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POLICY UNCERTAINTY, ELECTORAL SECURITIES, AND REDISTRIBUTION*

By Andrea Mattozzi[1]

California Institute of Technology, U.S.A.

This article investigates how uncertainty about the adoption of a redistribution policy affects political support for redistribution when individuals can trade policy-contingent securities in the stock market. In equilibrium the support for redistribution is smaller than where no "policy-insurance market" is available. This implies that in economies with well-developed financial markets redistribution decreases with the level of participation in these markets and with income inequality. Furthermore, the existence of a policy-insurance market may lead to a less equal distribution of income than where no insurance is available even if a majority of individuals are redistributing resources through private transfers.

1. INTRODUCTION

The relationship between income distribution and citizens' support for redistribution has long been a central issue in political economy. The seminal paper of Meltzer and Richard (1981) presents a simple but powerful argument: the more positive-skewed the distribution of income, the higher the political support for redistributive taxation. However, this argument is not supported by the data. As pointed out by Bénabou (2000) among others, for advanced countries the relationship seems to run in the opposite direction: the more unequal societies tend to redistribute less rather than more.[2]

In order to reconcile the basic insights of political-economy theories of redistribution with the empirical evidence, the recent literature has emphasized the potentially important role of *individual* uncertainty in explaining citizens' support for redistribution. For example, if agents are uncertain about their prospect of future income, and policies are persistent, relatively poor agents may choose to oppose a redistributive policy.[3] A largely unexplored issue, however, is whether citizens' reaction to *policy* uncertainty plays any role in understanding the relationship between income distribution and the likelihood of adopting redistributive policies. Political uncertainty is a pervasive phenomenon, which is inherent to the political process. It naturally arises because different candidates running for office, if elected, will implement different policies, and election results are uncertain; that is what happened, for example, in the last two presidential elections in the United States.[4] Furthermore, even after a candidate is elected, there might still be uncertainty about the likelihood that he will be able to implement his electoral promises (this

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[2] Bénabou (2000, p. 96) states: "The archetypal case is that of the United States versus Western Europe, but the observation holds within the latter group as well; thus Scandinavian countries are both the most equal and the most redistributive." Clearly this is only suggestive evidence for a dynamic phenomenon which can be particularly complex to assess quantitatively. In fact, even pre-tax income distribution is in turn affected by the redistributive policies already in place.

[3] See, e.g., Piketty (1995) and Bénabou and Ok (2001).

[4] For an extensive analysis of voters' information in U.S. presidential elections, see Alvarez (1998).

is the case, for example, with the health-care reform that was at the center of Clinton's 1992 presidential campaign but was defeated in Congress during his presidency).

In a recent paper Musto and Yilmaz (2003) study the relation between policy uncertainty and the adoption of redistributive policies by focusing on the interaction between financial markets and political outcomes. They consider a model where two candidates with different ideologies compete for election by announcing redistribution policies and all voters can share the "wealth risk" associated with different electoral outcomes by trading election-contingent securities in a frictionless financial market. They show that, because complete financial markets induce full insurance, all voters, regardless of their wealth, are indifferent between alternative redistribution policies. Hence, wealth considerations have no effect on electoral outcomes. They also note that "Since financial market access is intuitively weak for one side of this market, poor people, the result we find for complete and perfect markets can be viewed as cautionary, a prediction of the economy with easier access."[5]

In this article, I investigate how uncertainty about the adoption of a redistribution policy affects political support for redistribution when a *subset* of individuals can trade policy-contingent securities. I propose an equilibrium model where agents who are ex ante heterogeneous with respect to their income can trade policy-contingent securities and then vote on a redistribution policy whose probability of adoption increases with the number of its supporters. In this model, the very poor are excluded from the policy-insurance market. The extent to which participation is constrained determines the "size" of the market. I show that if poor individuals cannot trade in the policy-insurance market, the support for redistribution is always smaller than in the case where no insurance is available. In equilibrium, relatively poor individuals receive private transfers from the rich through the policy-insurance market and oppose a public redistribution policy that they would otherwise have supported.

This model implies a relationship between income inequality and support for redistribution. This relationship is nonmonotonic and depends on the size of the policy-insurance market. In particular, in economies with well-developed financial markets the level of redistribution decreases with the level of participation in these markets and with income inequality. Moreover, the size of the market also affects the inequality of the equilibrium income distribution. I show that the existence of a policy-insurance market may lead to a less equal equilibrium distribution of income than in the case where no insurance is available even if a majority of individuals are actually redistributing resources through private transfers. I use these theoretical findings to interpret the empirical evidence on the relationships between income inequality and redistribution.

There are three strands of literature that are related to this article. The first strand focuses on the interaction between politics and financial markets. As I already pointed out earlier, Musto and Yilmaz (2003) consider a model where two candidates with different ideologies compete for election by announcing redistribution policies and, unlike my model, all voters can share the wealth risk associated with different electoral outcomes by trading election-contingent securities in a frictionless financial market. Celentani et al. (2004) analyze risk sharing and endogenous fiscal spending in the presence of complete markets. They show that if markets are sequentially complete, fiscal policy can be used to manipulate future security prices leading to inefficient equilibrium allocations.

The second strand of literature presents different theoretical explanations for the fact that income inequality and popular support for redistribution are not positively correlated. Bénabou (2000) shows that if redistribution is ex ante welfare improving, the support for redistribution is U-shaped in inequality. The intuition is that when there is no inequality, everybody gains from a welfare improving redistribution. As inequality increases, somebody has to lose from the redistributive policy. However, when inequality is high enough, the skewness effect dominates. Lee and Roemer (1999) show that public spending is not necessarily increasing in inequality because, as inequality rises, a given tax rate produces a smaller tax base.

[5] Musto and Yilmaz (2003, p. 992).

The third strand of literature is on the empirical relationship between politics and the stock market. In Mattozzi (2008), I show that existing stocks that are currently traded on the U.S. stock market can be used to insure against political uncertainty. Focusing on the 2000 U.S. presidential election, I construct two "presidential portfolios" composed of selected stocks anticipated to fare differently under a Bush versus a Gore presidency. In order to construct these portfolios I use data on campaign contributions by publicly traded corporations and identify the major contributors on each side (excluding corporations that made significant contributions to both candidates' campaigns). Using daily observations for the six months before the election took place, I show that the excess returns of these portfolios with respect to overall market movements are significantly related to changes in electoral polls. Based on the evidence, I conclude that the presidential portfolios can actually be used as an instrument to hedge political uncertainty. Knight (2007) tests whether policy platforms are capitalized into equity prices, using data from the 2000 U.S. presidential election. He selects a sample of firms favored under the alternative policy platforms using reports from financial analysts and shows that campaign platforms matter for firms' profitability. In a similar vein, Herron et al. (1999) study the effect of the 1992 U.S. presidential election outcome on the profitability of different economic sectors, and Ayers et al. (2004) study whether security prices reflect fiscal policy uncertainty using data from the same election.[6]

The remainder of the article is organized as follows. Section 2 presents a simplified version of the model showing the main effect of the policy-insurance market on individuals' behavior. Section 3 contains the general equilibrium model. Section 4 deals with the effects of the policy-insurance market on the inequality of the expected income distribution after policy uncertainty is resolved. Section 5 explores the implications of the existence of a policy-insurance market on the relationship between income inequality and popular support for redistribution. Section 6 concludes.

2. AN EXAMPLE

In this section I present a simple example in order to show two important results of this article: First, if some individuals cannot trade in the policy-insurance market, the support for redistribution in the regime with policy insurance is always smaller than in the case where no policy insurance is available. Second, an increase in income inequality may actually decrease the popular support for redistribution.

Consider a one-period model with three groups of agents and logarithmic utility function over wealth. Each group has equal mass, and group i has an initial endowment of $y^i,\ i = \{1, 2, 3\}$, where $y^1 = h,\ y^2 = m$, and $y^3 = l$. Assume that $h > m > l$, and $m < \frac{h+m+l}{3} = E(y)$ (that is, the median endowment is below the mean endowment). Agents have to choose between two different alternatives: the status quo and a reform that taxes wealth proportionally at rate τ and redistributes $\tau E(y)$ to every agent. Sincere voting is weakly dominant with two alternatives and because voting is costless, each agent will vote for the alternative that gives him higher utility. If indifferent between alternatives, agents randomize with equal probability.

Policy uncertainty is modeled by assuming that there is ex ante uncertainty about the probability that the reform will be implemented. In particular, suppose that the probability of implementing the redistributive policy is equal to the share of its supporters in the population. Given that $m < E(y)$, the only group that is strictly worse off with the reform is $y^i = h$. Therefore, the probability q that the redistributive reform will be adopted is equal to $\frac{2}{3}$.

Suppose now that before voting over the reform a financial market opens. Agents can trade any quantity b of a financial security that pays 1 if the reform is implemented and pays 0 otherwise.[7] Let p be the price of the bond.

[6] At a more aggregate level, see also Pantzalis et al. (2000) and Santa-Clara and Valkanov (2003). In light of the third strand of literature, it is worth noting that, although betting on presidential elections is illegal in the United States, in 2004 the Irish company Tradesports started offering a winner-take-all contract on the U.S. presidential election.

[7] The argument is similar if instead b pays 0 when the reform is implemented and 1 otherwise.

The maximization problem that agents solve is

$$\max_{b_{y^i}} q\ln((y^i+b_{y^i}(1-p))(1-\tau)+\tau E(y))+(1-q)\ln(y^i-b_{y^i}p),$$

and market clearing requires

$$b_l+b_m+b_h=0,$$

where b_{y^i} denotes the quantity of the security traded by the agent with initial endowment y^i. By taking first-order conditions and using the market clearing equation I get

$$b_{y^i}=(y^i-E(y))\psi(\tau,q)$$
$$p=\frac{q(1-\tau)}{1-\tau q},$$

where $\psi(\tau,q)$ is positive.[8] Note that, because the security is a fair insurance and every agent can trade in the financial market, in equilibrium the wealth in the two states has to be the same. Every agent will be indifferent between voting in favor or against redistribution, and the final probability of adopting the reform will depend on the tie-breaking rule. Moreover, irrespective of whether or not the reform is implemented, some redistribution (through private transfers) will take place anyway. This result is similar to the one obtained by Musto and Yilmaz (2003).

Consider now the case in which trading in the policy-insurance market is conditional on having a given positive amount γ of initial endowment. For example, assume that the poorest group $y^i=l$ cannot trade ($l<\gamma<m$). In this case, taking first-order conditions and using the market clearing equation yields

$$b_{y^i}=\left(y^i-\frac{m+h}{2}\right)\rho(\cdot)$$
$$p=\frac{q(1-\tau)}{1-\tau+\dfrac{2\tau E(y)(1-q)}{m+h}},$$

where $\rho(\cdot)$ is positive.[9] Simple algebra shows that every group that can trade namely, $y^i=\{m,h\}$, will strictly prefer the status quo to the reform for any $q\in(0,1)$. Therefore, in equilibrium, the probability that the redistributive reform will be adopted in the regime with policy insurance is equal to $\frac{1}{3}$, that is strictly smaller than in the case where no insurance is available.

In order to see the intuition behind this result note that if the poor group cannot trade, the wealth of agents who trade is higher when redistribution does not take place, because when it does, part of the wealth goes to poor agents who do not trade. In other words, when everybody can trade, all the risk is idiosyncratic and therefore insurable. Whereas if the poor group cannot insure herself part of the risk becomes systematic. In the redistribution state, the poor group is

[8] In this particular example, $\psi(\tau,q)=\tau(1-\tau q)/(1-\tau)$.

[9] In this particular example,

$$\rho(\cdot)=\frac{2}{m+h}\frac{\left(1-\tau+\dfrac{2\tau E(y)}{m+h}(1-q)\right)\tau E(y)}{\left(1-\tau+\dfrac{2\tau E(y)}{m+h}\right)(1-\tau)}.$$

extracting money from the two other groups, and they will therefore strictly prefer the status quo.[10]

Suppose now, that holding the mean $E(y)$ constant, h decreases to $h' < h$ and l increases to $l' > \gamma > l$. As a result, the popular support for redistribution and therefore the probability of adopting the redistribution will increase even if the initial distribution of endowments is more equal.[11]

Note that if l is very small, the indifference result of Musto and Yilmaz (2003) can be obtained only in the limit when γ becomes smaller than l. In all other situations, either the market trivially has no effect ($\gamma > h$) or agents are not indifferent between policies, and in fact, if they can trade, they are strictly better off without redistribution. Moreover, because in equilibrium the poor group will sell the electoral security, a small l implies that $l + b_l(1 - p) < 0$, and the poor group will end up with a negative pre-tax wealth in the redistribution state. If l is small, by imposing an ex-post budget constraint, i.e., by requiring that poor agents' debt does not exceed their pre-tax endowment, the indifference result breaks down even if $\gamma < l$, and the probability that the redistributive reform is adopted in the regime with policy insurance is (weakly) smaller than in the case where no insurance is available.[12]

In the following three sections I show that the conclusions obtained above hold in a more general environment and explore the relationship between inequality and the adoption of redistributive policies.

3. THE MODEL

The economy is populated by a continuum of agents of measure one. Each agent is endowed with pre-tax income $y \geq 0$. The initial distribution of income is described by a known distribution function F, with associated density function f and support Y. Let

$$E(y) \equiv \int_Y y \, dF(y)$$

be the average income, and let $\underline{y} \geq 0$ be the lower bound of Y.

Agents are called to vote on the adoption of a reform. Two alternatives are available: the status quo versus a policy (τ, T), where τ is a proportional tax on wealth and T is a per-capita lump sum transfer. I assume that the budget is balanced, that is $T = \tau E(y)$. Voting is costless and, with only two alternatives, sincere voting is a weakly dominant strategy. Following most of the literature on redistributive taxation, I use a simple linear tax as a convenient way to describe my results. However, the implications of my analysis hold for a larger class of policies entailing a conflict of interest between those who gain from it and those who are hurt by it.[13]

As in the previous section, policy uncertainty is modeled by assuming that there is ex ante uncertainty about the probability that the reform will be implemented. Namely, I assume that the probability of implementing the redistribution policy increases monotonically with the number of its supporters. In other words, for given proportion q of individuals in favor of the redistributive policy, the probability that this policy will be actually implemented is $\varphi(q) \in [0, 1]$, where $\varphi(\cdot)$ is an exogenous function such that $\varphi(\frac{1}{2}) = \frac{1}{2}$, and $\varphi'(q) > 0$.[14] As long as $\varphi(q)$ is continuous and strictly increasing, its particular shape does not affect qualitatively the results.[15]

[10] Note that, depending on the level of the equilibrium price, a relatively poor agent may have an individual incentive not to participate in the market. Clearly this incentive to an individual boycott gets smaller and eventually vanishes as the number of agents increases. The same is true for group deviations given the incentive to free ride.

[11] Clearly, in this simple example with discrete endowment levels, the result depends on the tie-breaking rule.

[12] See the discussion in Section 3.

[13] See the discussion at the end of this section.

[14] The same assumption is also used in Grossman and Helpman (1996).

[15] A possible way to provide a microfoundation for the function $\varphi(\cdot)$ is to consider a model with a finite but large number of agents drawing income from the distribution F and consider simple majority rule. See the end of this section for a discussion of this case.

Before elections are held, a financial market opens. Agents can trade any quantity b of a security that pays 1 when the reform is enacted and 0 otherwise.[16] Let p be the security price and $\gamma \geq \underline{y}$ be an exogenous threshold on pre-tax income above which agents have access to the market.[17] Finally, I assume that the individuals' utility function $U(x)$ is smooth, increasing, and strictly concave with respect to wealth x.

Consider first the case in which $\gamma = \underline{y}$. This case corresponds to a situation where every agent can trade in the policy-insurance market. The maximization problem that each agent solves is

$$\max_b \varphi(q)U((y + b(1-p))(1-\tau) + \tau E(y)) + (1-\varphi(q))U(y - bp),$$

and market clearing requires

$$\int b \, dF(y) = 0.$$

If every agent can trade, it is easy to see that in equilibrium the security must be a fair insurance, that is,

$$\varphi(q)(1-\tau)(1-p) + (1-\varphi(q))(-p) = 0,$$

where the first term of the LHS reflects the assumption that the proportional tax is applied to ex-post income, i.e., after insurance transfers. Rearranging yields the unique equilibrium price

$$p = \frac{\varphi(q)(1-\tau)}{1-\varphi(q)\tau}.$$

Because the security is actuarially fair, risk-averse agents fully insure. As a result, the optimal demand for the security given the equilibrium price is equal to

$$b(y) = (y - E(y))\frac{\tau(1-\varphi(q)\tau)}{1-\tau}.$$

Note that, in equilibrium, all agents with income below (above) the average income will sell (buy) the security.[18] Moreover, because after trading all agents are indifferent between the redistributive policy and the status quo, the resulting expected probability of implementing the redistributive policy, that is $\widetilde{\varphi}$, will depend on the tie-breaking rule.[19]

[16] Alternatively, one could think of a situation where two candidates are running in an election, one proposing the redistribution policy and the other proposing no redistribution, and agents can trade a security that pays when the candidate in favor of redistribution is elected. This is in fact the case of Musto and Yilmaz (2003) and the one analyzed empirically in Mattozzi (2008). Given the continuum of agents assumption, this case can be approximated by assuming that the function $\varphi(q)$ increases sharply just above $q = 1/2$.

[17] Guiso et al. (2002, 2003) show that the proportion of U.S. households investing in risky assets, with gross financial wealth falling in the lowest quartile, is 1.4%. This proportion is less than 1% for the United Kingdom, the Netherlands, and Italy, and less than 3% for Germany. If I consider direct and indirect stockholding, all figures are below 5%, with the exception of Germany at 6.6%.

[18] The fact that in equilibrium $b(y)$ must be proportional to $(y - E(y))$ follows from noticing that, in order to fully insure, agents have to buy an amount of securities whose value corresponds to the wealth difference between the two states of the world. Because taxes are proportional and transfers are uniform, the wealth difference between the two states of the world is exactly proportional to the difference between individual income and average income.

[19] Note that because the indifference result does not depend on the value of $\varphi(q)$, any $\widetilde{\varphi} \in (0, 1)$ implied by the tie-breaking rule is indeed a fixed point.

Consider now the case in which $\gamma > \underline{y}$.[20] As before, the maximization problem that each agent with income $y \geq \gamma$ solves is

$$\max_b \varphi(q) U\left(\left(y + b(1-p)\right)(1-\tau) + \tau E(y)\right) + \left(1 - \varphi(q)\right) U\left(y - bp\right),$$

but now market clearing requires

$$\int_{Y|y\geq\gamma} b\, dF(y) = 0.$$

In this case, the fair price cannot clear the market. In fact, at the fair price there will be an excess of demand equal to

$$\int_{Y|y\geq\gamma} b(y)\, dF(y) = \left(\widetilde{y} - E(y)\right) \frac{\tau\left(1 - \varphi(q)\tau\right)}{(1-\tau)} \left(1 - F(\gamma)\right) > 0,$$

where

$$\widetilde{y} = \frac{\int_{Y|y>\gamma} y\, dF(y)}{1 - F(\gamma)} \geq E(y)$$

is the mean of the distribution of y truncated at γ. Hence, the equilibrium price must be higher than the fair price, i.e., $p > \varphi(q)(1-\tau)/(1-\varphi(q)\tau)$. Because in equilibrium, for all $y \geq \gamma$, optimality requires

$$\text{(1)} \qquad \frac{U'\left(\left(y + b(1-p)\right)(1-\tau) + \tau E(y)\right)}{U'\left(y - bp\right)} = \frac{\left(1 - \varphi(q)\right) p}{\varphi(q)(1-p)(1-\tau)},$$

then having $p > \varphi(q)(1-\tau)/(1-\varphi(q)\tau)$ implies that the RHS of the above equation is bigger than 1. As a consequence,

$$U'\left(\left(y + b(1-p)\right)(1-\tau) + \tau E(y)\right) > U'\left(y - bp\right),$$

and concavity of $U(\cdot)$ implies the following proposition:

PROPOSITION 1. *If $\gamma > \underline{y}$, for any continuous distribution $F(y)$, all agents trading in the market ($y \geq \gamma$) strictly prefer the status quo policy.*

By imposing more structure on the utility function $U(x)$, it is easy to obtain a closed-form solution for the optimal demand of insurance when $\gamma > \underline{y}$. Consider, for example, the case in which $U(x)$ belongs to the class of hyperbolic absolute risk aversion (HARA) functions that encompass constant absolute risk aversion, constant relative risk aversion, and logarithmic utility specifications as special cases. In this case, the wealth level x gives the agent a utility of:

$$U(x) = \frac{1-\theta}{\theta} \left(\frac{\alpha x}{1-\theta} + \beta\right)^{\theta},$$

[20] In order to simplify the exposition, I am also assuming that $\gamma \geq E(y) \max\left\{\frac{(1-\varphi(F(E(y))))\tau}{1-\varphi(F(E(y)))\tau}, \frac{(1-\varphi(F(\gamma)))\tau}{1-(F(\gamma))\tau}\right\}$. This condition guarantees that in the redistribution state an agent with income equal to γ cannot sell an amount of securities greater than his pre-tax endowment. If this condition is not satisfied, the individual budget constraint will bind for some y. I consider explicitly this case in Appendix A.

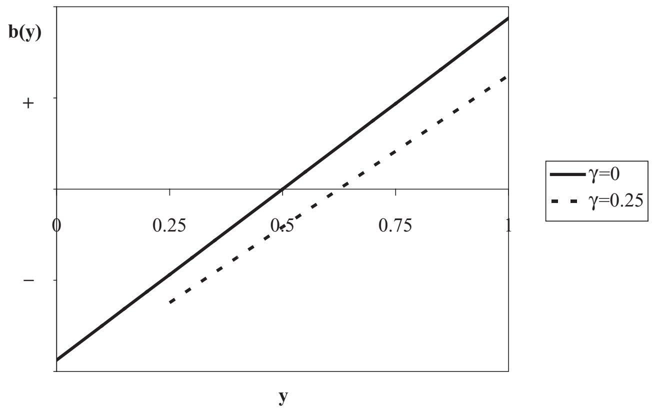

FIGURE 1

DEMAND FOR ELECTORAL SECURITIES

where $\alpha > 0,\ \beta \geq 0$, and

$$\frac{\alpha x}{1-\theta} + \beta > 0.^{21}$$

In equilibrium the optimal demand for the security will be proportional to $(y - \widetilde{y})$:

$$b(y) = (y - \widetilde{y})\,\varkappa(\tau, E(y), \varphi(q), \alpha, \beta, \theta, \gamma)\,,$$

where $\widetilde{y} = (\int_{Y|y>\gamma} y\, dF(y))/(1 - F(\gamma)) > \gamma$ represents the income level of the indifferent agent on the financial market.[22]

Figure 1 depicts the equilibrium demand schedule $b(y)$ as a function of y, in the case of $U(x) = \sqrt{x}$ (i.e., $\alpha = 1 - \theta = \frac{1}{2}, \beta = 0$), $\tau = \frac{1}{2}$, $y \sim U[0, 1]$, $\varphi(q) = q$, and $\gamma = \{0, \frac{1}{4}\}$. It shows how agents react to policy uncertainty: rich (poor) agents buy (sell) a positive amount of securities. Because $\widetilde{y}$ is the mean of the income distribution truncated at γ and, in equilibrium, it is equal to the income level of the indifferent agent on the market, it follows that $b(\widetilde{y}) = 0$. Note that $\widetilde{y}$ is increasing in γ, and an increase in γ induces a reduction, in equilibrium, of the total amount of securities traded and therefore a reduction of the size of the market.

If individuals with incomes in the left tail of the distribution cannot trade, the resulting excess in demand will increase the security price for given q. The result stated in Proposition 1 follows from the fact that, at the new equilibrium price, all agents trading in the market whose income is below the mean income are more than compensated by private transfers, and therefore they strictly prefer the status quo scenario.

Figure 2 depicts the difference DU in utility between the status quo and the redistribution state as a function of y, and γ, using the same parametrization of Figure 1. When $\gamma = 1$ (i.e., in the regime with no policy insurance), DU is monotonically increasing, and $DU(E(y)) = 0$.

[21] If $\beta = 1$ and $\theta \to -\infty$, I have the CARA utility, if $\beta \to 0,\ \alpha = 1 - \theta$, the CRRA utility obtains. If $\beta \to 0, \theta \to 0$ I have the logarithmic utility specification.

[22] In particular, by letting $g = (\alpha(\widetilde{y}(1-\tau) + \tau E(y)) + \beta(1-\theta))/(\alpha\widetilde{y} + \beta(1-\theta)) < 1$, I have that

$$\varkappa(\tau, E(y), \varphi(q), \alpha, \beta, \theta, \gamma) = \frac{\tau}{1-\tau}\,\frac{\alpha E(y) + \beta(1-\theta)}{\alpha\widetilde{y} + \beta(1-\theta)}\,\frac{(1-\varphi(q))g^{1-\theta} + \varphi(q)(1-\tau)}{(1-\varphi(q))g^{1-\theta} + \varphi(q)g},$$

and

$$p = \frac{\varphi(q)(1-\tau)}{(1-\varphi(q))g^{1-\theta} + \varphi(q)(1-\tau)}.$$

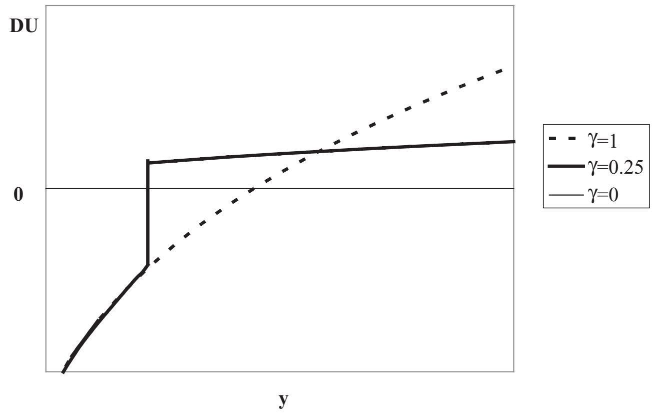

FIGURE 2

PREFERENCE FOR REDISTRIBUTION

When $\gamma = 0$ (i.e., in the regime where every agent can trade), DU is equal to zero for all y. The most interesting case is when $\gamma \in (0, 1)$. For low values of y, DU is negative and increasing. For values of y greater than γ (set equal to $\frac{1}{4}$ in the picture), DU is always positive. The chosen parametrization affects the shape of DU but not its quasi-monotonicity property.[23]

Given that every agent that can trade in the market strictly prefers the status quo policy, the resulting probability $\widetilde{\varphi}$ of implementing the redistribution policy will be equal to $\varphi(F(\gamma))$ when $\gamma \in (\underline{y}, E(y))$. If instead $\gamma \geq E(y)$, trading will not affect the proportion of agents voting for redistribution because all agents that can trade are already against redistribution. Hence, when $\gamma \geq E(y)$, the probability of implementing the redistribution policy is independent of whether there is a market or not. Therefore, Proposition 2 follows:

PROPOSITION 2. *For any continuous distribution $F(y)$, and any $\gamma > \underline{y}$, the probability of implementing redistribution in the regime with policy insurance is always (weakly) smaller than in the regime without policy insurance, and an increase in the size of market (a decrease in γ) decreases the support for the reform.*

The proof is in Appendix A. Figure 2 offers an alternative way to capture the economic intuition behind this result. Consider the problem faced by the marginal agent that can trade in the market in the most interesting case of $\gamma < E(y)$, that is the marginal agent is relatively poor and hence, in equilibrium, he will sell a positive amount of securities. If the redistributive policy is not implemented, he will receive a private transfer from rich agents that is compensating him for not having his ex ante most preferred alternative. If the redistributive policy will be the selected alternative, he has to make a private transfer to rich individuals. However, this transfer has to compensate the rich agents also for the additional amount of redistribution that is due to the fact that the very poor agents cannot trade in the market. Therefore, in equilibrium, he will strictly prefer to vote for his ex ante least preferred alternative. In other words, when $\gamma > \underline{y}$, the wealth of agents who trade *cannot* be equalized across states, and it is higher when redistribution does not take place, because when it does part of the wealth goes to poor agents who do not trade.

In the rest of this section I discuss three assumptions of the model: (*i*) the exogenous threshold γ; (*ii*) the probability of implementing the redistribution policy increases monotonically with the number of its supporters through the exogenous strictly increasing mapping $\varphi : [0, 1] \to [0, 1]$; (*iii*) redistribution does not entail any deadweight loss and taxation is linear.

The assumption of having an exogenous threshold on pre-tax income above which agents can trade has the merit of making transparent the force that is driving the result. However, the result of Proposition 2 also holds in a different setting where every agent (even the poorest)

[23] For example, in the case of $U(x) = \ln x$, DU is flat for $y > \gamma$.

can trade in the regime with policy insurance, but he cannot sell an amount of securities that exceeds his pre-tax endowment. A possible rationale for imposing this ex post budget constraint is that it ensures that every agent will be able to honor his obligations after the realization of the political state and before receiving the lump-sum transfer. In fact, as I mentioned earlier in the example, I can always find a $\underline{y}$ small enough such that the individual budget constraint (before public transfers) will bind for some y if the redistribution is implemented, and not all individuals will be indifferent between policies after trading. In Appendix A, I show that the result of Proposition 2 still holds in this alternative setting.

The only role of assumption (*ii*) is to assure that before and after trading there is always some residual policy uncertainty; otherwise trading will never occur.[24] I believe that it is reasonable to suppose that having a bare majority in favor of a particular policy may not always be sufficient to implement that policy. Moreover, it seems also intuitive to assume that the larger the plurality in favor of a policy, the smaller the expected chances that this policy will be somewhat modified before implementation or not implemented at all. Note that even simple majority elections can be closely approximated (still maintaining a small residual uncertainty) by assuming that $\varphi(\cdot)$ is almost flat everywhere but in a small neighborhood of 1/2, and it increases sharply at 1/2. One possible way to obtain an endogenous mapping from vote shares to the probability of implementing the policy is to consider a model with a large finite number of agents and simple majority rule. Suppose that there are N voters, where N is large but finite, and agent $i \in \{1, \ldots, N\}$ draws income y_i from the distribution F with mean $E(y)$. In the regime without the policy-insurance market, the probability that agent i votes in favor of redistribution is $F(E(y))$, because all agents with income smaller than $E(y)$ strictly prefer the redistribution policy. Then, it can be shown that using a central limit theorem, the number of votes in favor of redistribution can be approximated by a normal distribution, with mean $NF(E(y))$ and variance $NF(E(y))(1 - F(E(y)))$.[25] As a result, the probability of implementing the redistribution policy in the regime without the policy-insurance market is approximately

$$\mathcal{N}\left(\frac{N\left(F(E(y)) - \frac{1}{2}\right)}{\sqrt{NF(E(y))(1 - F(E(y)))}}\right),$$

where $\mathcal{N}(\cdot)$ is the normal standard distribution function. Similarly, I can obtain the approximate probability of implementing the redistribution policy in the regime with the policy-insurance market, which equals

$$\mathcal{N}\left(\frac{N\left(F(\gamma) - \frac{1}{2}\right)}{\sqrt{NF(\gamma)(1 - F(\gamma))}}\right).$$

Note that the latter expression is smaller than the former if and only if $\gamma < E(y)$.[26]

Regarding assumption (*iii*), first note that the implications of my analysis generalize to the case in which redistributive taxation entails some deadweight loss. In order to see this, suppose that $T = \tau E(y) - D < \tau E(y)$, where $D > 0$ is a deadweight loss. In this case the fair price cannot

[24] This is also an assumption in Musto and Yilmaz (2003).

[25] See Lindbeck and Weibull (1987) and Grossman and Helpman (1996) for a similar application of this central limit theorem.

[26] Note that $\varphi(\cdot)$ depends only on the share of voters in favor of redistribution. If instead randomness arises from the existence of an individual specific ideological bias (in favor or against redistribution) that is drawn from a known distribution, the expected probability of implementing the redistribution policy would also depend on the strength of voters' preferences, i.e., the specific form of the utility function.

clear the market even if all agents are trading. In fact, at the fair price there will be an excess of demand equal to

$$\int b(y)\, dF(y) = D\frac{\tau\,(1-\varphi(q)\tau)}{(1-\tau)} > 0.^{27}$$

Hence, if an equilibrium with trading exists, the price has to be higher than the fair price. This implies that when $\gamma = \underline{y}$ (i.e., when every agent can trade), generically there will be no market clearing price if $\varphi(0) = 0$. In order to see why this is the case, note that optimality requires

$$\frac{U'\left((y + b(1-p))\,(1-\tau) + \tau\, E(y) - D\right)}{U'\,(y - bp)} = \frac{(1-\varphi(q))\,p}{\varphi(q)(1-p)(1-\tau)}$$

for all agents, and when the price is higher than the fair price the RHS of the equation above must be greater than one. As a consequence, *every* agent strictly prefers the status quo policy, and the expected probability that the reform will be implemented after trading equals zero. Given that rational agents perfectly anticipate the effect of the financial market, trading will not occur in equilibrium.[28] Note that an equilibrium with trading may exist when $\gamma > \underline{y}$ even if $\varphi(0) = 0$, because agents with income $y < \min\{\gamma, E(y)\}$ will keep supporting the redistribution policy.[29] In this case, because the market clearing price must be higher than the fair price, the probability of implementing redistribution in the regime with policy insurance should be smaller than in the regime without policy insurance.

In the model, following most of the theoretical literature on redistribution, I restrict attention to the case of linear taxes. Relaxing this assumption is by no means a trivial exercise and, in the case of nonlinear taxes, existence of an equilibrium with trading may require additional restrictions. However, some insights about what happens in the presence of nonlinear taxes can still be derived. For example, if an equilibrium with trading exists, even if all agents can trade, it cannot be the case that they are all indifferent between policies after trading. In order to see this, let $\tau(y)$ be the marginal tax and assume that it is increasing in y, i.e., the taxation system is progressive.[30] If a market clearing p exists, because optimality requires

$$\frac{U'\left(\left(y + b(1-p)\right)(1-\tau(y)) + \int \tau(y) y\, dF(y)\right)}{U'\,(y - bp)} = \frac{(1-\varphi(q))\,p}{(1-p)\,(1-\tau(y))\,\varphi(q)}, \tag{2}$$

and the RHS of (2) is increasing in y, all agents with income smaller than $\widehat{y}$ will strictly prefer the redistribution after trading, where $\widehat{y}$ is such that the RHS of (2) equals 1, that is

$$\widehat{y} = \tau^{-1}\left(\frac{\varphi(q) - p}{(1-p)\varphi(q)}\right).$$

Note that trading implies a smaller support for redistribution with respect to the case without policy insurance if and only if $\widehat{y} = \tau^{-1}(\frac{\varphi(q)-p}{(1-p)\varphi(q)}) > E(y)$, which in principle may or may not be true depending on functional forms and on the specific shape of $\tau(y)$. However, a plausible conjecture is that with a progressive taxation system either there will be no market clearing price or, if an equilibrium with trading exists, the support for redistribution after trading will be smaller than in the case without trading. In order to see this, consider the case of a progressive taxation system where progressivity is achieved through a flat tax $\tau \in (0, 1)$ paired with an

[27] This expression follows from computing the optimal demand at the fair price and aggregating across agents.

[28] If instead $\varphi(0) > 0$, there can be an equilibrium with trading also when $\gamma = \underline{y}$.

[29] For example, in the case of a HARA utility function, it can be shown that a unique equilibrium with trading exists.

[30] The analysis is similar in the case of a regressive taxation system.

exemption level $y_\tau < E(y)$. In particular, assume that incomes above a given threshold y_τ are taxed at rate τ, whereas incomes below the threshold y_τ are exempt from taxation. Moreover, all agents receive a lump-sum transfer equal to $\tau \int_{y_\tau} y\, dF(y)$ which balances the budget. In this case, if $\gamma = \underline{y}$ and a market clearing price p exists, it follows that

$$\frac{U'\left((y+b(1-p))(1-\tau)+\tau\int_{y_\tau} y\, dF(y)\right)}{U'(y-bp)} = \frac{(1-\varphi(q))\,p}{(1-p)(1-\tau)\varphi(q)} \text{ for } y \geq y_\tau$$

$$\frac{U'\left(y+b(1-p)+\tau\int_{y_\tau} y\, dF(y)\right)}{U'(y-bp)} = \frac{(1-\varphi(q))p}{(1-p)\varphi(q)} \text{ for } y < y_\tau,$$

and generically p will satisfy

$$\frac{(1-\varphi(q))\,p}{(1-p)(1-\tau)\varphi(q)} > 1 > \frac{(1-\varphi(q))\,p}{(1-p)\varphi(q)}.$$

In fact, if the above inequality is violated, every agent will strictly prefer the same policy after trading (e.g., redistribution if $1 > (1-\varphi(q))p/((1-p)(1-\tau)\varphi(q)))$. As before, because rational agents will perfectly anticipate the effect of the financial market, trading will not occur in equilibrium. If instead the inequality holds and an equilibrium with trading exists, the probability of implementing redistribution in the regime with policy insurance will be smaller than in the regime without policy insurance as long as $y_\tau < E(y)$. Finally, if not all agents can trade, i.e., $\gamma > \underline{y}$, the equilibrium price would presumably increase, leading to an even larger support against redistribution. In conclusion, although a detailed analysis of the case of nonlinear taxes is beyond the scope of the present article, it seems that from a heuristic perspective the main results still hold when I relax the linearity assumption.

The main results of this section are that if poor individuals are constrained in the policy-insurance market, the support for redistribution is always smaller than in the case where no insurance is available, and the size of the market is positively correlated with the probability that a redistributive reform is adopted. In the next section I show that the size of the market also affects the inequality of the expected income distribution, and the existence of a policy-insurance market may lead to a less equal equilibrium distribution of income than in the case where no insurance is available even if a majority of individuals are actually redistributing resources through private transfers.

4. EXPECTED INCOME DISTRIBUTION

In this model, private redistribution takes place before the election even in the case where the reform is ultimately not implemented. The objective of this section is to analyze the effect of the policy-insurance market on the inequality of the expected income distribution after policy uncertainty is resolved. In particular, I show that the existence of a policy-insurance market may lead to a *less* equal equilibrium distribution of income than in the case where no insurance is available even if a majority of individuals are actually redistributing resources through private transfers. Throughout this section, for simplicity, I will assume that $U(x) = \ln(x)$, and that $\varphi(q) = q$.[31]

[31] The assumption that $\varphi(q) = q$ is made for simplicity, i.e., the results of this section hold also without it. On the other hand, assuming that $U(x) = \ln(x)$ allows for a simple comparison between the expected income distribution after elections in the regimes with and without policy insurance. Clearly, the results of this section will depend on the latter assumption, but the point of the exercise is to show in the simplest way that, although the existence of a policy-insurance market leads to some redistribution even without implementing a redistributive reform, it does not necessary lead to a more equal equilibrium distribution of income.

I can compare the degree of inequality of different income distributions using the concept of second-order stochastic dominance. F_x is more unequal than F_y, if F_x is a mean-preserving spread of F_y. More formally, let X be the common support of F_y and F_x; then F_x is more unequal than F_y if

$$\int_X x\, dF_x = \int_X x\, dF_y,$$

and

$$\int_{\underline{x}}^{x} (F_x - F_y)\, ds \geq 0 \quad \text{for all } x \in X, \tag{3}$$

where $\underline{x}$ is the lower bound of X. The equality of means implies that

$$\int_X F_x = \int_X F_y.$$

Hence if F_x and F_y cross only once, (3) is satisfied.

Let z be the expected income after elections in the regime with no policy insurance:

$$z = q\tau\, E(y) + (1 - q\tau)\, y.$$

By using the convolution formula,

$$F_z = \begin{cases} F\left(\dfrac{z - q\tau\, E(y)}{1 - q\tau}\right) & \text{for } z \geq q\tau\, E(y) + (1 - q\tau)\, \underline{y} \\ 0 & \text{otherwise,} \end{cases}$$

where $\underline{y}$ is the lower bound of Y. Because F and F_z have the same mean, $F(\underline{y}) > F_z(\underline{y}) = 0$, and they cross only once, F is a mean-preserving spread of F_z. I will use F_z as a benchmark to evaluate the effect of the market in terms of expected income distribution. I have to consider two cases:

Case 1. $\gamma \geq E(y)$

In this case the electoral market redistributes income through private transfers but does not affect the probability of adopting the reform. In fact, when $\gamma \geq E(y)$, trading will not affect the proportion of agents voting for redistribution because all agents that can trade are already (before trading) against redistribution. By letting z_m be the expected income after elections in the regime with policy insurance, and F_{z_m} be the expected income distribution, I can show the following result:

PROPOSITION 3. *Let* $U(x) = \ln(x)$. *If* $\gamma \geq E(y)$, *the expected income distribution in the regime without policy insurance is more unequal than the expected income distribution in the regime with policy insurance.*

The proof can be found in Appendix A. Figure 3 provides a graph of F_z, and F_{z_m}, in the case of $\gamma \geq E(y)$.

Note that F_{z_m} and F_z have the same support and are identical for $y < \gamma$. Because they have the same mean, the areas denoted by A, and B in Figure 3 are equivalent; therefore F_z is a mean-preserving spread of F_{z_m}. Intuitively, because the probability of adopting the reform does not change, the expected income distribution in both regimes is the same for all agents with $y < \gamma$. On the other hand, the fact that agents with $y > \gamma$ trade implies some consumption smoothing across states, which leads to a more equal expected income distribution.

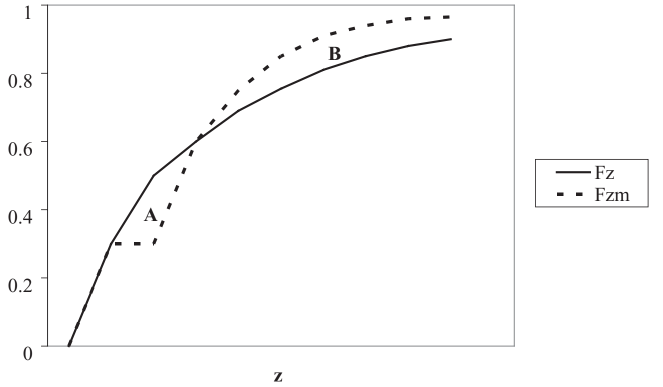

FIGURE 3

EXPECTED INCOME DISTRIBUTION WHEN $\gamma > E(y)$

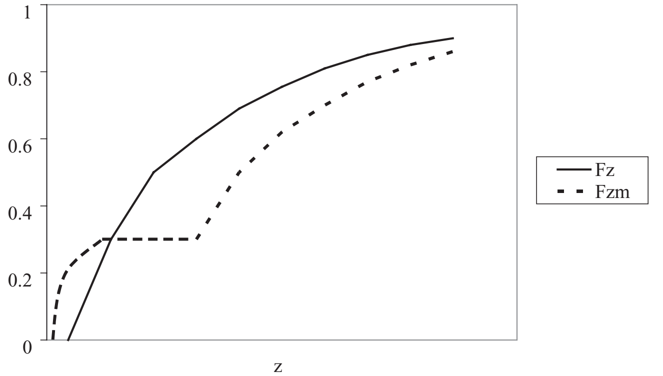

FIGURE 4

EXPECTED INCOME DISTRIBUTION WHEN $\gamma < \gamma^*$

Case 2. $\gamma \in (\underline{y}, E(y))$

In this case the effect of the electoral market is twofold: it redistributes income through private transfers before the reform takes place, and it affects the probability of adopting the reform. The next proposition provides a sufficient condition under which the latter effect is dominant and the conclusion of Proposition 3 is reversed.

PROPOSITION 4. *Let* $U(x) = \ln(x)$. *There exists a* $\gamma^* \in (\underline{y}, E(y))$ *such that if* $\gamma \leq \gamma^*$, *the expected income distribution in the regime without policy insurance is more equal than the expected income distribution in the regime with policy insurance.*

The proof is in Appendix A. Figure 4 provides a graph of F_z, and F_{z_m}, in the case of $\gamma \leq \gamma^*$. In this case, it is possible to show that F_{z_m} and F_z cross only once. Because they have the same mean, it follows that F_{z_m} is a mean-preserving spread of F_z. A simple intuition for this result follows from noticing that as γ approaches $\underline{y}$, the probability of redistribution taking place goes to zero, and therefore the equilibrium distribution of wealth converges to the prior distribution F, which is clearly a mean-preserving spread of F_z. The result follows by continuity.

In conclusion, when even relatively poor agents can trade, a large (private) redistribution is actually taking place before the election, and this maps in a smaller support for the redistribution policy. Hence, we should expect the policy-insurance market to reduce inequality of the equilibrium income distribution. However, this section demonstrates that this might not be the case. Even if a large proportion of agents is transferring resources from one state to the other, when the lower tail of the income distribution is still completely exposed to the electoral risk, the gap between losers and winners widens and, moreover, there is a shift of probability mass on the status quo. When the policy-insurance market is large, agents' reaction to electoral uncertainty leads, in expectation, to a distribution even less equal.

5. INCOME INEQUALITY AND REDISTRIBUTION

In this section, I study the relationship between income inequality and redistribution in an economy where the income distribution is positively skewed. In particular, to analyze the effect of the initial income distribution on the expected probability $\widetilde{q}$ of implementing the redistributive policy, assume that income is drawn from a Pareto distribution with parameters $c > 0$ and $\Delta < 1$.[32] Under these assumptions,

$$F(y) = 1 - \left(\frac{c}{y}\right)^{\frac{1}{\Delta}},$$

$$E(y) = \frac{c}{1-\Delta},$$

$$\frac{E(y)}{y_{med}} = \frac{1}{(1-\Delta)\,2^{\Delta}},$$

$$\text{Gini} = \frac{\Delta}{2-\Delta}.$$

In the regime without policy insurance, the probability of adopting the reform is given by

$$q = F\left(E(y)\right) = 1 - (1-\Delta)^{\frac{1}{\Delta}}.$$

An increase in Δ, which increases the Gini index as well as the ratio between mean and median income, unambiguously increases q. This is what a median voter model would have predicted. A reform with asymmetric benefit will be more popular the more polarized a society is, provided that a majority of voters were already in favor of it.

The comparative statics of the model are quite different if I consider the regime with policy insurance. Indeed, for $\gamma > c$, the end of period probability of implementing the reform is now given by the following expression:

$$\widetilde{q} = \begin{cases} 1 - \left(\frac{c}{\gamma}\right)^{\frac{1}{\Delta}} & \gamma < \frac{c}{1-\Delta} \\ 1 - (1-\Delta)^{\frac{1}{\Delta}} & \gamma > \frac{c}{1-\Delta}, \end{cases}$$

and, therefore, Proposition 5 follows:

PROPOSITION 5. *An increase in inequality will decrease (increase) the expected probability of adopting the reform if and only if $\gamma < (>)\ E(y)$. In particular,*

$$\frac{d\widetilde{q}}{d\Delta} = \begin{cases} \dfrac{\left(\frac{c}{\gamma}\right)^{\frac{1}{\Delta}}}{\Delta^2} \ln\frac{c}{\gamma} < 0 & \gamma < E(y) = \dfrac{c}{1-\Delta} \\ (1-\Delta)^{\frac{1-\Delta}{\Delta}} \dfrac{(1-\Delta)\ln(1-\Delta)+\Delta}{\Delta^2} > 0 & \gamma > E(y). \end{cases}$$

[32] The same analysis holds if I assume a log normal distribution. The log normal distribution is a reasonable approximation of the U.S. empirical distribution of income. The Pareto distribution is a reasonable approximation of the empirical distribution of high incomes.

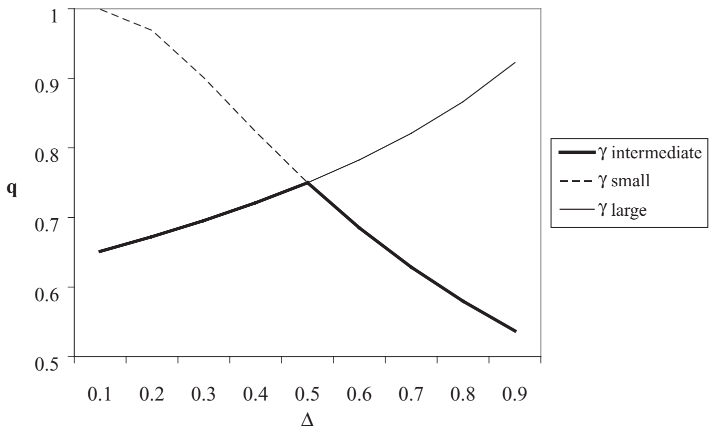

FIGURE 5

REDISTRIBUTION AND INEQUALITY

Increasing inequality has two distinct effects on the political support for redistribution: (i) given the distributional assumptions, it shifts probability mass toward below-average income, (ii) for given γ, it affects the fraction of agents who trade in the market. The first effect increases the value of $\widetilde{q}$, the second effect decreases the value of $\widetilde{q}$. In the case in which relatively poor individuals participate in the market, i.e., $\gamma < E(y)$, the second effect dominates, and an increase in inequality decreases the likelihood of adopting the reform. When γ gets larger, the existence of insurance only affects rich individuals who were already against redistribution. Hence, the first effect is the dominant one, and an increase in inequality is positively correlated with the likelihood of adopting the redistributive reform. Furthermore, note that, because in the case of a Pareto distribution $E(y) = c/(1 - \Delta)$ is increasing in Δ, for fixed γ I can always find a $\widetilde{\Delta}$ such that $\gamma = c/(1 - \widetilde{\Delta})$. Therefore, for intermediate values of γ, the relationship between income inequality and support for redistribution may be nonmonotonic.[33]

Figure 5 depicts the relationship between income inequality as measured by Δ and the equilibrium probability $\widetilde{q}$ of adopting the reform for different values of γ.

The relationship between income inequality and support for redistribution depends crucially on the size of the policy-insurance market. If financial markets can provide insurance against policy uncertainty, Proposition 5 implies that in economies with well-developed financial markets the level of redistribution decreases with the level of participation in these markets and with income inequality. The latter result provides a possible explanation for the empirical observation that, among advanced economies, countries that are more equal before redistribution tend to redistribute more rather than less. This is illustrated in Figure 6, which depicts a cross-country scatter plot of the relationship between Gini index and the ratio to GDP of transfers to households for OECD economies.[34]

Finally, note that Proposition 5 implies that, for a given level of inequality in the income distribution, different countries can support very different levels of redistribution depending on the development of their financial institutions. A failure of not taking into account this aspect may lead to a misspecified empirical model of the relationship between inequality and redistribution. This is because I am mixing regimes. In particular, this may provide an explanation of why Perotti (1996), among others, finds no significant empirical relationship between inequality and the share

[33] Clearly, an increase in Δ is not a mean-preserving spread. However, in Appendix B, I show that when every agent can trade but there is an ex post individual budget constraint on the amount of securities that can be traded, it is possible to construct examples where even a symmetric mean-preserving spread in the distribution of income can generate a nonmonotonic relationship between inequality and support for redistribution.

[34] Data are taken from the OECD Economic Outlook and Deninger and Squire (1996). In light of the existing literature on the relationship between different electoral systems and the size of the redistributive sector (see, e.g., Austen-Smith, 2000), it is worth noting that a similar picture also obtains if I restrict attention to parliamentary democracies with a proportional electoral system.

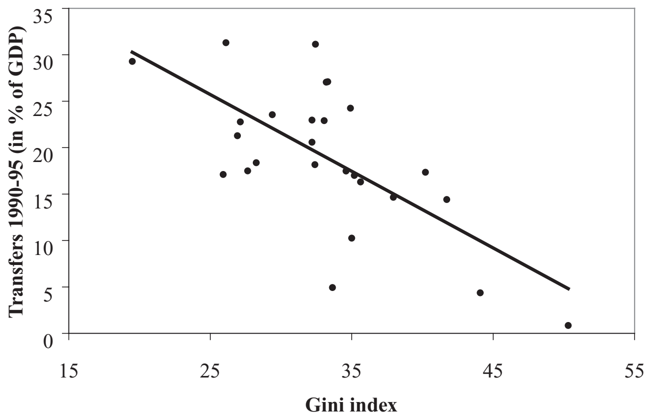

FIGURE 6

INEQUALITY AND REDISTRIBUTION (OECD)

of transfers or government expenditures in GDP, when he considers a sample of developed and developing countries.

6. CONCLUSION

This article presents a model that demonstrates the role citizens' reactions to policy uncertainty plays in the support for redistributive policies. I show how ex ante uncertainty about a government policy with redistributive consequences will influence the proportion of agents in favor of it, if a subset of the agents can trade policy-contingent securities. In an economy with a policy-insurance market, there is less support for redistribution than in one without such a market, and support for redistribution may decrease as income inequality increases. I provide conditions under which the existence of a policy-insurance market increases future expected income inequality even if a large proportion of agents is redistributing resources through private transfers.

Based on the prediction of the theoretical model, my analysis implies that the level of participation in the stock market should be negatively related to support for policies with redistributive content. This result is consistent with several empirical observations. First, European countries are characterized by smaller participation in the stock market and larger redistributive transfers with respect to the United States.[35] Furthermore, among all OECD economies, countries with a higher ratio to GDP of total stock market value traded are also characterized by a smaller level of transfers to households as a share of the GDP, as shown in Figure 7.[36]

By focusing on the recent U.S. experience, two important facts can be singled out. First, stock ownership in the United States has changed dramatically in the last decade. The proportion of U.S. households owning stocks directly or indirectly (through mutual funds or retirement accounts) has risen from 31.6% in 1989 to 51.9% in 2001, and the median income of stock owners has decreased by more than 9% in the period 1989–1998.[37] Second, the U.S. level of transfers to households as a share of the GDP has almost steadily decreased in the 1990s. A similar picture emerges by considering broader aggregates like the share of total government expenditures over GDP. Moreover, taking for granted the conventional wisdom that democratic platforms tend to carry more redistributive spending, the share of democratic votes in House elections has decreased from 52% in 1990 to 47% in 2000. Given that the 1990s were also characterized by an increasing inequality in income distribution, the combination of increasing stock market

[35] See Guiso et al. (2003).

[36] Data are taken from OECD Economic Outlook, and Beck, Demirgüç-Kunt, and Levine data set (2001).

[37] Data are taken from the Survey of Consumer Finances. See also Bertaut and Starr-McCluer (2002).

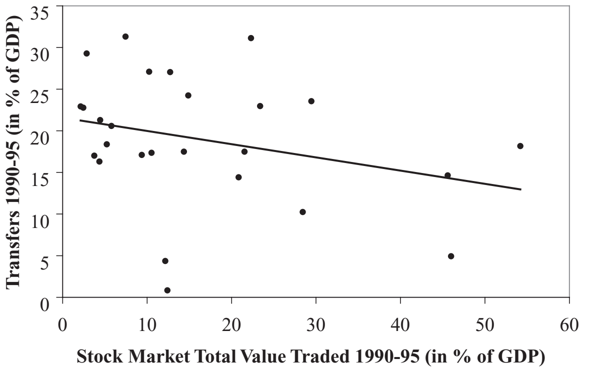

FIGURE 7

STOCK MARKET AND REDISTRIBUTION (OECD)

participation and decreasing support for redistribution is consistent with the mechanism described in the theoretical model.[38]

Clearly, any relationship between stock market participation and preference for redistribution that can be inferred from aggregate data may turn out to be spurious and due to a variety of other phenomena. However, the National Election Study (NES) data seem a promising starting point for further empirical analysis using microlevel data. The latest waves of the NES contain both individual level information about stock market participation and variables that summarize individual preferences on whether the government should increase or decrease the level of service/spending.[39] It is interesting to note that in every income quintile the proportion of stock owners who prefer less than or equal government services and spending with respect to the status quo is systematically higher than the proportion of those without stocks. In addition, even after controlling for sex, race, age, education, and income, a significative negative correlation between stock ownership and support for policies with redistributive content is observed.[40] This is only preliminary evidence, but it suggests that an economy's financial structure appears to be correlated with its policy choices in a way that is consistent with my theoretical model.

APPENDIX

A. *The Case of a Binding Budget Constraint.* Here I show that the results derived in Section 4 hold in an alternative setting in which all agents can trade provided that they cannot sell an amount of securities that exceeds their pre-tax endowment. In order to have a closed-form solution for the optimal demand of security $b^*(y)$, I consider the case of an HARA utility function. Moreover, for simplicity, let $\varphi(q)$ be the identity function. The maximization problem is

$$\max_b \left(q \left(\frac{\alpha \left((y + b(1-p))(1-\tau) + \tau E(y) \right)}{1-\theta} + \beta \right)^{\theta} + (1-q) \left(\frac{\alpha (y - bp)}{1-\theta} + \beta \right)^{\theta} \right)$$

$$\text{s.t. } y + b(1-p) \geq 0,$$

$$y - bp \geq 0,$$

$$\text{and } \int_Y b \, dF(y) = 0,$$

[38] Data are taken from Economic Outlook. The increasing income inequality that characterized the U.S. economy in the 1990s has been documented by Krugman (*New York Times*, October 20, 2002).

[39] Alternatively, one could look at preferences revealed by the vote cast in the election. There are two problems in using this alternative approach. First, one should take into account the selection bias due to the choice of voting versus abstention in the election. Second, it is not clear which type of election one should focus on, or how incumbency effects should be treated.

[40] See Mattozzi (2004).

where the two inequalities represent the budget constraint (for sellers and buyers, respectively), and the last equation is the market clearing condition. I will solve the problem by first assuming that the second constraint ($y - bp \geq 0$) does not bind, and then verify that this is always true in equilibrium. FOCs deliver

$$b(y) = \begin{cases} \dfrac{(x-(1-\tau))\,\alpha y - \alpha E(y)\tau - x\beta(1-\theta)(1-x)}{px\alpha + \alpha(1-p)(1-\tau)} & y \geq s \\ -\dfrac{y}{1-p} & y < s \end{cases},$$

where

$$x = \left(\frac{q(1-p)(1-\tau)}{(1-q)p}\right)^{\frac{1}{1-\theta}},$$

$$s = \frac{\alpha E(y)\tau + x\beta\,(1-\theta)\,(1-x)}{x\alpha}(1-p).$$

In equilibrium, the market clearing condition is

$$Q(p) = \int^{s}\left(-\frac{y}{1-p}\right)dF(y) + \int_{s}\frac{(x-(1-\tau))\,\alpha y - \alpha E(y)\tau - x\beta\,(1-\theta)\,(1-x)}{px\alpha + \alpha(1-p)(1-\tau)}\,dF(y) = 0.$$

Note that a necessary condition for an equilibrium to exist is that $x > (1-\tau)$ (otherwise $Q(p) < 0$). This implies that

$$p < \overline{p} = \frac{q}{q + (1-q)(1-\tau)^{-\theta}} < q,$$

and

$$Q(\overline{p}) < 0.$$

Moreover, if p goes to 0,

$$\lim_{p\to 0} Q(p) > 0.$$

Because $Q(p)$ is continuous in p, an equilibrium always exists. By evaluating $\frac{d(Q(p))}{dp}$ in $Q(p) = 0$,

$$\left.\frac{dQ(p)}{dp}\right|_{Q(p)=0} = \frac{-x\displaystyle\int^{s}\frac{y}{(1-p)^2}\,dF(y) + \frac{dx}{dp}\int_{s}\phi(y,p)\,dF(y)}{px + (1-p)(1-\tau)},$$

where

$$\phi(y,p) = \frac{(1-\tau)\alpha y + \beta\,(1-\theta)\left(px^2 + (1-p)(1-\tau)\,(2x-1)\right) + \alpha E(y)\tau p}{px\alpha + \alpha(1-p)(1-\tau)}$$

is increasing in y, and

$$\frac{dx}{dp} = -\frac{(1-\tau)q}{(1-\theta)(1-q)p^2} x^{\theta} < 0.$$

Because

$$\int_s \phi(y, p)\, dF(y) > \phi(s, p)(1 - F(s)) > 0,$$

it follows that

$$\left.\frac{dQ(p)}{dp}\right|_{Q(p)=0} < 0,$$

and, therefore, the equilibrium price is unique. Note that, for $y \geq s$, $y - b(y)p$ is increasing in y, and

$$s - b(s)p = s\frac{1}{1-p} > 0,$$

and the second inequality constraint is never binding in equilibrium.

Because individuals with incomes in the left tail of the distribution are constrained in the market, for given q the resulting excess in demand will lead to a price higher than the unconstrained solution. That is,

$$p > \frac{q(1-\tau)}{(1-q\tau)},$$

which in turn implies that $x < 1$.

If $y \geq s$, it follows that

$$DU|_{(y \geq s)} \equiv U(\text{status quo}) - U(\text{redistribution}) \geq 0$$

if and only if

$$\tau(y - E(y)) - (1 - \tau + p\tau)b(y) \geq 0. \tag{A.1}$$

Note that $x < 1$ implies that

$$\tau - (1 - \tau + p\tau)\frac{db(y)}{dy} > 0,$$

and the RHS of (A.1) is increasing in y. Because

$$\begin{aligned}&\tau(y - E(y)) - (1 - \tau + p\tau)b(y)\\ &\quad > \tau(s - E(y)) - (1 - \tau + p\tau)b^*(s) = \frac{\alpha E(y)\tau(1-x) + x\beta(1-\theta)(1-x)}{x\alpha} > 0,\end{aligned}$$

all agents with income $y \geq s$ will strictly prefer the status quo policy.

If $y < s$, it follows that

$$DU|_{(y<s)} \geq 0$$

if and only if

$$\frac{1}{1-p}y - \tau E(y) \geq 0.$$

Because

$$s > (1-p)\tau E(y),$$

this implies that

$$DU > 0 \text{ if and only if } y > (1-p)\tau E(y).$$

Therefore, the after trading probability $\widetilde{q} = F((1-p)\tau E(y))$ of adopting redistribution is always smaller than the before trading probability $q = F(E(y))$. Because rational agents will perfectly anticipate the effect of the financial market, they will consider the expected $\widetilde{q}$ in the maximization problem. By applying the implicit function theorem to the equation $Q(p) = 0$, I can show that

$$\left.\frac{dp}{dq}\right|_{Q(p)=0} = -\frac{\left.\frac{dQ}{dq}\right|_{Q(p)=0}}{\left.\frac{dQ}{dp}\right|_{Q(p)=0}} = \frac{\frac{dx}{dq}\int_s \frac{\phi(y,p)}{px+(1-p)(1-\tau)}\,dF(y)}{-\left.\frac{dQ}{dp}\right|_{Q(p)=0}} > 0,$$

because

$$\frac{dx}{dq} = \frac{(1-p)(1-\tau)}{(1-\theta)(1-q)^2 p}x^{\theta} > 0.$$

This implies that the function $F((1-p(q))\tau E(y)) \in [0, F(\tau E(y))]$ monotonically decreases in q. Therefore the mapping

$$q = F\left((1-p(q))\,\tau E(y)\right)$$

has a unique fixed point. Because $(1-p)\tau E(y) < E(y)$, in the unique equilibrium, the proportion of agents in favor of redistribution is always strictly smaller than in the case where agents cannot hedge electoral uncertainty. ∎

Proof of Proposition 2. First consider the regime without policy insurance. Because $y(1-\tau) + \tau E(y) = y$ if an only if $y = E(y)$, all agents with income smaller than the average income will strictly prefer the redistribution policy. This implies that the proportion of voters in favor of redistribution is $F(E(y))$ and, for given function $\varphi(\cdot)$ strictly increasing and such that $\varphi(\frac{1}{2}) = \frac{1}{2}$ capturing electoral uncertainty, the probability that the redistribution policy will be implemented equals $\varphi(F(E(y)))$. Consider then the regime with policy insurance and assume that $\gamma \in (\underline{y}, E(y))$. In this case, at the fair price there will be excess demand. In order to see this, first fix $\varphi(q) \in (0, 1)$ and notice that, at the fair price, the FOC implies that for all $y > \gamma$ the optimal demand for securities is

$$b(y) = (y - E(y))\,\frac{\tau\,(1-\varphi(q)\tau)}{(1-\tau)}.$$

But then

$$\int_{Y\mid y>\gamma} b(y)\,dF(y) = (\widetilde{y} - E(y))\,\frac{\tau\,(1-\varphi(q)\tau)}{(1-\tau)}\,(1-F(\gamma)) > 0,$$

where $\widetilde{y} = (\int_{Y|y>\gamma} y\,dF(y))/(1-F(\gamma)) \geq E(y)$, so that the equilibrium price must be higher than the fair price. This and optimality imply that

$$\frac{U'\left((y+b(1-p))\,(1-\tau)+\tau E(y)\right)}{U'\,(y-bp)} = \frac{(1-\varphi(q))\,p}{\varphi(q)(1-p)(1-\tau)} > 1.$$

But then, by concavity of $U(\cdot)$, it follows that for all $y > \gamma$,

$$(y+b(1-p))\,(1-\tau)+\tau E(y) < y-bp,$$

i.e., every agent that can trade in the market will strictly prefer the status quo policy. Note that this result holds for any $\varphi(q) \in (0,1)$, which implies that although rational agents will perfectly anticipate that $\varphi(q) = \varphi(F(\gamma))$, the after trading probability that the redistribution policy is implemented will be $\varphi(F(\gamma))$. Hence, $\varphi(F(\gamma))$ is a fixed point. If instead $\gamma \geq E(y)$, trading will not affect the proportion of agents voting for redistribution because all agents that can trade are already against redistribution. In this case $\varphi(q) = \varphi(F(E(y)))$. Noticing that $\varphi(F(\gamma))$ is increasing in γ completes the proof. ■

Proof of Proposition 3. Let z_m be the expected income after elections with market and F_{z_m} be the expected income distribution. The assumption of a logarithmic utility implies that in equilibrium

$$b(y) = (y-\widetilde{y})\,\frac{\tau}{1-\tau}\,\frac{E(y)}{\widetilde{y}}\,\frac{\widetilde{y}(1-\tau)+(1-q)\tau E(y)}{\widetilde{y}(1-\tau)+\tau E(y)}, \tag{A.2}$$

$$p = \frac{q\widetilde{y}(1-\tau)}{\widetilde{y}(1-\tau)+(1-q)\tau E(y)}. \tag{A.3}$$

Because, for $y \geq \gamma$

$$z_m = q\left((y+b(1-p))\,(1-\tau)+\tau E(y)\right)+(1-q)\,(y-bp)\,,$$

substituting (A.2) and (A.3) and rearranging yields

$$z_m = \begin{cases} \left(y\left(\widetilde{y}(1-\tau)+\tau E(y)(1-q)\right)+\widetilde{y}q\tau E(y)\right)\dfrac{q\tau E(y)+\widetilde{y}\,(1-\tau q)}{(\tau E(y)+\widetilde{y}(1-\tau))\,\widetilde{y}} & \text{for } y \geq \gamma \\ q\tau E(y)+(1-q\tau)y & \text{otherwise,} \end{cases}$$

and, by using the convolution formula

$$F_{z_m} = \begin{cases} F\left(\dfrac{z_m \dfrac{(\tau E(y) + \widetilde{y}(1-\tau))\,\widetilde{y}}{q\tau E(y) + \widetilde{y}\,(1-\tau q)} - q\tau\widetilde{y}E(y)}{\widetilde{y}(1-\tau) + \tau E(y)(1-q)}\right) & z_m \geq \overline{z} \\ F\,(\gamma) & z_m \in [q\tau E(y) + (1-q\tau)\,\gamma, \overline{z}) \\ F\left(\dfrac{z_m - q\tau E(y)}{1-q\tau}\right) & z_m - q\tau E(y) \in [(1-q\tau)\underline{y}, (1-q\tau)\gamma) \\ 0 & z_m - q\tau E(y) < (1-q\tau)\,\underline{y}, \end{cases}$$

where

$$\overline{z} = \frac{(\gamma(\widetilde{y}(1-\tau) + \tau E(y)(1-q)) + \widetilde{y}q\tau E(y))(\tau E(y)q + \widetilde{y}(1-\tau q))}{(\tau E(y) + \widetilde{y}(1-\tau))\widetilde{y}}.$$

Note that for $y < \gamma$, F_z and F_{z_m} are identical. For $y \geq \gamma$ they cross once in $y = \widetilde{y}$ and $F_z(\overline{z}) > F_{z_m}(\overline{z}) = F(\gamma)$. Because the existence of the market does not affect the mean of the income distribution,

$$\int_\gamma F_z = \int_\gamma F_{z_m},$$

but this implies that

$$\int_{\underline{y}}^{y} (F_z - F_{z_m})\, ds \geq 0 \text{ for all } y \in Y. \qquad \blacksquare$$

PROOF OF PROPOSITION 4. Let z'_m be the expected income after elections with market and $F_{z'_m}$ be the expected income distribution when $\gamma \in (\underline{y}, E(y))$. In this case the end of period probability of implementing the reform $\widetilde{q}$ is a function of the size the market, i.e., $\widetilde{q} = F(\gamma) < F(E(y)) = q$. In this case, proceeding as in the proof of Proposition 3, it can be shown that the expected income after elections in the regime with policy-insurance market is given by

$$z'_m = \begin{cases} (y\,(\widetilde{y}(1-\tau) + \tau E(y)\,(1-\widetilde{q})) + \widetilde{y}\widetilde{q}\tau E(y))\,\dfrac{\widetilde{q}\tau E(y) + \widetilde{y}\,(1-\tau\widetilde{q})}{(\tau E(y) + \widetilde{y}(1-\tau))\,\widetilde{y}} & \text{for } y \geq \gamma \\ \widetilde{q}\tau E(y) + (1-\widetilde{q}\tau)\,y & \text{otherwise,} \end{cases}$$

and, by using the convolution formula

$$F_{z'_m} = \begin{cases} F\left(\dfrac{z'_m \dfrac{(\tau E(y) + \widetilde{y}(1-\tau))\,\widetilde{y}}{\widetilde{q}\tau E(y) + \widetilde{y}\,(1-\tau\widetilde{q})} - \widetilde{q}\tau\widetilde{y}E(y)}{\widetilde{y}(1-\tau) + \tau E(y)\,(1-\widetilde{q})}\right) & z'_m \geq \overline{z}' \\ F\,(\gamma) & z'_m \in [\widetilde{q}\tau E(y) + (1-\widetilde{q}\tau)\,\gamma, \overline{z}') \\ F\left(\dfrac{z'_m - \widetilde{q}\tau E(y)}{1-\widetilde{q}\tau}\right) & z'_m - \widetilde{q}\tau E(y) \in [(1-\widetilde{q}\tau)\underline{y}, (1-\widetilde{q}\tau)\gamma) \\ 0 & z'_m - \widetilde{q}\tau E(y) < (1-\widetilde{q}\tau)\,\underline{y}, \end{cases}$$

where

$$\overline{z}' = \frac{(\gamma(\widetilde{y}(1-\tau)+\tau E(y)(1-\widetilde{q}))+\widetilde{y}\widetilde{q}\tau E(y))(\tau E(y)\widetilde{q}+\widetilde{y}(1-\tau\widetilde{q}))}{(\tau E(y)+\widetilde{y}(1-\tau))\widetilde{y}}.$$

In this case $F_{z'_m}(z) > F_z(z)$ for $z \leq \widetilde{q}\tau E(y) + (1-\widetilde{q}\tau)\gamma$, because $\widetilde{q} < q$. Moreover, $F_z(\overline{z}') > F_{z'_m}(\overline{z}')$ if and only if

$$G(\gamma) = \frac{(\gamma\,(\widetilde{y}(1-\tau)+\tau E(y)\,(1-\widetilde{q}))+\widetilde{y}\widetilde{q}\tau E(y))\,(\tau E(y)\widetilde{q}+\widetilde{y}\,(1-\tau\widetilde{q}))}{(\tau E(y)+\widetilde{y}(1-\tau))\,\widetilde{y}} + \\ -q\tau E(y) - \gamma\,(1-q\tau) > 0.$$

But note that

$$\lim_{\gamma\to\underline{y}^+} G(\gamma) = -q\tau(E(y)-\underline{y}) < 0.$$

In order to get the desired result I have to check whether the two distribution functions cross only once for $z \geq \overline{z}'$. Because

$$\lim_{\gamma\to\underline{y}^+} \overline{z}' = \underline{y},$$

I have that for $\gamma \to \underline{y}^+$,

$$F_{z'_m}(z) > F_z(z)$$

if and only if $z < E(y)$. Therefore, by continuity, there exists a $\gamma^* > 0$ such that for $\gamma \in (\underline{y}, \gamma^*)$, the expected income distribution in the regime without policy insurance is more equal than the expected income distribution in the regime with policy insurance. ■

B. *The Case of a Mean Preserving Spread in the Distribution of Income.* In Section 5, I have shown that a nonmonotonic relationship between inequality and popular support for redistribution is obtained in the case of an increase in the Gini index or in the ratio between mean and median income. This particular increase in inequality is clearly not a mean-preserving spread. In general, in any standard median voter type of model, a mean-preserving spread in the distribution of income can hardly induce a negative relationship between inequality and redistribution. Furthermore, even if the redistribution is ex ante welfare improving, a symmetric mean-preserving spread in any symmetric distribution of income cannot generate a nonmonotonic relationship.[41] This is also true in the present model under the assumption of an exogenous threshold on pre-tax income above which agents have access to the market. However, in this section I show that in the more general case where every agent can trade but there is an ex post individual budget constraint on the amount of securities that can be traded, I can easily construct examples where even a symmetric mean-preserving spread in the distribution of income can generate a nonmonotonic relationship between inequality and support for redistribution.

[41] A symmetric mean-preserving spread leads to a decline in popular support for an ex ante welfare improving redistribution and to an increase in popular support for a redistribution that entails some deadweight loss. See Bénabou (2000, p. 100, footnote 7).

Assume that income y is distributed in $[0, 1]$ with density function $f(y)$, where

$$f(y) = \begin{cases} \dfrac{1}{2} & \text{if } y \in \left[0, \dfrac{1}{2} - \varepsilon\right] \\ \dfrac{1}{2} + \dfrac{1}{4\varepsilon} & \text{if } y \in \left(\dfrac{1}{2} - \varepsilon, \dfrac{1}{2} + \varepsilon\right) \\ \dfrac{1}{2} & \text{if } y \in \left[\dfrac{1}{2} + \varepsilon, 1\right], \end{cases}$$

and $\varepsilon \in (0, \frac{1}{2})$. Then

$$E(y) = \int_0^1 y\, dF(y) = \frac{1}{2},$$
$$Var(y) = \int_0^1 (y - E(y))^2\, dF(y) = \frac{1 + 4\varepsilon^2}{24}.$$

Therefore, an increase in ε represents a mean-preserving spread in the distribution. For simplicity, let $\tau = \frac{1}{2}$. Finally, assume a logarithmic utility function. The problem that each agent solves is

$$\max_b q \ln\left((y + b(1 - p))\frac{1}{2} + \frac{1}{4}\right) + (1 - q)\ln(y - bp)$$
$$\text{s.t. } y + b(1 - p) \geq 0,$$

and market clearing requires

$$\int_0^1 b\, dF(y) = 0.$$

In equilibrium,

$$b^* = \begin{cases} \dfrac{2(q - p)y - p(1 - q)}{2p(1 - p)} & y > \dfrac{p(1 - q)}{2q} \\ -\dfrac{y}{1 - p} & y < \dfrac{p(1 - q)}{2q}. \end{cases}$$

In order to solve for the equilibrium price, I have to consider two cases:

$$\text{(i)} \qquad \frac{p(1 - q)}{2q} \in \left(\frac{1}{2} - \varepsilon, \frac{1 - q}{2}\right)$$
$$\text{(ii)} \qquad \frac{p(1 - q)}{2q} \leq \frac{1}{2} - \varepsilon.$$

In case (i), by using the market clearing condition, I can derive a closed-form expression for $p(q)$, and if

$$\frac{1 - p(q)}{4} \leq \frac{1}{2} - \varepsilon,$$

it follows that $\widetilde{q}$ is the unique solution to

$$\widetilde{q} - \frac{1 - p(\widetilde{q})}{8} = 0.$$ [42]

It is possible to show numerically that there exist ε' and ε'' such that for $\varepsilon \in (\varepsilon', \varepsilon'')$, the support for redistribution is decreasing in the level of inequality, that is $\frac{\partial \widetilde{q}}{\partial \varepsilon} < 0$. The opposite relation obtains if $\varepsilon \in (\varepsilon'', \frac{1}{2})$. In case (ii), it is a matter of simple algebra to show that $\widetilde{q}$ is independent of ε.

The intuition for this result is that, when $\varepsilon \in (\varepsilon', \varepsilon'')$, an increase in inequality increases the mass of constrained agents in the market, and the equilibrium price increases to compensate the resulting excess of demand. The agent that was indifferent between the redistributive policy and the status quo (that in equilibrium is always a constrained net seller of electoral securities as it is shown in Appendix A), is now strictly better off if the redistributive policy is not implemented. By further increasing inequality above ε'', the effect on prices is compensated by the increase in the mass of low-income individuals and the relation between inequality and support for redistribution becomes positive. Finally, if ε is very small, that is a large fraction of the population is concentrated around the mean, an increase in inequality has no effect on the mass of constrained sellers and, in this particular example, $\widetilde{q}$ is independent of ε.

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[42] In this case, $p(q) = \frac{q(1-q+(7-3q)2\varepsilon-\sqrt{2\varepsilon}\sqrt{84\varepsilon-6q-52q\varepsilon+7-(q+(1-q)2\varepsilon)^2})}{(1+2\varepsilon)(1-q)^2}$.

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