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Education, Redistributive Taxation and Confidence

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ABSTRACT

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We consider redistributional taxation between people with and without human capital if education is endogenous and if individuals differ in their perceptions about own ability. Those who see their ability as low like redistributive taxation because of the transfers it generates. Those who see their ability as high may also like redistributive taxation because it stops other people receiving education and increases the quasi rents on their own human capital. It is surprising that this rather indirect effect can overcompensate them for the income loss from taxation and make the overconfident want higher taxes than the less confident do. The results, however, turn out to be in line with empirical evidence on the desired amount of redistribution among young individuals.

JEL Classification: D78, H23, I21

Keywords: education, redistribution, confidence

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1 Introduction

A common theme in life and in literature suggests that people are leftist, socialist, even communist, or at least have strong egalitarian redistributional preferences when they are young, and as they grow older they tend to become conservative, particularly if their professional career had been successful. This shift in redistributional preferences is often attributed to the change in income position and its variability. As has been pointed out by Sinn (1995), young people face a situation in which future income is uncertain and which they cannot fully control. These people may want future redistributional taxation as a means of insurance, but, once their own position in the income distribution has been determined, the demand for redistribution that stems from the insurance motive disappears. Piketty (1995) emphasizes the importance of mobility experience for redistributional preferences: mobility experience may be related to perceptions about the incentive cost of redistribution and may account for differences in redistribution in different countries. Income dynamics and social mobility also play a major role in a number of analyses that consider redistributional preferences and voting outcomes on redistributive taxation. Individuals who expect a major change in their income will take this into consideration when expressing their attitudes about governmental income redistribution.[1]

Ravallion and Lokshin (2000), who consider the Russian situation, find that own expectations about own future welfare are very relevant for redistributional preferences. Empirically, high current income makes individuals favor less redistribution (see, e.g., Fong 2001, Piketty 1995, 1999, Gilens 1999, p.51, or Kluegel and Smith 1986). This is a result that is robust with respect to the addition of socio-demographic characteristics. However, other variables also matter, and these can considerably reduce the share that income contributes to redistributional preferences (Piketty 1999). One aspect is whether individuals think that success is determined by luck or is the reward for personal effort. This, and some further aspects that motivate attitudes towards redistribution, are surveyed and analysed empirically in Fong (2001).

[1] Two papers analysing some of these aspects are Glazer and Konrad (1994) and Bénabou and Ok (2001). Glazer and Konrad (1994) show that rich people may want to live in a neighborhood where a persistent majority of poor makes sure there will also be some redistribution of income in the future if there is some risk that they themselves will become poor then. Bénabou and Ok (2001) show that the "prospect of upward mobility" may yield a political majority that opposes redistribution.

Perceived benefits from poverty reduction could, for instance, be based on altruism or group loyalty (Luttmer 2001) or on the crime reducing effect of poverty reduction (Pauly 1973, Piven and Cloward 1971).[2]

In this paper we highlight an additional, *intra*-generational dimension along which redistributional preferences can differ. This dimension can moderate or even reverse the relationship between own income expectations and preferences for future redistributional taxation, even though it is based purely on narrowly defined selfish behavior. Future redistributional taxation affects the choice of whether to invest in human capital. In turn, redistributional taxation affects the scarcity rents of human capital. We characterize conditions where individuals, who perceive their own talent as high and are therefore likely to benefit greatly from human capital investment, may prefer even more redistribution than those who are less confident about their talent.[3]

We consider a large set of individuals who are all symmetric ex ante, except for their beliefs about what they can gain from investing in education. Some individuals expect to be able to gain little. Some individuals have intermediate expectations about what they can gain, and, finally, some individuals expect to earn a high education premium. In line with the large and growing literature in economics that draws on empirical observations from psychology about perception biases regarding own ability, we could also assume that these differences are simply based on different 'psychological biases'. Accordingly, the three groups may be called 'underconfident', 'adequately confident' and 'overconfident', respectively. For our results it does not matter if these differences in expected education premiums are 'true' in the sense that they are based on heterogenous, but true perceptions about own ability, or are caused by perception biases.

For a given cost of investment in education, the investment incentives of the three types of individual will be different, and they may also differ in their

[2] A policy of public enforcement of redistribution is typically derived from these motivations in order to overcome the free-rider problem that emerges in the context of voluntary redistribution among the group of well-off who may all benefit if the poor receive more support that has been highlighted by Hochman and Rogers (1974).

[3] Insurance aspects of redistributive taxation (e.g., Varian 1980, Sinn 1996) and other means that make the wage distribution more egalitarian (see, e.g., Agell and Lommerud 1992 for an analysis of wage compression) have received considerable attention. We will assume risk neutral individuals throughout, in order to isolate and highlight the effects we consider.

preferences for income redistribution. Those who expect higher own returns from education investment will be more likely to invest in education and this is unsurprising. However, the redistributional preferences can be surprising. We show that the individuals who are highly confident may prefer more redistribution than the individuals who are less confident or even have no confidence at all.[4]

The intuitive reason is as follows. The less confident individuals are unlikely to invest in education and will not pay the tax on the education premium. They would like to maximize the per capita net transfers to the individuals who do not invest in education, and, in this respect, they face a Laffer type trade-off: a higher tax reduces the tax base. The highly confident individuals collectively may want to exclude others from acquiring education, because the smaller the set of highly educated persons, the higher their skill premium. Hence, the highly confident also face a trade-off: the higher the tax they have to pay, the larger the skill premium they can obtain. Which of the most preferred taxes of the two groups is the higher is unclear, as they optimize along different trade-offs.[5]

For our analysis it does not matter whether education investment endows individuals with skills that improve their productivity in the labor market as is predominantly assumed in the human capital theory (Becker 1962), or whether the productivity increase is the result of education as a filter and assignment process, as has been discussed by Arrow (1973).

In the theoretical analysis we assume that all individuals differ only in their perceptions about their own ability. We need not discriminate between whether these perceptions are based on true differences or simply misperceptions. Indeed, confidence biases, and overconfidence in particular, are documented in the psychology literature.[6] For the purpose of our analysis,

[4] A possible candidate for explaining such preferences in a theoretical analysis is risk aversion. As is known from Dionne and Eeckhoudt (1985), self-insurance and self-protection have non-trivial and partially paradoxical comparative statics. But this explanation is not at work in our framework as we consider risk neutral agents.

[5] Alternative tools may come to mind when we think about how to increase scarcity rents for human capital. Note, however, that the group of individuals under consideration cannot simply erect more classical barriers to entry such as admission rules that are guarded by professional associations. Such classical barriers make sense only for individuals who are already "inside" and have passed the barriers that are to be erected, whereas, prior to the education choice, the individuals who express their redistributional preferences are still themselves "outside".

[6] The most relevant evidence in this context is the “better than average” effect that has

we adopt the notion of being 'highly confident', 'just confident' and 'lowly confident'.

This irrelevance regarding the causes of differences in confidence is also important when turning to the data. Individuals' perceptions matter for their career decisions, regardless of where these perceptions come from and whether they are correct or not. Accordingly, those who expect to earn higher education premiums will self-select into education programmes, whether they are overly optimistic about their abilities or are simply really better than average. Hence, the education choice can be seen as a proxy for confidence as regards own benefits from the education investment, i.e., for high confidence, and when we analyse survey data on redistributional preferences, the education choice is our proxy for confidence.

2 Taxation and education choices

Let there be a continuum of individuals i, with $i \in [0, 1]$. Each individual can abstain from trying to become productive and receive a wage that is normalized to zero. Alternatively, the person can invest in education. The cost of investment is e. This can be thought of as the opportunity cost of time or inconvenience, but it is expressed in terms of its equivalent monetary income such that e and monetary income can simply be added.

Educated individuals will earn a wage premium w, which is defined as

$$w = (a - \gamma b)\theta. \tag{1}$$

Consider the components of w in (1). First, θ is a random variable that reflects the individuals' confidence in their education productivity. Individuals know that their own productivity is a random variable, and we denote individual i's perceived expected productivity as $E\theta_i$. Individuals differ in their perceptions, reflecting objective differences, or psychological biases.

For concreteness, we focus on a simple distribution of expectations in which the individuals are allocated among three groups: A_0 is the group of

been documented, e.g., by Guthrie, Rachlinski and Wistrich (2001) with respect to judges' assessments of their decisions, or by Svenson (1981) with respect to driving skills. Further references can be found, for instance, in Squintani (1999) and Heifetz and Spiegel (2000). Relevant papers considering the relationship between confidence and dynamic education filters are Squintani (1999) and Flåm and Risa (2003). This literature is silent with regard to redistributive taxation.

individuals who have "high confidence", individuals in A_1 have "intermediate or just confidence", and individuals in A_2 have "low confidence". These are characterized by the following expected values:

$$\begin{array}{c} E\theta_i = h > 1, \text{ for } i \in A_0 \\ E\theta_i = 1, \text{ for } i \in A_1 \\ E\theta_i = 0, \text{ for } i \in A_2. \end{array} \tag{2}$$

Without loss of generality we can consider the individuals numbered and sorted so that the set of highly confident $A_0 = [0, \alpha_0]$, the set of just confident $A_1 = (\alpha_0, \alpha_0 + \alpha_1]$, and the set of individuals with low confidence, $A_2 = (\alpha_0 + \alpha_1, 1]$. This exhausts the set $[0, 1]$ of all individuals and also determines the relative size α_0, α_1 and $1 - \alpha_0 - \alpha_1$ of these groups.

Note that, where individuals' perceptions are not correct but are biased with respect to their own ability, individuals have correct beliefs about the distribution of perceptions of confidence etc.

Second, a and b in (1) are positive and exogenous parameters, and $\gamma \in [0, 1]$ is the share of individuals who invest in education. The expected wage premium is a linear, declining function of the share of educated individuals, and shows that the marginal product of human capital should be declining in the amount of the human capital that is available in the economy. We assume that

$$a - (\alpha_0 + \alpha_1)b - e > 0. \tag{3}$$

This implies that education investment is desirable in the absence of taxes at least for all individuals i with $E\theta_i \geq 1$ and rules out some uninteresting corner solutions.

A tax t will be chosen that is paid by all individuals who have invested in education, and, hence, earn the education premium (1). Taxes are redistributed on a lump-sum basis, similar to the classical analysis of redistributive taxation in Meltzer and Richard (1981). Accordingly, the government budget constraint requires that the transfer payment to each individual is equal to γt. In a more narrow interpretation, t could also be seen as tuition fees. However, we follow the more general interpretation of a less specific tax in what follows.

Individuals' perceived payoffs depend on their own education choice, the education choices of others, the size of the tax, and their own level of confidence. For simplicity, individuals will be risk neutral. The perceived payoff

of an individual who invests in education is

$$\pi_i(t,e) = E\theta_i(a-\gamma b) - (1-\gamma)t - e. \tag{4}$$

The expected payoff for an individual who does not invest in education and hence, does not earn an education premium is equal to

$$\pi_i(t,0) \equiv \gamma t. \tag{5}$$

In what follows we characterize the investment choices for different levels of taxes, and concentrate on pure strategy equilibria only.

Proposition 1 *The equilibrium share of individuals investing in education is uniquely determined for all $t \geq 0$. The equilibrium share is*

$$\gamma(t) = \begin{cases} \alpha_0+\alpha_1 & \text{if} \quad t \in [0, a-(\alpha_0+\alpha_1)b-e] \equiv T_1 \\ \frac{a-e-t}{b} & \text{if} \quad t \in (a-(\alpha_0+\alpha_1)b-e, a-\alpha_0 b-e) \equiv T_2 \\ \alpha_0 & \text{if} \quad t \in [a-\alpha_0 b-e, ha-\alpha_0 hb-e] \equiv T_3 \\ \frac{ah-e-t}{bh} & \text{if} \quad t \in [ha-\alpha_0 hb-e, ha-e) \equiv T_4 \\ 0 & \text{if} \quad t \in [ha-e, \infty) \equiv T_5 \end{cases} \tag{6}$$

Proof. For their investment decision, individuals i compare their payoff $\pi_i(t,e)$ from investing with their payoff $\pi_i(t,0)$ from not investing, and these values depend on the share γ of other individuals who invest in education.

All $i \in A_2$ never invest in education, regardless of what any other individual does, as $\pi_i(t,e) = -e-(1-\gamma)t < \gamma t$ for any tax $t \geq 0$ and any share $\gamma \geq 0$.

Consider $i \in A_0 \cup A_1$. For any γ, $\pi_i(t,0) = \gamma t$ for both $i \in A_0$ and $i \in A_1$, whereas $\pi_i(t,e) > \pi_j(t,e)$ if $i \in A_0$ and $j \in A_1$. Accordingly, all highly confident individuals invest if at least some just confident individuals invest, and none of the just confident individuals invests if at least some of the highly confident individuals abstain from investing.

Consider a tax $t \in T_1 = [0, a-(\alpha_0+\alpha_1)b-e]$. Individuals $i \in A_1$ invest if $\pi_i(t,e) > \pi_i(t,0)$, which can be written equivalently as $a-\gamma b-e-t > 0$. For all $\gamma \leq \alpha_0+\alpha_1$ this inequality is fulfilled for all $t \in T_1$. All individuals from A_1 and, *a fortiori*, all individuals from A_0 invest, and this yields $\gamma = \alpha_0+\alpha_1$ as the unique equilibrium share $\gamma(t)$ for $i \in T_1$.

Consider a tax $t \in T_2 = (a-(\alpha_0+\alpha_1)b-e, a-\alpha_0 b-e)$. Note that

$$\gamma(t) = \frac{a-e-t}{b} \tag{7}$$

is an equilibrium share for $t \in T_2$. All $i \in A_0$ strictly prefer to invest if they believe that the share of other individuals who invest is equal to $\gamma(t)$ as in (7) as they prefer to invest if $ha - \gamma hb - e - t > 0$, and inserting (7) into this condition yields $(h-1)(e+t) > 0$, which is fulfilled as $h > 1$. All $i \in A_1$ are just indifferent whether to invest; this can be confirmed by inserting (7) into the indifference condition $a - \gamma b - e - t = 0$. Hence, a measure equal to $\gamma - \alpha_0$ of individuals from A_1 may invest, making the belief (7) just fulfilled.

There are uncountably many combinations of investment choices of individuals from A_1 that yield (7). However, the share (7) is the unique equilibrium share for $t \in T_2$. Suppose there is a second equilibrium share $\hat{\gamma} \neq \frac{a-e-t}{b}$. Note that it must hold that $\hat{\gamma} \in [0, \alpha_0 + \alpha_1]$. Note further that for $t \in T_2$, $ha - \gamma hb - e - t > 0$ is fulfilled for all $\hat{\gamma} \in [0, \alpha_0 + \alpha_1]$. Hence, all individuals $i \in A_0$ invest. Therefore, $\hat{\gamma} \in [\alpha_0, \alpha_0 + \alpha_1]$. If $\hat{\gamma} \in (\alpha_0, \alpha_0 + \alpha_1)$, then this requires that all $i \in A_1$ must be just indifferent about whether to invest. But the indifference condition for them is $a - \gamma b - e - t = 0$ and has one unique solution which is (7). It remains to show that $\hat{\gamma} = \alpha_0$ and $\hat{\gamma} = \alpha_0 + \alpha_1$ are not equilibrium shares. For $\hat{\gamma} = \alpha_0$, all individuals $i \in A_0 \cup A_1$ strictly prefer to invest, leading to a share of individuals who invest equal to $\alpha_0 + \alpha_1 \neq \alpha_0$, hence, a contradiction. For $\hat{\gamma} = \alpha_0 + \alpha_1$ only $i \in A_0$ prefer to invest, all $i \in A_0$ prefer not to invest. This yields a group of individuals who invest which constitutes a share $\gamma = \alpha_0 \neq \alpha_0 + \alpha_1$, and, hence, a contradiction.

Consider now taxes in the interval $T_3 = [a - \alpha_0 b - e, ha - \alpha_0 hb - e]$. Individuals $i \in A_1$ invest (and $i \in A_0$ invest *a fortiori* then) if $a - \gamma b - e - t > 0$. For $t > a - \alpha_0 b - e$ this inequality cannot be fulfilled for any $\gamma > \alpha_0$. Hence, for taxes $t > a - \alpha_0 b - e$, it cannot be optimal for $i \in A_1$ to invest in education. Consider then $i \in A_0$. They prefer to invest if $ha - \gamma hb - e - t > 0$. Note that this inequality is strictly fulfilled for all $t \in T_3 \backslash \{ha - \alpha_0 hb - e\}$ for all $\gamma \leq \alpha_0$, implying that $\gamma = \alpha_0$ is the only belief that is consistent with equilibrium behavior. Finally, for $t = ha - \alpha_0 hb - e$, the condition $ha - \gamma hb - e - t > 0$ is fulfilled for all $\gamma < \alpha_0$, implying that $\gamma = \alpha_0$ is the only equilibrium belief for this tax as well.

Consider now taxes in the interval $T_4 = [ha - \alpha_0 hb - e, ha - e)$. Such high taxes are not compatible with $\gamma > \alpha_0$, implying that only individuals with high confidence may invest. Individuals $i \in A_0$ invest if $ha - \gamma hb - e - t \geq 0$. However, $ha - \alpha_0 hb - e - t < 0$, implying that less than all highly confident individuals invest in the equilibrium. Note that

$$\gamma(t) = \frac{ah - e - t}{bh} \tag{8}$$

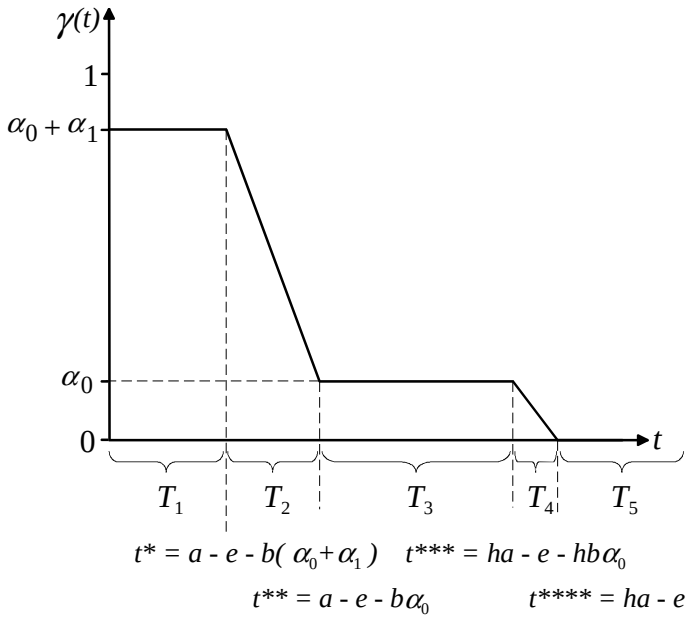

Figure 1: The equilibrium relationship between t and the share $\gamma(t)$ of individuals who invest in education.

is the unique solution to the indifference condition $ha - \gamma hb - e - t = 0$. For this, and only for this γ, all individuals from A_0 are indifferent to whether to invest.

Finally, consider the interval $T_5 = [ha - e, \infty)$. In this interval, $ha - \gamma hb - e - t < 0$ even for the smallest feasible $\gamma \geq 0$. All individuals prefer not to invest and $\gamma = 0$ is the only equilibrium belief. ■

The equilibrium relationship between t and the share $\gamma(t)$ of individuals who invest in education.The equilibrium relationship between t and the share $\gamma(t)$ of individuals who invest in education.

The function $\gamma(t)$ is displayed in Figure 1, and its curvature is intuitively plausible. A very low tax will not prevent individuals who expect to gain a premium from investing in education that strictly exceeds their education cost, and the higher the tax on the education premium, the smaller the group of individuals who decide to invest. For a sufficiently high tax all individuals prefer not to invest. The steps in the function $\gamma(t)$ result from the jumps in confidence levels $E\theta_i$ between the three types of individuals considered.

3 Tax preferences

For the discussion of tax preferences it is useful to define some of the limits of the tax intervals in proposition 1 explicitly. The highest tax rate at which all individuals except individuals with very little confidence invest is

$$t^* \equiv a - (\alpha_0 + \alpha_1)b - e. \tag{9}$$

For higher tax rates, some just confident individuals do not invest. In this range, the relationship between t and γ in the equilibrium is described by (7). Once the tax rate is sufficiently high, all just confident individuals decide not to invest and only the highly confident individuals invest. The smallest tax rate for which this is true is

$$t^{**} \equiv a - \alpha_0 b - e. \tag{10}$$

The largest tax rate for which this is true is

$$t^{***} \equiv ha - h\alpha_0 b - e. \tag{11}$$

For higher tax rates in the range T_4, only some of the highly confident individuals invest and the relationship between t and γ is described by (8). From a certain tax rate onwards, however, no single individual will invest. This critical tax rate is

$$t^{****} \equiv ha - e.$$

For the analysis that follows we make the following assumption that is an implicit assumption about the elasticity of the tax base:

$$b < \min\left\{\frac{a-e}{2(\alpha_0+\alpha_1)}, \frac{ha-e}{2h\alpha_0}\right\}. \tag{12}$$

Condition (12) implies that $\gamma(t)t$ is non-increasing in t both for $t \in T_2$ and $t \in T_4$. This makes it easier to single out the most preferred tax rates from the perspective of individuals from the sets A_0, A_1 and A_2. It will turn out that we can concentrate on comparing preferences about the tax rates t^*, t^{**} and t^{***}.

Proposition 2 *The tax rate that is most preferred by individuals from group A_2 is t^* or t^{***}. They strictly prefer t^* to t^{***} if*

$$(a - (\alpha_0 + \alpha_1)b - e)(\alpha_0 + \alpha_1) > (ha - h\alpha_0 b - e)\alpha_0 \tag{13}$$

and t^{***} to t^* if the reverse inequality holds.

Proof. Individuals $i \in A_2$ choose t that maximizes $\gamma(t)t$. This maximum is in the range $[t^*, t^{****}]$ as $\gamma(t)t$ is strictly monotonically increasing in t for $t < t^*$ and $\gamma(t)t = 0$ for all $t \geq t^{****}$. The elasticity condition (12) further simplifies the problem, as $b < \frac{a-e}{2(\alpha_0+\alpha_1)}$ implies that $\frac{d(\gamma(t)t)}{dt} < 0$ in the range $t \in T_2$, and $b < \frac{ha-e}{2h\alpha_0}$ implies that $\frac{d(\gamma(t)t)}{dt} < 0$ in the range $t \in T_4$. Hence, the maximum for $\gamma(t)t$ is reached for t^* or t^{***}. Inserting (9) and (11) yields $\gamma(t^*)t^* > \gamma(t^{***})t^{***}$ if and only if (13) holds. ■

Intuitively, the individuals with little confidence would like to maximize redistributed tax revenue as this is redistributed on a per capita basis. They face the usual Laffer-curve problem: a larger tax rate will reduce the tax base, because fewer of the more confident individuals invest. Given that the tax revenue is declining in the interior of T_2 and T_4, the tax revenue curve $\gamma(t)t$ peaks either at t^* or at t^{***}, and condition (13) discriminates between these two cases.

We now turn to the just confident group of individuals.

Proposition 3 *The tax rate that is most preferred by individuals from group A_1 is $t = 0$ or t^{***}. They strictly prefer $t = 0$ if and only if*

$$a - (\alpha_0 + \alpha_1)b - e > (ha - h\alpha_0 b - e)\alpha_0 \tag{14}$$

and t^{***} if the reverse inequality holds.

Proof. For $t > t^{**}$, individuals $i \in A_1$ do not invest, and their payoff for this range of taxes is $\gamma(t)t$. By (12) $\gamma(t)t$ is monotonically decreasing in t for $t \in T_4$ and constant and equal to zero for even higher t. Moreover, $\gamma(t)t$ is monotonically increasing in t for $t \in T_3$. Hence, $t^{***} = \arg\max_{t \in T_3 \cup T_4 \cup T_5}[\gamma(t)t]$.

For $t \in T_1$, individuals $i \in A_1$ strictly prefer to invest in education. Their payoff is $(a - (\alpha_0 + \alpha_1)b - e) - (1 - (\alpha_0 + \alpha_1))t$ and strictly decreases in t. For $t \in T_2$, individuals are indifferent to whether to invest or not to invest. Accordingly, their payoff equals $\gamma(t)t$, and by (12) it decreases in t in this interval. Finally, the payoff is a continuous function of t at t^*. This shows that the just confident individuals strictly prefer $t = 0$ among all $t \in T_1 \cup T_2$.

Whether $i \in A_1$ prefers $t = 0$ or $t = t^{***}$, the equilibrium payoff for individuals $i \in A_1$ for these taxes needs to be compared. The left-hand side in (14) is the payoff from $t = 0$ and the right-hand side of (14) is the payoff from $t = t^{***}$. ■

Consider finally $i \in A_0$. The following proposition holds for the group of individuals with high confidence:

Proposition 4 *The tax rate that is most preferred by individuals from group A_0 is $t = 0$ or some $t \in T_2$ with $t > t^*$. Their most preferred tax is $t = t^{**}$ if*

$$h > \frac{a-e}{b} - 2\alpha_0 + 1 \tag{15}$$

and

$$(ha - h\alpha_0 b - e) - (1-\alpha_0)[a - \alpha_0 b - e] > ha - h(\alpha_0 + \alpha_1)b - e. \tag{16}$$

Proof. The perceived payoff of a highly confident individual from making the individually optimal choice to invest or not to invest is

$$\begin{array}{cc} (ha - h\gamma(t)b - e) - (1-\gamma(t))t & \text{for} \quad t \in T_1 \cup T_3 \cup T_3 \\ \gamma(t)t & \text{for} \quad t \in T_4 \cup T_5. \end{array} \tag{17}$$

For $t \in T_1$, the equilibrium $\gamma(t) = const.$ with respect to a small increase in t, and, hence, the payoff of the highly confident individuals (17) decreases in t for $t \in T_1$. All $i \in A_0$ strictly prefer $t = 0$ to $t = t^*$. Also, for $t \in T_3$, a similar argument applies, and $t = t^{**}$ is strictly preferred to $t = t^{***}$. For $t \in T_4 \cup T_5$, all $i \in A_0$ in the equilibrium weakly or strictly prefer not to invest. Their perceived payoff is therefore equal to $\gamma(t)t$ in this range, and, by $b < \frac{ha-e}{2h\alpha_0}$ from condition (12), $\gamma(t)t$ is decreasing in t for $t \in T_4$ and constant (and equal to zero) for $t \in T_5$. Among all $t \in T_3 \cup T_4 \cup T_5$, they strictly prefer t^{**}. All this together implies that the perceived payoff of $i \in A_0$ must take its maximum on $t = 0$ or on some $t \in [t^* + \Delta, t^{**}]$, for some strictly positive Δ, hence, for a tax that is strictly higher than t^*. This shows the first part of proposition 4.

In the range $t \in T_2$ an increase in t increases the perceived gross income for $i \in A_0$ by $\frac{\partial(E\theta_i(a-\gamma(t)b)-e)}{\partial t} = h$, and it increases the individual's tax (net of transfers received) by $\frac{\partial[1-\gamma(t))t]}{\partial t} = \frac{2t-a+e}{b} + 1$. Accordingly, a corner solution at $t = t^{**}$ is obtained if $h - \frac{2(a-\alpha_0 b-e)-a+e}{b} - 1 \geq 0$, which condition can be written equivalently as (15). The condition (16) compares the perceived payoff at this tax t^{**} with the perceived payoff for $t = 0$. ■

Propositions 2, 3 and 4 characterize the tax rates that members of the respective groups prefer most. It seems to be plausible that members of the group A_2 who never invest in education, never pay the tax and simply receive redistributions from the total tax revenue prefer higher tax rates than other confidence types. However, this is not generally the case:

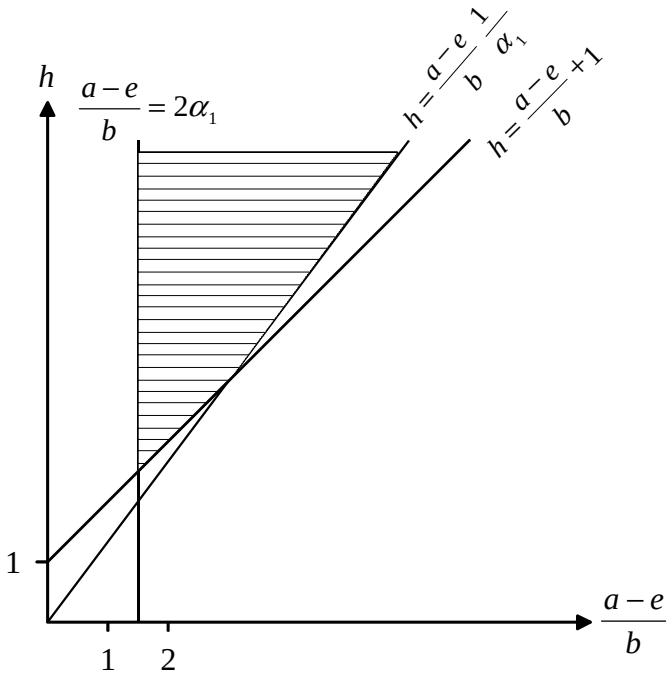

Figure 2: The most confident prefer t^{**}, the just confident prefer $t = 0$ and the invididuals with low confidence prefer t^* with $0 < t^* < t^{**}$ in the shaded area which is drawn for $\alpha_0 \to 0$ and $\alpha_1 = 0.75$.

Proposition 5 *If the set A_0 is sufficiently small then $i \in A_1$ prefer the lowest tax rate $t = 0$, $i \in A_2$ most prefer t^*, and $i \in A_0$ most prefer a tax rate that may exceed the tax t^*. Their most preferred tax is t^{**} if $h - 1 > \frac{a-e}{b}$ and $h\alpha_1 > \frac{a-e}{b}$ hold.*

Proof. For a proof, consider $\alpha_0 \to 0$.

For $\alpha_0 = 0$, condition (13) becomes $0 < a - \alpha_1 b - e$, which is fulfilled by (3). Hence, by proposition 2, t^* is the most preferred tax for $i \in A_2$.

For $\alpha_0 = 0$, condition (14) reduces to the same condition $0 < a - \alpha_1 b - e$. Hence, by proposition 3, $t = 0$ is the most preferred tax for $i \in A_1$.

For $\alpha_0 = 0$, for $i \in A_0$, the conditions (15) and (16) reduce to $h > \frac{a-e}{b} + 1$ and $h\alpha_1 > \frac{a-e}{b}$. ■

Proposition 5 shows that the individuals with high confidence who will invest in education and pay the tax may favor a higher tax than the just

confident or even the individuals who have low confidence and who never pay this tax but receive redistributions from it. It is important to notice that this range is non-empty. This is illustrated in Figure 2. The shaded area defines such a parameter range of h and $(a-e)/b$. Conditions (3), (12), (13), (14), (15) and (16) must hold. For $\alpha_0 \to 0$, (3), (13) and (14) reduce to $\frac{a-e}{b} > \alpha_1$. The first condition in (12) reduces to $\frac{a-e}{b} > 2\alpha_1$, hence, a strighlty tighter condition. The second condition in (12) is trivially fulfilled for $\alpha_0 \to 0$. Condition (15) reduces to $\frac{a-e}{b} < h-1$, and (16) to $\frac{a-e}{b} < \alpha_1 h$.

The intuition for the result is perhaps more straightforward than the calculations that lead to proposition 5. Individuals with little confidence who never invest in education would like to maximize the total tax revenue that can be redistributed, because this maximizes the transfers they receive. As is well known from standard Laffer curve arguments, the tax revenue is not maximized for the maximum tax that is feasible. People with high confidence are guided by a different consideration. They know they will invest in education and expect a high wage premium from education. This premium will be higher, the smaller the number of other individuals who invest in education, as scarcity of human capital will drive up the wage premium from education. For this reason, they are willing to accept a considerable tax if this tax prevents a sufficiently large number of other individuals from investing in education, such that the increase in their expected gross wage premium from deterring others from investing in education exceeds their additional cost of tax payments required to make this deterrence effective. Proposition 5, together with Figure 2, illustrates that this can really be the case and the analysis suggests that the full effect is more likely to be at work if individuals with high confidence are very confident, and if their number is small in comparison to the number of individuals who have an intermediate confidence level.

Proposition 5 is a possibility result only, and, in its extreme format, it might perhaps be considered as less plausible. However, the result highlights a general and important effect that applies even if the counterintuitive result of proposition 5 does not apply in a strict sense. High taxes on an education premium are less painful for those who invest in education, as there is a counterbalancing effect. The higher tax reduces education investment and this drives up the scarcity rents for those who invest. This counterbalancing effect may reduce the resistance to higher taxes even among those who invest in education and pay these taxes. From this perspective, proposition 5 mainly states that this counterbalancing effect can be very strong, indeed.

4 The data and the empirical strategy

In this section we turn to the empirical relationship between perceptions about own ability and redistributional preferences. We use a data set that has been obtained from a survey of 2000 individuals that Thomas Piketty conducted in France in 1998 with financial support from the McArthur Foundation.[7] The data set contains 65 variables and includes income, many socio-demographic characteristics and answers to questions on social, political, ethical, and cultural issues.

In line with the theoretical analysis in sections 2 and 3 that considers individuals who choose their human capital investment and do not yet know whether their own investment will be successful, we consider only individuals aged 18-25. This reduces the size of the sub-sample used to 321 observations.

The endogenous variable to be explained is preferences for redistributive taxation, or the desire for redistribution. The data set provides several measures for an individual's preferences with regard to income redistribution. We concentrate on the following three questions to construct the variables we use. The first variable is the respondents' answer to the question "According to you, taxes should be increased or not?" (*dumimp*). The second and third variables are constructed from two questions regarding the monthly wage of a shopkeeper. One question is "According to you, what should the average monthly wage of a shopkeeper be?" (*revsouhcaiss*) and the other is "According to you, what is the average monthly wage of a shopkeeper?" (*revcaiss*). The answers to these questions were used by Piketty (1999) to construct an indirect measure of the desired redistribution. More precisely, we have used the answer to the question "what should be..." (*revsouhcaiss*) and the variable (*revmoy*) concerning the respondent's beliefs about the average household income. We do this in order to control for the possible differences in individuals' perception of average incomes in the population. An alternative to this procedure has been to construct a new variable (*diffrevsoucaiss*) as the ratio: [*revsouhcaiss*] / [*revcaiss*]. This ratio solves the problem of controlling for the heterogeneity of the beliefs on the average household income level in a direct way.

We also conducted some estimates using other variables, e.g. *opinrmi*, defined as the answer to "According to you, the RMI (minimum income) should be increased, maintained, decreased, suppressed?", that look attrac-

[7] For a detailed description see Piketty (1999).

tive at the first glance. We do not reproduce the estimation results here as the estimations turned out to be inconclusive.

We need an explanatory variable that measures the respondents' confidence. For this purpose, we try to correctly identify the group of respondents, who, for the right or wrong reason, are very confident about their ability to turn human capital investment into own productivity, and use it to consider the explanatory power of high confidence for the desire for redistribution. The data set allows for constructing several variables that can be considered as proxies for an individual's own perceptions about talent or the ability to turn human capital investment into high own productivity.

We constructed several variables to measure confidence and report results only on the following four. The first measure of confidence is based on the idea that highly confident individuals should self-select and choose to become students. Hence, we chose a dummy variable (*dumstud*) which takes value 1 if the respondent is a student, and zero otherwise. The second measure of confidence uses the questions concerning the perceived determinants of own professional success: the respondent has been asked whether he/she thinks that success depends on effort or, alternatively, on uncontrolable events. Based on this question, we define the dummy *explicreuss2* that is 1 if the respondent believes in effort as the determinant of individual success and 0 otherwise. The dummy *overconf1* is constructed by multiplying *dumstud* and *explicreuss2*. It captures the following condition of perceived high ability: student and believing in effort as the determinant of own success. The third measure of confidence uses respondents' answers with regard to their future prospects (how things will be in the next 5 years). The respective dummy variable is *opin5ans2* and takes on the value 1 if the answer is "better than now" and 0 if the answer is "similar to or worse than now". Using this dummy, we construct the dummy (*overconf2*): student with positive/very positive future prospects. The fourth definition of high confidence captures the students with positive future prospects who, in addition, believe in effort as the reason for success (as in definition 2). To build the corresponding dummy (*overconffutur*), taking values 0 and 1, we simply multiply the dummies *dumstud*, *opin5ans* and *explicreuss2*.

Our empirical strategy is to test for the explanatory power of different definitions of confidence for the preference for redistribution. The empirical relationship or reduced form model is as follows: the desire for redistributive taxation (or, alternatively, the intensity of redistribution preferences) is explained as a function of dummies that capture perceived own ability

and other variables such as income and further socio-demographic variables. We use the measures of redistributional preferences discussed above as the endogenous variables, the various measures of confidence as an explanatory variable, and use income, socio-demographic variables (age, gender, size of the area where the respondent lives, profession of the parents, etc.) as further controls.

In order to adjust a model for *dumimp*, given the binary nature of the variable, we estimate a discrete choice model (a probit in our case). When the endogenous variable was the question "what should the monthly wage be..." or the ratio *diffrevsoucaiss* we use an OLS regression.

In general, the estimations suffered from the small size of the sub-sample we used. In particular, the number of observations which have a "1" for the variables constructed in a more sophisticated way is small (see Table 1). Some of the empirical models we have estimated failed to pass the tests of robustness. In particular, in the case of the discrete choice models, we eliminated all the estimations with a predictive power lower than 80% (i.e. the percentage of correctly predicted 1 and 0 was lower than 0.8). Table 1 provides definitions of variables. In tables 2, 3 and 4, we present a selection of results that, in our opinion, are relevant from an econometric point of view. Also, we report only the variables and their respective coefficients if the level of significance is above 90 percent. In table 2 the dependent variable is the dummy about tax preferences (*dumimp*). In table 3 the endogenous variable is *diffrevsoucaiss*, the relation between the desired and estimated monthly wage of a shopkeeper as discussed above. Finally, in table 4, we use the question about shopkeeper monthly income (i.e: what should the monthly income of a shopkeeper be?) as a measure of attitude toward inequality.

The coefficient of the income variable *revfoy2* is negative and significant in all these estimations. This result is in line with the related previous empirical findings and with economic intuition according to which low income earners expect to benefit from redistribution. More surprisingly, in some cases, we find that the measure of perceived own high ability is positively correlated with the intensity of the taste for redistribution. This is particularly true in the case of the first definition of perceived own high ability in which, independently of the measure of the redistributive preferences used, the coefficient of the dummy that captures high ability (*dumstud*) is always positive and significant (at the 10 percent level), as reported in the first set of regressions in each table. This is in line with the view that individuals who perceive their own ability as high and, hence, self select to become students,

may favor more redistribution.

However, we are very reluctant to draw any general conclusions. The empirical results are not very robust, the theoretical relation between confidence and redistributional preferences has been shown to depend on distributional parameters that have no counterpart in the empirical estimation, and the qualitatively unambiguous empirical results can be assigned to a number of theoretical considerations. For instance, when we change the definition of the respondent's perception of own ability, the coefficients of the corresponding dummies are not significant (see the second set of results in table 2 and all the other regressions of table 4). Still, *dumstud* remains significant and with a positive sign: the probability of having high redistributive preferences is positively affected by the choice of being a student. Moreover, using the ratio *diffrevsouhcaiss* as a measure of redistributive preference and the status student and believing in effort as the definition of perceptions of high own ability (second set of regressions in table 3), we get that the coefficient of *dumstud* still remain positive and significant but, the coefficient of the dummy *overconf1* appears to be significant and negative.

To conclude, the relationship between perceived own ability and preferences for income redistribution is not straightforward, but we could show that the two variables are not necessarily negatively correlated.

5 Conclusions

Individuals who perceive their own talent to be very high may favor a high income tax as a barrier to entry that prevents those individuals investing in education, who perceive their own ability to be less high. The tax reduces the share of individuals who invest in human capital and increases the scarcity rent that accrues to those individuals who invest. We showed that this effect can, but need not, dominate its cost in terms of the high taxes to be paid that comes along with this policy. As a result, individuals who are very confident about their own ability may prefer taxes that are even higher than those wanted by people who benefit from the increased redistribution that is financed by these taxes. The empirical implication of the result is that highly confident individuals should articulate a preference for more redistribution. We cannot test a very specific hypothesis in the empirical analysis, but we do find evidence that, for this or other reasons, is in line with the theoretical results. Overall the result can be interpreted as showing that there is no

general conflict between the poor and uneducated on the one side and the rich and educated on the other, with the former asking for more redistribution and the latter for less, but that there are forces that can make the opposite redistributional preferences possible.

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Table 1. Description of the variables used and his label.

Dumimp	Dummy: 1 if the individual wants more taxes; 0 otherwise	Nº of 0 : 184 ; Nº of 1: 137
Dumstud	Dummy: 1 if student; 0 otherwise	Nº of 0 : 192 ; Nº of 1: 129
Revfoy2	Income of the household in which the individual lives (in annual French francs)	Mean = 134903 ; standard dev. = 97364
Profpere2	Father's profession (4 types): 1 (self employed), 2 (white collar), 3 (blue collar), 4 (pensioner)	Nº of 1 : 82 ; Nº of 2: 45; Nº of 3 : 151 ; Nº of 4: 43
Profmere2	Mother's profession (4 types): 1 (self employed), 2 (white collar), 3 (blue collar), 4 (pensioner)	Nº of 1 : 31 ; Nº of 2: 48; Nº of 3 : 229 ; Nº of 4: 13
Sex	1 if boy, 2 if girl	Nº of 1 : 143 ; Nº of 2: 178
Age	Age	Mean = 21.6 ; standard dev. = 2.3
Opinrmi2	Answer about the RMI: the RMI (minimum income) should be increased (4), maintained (3), decreased (2), suppressed (1)	Nº of 1 : 13 ; Nº of 2: 8; Nº of 3 : 99 ; Nº of 4: 197
Agglo2	Size of agglomeration in which the respondent lives (in increasing categories): 1 (less than 50.000 inhabitants); 2 (between 50 000 and 200.000); 3 (more than 200.000)	Nº of 1 : 139 ; Nº of 2: 43; Nº of 3 : 139
Revsouhcaiss	Desired (by the respondent) monthly income of a shopkeeper (French Francs)	Mean = 7255 ; standard dev. = 1554
Revcaiss	Estimated (by the respondent) monthly income of a shopkeeper (French Francs)	Mean = 5755; standard dev. = 992
Revmoy	Estimated (by the respondent) average monthly household income (French Francs)	Mean = 10123; standard dev. = 4342
Diffrevsocaiss	Revsouhcaiss/revcaiss	Mean = 1.26 ; standard dev. = 0.22
Explicreuss2	Dummy; 1 if respondent believes in effort as the main determinant of individual success; 0 if he/she believes in other incontrollable factors	Nº of 0 : 233 ; Nº of 1: 88
Overconf1	Explicreuss2*dumstud	Nº of 0 : 288 ; Nº of 1: 33
Opin5ans2	Dummy: 1 if respondent thinks that in the next 5 years own economic conditions will be better then they are now; 0 otherwise	Nº of 0 : 149 ; Nº of 1: 172
Overconf2	Opin5ans2*dumstud	Nº of 0 : 262 ; Nº of 1: 59
Overconffutur (overconfid-r)	Opin5ans2*dumstud*explicreuss2	Nº of 0 : 304 ; Nº of 1: 17

Table 2. Measure of attitude toward inequality: question about taxes (dumimp). Probit, dependent variable: dumimp (1 if more taxes, 0 otherwise).

definition of high confidence	**age 18-25 and student**			**age 18-25, student believing in effort**		
	Coef.	Std. Err.	P > z	Coef.	Std. Err.	P > z
revfoy2	-1.76E-06	9.02E-07	0.052	-1.78E-06	9.09E-07	0.000
dumstud	0.3741264	0.2131325	0.079	0.398167	0.2397785	0.097
explicreuss2				-0.0898737	0.2265374	0.692
overconf1				-0.1004084	0.3740957	0.788
age	0.0620315	0.0415555	0.136		0.0607089	0.0419

Table 3. Measure of attitude toward inequality: relation between the desired and estimated (by the respondent) monthly wage of a shopkeeper (i.e: Which should be the monthly income of a shopkeeper?/ Which is the monthly income of a shopkeeper?). Ordinary Least Squares. Dependent variable: diffrevsouhcaiss.

definition of high confidence	**age 18-25 and student**			**age 18-25, student believing in effort**		
	Coef.	Std. Err.	P > z	Coef.	Std. Err.	P > z
revfoy2	-2.26E-07	1.48E-07	0.128	-2.37E-07	1.43E-07	0.099
dumstud	0.0661108	0.0372335	0.077	0.0967393	0.0424295	0.024
explicreuss2				-0.0225034	0.0341603	0.511
overconf1				-0.11994	0.0584527	0.041
_Iprofpere-2	0.0754316	0.042328	0.076	0.0700318	0.0409939	0.089
age	0.017502	0.0066796	0.009	0.016824	0.0064848	0.01
_cons	0.8683943	0.160896	0	0.8864374	0.1567114	0

Table 4. Measure of attitude toward inequality: question about shopkeeper monthly income (i.e: Which should be the monthly income of a shopkeeper?). OLS. Dependent variable: revsouhcaiss.

definition of high confidence	**age 18-25 and student**			**age 18-25, student believing in effort**			**age 18-25, student and positive/very positive on his future condition (next 5 years)**			**age 18-25, student, believing in effort and positive/very positive on his future condition (next 5 years)**		
	Coef.	Std. Err.	P > z	Coef.	Std. Err.	P > z	Coef.	Std. Err.	P > z	Coef.	Std. Err.	P > z
revmoy	0.071396	0.0189503	0	0.0740287	0.0192782	0	0.0773396	0.018718	0	0.0736915	0.0187817	0
revfoy2	-0.0002895	0.0008303	0.728	-0.0001126	0.0008182	0.891	0.000088	0.0008468	0.917	-0.0006818	0.0008919	0.445
dumstud	672.0402	246.5485	0.007	798.4154	280.2058	0.005	746.3918	321.3293	0.021	723.2077	267.7921	0.007
explicreuss2				-54.41921	237.3512	0.819				-35.812	216.517	0.869
opin5ans2							149.294	212.3613	0.483	170.0322	184.8875	0.359
overconf1				-423.3885	423.2037	0.318						
overconf2							-51.33481	378.4187	0.892			
overconfid-r										-646.4981	523.4482	0.218
_Iprofpere-2	760.3251	284.3135	0.008	723.0515	283.0438	0.011	677.1683	288.2462	0.02	566.2561	297.6039	0.058
_Iprofmere-4	333.2898	360.4273	0.356	408.1264	356.2426	0.253	645.4761	345.6986	0.063	854.1951	440.9801	0.054
_cons	5006.517	1124.001	0	4766.594	1109.858	0	4429.689	1151.394	0	3977.047	1124.134	0