Inequality, Tax Avoidance, and Financial Instability

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February 21, 2011

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Abstract

We model the link between imperfect redistribution and financial risk taking. In the presence of an increasing returns tax-avoidance technology, risk-averse agents are willing to take financial risk without financial rewards. Following an increase in inequality, an incumbent politician facing retrospective voters does not regulate against such financial gambling. If the right tail of wealth distribution is sufficiently fat, then arbitrarily small increases in inequalities lead the politician to promote excessive risk taking. By increasing the scope for tax avoidance, globalization of capital and human capital markets might have increased financial fragility.

"We don't pay taxes. Only the little people pay taxes."
Leona Helmsley

1 Introduction

Following the 2007-2009 crisis, substantial attention has been devoted to deciphering the build-up of risk in the U.S. financial system. Numerous studies have underlined the role played by market failures, incentive problems and regulatory loopholes within the financial sector. For instance, it is frequently argued that persistently lax monetary policy induced excess risk-taking by investors "searching for yield", a view expressed by e.g. Rajan (2005), Diamond and Rajan (2009), or Stiglitz (2010). Other studies emphasize the fact that financial institutions had poor incentives to monitor borrower quality because they were transferring risks through securitization to final investors that were subsidized or unsophisticated (Shleifer and Vishny, 2010, Nadauld and Weisbach, 2010, Rajan et al., 2008, Purnanandam, 2010). Yet, for others, the belief that the Fed would bail-out "too-big-to-fail" institutions triggered excess exposure of individual financial actors to common risk-factors (See e.g. Fahri and Tirole (2010)). Such excess risk taking was facilitated by regulatory loopholes, such as off-balance sheet liabilities, or by taking advantage of favorable ratings provided by rating agencies. More broadly, all accounts of the crisis share the common ingredient that the U.S. government seems to have encouraged excessive risk taking.

Without denying the key role of such frictions in the chain of events that led to the crisis, this paper puts financial instability in a broader perspective than the functioning of the financial sector, namely that of political economy and optimal taxation. In our framework, the high level of risk undertaken by U.S. citizen collectively can be interpreted as the equilibrium outcome of political and technological forces. In particular, we uncover a link between the increase of inequality and the build-up of financial risk. In doing so, our paper joins the voices of several scholars who have underlined a potential causal channel between inequality and financial fragility (see e.g. Rajan (2010) and Krugman (2010)). To our knowledge, this is the first paper that formalizes a mechanism through which an inequality shock creates a higher level of financial risk taking.

Our model has two main building blocks. The first one analyses the link between taxes and financial risk taking. If post-tax wealth is a convex function of wealth for some range of wealth, a demand for financial gambling arises: Some agents are willing to take risky gambles without being com-

pensated for it by a positive risk premium. We show that such convexity arises endogenously in an environment where the government can only imperfectly redistribute wealth. Specifically we assume an increasing returns tax-avoidance technology, which limits the taxation of wealthy agents. We fully solve a Mirlees program with tax avoidance in that context. The optimal tax scheme features a convex kink in the mapping of gross to net wealth. People with gross wealth around this kink have endogenously risk-seeking preferences on pre-tax wealth, while being intrinsically risk averse. This establishes a demand for gambles that we characterize.

The key assumption that creates a transmission channel between fiscal policy and financial risk-taking is that tax-avoidance has increasing returns in wealth. In our model, this leads to decreasing marginal tax rates at the top of the distribution in equilibrium. The idea that tax-avoidance involves a fixed cost is in line with anecdotal evidence: in many instances, tax avoidance involves the creation of special purpose vehicles or migration into a favorable country. Only richer people are likely to pay such fixed costs. Several sources document a trend toward higher levels of tax avoidance. In line with the view that post-tax wealth has become a more convex function of wealth, Piketty and Saez (2007) report that the progressivity of the U.S. federal tax system at the top of the income distribution has declined dramatically since the 1960s while average federal tax rates for the middle class have remained roughly constant over time.

A second building block of our model is concerned with the incentives of politicians to allow or forbid such financial gambling. Absent political frictions, a benevolent government would ban inefficient risk taking. We assume retrospective voting in an otherwise standard probabilistic-voting framework and analyze how it shapes politicians preferences for regulation: agents have a tendency to vote in favor of the incumbent if their wealth as increased during its political mandate. Our formal model is in line with e.g. Fiorina (1981). The incumbent government then has an incentive to allow financial risk taking for voters that have experienced decreasing wealth in the hope of gaining their support. It follows that, after an increase in inequality, incumbents might encourage financial risk-taking, e.g. through lax financial regulation. Very small increases in inequality suffice to trigger this political endorsement of excessive risk taking in the case in which the ex ante wealth distribution has a sufficiently fat right tail.

2 Increasing Returns to Tax Avoidance and The Mirrlees Problem

2.1 Optimal Taxation Under Increasing Returns to Tax Avoidance

Consider a population comprised of a continuum of individuals with unit mass. There is a single consumption good. Individuals consume positive quantities at a single date, and have identical preferences represented by an increasing and strictly concave utility function u such that $u'(0) = +\infty$, $\frac{u(y)}{y} \underset{y \to +\infty}{\to} 0$. Individuals differ only with respect to their initial endowments of the consumption good ("wealth"). All endowments are positive. Let $F(\cdot)$ denote the wealth distribution, which is common knowledge. We suppose that

$$\int_0^{+\infty} w dF(w) < +\infty;$$

and that the support of the distribution is equal to $[0; +\infty)$. The assumption of an unbounded support is only meant to simplify the discussion. That the support is an interval is the substantial (and arguably realistic) part of the assumption.

A social planner seeks to maximize utilitarian welfare. The social planner faces an informational friction. Each individual privately observes its endowment, and can secretly consume all or part of it before reporting the residual. An individual who reports only y units out of a total endowment of x secretly consumes $G(x; y)$, where G is continuous, and satisfies

$$x - y \geq 0 \Rightarrow 0 \leq G(x; y) \leq x - y. \tag{1}$$

This secret consumption adds up to the amount that the individual receives after the social planner redistributes aggregate reported income. Grochulski (2007) studies the case in which $G(x; y) = \int_y^x \tau(t)dt$, with $\tau \in (0; 1)$. That is, the cost of avoiding taxes on a given dollar depends only on the "rank" of this dollar in one's pre-tax wealth, but neither on total wealth nor on the diverted fraction of it. Our general specification also encompasses the (perhaps more natural) case in which $G(x; y) = g(x - y)$. In this case, avoidance costs depend only on the amount that is diverted.

In application of the Revelation Principle, one can write down the planner's problem using only direct mechanisms. A direct mechanism is a pair of functions of wealth $(r(w); v(w))$ such that an individual with wealth w has

From now on, we assume that $G(x;y) = g(x \quad y)$ with g increasing, convex, and $g(0) = 0$. Condition (3) is clearly satisfied in this case.[1] This corresponds to increasing returns to tax avoidance. As mentioned in the introduction, many forms of tax avoidance imply significant fixed costs and thus satisfy this property.

Under this specification, it is easy to see that the optimal tax scheme (4) is progressive at least up to some wealth level. Formally,

Corollary 2

The fraction of gross wealth that is taxed increases w.r.t. wealth over $[0;\overline{w}]$ for some $\overline{w} > 0$: It may or may not be decreasing w.r.t. wealth for su¢ ciently high wealth levels.

Proof. See the appendix.

As extensively discussed in the introduction, it seems to be the case that total taxes are progressive for most of the population because so are labor income taxes in most advanced countries, but that taxes may become regressive for sufficiently high net wealth individuals. Our framework nicely accommodates for this.

A second interesting property of this tax avoidance friction is that it generates simple social costs of inequality. Consider two economies A and B that are identical except for their gross wealth distributions: F_B dominates F_A in the sense of second-order stochastic dominance. In this sense, economy A is more inequal than economy B: Then any individual in economy A receives a lower net consumption than an individual with the same gross endowment in economy B. This is because the constant term in the optimal scheme defined in (4) is smaller in economy A by concavity of the function $t \quad g(t)$: This implies that inequality reduces utilitarian welfare because of the increasing returns to tax avoidance.

2.2 Increasing Returns to Tax Avoidance and Risk Taking

This section develops one of the two main building blocks of our model: risk-taking incentives induced by increasing returns to tax avoidance. To do so, we enrich the previous model as follows.

First, we assume that two tax avoidance technologies are available to individuals. The first one dissipates a fixed fraction $\quad 2\ (0;1)$ of each diverted unit of consumption. The second one wastes only $\quad 2\ (0; \ )$

[1] Casamatta (2010) studies the case in which $g(x \quad y)$ is concave. He shows that in this case, the optimal tax scheme may feature some tax avoidance ($r(w) < w$) by the middle class but not by the wealthiest nor the poorest.

out of each diverted consumption unit, but comes at a fixed cost $c > 0$ per individual. In sum, we assume that

$$g(x) = (1 \quad)\, x + 1_{\{x \quad cg\}} \quad (x \quad c):$$

Second, the economy has now two dates, 0 and 1. Individuals receive their endowment at date 0 and consume at date 1, which is also the date at which the social planner announces the redistribution scheme. At date 0, individual $i \in [0;1]$ receives wealth $w_i \quad 0$: Let F_0 denote the date-0 wealth distribution, which is assumed to have full support over $[0;+1)$. A risk-free storage technology with unit return is available to individuals for the transfer of their endowment from date 0 to date 1: Each individual may also add to this risk-free return a diversifiable (and thus not rewarded) risky return with any arbitrary unit-mean distribution with full support over $[0;+1)$.

We solve for the subgame perfect equilibria of this economy. An equilibrium is characterized as follows:

- The social planner announces an optimal redistribution scheme after observing the date-1 wealth distribution F_1:

- Rationally anticipating the realization of F_1 and the planner's decision, each individual i optimally chooses the risk profile of her storage technology.

- F_1 is consistent with the risk profiles chosen by the individuals.

Since F_0 and the risky returns (if any) chosen by individuals have full support over $[0;+1)$, then so must F_1. Thus, Proposition 1 applies at date 1. This means that upon observing F_1, the social planner simply implements the scheme

$$v(w) = g(w) + \int_0^{+1} (u \quad g(u))\, dF_1(u): \tag{5}$$

We now need to solve for the optimal risk-shifting choice of each individual at date 0 given her endowment and beliefs about F_1. We first ignore the constraint that risky returns must have full support over the positive half line. An individual $i \in [0;1]$ with initial wealth w_i faces the following problem:

$$\begin{aligned} &\sup_{\in M} \int_0^1 u(v(w))\, d\ (w) \\ &\text{s.t.} \int_0^1 w d\ (w) = w_i; \end{aligned} \tag{6}$$

where M is the set of Borelian probability measures over $[0;+1)$: Notice that F_1 enters in (6) only to determine the constant term in v. Let $S(w_i)$

denote the solution of this problem, and S denote the solution of the dual problem, which given the primal problem (6) takes the following form:

$$S \quad \inf_{(z_1;z_2)\,2\,R^2} z_1 + w_i z_2$$
$$\text{s:t:} \quad 8w \quad 0; z_1 + wz_2 \quad u(v(w)):$$

In words, the dual problem minimizes the value at w_i of a straight line that is above the graph of $u \quad v$. Proposition 1 in Makarov and Plantin (2011) shows that $S(w_i) = S \quad (w_i)$. It is then easy to derive graphically the solution to the dual problem for a given arbitrary distribution F_1. Recall that v is linear everywhere except for a convex kink at c. Refer to Figure 1.

Figure 1 here

The concavification of $u \quad v$ - that is, the smallest concave function above $u \quad v$, is equal to $u \quad v$ outside $[\underline{w};\overline{w}]$, and is the chord between $(\underline{w}; u(v(\underline{w}))$ and $(\overline{w}; u(v(\overline{w}))$ over $[\underline{w};\overline{w}]$. The dual problem is solved with the tangent of $u \quad v$ outside $[\underline{w};\overline{w}]$ and with this chord otherwise. Thus,

$$\begin{cases} S(w_i) = u(v(w_i)) \text{ if } w_i \not\in [\underline{w};\overline{w}]; \\ S(w_i) = \frac{w_i \quad \underline{w}}{\overline{w} \quad \underline{w}} u(v(\overline{w})) + \frac{\overline{w} \quad w_i}{\overline{w} \quad \underline{w}} u(v(\underline{w})) \text{ if } w_i \; 2 \; [\underline{w};\overline{w}]: \end{cases}$$

This means that individuals such that $w_i \not\in [\underline{w};\overline{w}]$ invest at the risk-free rate, while the others enter into a fair binary bet that pays either $\overline{w}$ or $\underline{w}$ with probabilities that depend on w_i. Such binary bets would no longer be admissible under our assumption that risky returns have full support over $[0;+1 \;)$. In this case individuals willing to gamble would simply pick returns with a full-support distribution that approximates arbitrarily well the optimal binary one. In what follows, for expositional simplicity, we will ignore this and work directly with the limiting binary distribution.

This solution to investors' problem given F_1 ensures that a candidate equilibrium F_1 must be such that there exists $\underline{W} < c < \overline{W}$ such that

- F_1 coincides with F_0 over $[0;\underline{W})$ and $\overline{W};+1 \quad ;$
- The residual of the mass of F_1 is concentrated in two atoms in $\underline{W}$ (with mass $\int_{\underline{W}}^{\overline{W}} \frac{\overline{W} \quad w}{\overline{W} \quad \underline{W}} dF_0(w)$) and $\overline{W}$ (with mass $\int_{\underline{W}}^{\overline{W}} \frac{w \quad \underline{W}}{\overline{W} \quad \underline{W}} dF_0(w)$).

An equilibrium is then such that $\underline{w} = \underline{W}$ and $\overline{w} = \overline{W}$, where $(\underline{w};\overline{w})$ is defined above as the interval over which the concavification of $u \quad v$ (for this given F_1) is linear. Standard compacity and continuity arguments ensure that the mapping from a pair $\underline{W};\overline{W}$ into a pair $(\underline{w};\overline{w})$ has a fixed point, so that there exists at least one equilibrium. Further, that $u'(0) = +1$,

$\frac{u(y)}{y} \underset{y \to +\infty}{\to} 0$ ensures that all equilibrium pairs $(\underline{w}; \overline{w})$ are included in a compact subset of $(0; +\infty)$. The following proposition collects these results.

Proposition 3

There exists an equilibrium. There exists $m; M > 0$ such that every equilibrium is fully characterized by two wealth levels $\underline{w}$ and $\overline{w}$ satisfying $m < \underline{w} < c < \overline{w} < M$. In this equilibrium, each individual with initial wealth $w \in (\underline{w}; \overline{w})$ invests with binary payoffs $\{\underline{w}; \overline{w}\}$. The high payoff has probability $\frac{w - \underline{w}}{\overline{w} - \underline{w}}$. Other individuals invest in the risk-free technology. This implies that F_0 dominates F_1 in the sense of second-order stochastic dominance, and that all taxable wealth is below $\underline{w}$ or above $\overline{w}$ at date 1.

Proof. See above.

While we are unable to establish equilibrium uniqueness in general, we offer in Proposition 3 a qualitative description of all equilibria that has interesting empirical content. Refer to Figure 2:

Figure 2 here

In all equilibria, there is an interval containing c such that all wealth levels within this interval disappear. People belonging to this "middle class" become risk-loving because the prospects from avoiding taxes more efficiently in case of success more than offsets increased uncertainty in future consumption. Increasing returns to tax avoidance thus have an impact on gross inequality because they induce riskier behavior. Our abstract one-period gambles can be interpreted literally as financial risk-taking, such as taking on mortgages with very high loan-to-value ratios or balloon interest. The principal lever available to many individuals willing to add risk to their future consumption consists actually in generating riskier returns to their human capital. Opting for a career in the financial services industry or becoming self-employed generates such risk increases (and may, in addition, yield a risk premium). Such a shift towards finance jobs and self-employment have been observed in the U.S. over the last two decades.

The risk-taking behavior described in Proposition 3 is socially inefficient. The net wealth associated with any given gross wealth is strictly lower under F_1 than F_0 even though aggregate wealth remains unchanged. The social planner can in principle avail himself of several tools to eliminate this inefficiency if he is allowed to act at date 0.

First, the social planner could commit to a tax scheme at date 0 instead of being a Stackelberg follower after the date-1 wealth distribution is realized.

In this case, one can show that the social planner would announce a scheme v such that $u \quad v$ has the same shape as the concavification of $u \quad v$ shown in Figure 1. Intuitively, in the presence of the gambling friction, the social planner finds it optimal to concavify the tax scheme himself instead of letting individuals do it themselves inefficiently with socially costly increases in pre-tax inequality. In this case, individuals would all choose the risk-free storage technology. We do not offer a formal proof of this result because we find such commitment power implausible in countries with frequent electoral competitions that are of interest to us.

Second, the social planner would unambiguously prefer to ban any inefficient risk-taking at date 0 had he the ability to do so. In the next section, we show, however, that the pressure of electoral competition may actually lead a politician who has this ability to let individuals inefficiently gamble.

3 Tax Avoidance, Inequality, and the Political Economy of Risk Taking

This section assumes that date-1 taxation power accrues to the winner of an election. Two politicians, an incumbent and his challenger, face off in a date-1 election. After F_1 is realized, they each announce a platform comprised of a redistribution proposal, and individuals vote according to criteria that we shall describe shortly. Each politician maximizes the probabillity of winning the election. At date 0, the incumbent can decide in favor of or against the ban of all risk taking.[2] An important lever available to governments willing to control risk taking by society is financial regulation, in particular the prudential regulation of financial intermediaries. It consists mainly in fairly technical rules for which "the devil is in the details". These crucial details are typically not subject to parliamentary approval, nor much discussed in the public debate. For example, until the 2008 crisis, how to treat the liquidity options granted by banks to their SIVs, or how to determine bank capital requirements for AAA structured products were questions discussed mainly among small groups of officials and experts, even though they directly determined the effective leverage of banks. Accordingly, we assume that the incumbent politician has a free hand at making a discretionary regulatory choice at date 0.

We adopt a probabilistic voting framework. We index by 1 the incumbent politician and by 2 his challenger, and denote by v_j each redistribution

[2] We discuss a larger space of regulatory choices later.

scheme, where $j \in \{1, 2\}$. Individual $i \in [0, 1]$ votes for the incumbent if

$$_i > \ddot{e}, \tag{7}$$

where

$$_i = u(v_1(w_i)) \quad u(v_2(w_i)) + \quad _i;$$

and $\ddot{e}$ is uniformly distributed over $[\quad ; \ ]$. He votes for the challenger if inequality (7) is reversed, and tosses a fair coin otherwise. Thus individual i's voting criterion depends on his utility from consumption and on an orthogonal factor that has a fixed individual-specific component $_i$; and a common random component $\ddot{e}$.

We add a novel component to this otherwise standard probabilistic-voting framework by assuming that $_i$ is determined by history. The individual bias $_i$ is equal to $\quad$ if i's gross endowment increases between dates 0 and 1, to $\quad$ if it decreases, and to 0 if it remains unchanged, where > 0. In other words, we introduce retrospective voting in the probabilistic voting theory. Retrospective voting, whereby the evolution of an individual's situation influences his support of an incumbent politician, is an empirical regularity observed in a wide array of political contexts. Whether is is rational and/or efficient is debated. We posit it as an exogenous behavioral trait here for simplicity, but will discuss efficient retrospective voting in the next section.

Suppose that u is bounded above and that

$$> \sup u + \quad . \tag{8}$$

We study subgame-perfect equilibria. More precisely, equilibrium can be described backwards as follows:

- At date 1, after observing history (in particular the realization of F_1) politicians announce platforms that constitute a Nash equilibrium.

- Rationally anticipating these platforms, individuals make risk-taking decisions at date 0 if they are allowed to do so.

- Initially, the incumbent optimally chooses to ban risk taking or not.

Working our way recursively, we have the following results. First, at date 1; after the $_i$s and F_1 are determined, condition (8) classically implies that the unique Nash equilibrium is that politicians offer identical platforms that maximize utilitarian welfare. Thus they both propose the scheme (5). Given this, equilibrium risk-taking decisions are characterized by Proposition 3. It remains to pin down the incumbent's initial regulatory decision. This may be problematic in general absent uniqueness of the equilibrium outcome of

the risk-taking game. We study here particular cases in which the properties of all equilibria offered in Proposition 3 are sufficient to pin down this initial decision of the incumbent.

The Benchmark Case

Proposition 4

De...nem; M as in Proposition 3. Suppose that F_0 is concave over [m; M]. Then the incumbent politician bans risk-taking.

Proof. Suppose the politician allows risk taking. F_0 is concave and thus absolutely continuous over [m; M]. It therefore admits a decreasing density over [m; M]. Thus, for all equilibrium $(\underline{w}; \overline{w})$

$$E\,(w \mid w \in [\underline{w}; \overline{w}]) < \frac{\underline{w} + \overline{w}}{2};$$

which implies

$$\int_{\underline{w}}^{\overline{w}} \frac{\overline{w} - w}{\overline{w} - \underline{w}} dF_0(w) > \int_{\underline{w}}^{\overline{w}} \frac{w - \underline{w}}{\overline{w} - \underline{w}} dF_0(w):$$

That is, in any equilibrium, more gambles fail than succeed. Risk-taking thus creates an overall bias against the incumbent.

Risk-taking is detrimental to the incumbent politician in this case because it means that a majority of the risk-takers take "long-shot" bets, aiming at a large wealth increase with a small probability of success. We consider the assumption that F_0 is concave over [m; M] to be plausible. The individuals whose wealth is not too far form the threshold c where sophisticated tax optimization is available are significantly wealthier than average. They lie in the region of the wealth distribution where the density decreases. In fact, power laws typically fit well the right tail of wealth distributions, and have decreasing densities.

It is important to notice that our assumption that only the sign of wealth changes (not their magnitudes) affects electoral biases stacks the deck against lax regulation. Proposition 4 states that the incumbent strictly prefers to ban inefficient risk taking under this specification. If biases depended instead on wealth changes in a linear fashion, then the incumbent would be indifferent between banning risk taking or not regardless of the distribution F_0 given that bets are fair. We now show how an inegalitarian shock on endowments, even arbitrarily small, may suffice to induce lax prudential regulation provided wealth distribution has sufficiently fat tails.

Inegalitarian Shock

We assume in this section that wealth is distributed according to a power law:

$$1 \quad F_0(w) = \frac{(\quad 1)\,l}{w} \quad ;$$

where $> \; 1; 0 < l < c$. l is thus average wealth, and $\frac{(\quad 1)l}{}$ is the lower bound on endowments.[3] We also suppose that u is continuously differentiable.

We introduce a simple inegalitarian shock as follows. We suppose that for a representative sample of the population with measure , the risk-free technology will generate a return smaller than one for individuals whose wealth is below some threshold, and higher than one otherwise. The rest of the population is not affected. For expositional simplicity only, we consider the limiting case in which the threshold is arbitrarily large, and the risk-free return below the threshold is arbitrarily close to 1.[4] In this case, if the incumbent bans risk-shifting then he expects this shock to create an aggregate bias against him since $\int_{¡} di = \frac{1}{2}$.

Not surprisingly, if is sufficiently close to 0, then an incumbent expecting this shock is still banning risk taking. The proof of Proposition 4 has shown that risk shifting creates a bias against him. This bias would become larger than for small enough. Conversely, for sufficiently close to 1, the shock induces lax prudential regulation because in this case the incumbent might as well "go for broke," or gain positive biases from the lucky gamblers instead of having an arbitrarily large fraction of the population biased against him. The next proposition states conditions under which the shock suffices to trigger lax prudential regulation or not for intermediate values of .

Proposition 5

For all > 0, the incumbent politician authorizes risk taking for and su¢ ciently small, and bans it for su¢ ciently large.

Proof. Conditionally on the equilibrium with risk-taking being characterized by $(\underline{w}; \overline{w})$, more individuals are biased towards the incumbent when

[3] Introducing a positive lower bound for wealth distribution does not affect any of the previous results, except for the fact that there might now be gambling equilibria where $\underline{w} = \frac{(\quad 1)l}{}$.

[4] The analysis of this limiting case is simple because the shock does not affect gambling decisions in the limit. More general specifications would clutter up the analysis without adding insights.

risk taking is allowed than when it is banned if

$$E \quad \frac{w \quad \underline{w}}{\overline{w} \quad \underline{w}} \; j \; w \; 2 \; [\underline{w}; \overline{w}] \quad > \frac{1}{2}(1 \qquad) \; ; \tag{9}$$

where expectation is computed under the initial wealth distribution F_0. Introducing $x = \frac{\overline{w}}{\underline{w}}$; we have

$$E \quad \frac{w \quad \underline{w}}{\overline{w} \quad \underline{w}} \; j \; w \; 2 \; [\underline{w}; \overline{w}] \quad = \frac{1}{x \quad 1} \quad \frac{x \qquad x}{1 \; x \qquad 1} \quad 1 \quad : \tag{10}$$

Thus, if all else equal, $\quad ! \quad + 1$, then the right-hand side of (10) tends to 0, uniformly over $[1; + 1 \;)$: This implies that the incumbent bans risk shifting when $\quad$ is sufficiently large all other things equal.

If, all else equal, $\quad ! \quad 1$, then

$$E \quad \frac{w \quad \underline{w}}{\overline{w} \quad \underline{w}} \; j \; w \; 2 \; [\underline{w}; \overline{w}] \quad ! \quad \frac{1}{x \quad 1} \quad \frac{x \ln x}{x \quad 1} \quad 1 \quad ;$$

which decreases from $\frac{1}{2}$ to 0 over $[1; + 1 \;)$: To prove the result, it then suffices to show that all equilibrium thresholds $(\underline{w}; \overline{w})$ are such that x can be made arbitrarily close to 1 for $\qquad$ sufficiently small regardless of the value of $\quad$. To see this, notice that all equilibrium thresholds $(\underline{w}; \overline{w})$ satisfy by definition

$$\begin{aligned} & (1 \qquad) \, u^0 \quad g(\underline{w}) + \int_0^{+1} (u \quad g(u)) \, dF_1(u) \\ = \; & (1 \qquad + \qquad) \, u^0 \quad g(\overline{w}) + \int_0^{+1} (u \quad g(u)) \, dF_1(u) \quad ; \end{aligned}$$

or

$$\begin{aligned} & (1 \qquad) \left(\begin{array}{c} u^0 \quad g(\underline{w}) + \int_0^{+1} (u \quad g(u)) \, dF_1(u) \\ u^0 \quad g(\overline{w}) + \int_0^{+1} (u \quad g(u)) \, dF_1(u) \end{array} \right) \\ = \; & u^{\;0} \quad g(\overline{w}) + \int_0^{+1} (u \quad g(u)) \, dF_1(u) \end{aligned} \tag{11}$$

The right-hand side is smaller than $\quad u^{\;0}((1 \qquad)c)$ and thus tends to 0 as $\quad ! \quad 0$ uniformly over all $\quad$ and all equilibria $(\underline{w}; \overline{w})$. Since $\underline{w} < c < \overline{w}$ and $u^{0 \;\; 1}$ is continuous, equality (11) implies that x can be made arbitrarily close to 1 for all $\quad$ and all equilibria $(\underline{w}; \overline{w})$ provided $\qquad$ is sufficiently small. This concludes the proof.

Proposition 5 may be viewed as a political-economy version of the risk-shifting problem introduced by Jensen and Meckling (1976) in corporate finance. This seminal paper shows that overly leveraged firms may undertake value-destroying projects provided they are sufficiently risky. Somewhat similarly, an incumbent politician expecting an inegalitarian shock may find it desirable to encourage inefficient risk taking. Proposition 5 establishes two interesting sufficient conditions under which this "policy substitution" problem is important for a given shock . It must be that gross inequalities are important in the sense that F_0 has sufficiently fat tails (small). It must also be the case that the returns to tax avoidance are sufficiently moderate. Altogether these conditions imply that a sufficiently large fraction of risk takers do so successfully. This fraction is arbitrarily close to $1=2$ for and arbitrarily small, in which case any arbitrarily small inegalitarian shock triggers inefficient risk taking.

4 Extensions

Wealth-Contingent Risk Regulation

Financial regulation conditions de facto the amount of risk that an individual can take on his wealth. For example, hedge funds can tap high net worth individuals without restriction, but not the general public. Investments that benefit from tax subisidies such as retirement savings are typically intermediated by institutions subject to some prudential regulation. The common justification for this pertains to consumer protection. Investors who are not financially sophisticated nor can afford sophisticated advice must be shielded from taking risks that they do not fully understand and measure. In our setup, the incumbent politician would find such wealth-contingent regulation highly valuable. Since the probability of success of a gamble increases with the gambler's wealth, the incumbent could use such a regulation to rule out politically costly long-shot gambles, and allow only those that have a high probability of success. This "Machiavellian" motive for wealth-contingent investor protection is novel, to our knowledge.

Idiosyncratic Versus Systematic Risk-Taking

We focus on an environment without aggregate uncertainty for simplicity. In practice, the occupational or financial risk-seeking behaviors that we have in mind involve exposure to systematic risk. This exposure may not be entirely deliberate. Large bets involve leverage (mortgages, student loans,...).

With limited liability, leverage is cheaper with collateral, which may expose unwitting agents to the systematic component of collateral value fluctuations. In our environment, individuals should value bets that are negatively correlated with systematic risk. It is preferable to be wealthy when redistribution is small because of a negative aggregate shock than when it is more generous. On the other hand, if systematic risk exposure commands a risk premium, then the incumbent politician may on the contrary induce systematic rather than idiosyncratic risk taking. The risk premium would shift the number of individuals whose wealth increases after a gamble compared with the idiosyncratic case.

E¢ cient Retrospective Voting

Retrospective voting is an assumed behavior that serves no purpose in our model. Absent the risk-taking problem, it would come at no social cost. But it becomes socially costly when it gives rise to "policy substitution." The political economy literature typically justifies retrospective voting as a device to discipline politicians who would otherwise be tempted to extract rents while in office (see, e.g., Barro, 1973). If in our model the incumbent could, say, extract private benefits at the cost of reducing the return on storage, then retrospective voting would also be a socially desirable behaviour absent the risk-taking problem. Retrospective voting could still be overall socially desirable despite causing financial instability if the costs of inefficient risk-taking were smaller than the inefficiencies associated with rent extraction.

Endogenous Tax Avoidance Technology and Multiple Equilibria

Another possible extension consists in endogenizing the tax-avoidance technology. Suppose that the introduction of the costlier and more efficient technology comes at an overall fixed cost K: Such a fixed cost can be interpreted as lobbying expenditures. It may also be the domestic taxes lost by a different country that reduces its tax rates so as to induce high-net wealth foreigners to relocate. In this case, the risk-taking decisions would become strategic complements. If a sufficiently high fraction of the middle class takes risks, then the fixed cost K is spread among sufficiently many individuals that the sophisticated avoidance technology becomes viable. This vindicates taking risk in the first place. We conjecture that this could lead to multiple Pareto-ranked equilibria. In the worst equilibria, maximal risk-taking would generate important gross inequality, and tax avoidance would

in turn imply that net inequality be important as well.

5 Appendix

Proof of Proposition 1

Step 1. We first show that a tax scheme that satisfies constraints (2) and such that

$$\int r(w)dF(w) < \int wdF(w) \tag{12}$$

cannot be optimal. From such a scheme $(r;v)$, fix $\varepsilon > 0$ and define the scheme $(r_\varepsilon;v_\varepsilon)$ as

$$\begin{aligned} r_\varepsilon(w) &= w; \\ v_\varepsilon(w) &= v(r(w)) + G(w;r(w)) + \varepsilon. \end{aligned}$$

Clearly, this new scheme is strictly preferable to $(r;v)$ because it delivers more consumption at any income level. This new scheme is incentive-compatible: for all $w \quad w'$, we have

$$\begin{aligned} v(r(w)) + G(w;r(w)) + \varepsilon \quad & v(r(w')) + G(w;r(w')) + \varepsilon; \\ & v(r(w')) + G(w';r(w')) + G(w;w') + \varepsilon. \end{aligned}$$

The first inequality stems from the fact that $(r;v)$ is incentive-compatible, and the second one follows from (3). Further, this new scheme $(r_\varepsilon;v_\varepsilon)$ is feasible for ε sufficiently small because it does not waste resources through tax avoidance while $(r;v)$ does from (12). Thus, $(r_\varepsilon;v_\varepsilon)$ satisfies (2) for ε sufficiently small and strictly dominates $(r;v)$, which establishes the result. Thus, one can assume $r(w) = w$ w.l.o.g.

Step 2. Consider the following auxiliary program $(\mathcal{P})$:

$$\begin{aligned} \max_{v} \quad & \int_0^{+\infty} u(v(w))\, dF(w) \\ \text{s.t.:} \quad & \int_0^{+\infty} v(w)dF(w) \quad \int_0^{+\infty} wdF(w); \\ & \forall w \quad 0;\ v(w) \quad G(w;0) + v(0). \end{aligned} \tag{13}$$

We will show that

$$V(w) = G(w;0) + \int_0^{+\infty} (t \quad G(t;0))\, dF(t)$$

attains the solution of $(\mathcal{P})$. Notice that V satisfies (13).

Consider a function v that attains the solution of $(\}\ ^{0})$. Clearly, v must be (weakly) increasing. Thus, v admits a right limit $v(x\ \ )$ and a left limit $v(x^{+})$ at each point $x\ 2\ (0;+1\ )$. Suppose that for some $x_0\ 2\ (0;+1\ )$; $v(x_0) < v(x_0^{+})$. Then one could slightly increase v in the left neighborhood of x, slightly decrease it in the right neighborhood, and thus strictly increase social welfare while still satisfying constraints (13). Thus v must be continuous over $(0;+1\ )$ (and with a similar argument also right-continuous in 0).

Suppose now that for some $x_1\ 2\ (0;+1\ )$,

$$v(x_1) > G\ (x_1;0) + v(0): \tag{14}$$

Since v and G are continuous, inequality (14) actually holds over some neighborhood of x_1. Consider a bounded measurable function h with support within s.t. $\int hdF = 0$. The function

$$w\ !\quad v(w) + th(w)$$

satisfies constraints (13) for t sufficiently small. Thus it must be that

$$(\ t) = \int_{0}^{+1} u(v(w) + th(w))\, dF(w)$$

has a local maximum in 0, or that

$$^{0}(0) = \int_{0}^{+1} u^{0}(v(w))\, h(w) dF(w) = 0:$$

since it holds for any function h, it must be that v is constant over . Clearly this implies that v must be constant over $[0;x_1)$, which cannot be unless $G(:;0)$ is equal to 0 over this interval. In any case, this contradicts (14). Thus $v = V$.

Since constraints (13) are necessary conditions for constraints (2) and V happens to satisfy (2) from (3), this concludes the proof.

Proof of Corolllary 2

The fraction of income that is taxed is

$$= \frac{w\quad g(w)\quad \int (t\quad g(t))\, dF(t)}{w};$$

and

$$\frac{d}{dw} = \frac{g(w)\quad wg^{0}(w) + \int (t\quad g(t))\, dF(t)}{w^2};$$

which is positive for w sufficiently small.

If $g(x) = (x - K)^+$ and K sufficiently large, then clearly $\frac{d}{dw} < 0$ for $x > K$. Conversely, $\frac{d}{dw} > 0$ for all w when g is linear.

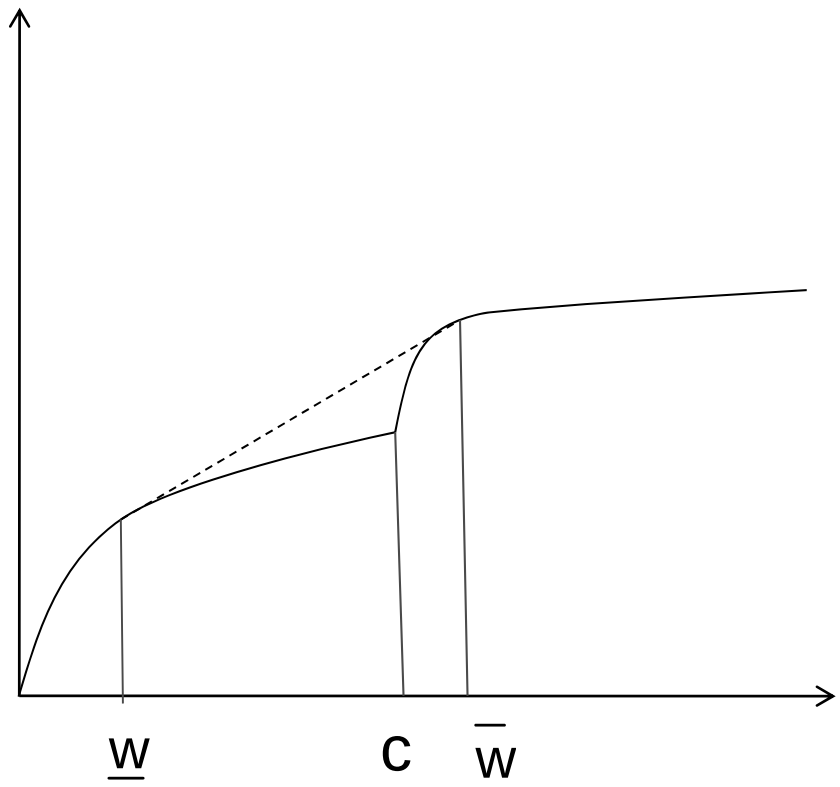

Figure 1. The function u_{ov} and its concavification.