suppose that the population can be divided in at least two groups characterized by different income mobility processes. Then a larger value of T is neither a necessary nor a sufficient condition for a larger value of P in absolute terms.*

The proof is in the appendix 1.

To prove this proposition we use a numerical example in which the POUM effect changes non-monotonically in T. So extending the political horizon may strengthen, weaken or reverse the POUM effect. An observer who finds a positive (negative) POUM effect in the data can say nothing about a larger political horizon without knowing the characteristics of the income mobility processes of the groups in which the population can be divided. The only thing he can say is that for $T \to \infty$, only (and all) individuals belonging to group $a$ are in the coalition favoring redistribution, and that $\lim_{T\to\infty} P = (n_a F^a(\mu_F) + n_b F^b(\mu_F) - n_a)/(n_a + n_b)$.

In this setting the sign and the magnitude of the POUM effect depends on the kind of information used by individuals to discriminate their future perspectives. For example, if individuals discriminate groups according to characteristics that do not affect the income transition function (therefore groups end up having the same transition functions), the sign of the POUM has to depend on the functional form of the aggregate transition function. By contrast, if in the same society people discriminate groups according to some individual characteristics affecting income perspectives, the story may be different. Therefore the partition we have to use to measure the POUM effect correctly, remains an open question.

## *V. EMPIRICAL ANALYSIS*

In the previous sections we have seen how heterogeneity in income dynamics affects the prospect of upward mobility. Now we turn to the question whether this "heterogeneity effect" is in the data, and if so, how large it is. To answer this question, we perform, for the period 1989–2004, a first very simple and preliminary empirical analysis using the Bank of Italy Survey on Italian Households Income and Wealth (SHIW).[18] SHIW data is available for the following years: 1989, 91, 93, 95, 98, 00, 02, 04; a subset of the dataset is panel, so we can use it to estimate income transition functions. In our analysis we use the net disposable individual income, reported in euro and deflated at 2004 values.[19] Consider the following AR1 process with fixed effects:

$$y_{i,t} = \rho_0 + \rho_1 y_{i,t-1} + u_i + \varepsilon_{i,t} \tag{9}$$

[18] Our purpose here is not to carry out a large empirical study or a detailed calibration, but to show how the heterogeneity in the income dynamics could affect the measurement of the POUM effect.
[19] To deflate the values we use annual coefficients provided by ISTAT; details on the dataset are available on www.bancaditalia.it.

where $y$ is the log of income, $u$ is the individual (and unobserved) effect and $\varepsilon$ is the individual error term (i.i.d. with $E(\varepsilon) = 0$). By GMM[20] we can estimate it either for the whole sample or for different subsamples according to some observable characteristic. Assuming log-normality in the income distribution, the expected future income is given by:

$$E_{t-1}\left[y_{i,t} \middle| y_{i,t-1}\right] = exp\left[\bar{u} + \rho_0 + \rho_1 y_{i,t-1} + \sigma_{ue}^2/2\right] \tag{10}$$

where $\bar{u}$ is the mean of the individual effects and $\sigma_{ue}^2$ is the variance of the sum between error term and individual effect. In order to illustrate how heterogeneity affects the measurement of the POUM effect, we first estimate (9) without considering heterogeneity and compute the expected incomes using (10) [21] for each year in the data. Then we divide individuals in two subgroups according to some characteristics; for each group, we estimate (9) and compute the expected incomes using (10). Finally, in both cases and for each year, we compute the POUM effect defined as the difference between the fraction of people with current income below the average and the fraction of people with expected future income below the mean. In the following we report only the main evidences; the complete estimations and results are in appendix II.

The income distribution considered here show, on average, 62.8% of individuals with a disposable income below the average. Considering the expect incomes, computed estimating (9) without consider heterogeneity, we find that, on average, 48.2% of individuals have an expected future income below the average. So we find a positive POUM effect of 14.6%.

Now we assume that individuals can be divided into two groups, *a* and *b*, according to their work status: in group *b* there are junior managers, managers and self-employed and in group *a* all others.[22] We find that 82.3% of individuals belong to group *a* and earn, on average, an income of 0.89 times the mean income of the whole population; the remaining 17.7% of individuals belong to group *b* and earn, on average, an income of 1.57 times higher than the

[20] See Arellano Bond (1991) for details.

[21] By GMM, using the panel data, we estimate only parameter $\rho_1$; therefore we compute the expected future income for all individuals sampled in the SHIW, including all those that are not in the panel. In order to compute the expected future income in year *x*, we set a value for the term $exp[\bar{u} + \rho_0 + \sigma_{ue}^2/2]$ such that the average of the (so computed) expected incomes is equal to the average of income in year *x-1*. (Note that (10) can be written as $E_{t-1}\left[y_{i,t} \middle| y_{i,t-1}\right] = exp\left[\rho_1 y_{i,t-1}\right] exp[\bar{u} + \rho_0 + \sigma_{ue}^2/2]$).

[22] Blue-collar workers, office workers, school teachers and not employed.

mean income.[23] Considering this partition, we find that, on average, 68.2% of individuals have an expected future income below the average. So we find a negative POUM effect of 5.4%.

Comparing these two measures we see that the introduction of heterogeneity in the mobility process can change drastically the magnitude of the POUM effect. Moreover, we see that the statement in proposition 5 is not a "strange case" but it could be in the data. Without heterogeneity the estimated value of $\rho_1$ is smaller than 1; this implies a concave expected income function. Therefore, our finding of a negative POUM effect when we consider heterogeneity in the mobility process, gives us an empirical confirmation that concavity in the aggregate income transition function is not a sufficient condition for a positive POUM effect.

Now we assume that the population can be divided in two groups, *c* and *d*, according to sex[24]: in group *c* there are all the men and in group *d* all the women. We find that 56.2% of individuals belong to group *c* and earn, on average, an income of 1.23 times the mean income of the whole population; the remaining 43.8% of individuals belong to group *d* and earn on average an income of 0.72 times the mean income. Considering this partition we find a positive POUM effect of 18.3%. The comparison of this measure of the POUM effect with the previous one gives us an empirical confirmation that these measures strictly depend on the kind of partition we use.

## *VI. CONCLUSIONS*

This paper has studied how the evaluation of expected future incomes affects the preferences for income redistribution when individuals are divided into different groups characterized by different income transition functions. Several main results are obtained: first we have shown that a membership in a social group is more important the greater the intra-group mobility and the longer the political horizon. A second result is that there is no clear relationship between the shape of the aggregate transition function and the sign of the POUM effect. Finally, we have shown that the magnitude of the POUM effect can change drastically using different partitions of the population. There are several directions for future research. One is to generalize our model to many groups and link the POUM effect to some measure of

[23] These values are the averages over the years considered in the survey.
[24] Given that this is a very preliminary analysis, we report only the measure of the POUM effect.

heterogeneity. Another is to divide the population not according to exogenous characteristics but according to individual behavior; for example, we could use mixture regression models in order to select the correct number of groups.

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## *APPENDIX I*

Proof of Proposition 1.

By the income processes described in (2), the expected future income is given by $E[y_{i,t+1}] = \rho_{0k} + \rho_{1k} y_{i,t}$. Solving the inequality $\rho_{0k} + \rho_{1k} y_{i,t} \geq \mu_k$ for $y_{i,t}$ we obtain $y_{i,t} \geq (\mu_k - \rho_{0k})/\rho_{1k}$. Therefore, the threshold $\tilde{y}_k$, such that all individuals with a greater current income have an expected future income above $\mu_F$, is given by the right side of the previous inequality. Directly follows the preference of vote. QED.

Proof of Proposition 2.

By the assumption of stationary income processes, we have $\rho_{0k} = (1 - \rho_{1k})\mu_k$. Substituting into the expression for $\tilde{y}_k$ and taking the first derivative in $\rho_{1k}$ we get:

$$\frac{\partial \tilde{y}_k}{\partial \rho_{1k}} = \frac{\mu_{k-}\mu_F}{\rho_{1k}}$$

which is negative for $k = a$ and positive for $k = b$. QED.

Proof of Theorem 1.

Inserting (3) and (4) in the definition of P we obtain:

$$P = \frac{n_a[F^a(\mu_F) - F^a(\tilde{y}_a)] + n_b[F^b(\mu_F) - F^b(\tilde{y}_b)]}{n_a + n_b}$$

Since the denominator of this expression is strictly positive its sign depends on the sign of the numerator. Thus *P>0* if:

$$n_b F^b(\mu_F) - n_a[F^a(\tilde{y}_a) - F^a(\mu_F)] > n_b F^b(\tilde{y}_b) \tag{11}$$

When condition (5) is satisfied, the left hand side of (11) is strictly positive. Using the assumption that $F$ is strictly increasing, we can find a value $\bar{y}$ such that for all $\tilde{y}_b < \bar{y}$ inequality (11) is satisfied (for a given value of the left side). Given that $\tilde{y}_b$ is increasing in $\rho_{1k}$ (see proposition 2), we can find a value of $\hat{\rho}_{1k}$ such that all transition function in $\Omega(F^b)$ characterized by $\rho_{1k} < \hat{\rho}_{1k}$ leads to a *P>0* (for a given transition function in $\Omega(F^a)$). QED.

Proof of Corollary 1.

The condition such that $r_0$ beats $r_1$ is:

$$\frac{n_a F^a(\tilde{y}_a) + n_b F^b(\tilde{y}_b)}{n_a + n_b} < 0.5$$

Rearranging, we obtain:

(12) $$n_b F^b(\tilde{y}_b) < 0.5(n_a + n_b) - n_a F^a(\tilde{y}_a)$$

Assume that the right hand side is positive. Therefore, given the assumption that $F$ is strictly increasing, we can find a value $\bar{y}$ such that for all $\tilde{y}_b < \bar{y}$ inequality in (12) is satisfied (for a given value of the left hand side). By the result in proposition 2, $\tilde{y}_b$ is increasing in $\rho_{1k}$, we find a value of $\hat{\rho}_{1k}$ such that, for all transition functions in $\Omega(F^b)$ characterized by $\rho_{1k} < \hat{\rho}_{1k}$, $r_0$ beats $r_1$ (for a given transition function in $\Omega(F^a)$). QED.

Proof of Proposition 3.

Solving condition (6) for $y_{i,1}$ (income of individual $i$ at time $t=1$) we obtain the following inequality:

$$y_{i,t} \leq \frac{1 - \rho_{1k}\beta}{(1 - (\rho_{1k}\beta)^{T-1})\rho_{1k}\beta} \sum_{t=2}^{T} \beta^{t-1} \left( \mu_F - \rho_{0k} \frac{1 - \rho_{1k}^{t-1}}{1 - \rho_{1k}} \right)$$

The right hand side depends on the parameters of the system and represents the upper bound of the current income for individuals belonging to group $k$ to favor redistributive policy $r_1$. We denote it by $\tilde{y}_k$. QED.

Proof of Proposition 4.

Simplifying the expression for $\tilde{y}_k$ (see proof of proposition 3) we obtain:

$$\tilde{y}_k = \frac{1 - \rho_{1k}\beta}{(1 - (\rho_{1k}\beta)^{T-1})\rho_{1k}\beta} \sum_{t=2}^{T} \beta^{t-1} \left( \mu_F - \mu_k (1 - \rho_{1k}^{t-1}) \right)$$

Rearranging the right hand side we obtain:

$$\tilde{y}_k = \frac{1 - \rho_{1k}\beta}{\rho_{1k}\beta} \left[ \frac{(\mu_F - \mu_k)(1 - \beta^{T-1})\beta}{(1 - \beta)(1 - (\rho_{1k}\beta)^{T-1})} + \frac{\mu_k \beta \rho_{1k}}{1 - \beta\rho_{1k}} \right]$$

In this expression, only the first term inside the bracket depends on $T$; we note that it is decreasing in $T$. Indeed, dividing it into two factors, we can see that the first one, $(\mu_F - \mu_k)\beta/(1 - \beta)$, is negative for group $b$ (because $\mu_F \leq \mu_b$) and positive for group $a$. The second factor, $(1 - \beta^{T-1})/(1 - (\rho_{1k}\beta)^{T-1})$, has a positive derivative with respect to $T$ for all $\beta \in (0,1)$ and $\rho_{1k} \in (0,1)$. It follows that $\tilde{y}_k$ decreases in T for individuals belonging to group $b$, while it increases in T for individuals belonging to group $b$. QED.

Proof of Theorem 2.

Part 1. The derivative of the threshold $\tilde{y}_k$ with respect $\rho_{1k}$ is:

$$\frac{d\tilde{y}_k}{d\rho_{1k}} = -\frac{\sum_{t=2}^{T}(t-1)\beta^{t-1}\rho_{1k}^{t-2}(\mu_F - \mu_k)\sum_{t=2}^{T}\beta^{t-1}}{(\sum_{t=2}^{T}(\rho_{1k}\beta)^{t-1})^2}$$

If $\mu_F < \mu_k$ the derivative is strictly positive and the number of agents in group *k* voting for $r_1$ is strictly decreasing. The rest of the proof is similar to that of theorem 1 and it is omitted. QED.

Part 2. Assume that condition (8) is satisfied. By proposition 4, we note that in group *b* the share of individuals voting for $r_0$ is strictly increasing on *T*. Then it is directly verifiable that there exists a sufficiently large value of *T*, say *T"*, such that for all $T \geq T"$ $n_a\left(1 - F^a(\mu_F)\right) < n_b(F^b\ (\mu_F\ ) - F^b\ (\tilde{y}_b\ ))$. It follows that for all $T \geq T"$ the number of individuals in group *b* switching preferences to $r_0$ is larger than the maximum number of individuals in group *a* that could switch preferences to $r_1$. QED.

Proof of Proposition 5.

To prove this proposition we use two numerical examples. In both there are two groups with different income distributions and different income transition functions. For both groups the income is distributed in the interval $[0,5]$. The coefficients of the income transition functions are taken to produce the same mean through periods. The aggregate transition function is: [25]

$$y_t = \frac{(\rho_{0a}+\rho_{1a}y_{t-1})n_a f^a[y_{t-1}] + (\rho_{0b}+\rho_{1b}y_{t-1})n_b f^b[y_{t-1}]}{n_a f^a[y_{t-1}] + n_b f^b[y_{t-1}]}$$

*Example 1.* In this example we show that a positive POUM is generated even if the aggregate income transition function is convex. This proves that a concave mobility process is not a necessary condition for a positive POUM effect.

Assume $n_a = n_b$, $f^a[y] = 0.4 - 0.08y$, $f^b[y] = 0.3 - 0.04y$, $y_{a,t} = 1.167 + 0.3y_{a,t-1}$, $y_{b,t} = 1.458 + 0.3y_{b,t-1}$. Then the resulting mean incomes are $\mu_a = 1.667$, $\mu_b = 2.083$, $\mu_F = 1{,}875$ and the aggregate transition function is $y_t = \frac{45.21+2.92y_{t-1}-1.8y_{t-1}^2}{35-6y_{t-1}}$. The aggregate transition function is convex, indeed it is verifiable that the second derivative is positive

[25] This is the Bayesian aggregation of the two mobility processes: for each level of $y_{t-1}$ the aggregate income transition function is the weighted average of the income transition functions of the two groups.

$\forall y \in [0,5]$.[26] We have approximately 11.2% of people in group $a$ with a current income above $\mu_F$ and expected future income below. In group $b$ we have, approximately, 11.4% of people with a current income below $\mu_F$ and expected future income above. Thus, there is a positive POUM even if the aggregate income transition function is convex.

Example 2. In this example we show that a negative POUM is generated even if the aggregate income transition function is concave. This proves that a concave mobility process is not a sufficient condition for a positive POUM effect. Assume $n_a = 1$, $n_b = 2.3$, $f^a[y] = 0.35 - 0.06y$, $f^b[y] = 0.3 - 0.04y$, $y_{a,t} = 1.74 + 0.1y_{a,t-1} - 0.01y_{a,t-1}^2$, $y_{b,t} = 1.646 + 0.3y_{b,t-1} - 0.03y_{b,t-1}^2$. Then the resulting mean incomes are $\mu_a = 1.875$, $\mu_b = 2.083$, $\mu_F = 2{,}02$ and the aggregate transition function is $y_t = \frac{45.21+2.92y_{t-1}-1.8y_{t-1}^2}{1.04-0.152y_{t-1}}$. The aggregate transition function is concave, indeed it is verifiable that the second derivative is negative $\forall y \in [0,5]$. We have approximately 41.54% of people in group $a$ (12.6% of the whole population) with a current income above $\mu_F$ and expected future income below. In group $b$ we have approximately 12.91% of people with current income below $\mu_F$ and expected future income above (9% of the whole population). Thus, there is a negative POUM even if the aggregate income transition function is concave. QED

Proof of Proposition 6.

To prove this proposition we use a numerical example. All assumptions in example 1 in the proof of proposition 5 are still valid. We change only the two transition functions to $y_{a,t} = 0.83 + 0.5y_{a,t-1}$ *and* $y_{b,t} = 0.83 + 0.6y_{b,t-1}$.We have 55.1% of the population with current income below the mean. Computing the POUM effect for different political horizons using a discount factor equal to 1 we obtain the following values:

| *T* | *1* | *2* | *3* | *4* | *5* | *6* |
|---|---|---|---|---|---|---|
| *POUM* | *-0.94* | *-2.73* | *-4.90* | *-1.83* | *5,10* | *5.10* |

We have a negative and decreasing POUM effect in the first 3 years; then the POUM effect increases to become positive in period 5. From then on the POUM is stable because all

[26] The second derivative is approximately $\frac{-71.5}{(6y-35)^3}$

individuals in group *a* have an expected future income below the mean while all individuals in group *b* have an expected future income above the mean. QED.

## *APPENDIX II*

Estimation of the income mobility process (9)

No heterogeneity

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =     15454
Group variable (i): Id                          Number of groups   =      7397
                                                Wald chi2(.)       =         .
Time variable (t): anno                         Obs per group: min =         1
                                                               avg =  2.089225
One-step results                                               max =         6
------------------------------------------------------------------------------
       y     |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       y(t-1)|    .211679   .0171521    12.34   0.000     .1780615    .2452966
       a3    |  -.0346676   .0160537    -2.16   0.031    -.0661323   -.003203
       a4    |  -.0386742   .0168178    -2.30   0.021    -.0716365   -.005712
       a5    |  -.0137822   .0181834    -0.76   0.448     -.049421    .0218566
       a6    |  -.0055581   .0192293    -0.29   0.773    -.0432467    .0321306
       a7    |  -.0052037   .0199744    -0.26   0.794    -.0443529    .0339454
       a8    |   .0274293   .0207867     1.32   0.187    -.0133118    .0681705
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(10) =    11.95      Prob > chi2 = 0.2882
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z = -31.90   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =   0.67   Pr > z = 0.5044
```

With heterogeneity: two groups, *a* and *b*.

*Group a: Blue-collar workers, office workers, school teachers and not employed*

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =     12948
Group variable (i): Id                          Number of groups   =      6377
                                                Wald chi2(.)       =         .
Time variable (t): anno                         Obs per group: min =         1
                                                               avg =  2.030422
One-step results                                               max =         6
------------------------------------------------------------------------------
       Y     |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       y(t-1)|   .2363868   .0188056    12.57   0.000     .1995285    .2732452
         a3  |  -.0155362   .0166819    -0.93   0.352    -.0482321    .0171596
         a4  |  -.0167166   .0176779    -0.95   0.344    -.0513646    .0179314
         a5  |  -.0144939   .0191923    -0.76   0.450    -.0521101    .0231222
         a6  |  -.0149999   .0203461    -0.74   0.461    -.0548776    .0248777
         a7  |  -.0197257   .0211411    -0.93   0.351    -.0611614      .02171
         a8  |  -.0081488   .0219865    -0.37   0.711    -.0512417     .034944
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(10) =    13.90      Prob > chi2 = 0.1776
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z = -27.36   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -1.40   Pr > z = 0.1612
```

*Group b: junior managers, managers and self-employed*

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =      2506
Group variable (i): Id                          Number of groups   =      1490
                                                Wald chi2(.)       =         .
Time variable (t): anno                         Obs per group: min =         1
                                                               avg =  1.681879
One-step results                                               max =         6
------------------------------------------------------------------------------
       y     |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      y(t-1)|   .1790161   .0439709     4.07   0.000     .0928347    .2651976
        a3   |  -.1325206   .0507602    -2.61   0.009    -.2320087   -.0330325
        a4   |  -.1511914   .0539776    -2.80   0.005    -.2569856   -.0453971
        a5   |  -.0078984   .0603788    -0.13   0.896    -.1262386    .1104418
        a6   |   .0512153   .0672854     0.76   0.447    -.0806616    .1830922
        a7   |   .0797745   .0717344     1.11   0.266    -.0608223    .2203713
        a8   |   .2337168   .0760313     3.07   0.002     .0846981    .3827355
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(10) =    12.89      Prob > chi2 = 0.2301
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z = -12.20   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =   1.40   Pr > z = 0.1609
```

With heterogeneity: two groups, *c* and *d*.

*Group c: men*

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =      9120
Group variable (i): Id                          Number of groups   =      4259
                                                Wald chi2(.)       =         .
Time variable (t): anno                         Obs per group: min =         1
                                                               avg =  2.141348
Two-step results                                               max =         6
------------------------------------------------------------------------------
        y    |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     y(t-1)  |   .1274201   .0347037     3.67   0.000     .0594022    .1954381
        a3   |  -.0223108   .0180153    -1.24   0.216    -.0576201    .0129984
        a4   |  -.0459537   .0187609    -2.45   0.014    -.0827245   -.0091829
        a5   |  -.0076252   .0209866    -0.36   0.716    -.0487582    .0335077
        a6   |    -.03442   .0219009    -1.57   0.116    -.0773449     .008505
        a7   |  -.0299888   .0226526    -1.32   0.186     -.074387    .0144095
        a8   |  -.0064723   .0238965    -0.27   0.787    -.0533085    .0403639
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(10) =    13.97      Prob > chi2 = 0.1741
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z = -10.58   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =   2.21   Pr > z = 0.0268
```

*Group d: women*

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =      6334
Group variable (i): Id                          Number of groups   =      3138
                                                Wald chi2(.)       =         .
Time variable (t): anno                         Obs per group: min =         1
                                                               avg =  2.018483
Two-step results                                               max =         6
------------------------------------------------------------------------------
        Y    |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
      y(t-1) |   .2515189    .041067     6.12   0.000      .171029    .3320088
          a3 |   -.047667   .0233093    -2.04   0.041    -.0933524   -.0019817
          a4 |   -.028274   .0244368    -1.16   0.247    -.0761692    .0196212
          a5 |  -.0180442   .0268425    -0.67   0.501    -.0706545     .034566
          a6 |   .0510606    .028967     1.76   0.078    -.0057136    .1078348
          a7 |   .0375997   .0308811     1.22   0.223    -.0229262    .0981256
          a8 |   .0815573   .0323442     2.52   0.012     .0181639    .1449507
------------------------------------------------------------------------------
Sargan test of over-identifying restrictions:
         chi2(10) =     6.91      Prob > chi2 = 0.7335
Arellano-Bond test that average autocovariance in residuals of order 1 is 0:
         H0: no autocorrelation   z =  -6.49   Pr > z = 0.0000
Arellano-Bond test that average autocovariance in residuals of order 2 is 0:
         H0: no autocorrelation   z =  -0.77   Pr > z = 0.4425
```

## Mesures of the POUM effect

No heterogeneity

| anno | Individuals with current income below the average (% of the total) | Individuals with expected future income below the average (% of the total) | POUM effect |
|---|---|---|---|
| 1 | 63.61 | 49.32 | 14.29 |
| 2 | 60.80 | 49.15 | 11.65 |
| 3 | 62.39 | 48.11 | 14.28 |
| 4 | 62.73 | 47.63 | 15.10 |
| 5 | 63.50 | 47.20 | 16.30 |
| 6 | 61.92 | 46.81 | 15.11 |
| 7 | 63.70 | 49.95 | 13.75 |
| 8 | 64.04 | 47.30 | 16.74 |
| average | 62.82 | 48.19 | 14.63 |

With heterogeneity: two groups, *a* and *b*.

| anno | Individuals with current income below the average (% of the total) | Individuals with expected future income below the average (% of the total) | POUM effect |
|---|---|---|---|
| 1 | 63.61 | 70.32 | -6.71 |
| 2 | 60.80 | 69.85 | -9.05 |
| 3 | 62.39 | 64.36 | -1.97 |
| 4 | 62.73 | 63.73 | -1.00 |
| 5 | 63.50 | 67.41 | -3.91 |
| 6 | 61.92 | 67.70 | -5.78 |
| 7 | 63.70 | 70.13 | -6.43 |
| 8 | 64.04 | 72.70 | -8.66 |
| average | 62.82 | 68.24 | -5.42 |

With heterogeneity: two groups, *c* and *d*.

| anno | Individuals with current income below the average (% of the total) | Individuals with expected future income below the average (% of the total) | POUM effect |
|---|---|---|---|
| 1 | 63.61 | 40.77 | 22.84 |
| 2 | 60.80 | 42.10 | 18.70 |
| 3 | 62.39 | 45.30 | 17.09 |
| 4 | 62.73 | 45.33 | 17.04 |
| 5 | 63.50 | 44.98 | 18.52 |
| 6 | 61.92 | 45.44 | 16.48 |
| 7 | 63.70 | 46.18 | 17.52 |
| 8 | 64.04 | 46.23 | 17.81 |
| average | 62.82 | 44.55 | 18.27 |

Distribution of individuals and relative mean income in groups *a* and *b*.

| anno | Individuals in group *a* (% of the total) | Individuals in group *b* (% of the total) | Mean income of group *a* (mean income of whole population=1) | Mean income of group *b* (mean income of whole population=1) |
|---|---|---|---|---|
| 1 | 77.21 | 22.79 | 0.870 | 1.470 |
| 2 | 78.57 | 21.43 | 0.872 | 1.492 |
| 3 | 83.81 | 16.19 | 0.908 | 1.560 |
| 4 | 82.20 | 17.80 | 0.910 | 1.510 |
| 5 | 82.34 | 17.66 | 0.890 | 1.586 |
| 6 | 83.11 | 16.89 | 0.886 | 1.592 |
| 7 | 84.99 | 15.01 | 0.888 | 1.663 |
| 8 | 85.90 | 14.10 | 0.879 | 1.784 |
| average | 82.28 | 17.72 | 0.888 | 1.569 |

Distribution of individuals and relative mean income in groups *c* and *d*.

| anno | Individuals in group *c* (% of the total) | Individuals in group *d* (% of the total) | Mean income of group *c* (mean income of whole population=1) | Mean income of group *d* (mean income of whole population=1) |
|---|---|---|---|---|
| 1 | 59.93 | 40.07 | 1.204 | 0.712 |
| 2 | 58.51 | 41.49 | 1.207 | 0.720 |
| 3 | 55.81 | 44.19 | 1.264 | 0.698 |
| 4 | 55.53 | 44.47 | 1.272 | 0.698 |
| 5 | 56.48 | 43.52 | 1.251 | 0.704 |
| 6 | 55.45 | 44.55 | 1.226 | 0.731 |
| 7 | 54.00 | 46.00 | 1.214 | 0.758 |
| 8 | 53.80 | 46.20 | 1.224 | 0.753 |
| average | 56.17 | 43.83 | 1.232 | 0.723 |

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Francesco Feri

Information, Social Mobility and the Demand for Redistribution

## Abstract

This paper studies how heterogeneity in income dynamics affects the POUM hypothesis (the idea that poor people do not support high level of redistribution because they hope to be rich in the future). We consider a setting where individuals evaluate their expected future income using both their current income and observable characteristics such as education, race or gender. We find that the POUM effect could increase or decrease the support for redistribution depending on the parameters of the model. Moreover we find that the POUM effect is independent of a particular shape (the concavity) of the resulting aggregate income transition function. Finally, using data from Italy, we test the model and perform a first empirical estimation of the POUM effect in Italy.

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