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GROWING INTO AND OUT OF SOCAL CONFLICT

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Growing into and out of social conflict

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Abstract

We present a model of growth and distributional conflict that implies a non-monotonic relationship between average wealth and the likelihood of radical redistribution: while the net benefits of redistribution for members of the poor class are small at low stages of development, a shift towards egalitarianism considerably improves agents' income prospects once an intermediate level of per-capita wealth is reached. As the economy grows further, the incentive to challenge the existing social order decreases again and eventually vanishes. This nonmonotonicity captures the observation that historical shifts to radically redistributive policies frequently took place after extended periods of economic growth.

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1 Introduction

Over the past decade, the effect of social conflict on economic growth has attracted considerable attention, and a large body of theoretical and empirical work has demonstrated that distributional struggles, resulting in distortionary taxation, populist policies, or outright violence, reduce growth by deterring the accumulation of capital and the expansion of knowledge.[1] What seems less obvious, on the other hand, is the reverse causal relationship: how does the level of a country's economic development affect the intensity of social conflict and the extent of redistribution?[2] Our analysis addresses this issue by investigating how incentives to overthrow the existing wealth order vary along an economy's development process, and demonstrates that the relationship between economic development and social conflict may be non–monotonic. In fact, the likelihood of radical redistribution may be greatest when a country has reached an intermediate stage of per–capita income and wealth.

There are two reasons why the intensity of social conflict may undergo changes in the course of economic development: on the one hand, inequality of wealth endowments *per se* creates social tensions, and "an increase in the 'utility distance' between any pair of groups leads, ceteris paribus, to an increase in societal conflict " (Esteban and Ray, 1999:381). Intuitively, the greater the cleavage between the haves and the have–nots, the greater the attractiveness of redistribution, and if economic growth is associated with changes in wealth and income inequality –as conjectured, for instance, by Kuznets (1955)–, the development pattern will typically display phases of more or less intense conflict. The second, more indirect channel through which economic growth may affect the incentive to challenge the existing social order is due to the link between wealth and economic *perspectives*. In a world of imperfect capital markets, the ability to realize profitable investment projects depends on agents' initial endowments, and wealth inequality therefore implies unequal chances of economic success. As a consequence, redistribution may be attractive as a substitute for missing capital markets and as a means to overcome barriers to social mobility. This, however, requires that aggregate wealth has reached a level at which redistribution, instead of merely impoverishing the entire population, provides the poor with career and investment opportunities that would otherwise not exist.

[1]Perotti (1996), Benabou (1996), and Drazen (2000) present excellent surveys of this literature.

[2]Most empirical studies on social conflict and growth are aware that causality may run both ways and use appropriate methods to address the resulting endogeneity problem.

In this paper, we thus stress that, at any point in time, the intensity of social conflict depends both on the *distribution* and on the *level* of an economy's wealth, and investigate how these forces jointly determine the likelihood of radical redistribution along an economy's development path. We present a dynamic general equilibrium model in which borrowing constraints give rise to persistent class differences: while members of rich dynasties are able to finance the formation of firms and to earn profits, the children of poor parents are confined to live as workers and receive a lower wage income. The more favorable starting position of the rich is thus augmented by better earning prospects, and this reinforces the divergence of wealth levels. Assuming that the economically deprived have the political power to overturn the market outcome by radically redistributing wealth, we compare the benefits they derive from such a 'revolution' with the costs. It turns out that, under reasonable assumptions, these net benefits are highest when the economy has reached an intermediate level of per–capita wealth. The intuition for this non–monotonicity result runs as follows: while at low and high stages of economic development redistribution amounts to a mere transfer of wealth from the rich to the poor, it acts as a substitute for missing capital markets and substantially improves poor agents' earning prospects at intermediate levels of per–capita wealth.

Our paper is related to several strands of literature: the economic framework heavily borrows from contributions that consider the effect of capital market imperfections on growth and inequality (Galor and Zeira 1993, Freeman 1996, Maoz and Moav 1999, Matsuyama 2000, 2001). We follow this literature in demonstrating that, in the presence of borrowing constraints, agents' inherited wealth predetermines their earning possibilities. We also show that in the long run such an economy may either be characterized by persistent inequality or by a convergence of income and wealth levels. What is new about our paper is that we explicitly consider the intensity of social conflict associated with a given evolution of the wealth distribution, and that we demonstrate that the likelihood of radical redistribution may be a non–monotonic function of time even if inequality monotonically decreases along an economy's development path.

The focus on distributional conflict further relates our work to the literature on political economy in dynamic models (Perotti 1993, Persson and Tabellini 1994, Alesina and Rodrik 1994, Tornell and Velasco 1992, Benhabib and Rustichini 1996, Lane and Tornell 1998). A subset of these contributions explicitly considers the interdependence between social conflict and per–capita income: in particular, Lane and Tornell (1998) show that a sudden windfall gain may exacerbate rather than alleviate distributional struggles. On the other hand, Somanathan (2002) argues that the class conflict between capital owners and workers diminshes as an economy becomes richer. Finally, Benhabib and Rustichini (1996) demonstrate that it depends on preferences and technology whether the net benefits of socially detrimental behavior increase or decrease along an economy's growth path. By demonstrating that the relationship between per–capita wealth and the likelihood of redistribution may in fact be hump–shaped, our paper integrates these two positions, and reconciles the political and social stability enjoyed by industrialized countries with the observation that many great social revolutions of the past took place after periods of rapid economic growth.

Finally, our argument is related to a number of contributions in political science which argue that, by creating and intensifying social conflicts, rapid growth could be a 'destabilizing force' (Olson 1963, Huntington 1968), and that agents' willingness to revolt is linked to the degree of *relative deprivation* (Gurr 1970). However, while these studies allow for a whole range of political, social, and psychological factors as a source of conflict, our analysis is much more reductionist and focuses on a purely economic motivation for radical redistribution. Moreover, while relative deprivation, resulting from a perceived contradiction between agents' aspirations and existing circumstances, may lead to a rebellion even if this harms both haves and have–nots, agents in our model decide to challenge the existing social order only if the economic benefits of a revolt exceed the costs.[3]

The rest of the paper is structured as follows: Section 2 introduces the economic framework and derives our crucial result on the evolution of average wealth and inequality. The model we present is based on Matsuyama (2001). Unlike Matsuyama, however, we are interested in explicitly deriving the time path of the wealth distribution and in analyzing how agents' incentives to implement a policy of radical redistribution vary over time. The latter question is tackled in Section 3, in which we demonstrate that the net benefits of equalizing wealth for the politically decisive agent may in fact be a non–monotonic function of time. Section 4 considers the effect of relaxing some important assumptions and discusses the historical evidence. Section 5 summarizes and concludes.

[3]For a more recent discussion of the theoretical foundations and the empirical relevance of relative deprivation, see Lichbach (1990) and Midlarsky (1988).

2 The economic framework

2.1 Technology and occupational choice

The economy we consider is populated by a continuum of agents whose total mass is normalized to one, who live for one discrete time period, and who reproduce asexually such that the population size remains constant over time. Agents are born with an initial wealth endowment which they inherit from their parent. These endowments may differ across agents, and in what follows we will distinguish between two homogeneous 'classes': a *rich* class whose members inherit x_t^R, and a *poor* class whose members are endowed with x_t^P. We assume that initially $x_t^R > x_t^P$ and that the mass of the poor, n^P, exceeds that of the rich, that is $n^P > 0.5$. Based on this assumption we will later model the decision to redistribute as solely depending on the distributional preferences of the poor.

After receiving their endowment, agents decide whether they will spend their lives as entrepreneurs who run firms and hire labor, or as workers who are employed by entrepreneurs. The representative entrepreneur's firm uses the following technology to produce a homogeneous (numeraire) good: for arbitrary capital input K and labor input L the resulting output $R(K, L)$ is given by

$$R(K,L) = \begin{cases} F(L) & \text{if} \quad K \geq I \\ 0 & \text{if} \quad K < I, \end{cases} \tag{1}$$

where I is strictly positive.[4] Hence, a capital input of at least I is essential for production, but adding further capital does not increase output.[5] The function F is assumed to be strictly increasing and strictly concave in L. Moreover, it satisfies the usual Inada conditions, as well as $\lim_{L\to 0} F(L) = 0$ and $\lim_{L\to+\infty} F(L) = +\infty$. Entrepreneurs hire workers on a competitive labor market to maximize their profits $F(L) - wL$. The resulting profit function $\Pi(w) := F(F'^{-1}(w)) - wF'^{-1}(w)$ obviously satisfies $\Pi' < 0$ and $\Pi'' > 0$. Furthermore, $\lim_{w\to 0} \Pi(w) = +\infty$ and $\lim_{w\to+\infty} \Pi(w) = 0$.

Capital completely depreciates within a period. Hence, an agent who wants to become an entrepreneur has to invest at least I units of the numeraire good at the start of his life, and since raising the capital stock beyond I does not increase production, no entrepreneur invests more than I. We assume that, due to enforcement problems, there is neither borrowing nor lending: as a consequence, agents can only become entrepreneurs if their initial endowment is high enough

[4]Whenever we omit time subscripts the corresponding relations hold at every date.

[5]Postulating a more general technology with F also increasing in K would not change our results.

to finance I.[6] Note that our assumptions regarding the production technology imply that aggregate output is zero if nobody is able to become an entrepreneur.

At the end of their lives, agents divide their total wealth between consumption and the bequest they leave to their offspring. An entrepreneur's end–of–life wealth is the sum of his initial endowment x and his *net profit* $\Pi(w) - I$. On the other hand, end–of–life wealth of a worker who received an endowment x is given by $x + w$.

Subject to the borrowing constraint, agents choose the professional career that maximizes their end–of–life wealth. Hence, an agent who is able to cover I is willing to become an entrepreneur if and only if the wage rate is such that

$$\Pi(w) + (x - I) \geq w + x \quad \Leftrightarrow \quad \Pi(w) - w \geq I. \tag{2}$$

The properties of our production technology imply that there exists a unique wage rate, $\overline{w}$, such that $\Pi(\overline{w}) - \overline{w} = I$ and $\Pi(w) - w > I$ for $w < \overline{w}$.

2.2 Profits and wages in a static equilibrium

In what follows, we will derive labor demand and supply, and characterize the equilibrium on the labor market for an arbitrary distribution of endowments. This distribution is characterized by the distribution function Φ where $\Phi(Z)$ denotes the share of agents inheriting wealth *strictly smaller* than Z. We assume that $\Phi(I) < 1$, that is, there is a positive mass of agents who can finance investments.[7]

Due to the borrowing constraint, the number of entrepreneurs is at its maximum level $(1 - \Phi(I))$ if entrepreneurs are strictly better off than workers, that is, if $w < \overline{w}$. For $w = \overline{w}$, the share of entrepreneurs in the total population can take any value m in the interval $[0, (1 - \Phi(I))]$. Finally, if w is larger than $\overline{w}$ no agent is willing to set up a firm, and labor demand drops to zero. For a given wage rate, we can thus describe labor demand, L^D, as follows:

$$L^D = \begin{cases} 0 \quad \text{if } w > \overline{w} \\ F'^{-1}(w)m \text{ for } m \in [0, (1 - \Phi(I))] \quad \text{if } w = \overline{w} \\ F'^{-1}(w)(1 - \Phi(I)) \quad \text{if } w < \overline{w}. \end{cases} \tag{3}$$

[6] The scenario behind this assumption is that there are no financial institutions which successfully enforce claims, and that individual agents do not manage to pool their resources in order to finance investments. Replacing such an extreme form of capital market imperfection by the assumption of *limited* borrowing is straightforward and would not affect our results. What is crucial is that poor agents cannot raise all the capital they need to finance entrepreneurship and that initial wealth is therefore decisive for agents' ability to set up firms.

[7] Recall that if $\Phi(I) = 1$, there would be no production and the wage rate would be zero. Note also that, for the time being, we are not imposing any other restrictions on Φ. Hence, it may capture both a two–class society and a society where endowments are equalized.

Conversely, we can characterize the labor supply correspondence L^S:

$$L^S = \begin{cases} 1 \quad \text{if } w > \overline{w} \\ k \in [\Phi(I), 1] \quad \text{if } w = \overline{w} \\ \Phi(I) \quad \text{if } w < \overline{w} \end{cases} \tag{4}$$

Note that on the interval $(0, \overline{w})$, L^D is strictly decreasing in w while L^S is non–decreasing. For labor market equilibrium, demand must equal supply and the mass of workers and entrepreneurs must add up to one. It is obvious from (3) and (4) that a wage rate above $\overline{w}$ cannot be an equilibrium since, in this case, supply clearly exceeds demand. We therefore focus on the interval $[0, \overline{w}]$ and state the equilibrium outcome on the labor market in our first theorem:

Theorem 1 *Under the assumption that $\Phi(I) < 1$, the equilibrium wage rate is given by*

i) $\overline{w}$ *if* $F'^{-1}(\overline{w}) \geq \Phi(I)/[1 - \Phi(I)]$.

ii) $F'(\Phi(I)/(1 - \Phi(I))) < \overline{w}$ *if* $F'^{-1}(\overline{w}) < \Phi(I)/[1 - \Phi(I)]$.

The intuition for our results runs as follows: $\Phi(I)$ is a lower boundary for the number of workers in the economy since, due to the borrowing constraint, agents who are unable to cover I are prevented from becoming entrepreneurs. Hence, the number of workers per firm can never be lower than $\Phi(I)/[1 - \Phi(I)]$ in equilibrium. If labor demand per firm at $w = \overline{w}$, that is $F'^{-1}(\overline{w})$, is lower than $\Phi(I)/[1 - \Phi(I)]$, the properties of L^S and L^D guarantee that there is some $w < \overline{w}$ that clears the labor market. On the other hand, if labor demand per firm *exceeds* $\Phi(I)/[1 - \Phi(I)]$ at $w = \overline{w}$, m and k adjust to bring about labor market equilibrium.[8] Note that, in this case, agents are indifferent between the two occupations since, by definition, $\overline{w} = \Pi(\overline{w}) - I$. Hence, agents may decide to become workers even if the self–financing constraint is not binding for them. The two possibilities just described are illustrated in Figures 1 and 2.

INSERT FIGURES 1 AND 2 ABOUT HERE

Applying these results to our two–class society, we assume that the mass of the poor relative to the rich is such that, whenever $x^P < I \leq x^R$, net profits exceed the wage rate. It follows from Theorem 1 that this requires to impose:

Assumption 1 $F'^{-1}(\overline{w}) < n^P/(1 - n^P)$

[8] The equilibrium values of k and m can be derived from $F'^{-1}(\overline{w})m = k$ and $m = 1 - k$.

We denote the resulting equilibrium wage by $\widetilde{w} := F'(n^P/(1-n^P))$. Since $\widetilde{w} < \overline{w}$, we have $\widetilde{\pi} := \Pi(\widetilde{w}) - I > \widetilde{w}$. Note, finally, that $n^P\widetilde{w} + (1-n^P)\widetilde{\pi} < \overline{w}$. This implies that the per–capita income in a society where all agents enjoy equal opportunities is higher than in an economy where borrowing constraints generate a difference between wages and net profits.

At time zero, the two–class structure that characterizes the economy can be represented by the triple (x_0^P, n^P, x_0^R). To avoid a situation where, due to a lack of entrepreneurs, there is no positive production at time zero, we focus on the case that $x_0^R > I$, that is, the members of rich dynasties initially face no restrictions when choosing their occupation. On the other hand, we assume that the self–financing constraint is binding for members of the poor class at $t = 0$:

Assumption 2 *The initial triple* (x_0^P, n^P, x_0^R) *satisfies* $x_0^P < I \leq x_0^R$.

We call a triple $(x_0^P, n^P, x_0^R) \subset \mathbb{R}_+^3$ *admissible* if it meets the requirements of Assumptions 1 and 2.

2.3 The evolution of income and wealth levels

Having studied the static labor market equilibrium, we can now turn to the dynamic behavior of the economy. At the end of their lives, agents divide their total lifetime wealth between consumption and bequest. We assume that agents bequeath a constant share $\alpha \in (0,1)$ of their end–of–life wealth to their offspring and consume the rest.[9] Since the bequest of agent i in period t is the initial endowment of his offspring in period $t+1$, we can describe the evolution of his dynasty's endowment by the following first–order difference equation:

$$x_{t+1}^i = \begin{cases} \alpha(\Pi(w_t) + x_t^i - I) & \text{if agent } i \text{ is an entrepreneur in } t \\ \alpha(w_t + x_t^i) & \text{if agent } i \text{ is a worker in } t. \end{cases} \tag{5}$$

In our simple framework, all members of a given class inherit the same endowment and earn the same income. Hence, $i \in \{R, P\}$, and we can focus on the evolution of the wealth endowment for a representative dynasty within the rich or the poor class. Moreover, since $x_t^R < I$ would imply zero production, we assume that $x_t^R \geq I$ at every point in time.

It follows from Theorem 1 and Assumption 1 that the wage in t is given by

$$w_t = \begin{cases} \widetilde{w} & \text{if} \quad x_t^P < I \leq x_t^R, \\ \overline{w} & \text{if} \quad x_t^P \geq I, \end{cases} \tag{6}$$

[9]Such a bequest behavior can be derived from a homothetic utility function with consumption and the size of the bequest as arguments.

while net profits read

$$\Pi(w_t) - I = \begin{cases} \widetilde{\pi} > \widetilde{w} & \text{if} \quad x_t^P < I \leq x_t^R, \\ \Pi(\overline{w}) - I = \overline{w} & \text{if} \quad x_t^P \geq I. \end{cases} \tag{7}$$

Hence, as long as $x_t^P < I \leq x_t^R$, the offspring of a rich parent not only inherits a larger endowment, but also earns a higher income during his working life. The latter difference only disappears once $x_t^P \geq I$, that is, once the borrowing constraint no longer prevents members of the poor class from becoming entrepreneurs.

Whether an economy that starts from an admissible initial triple (x_0^P, n^P, x_0^R) ever reaches a point where $x_t^P \geq I$ depends on the maximum wealth that the poor can accumulate under $w = \widetilde{w}$. If the fixed point of the difference equation $z_{t+1} = \alpha(\widetilde{w} + z_t)$ exceeds I, the self–financing constraint will no longer be binding for the poor after finite time. We impose the following condition which is necessary and sufficient for this property:

Assumption 3 *$\widetilde{w}/(1/\alpha - 1) > I$.*

Obviously, whether this assumption is satisfied depends on agents' propensity to bequeath α, the properties of the technology F, and the share of poor agents in the population n^P. In Section 4 we will discuss the consequences of relaxing this assumption. Note finally, that, owing to $\widetilde{\pi} > \widetilde{w}$, the fixed point of $z_{t+1} = \alpha(\widetilde{\pi} + z_t)$ is also greater than I, and that, combined with Assumption 2, this implies that $x_t^R \geq I$ holds at every point in time.

An economy satisfying Assumptions 1 to 3 goes through two distinct stages of economic development: at first, members of the poor class are unable to become entrepreneurs, while the credit constraint does not bind for the rich. As a consequence, net profit incomes are strictly higher than wage incomes. However, at some point in time, the poor have accumulated sufficient wealth to cover the fixed costs of becoming entrepreneurs. Starting from that point in time, net profits and wages are equalized.

The evolution of x_t^P is described by the phase diagram in Figure 3, and the following theorem summarizes the corresponding evolution of the wage rate:

INSERT FIGURE 3 ABOUT HERE

Theorem 2 *If Assumptions 1 – 3 are satisfied there exists a positive natural number T^P for every admissible initial triple (x_0^P, n^P, x_0^R), such that the realized sequence of wage rates is given by $w_t = \widetilde{w}$ for $t \leq T^P - 1$ and $w_t = \overline{w}$ for $t \geq T^P$.*

In what follows, we will describe the wealth distribution in our economy by the difference between average wealth $\overline{x}_t := n^P x_t^P + (1 - n^P) x_t^R$ and poor dynasties' wealth x_t^P.[10] For the interval $0 \leq t \leq T^P - 1$, we have $x_t^P < I$ by definition of T^P, and the evolution of x_t^P can therefore be determined by solving the lower row of (5) with $w_t = \widetilde{w}$:

$$x_t^P = (x_0^P - \widetilde{w}/(1/\alpha - 1))\alpha^t + \widetilde{w}/(1/\alpha - 1). \tag{8}$$

On the other hand, the evolution of average wealth $\overline{x}$ for $0 \leq t \leq T^P - 1$ is governed by the difference equation

$$\overline{x}_{t+1} = \alpha(\overline{x}_t + n^P \widetilde{w} + (1 - n^P)\widetilde{\pi}), \tag{9}$$

the solution of which is

$$\begin{aligned} \overline{x}_t &= (\overline{x}_0 - (n^P \widetilde{w} + (1 - n^P)\widetilde{\pi})/(1/\alpha - 1))\alpha^t \\ &+ (n^P \widetilde{w} + (1 - n^P)\widetilde{\pi})/(1/\alpha - 1). \end{aligned} \tag{10}$$

Using (8) and (9), we can describe the distance between average wealth and x_t^P for $0 \leq t \leq T^P$ by

$$\begin{aligned} \overline{x}_t - x_t^P &= (1 - n^P) \left[x_0^R - \widetilde{\pi}/(1/\alpha - 1) - (x_0^P - \widetilde{w}/(1/\alpha - 1)) \right] \alpha^t \\ &+ (1 - n^P)(\widetilde{\pi} - \widetilde{w})/(1/\alpha - 1). \end{aligned} \tag{11}$$

Whether $\overline{x}_t - x_t^P$ increases or decreases over time depends on the sign of $[x_0^R - \widetilde{\pi}/(1/\alpha - 1) - (x_0^P - \widetilde{w}/(1/\alpha - 1)]$, with $\overline{x}_t - x_t^P$ *increasing* in t for $0 \leq t \leq T^P$ if this expression is negative. The terms $\widetilde{\pi}/(1/\alpha - 1)$ and $\widetilde{w}/(1/\alpha - 1)$ represent the steady states of rich and poor class wealth that would be reached if class differences prevailed forever, i.e. if Assumption 3 did not hold. Hence, $\overline{x}_t - x_t^P$ increases in t if the rich class' initial wealth is further away from its steady state than the poor class' initial wealth.

In what follows, we will focus on a scenario that implies a widening of inequality in early stages of economic development.[11] Hence, we assume:

Assumption 4 $\widetilde{\pi}/(1/\alpha - 1) - x_0^R > \widetilde{w}/(1/\alpha - 1) - x_0^P$

[10] Note that since $\overline{x}_t - x_t^P = (1 - n^P)(x_t^R - x_t^P)$, studying the evolution of $\overline{x}_t - x_t^P$ is equivalent to investigating the time path of $x_t^R - x_t^P$.

[11] A discussion of the alternative scenario will be provided in Section 4. Note that an evolution with increasing inequality is even more likely if we allow for a propensity to bequeath that is increasing in wealth instead of a constant bequest ratio.

From period T^P onward, the self–financing constraint is no longer binding for the poor. As a consequence, members of the poor class are able to become entrepreneurs, and the equilibrium wage equals $\overline{w}$ if $t \geq T^P$. It follows from (5) and $\Pi(\overline{w}) - I = \overline{w}$ that, for $t \geq T^P$, the wealth dynamics of both classes are governed by

$$x_{t+1}^i = \alpha(x_t^i + \overline{w}) \tag{12}$$

with $i \in \{P, R\}$, while average wealth follows

$$\overline{x}_{t+1} = \alpha(\overline{x}_t + \overline{w}). \tag{13}$$

Since $\alpha < 1$, the difference $\overline{x}_t - x_t^P$ declines for $t \geq T^P$: under a wealth–independent propensity to bequeath all classes approach the same wealth level –the fixed point of (12)– regardless of the initial conditions.[12] We summarize these results in the following theorem.

Theorem 3 *If Assumptions 1 through 4 hold, the sequence* $(\overline{x}_t - x_t^P)_{t \in \mathbb{N}_0}$

i) is strictly increasing for $t \in [0, T^P]$,

ii) is strictly decreasing for $t \geq T^P$.

Hence, if Assumptions 1 – 4 hold, our model generates a time path of inequality that is consistent with the observation of Kuznets (1955): in early stages of development, between–class differences widen since the more favorable initial conditions of rich parents' children are augmented by better earning prospects. Once the poor gain the opportunity to become entrepreneurs as well, inequality declines since earnings become independent of the wealth endowment.

Note, finally, that since average wealth at time t is given by $\overline{x}_t := n^P x_t^P + (1 - n^P)x_t^R$, it is strictly larger than x_t^P for $t \leq T^P$. We can therefore conclude that average wealth passes beyond I no later than the endowment of the poor:

Lemma 1 *There exists a positive natural number* $\overline{T} \leq T^P$ *such that* $\overline{x}_t$ *is below* I *for* $t \leq \overline{T} - 1$ *and exceeds* I *if* $t \geq \overline{T}$.

In what follows, the fact that $\overline{T} \leq T^P$ will be important since it creates an incentive to use redistribution as a substitute for missing capital markets *before* market forces themselves bring about an equalization of opportunities.

[12] This property is preserved even if we admit convex bequest functions as long as the marginal propensity to bequeath is bound away from 1

3 The decision to redistribute

3.1 Assumptions and sequence of events

Having characterized the evolution of income and wealth levels in an economy that satisfies Assumptions 1 to 4 we will now investigate the incentives to overthrow the existing distribution of wealth. We assume that the redistribution decision is taken by members of the poor class. Without specifying the details of the political process, we note that this could be the outcome of a direct vote with the poor representing a majority, or the result of a popular uprising.

We also assume that, at time t, poor agents either implement *complete* redistribution or no redistribution at all, thus accepting the market outcome. If they choose redistribution, the sum of endowments is confiscated and distributed among the entire population.

Finally, we assume that redistribution is costly: if agents decide to level wealth in period t, this reduces all agents' incomes by some value C_t, which summarizes the social, political, and economic factors that determine the costs of radical redistribution relative to its benefits. Hence, a high value of C_t may result from intense repression by the incumbent government or from other obstacles to organize collective action. On the other hand, a low value of C_t would reflect an overall weakness of the prevailing regime or a general spirit of unrest, facilitating an assault on the existing social order. We are following Acemoglu and Robinson (2000) in assuming that C_t is a random variable. Moreover, we assume that it is not correlated over time and that it has a continuous strictly increasing distribution function G over the non–negative real numbers. The sequence of events in period t looks as follows:

- Agents receive their endowment x_t^i.
- C_t is realized.
- Poor agents decide about redistribution and get the resulting transfer.
- Agents decide whether to become entrepreneurs.
- Production takes place and agents receive their incomes.
- Agents consume a share $(1-\alpha)$ of their end–of–life wealth and bequeath the rest to their offspring.

3.2 A non–monotonic hazard rate of redistribution

In this section we will show that at each point in time there is a critical value $\widetilde{C}_t$ which determines whether a given realization of C_t triggers redistribution or not. We will derive the sequence of these threshold values $(\widetilde{C}_t)_{t\in\mathbb{N}_0}$ which follows for admissible initial conditions and demonstrate that, given Assumptions 1 to 4, the time path of this critical threshold is not monotonic, but hump–shaped. From an ex–ante perspective, this means that the *hazard–rate* of radical redistribution –the probability that C_t is below the critical threshold in period t given that there has been no redistribution before– reaches its maximum at an intermediate stage of economic development.

Radical redistribution takes place when the benefits exceed the costs, and in assessing the net benefits, poor agents take into account both the direct gain from appropriating part of the rich class' endowments and the effect of redistribution on their future incomes. After redistribution, all individuals have average wealth $\overline{x}$. If $\overline{x}$ is lower than I, nobody has the resources to become an entrepreneur and production drops to zero. On the other hand, if $\overline{x} \geq I$, the credit constraint is no longer binding, and it follows from Theorem 3 that wages and net profits are equalized, i.e. $\overline{w} = \Pi(\overline{w}) - I$.

In the last section, we have assigned unique values T^P and $\overline{T}$ in $\mathbb{N}_0$ to every admissible initial triple (x_0^P, n^P, x_0^R): while T^P indicates the first period in which the poor class' wealth exceeds I, $\overline{T}$ denotes the first period in which *average* wealth is larger than the capital outlay required for setting up a firm. Assumption 3 guarantees that both numbers are finite, and it was stated in Lemma 1 that $\overline{T} \leq T^P$. This implies that we can distinguish three different 'stages': stage 1 with $0 \leq t \leq \overline{T}-1$, stage 2 with $\overline{T} \leq t \leq T^P - 1$, and stage 3 with $t \geq T^P$.[13] In the first stage, neither a poor agent's endowment nor average wealth is sufficient to cover the costs of becoming an entrepreneur. In stage 2, redistribution enables poor agents to invest, while they would be confined to become workers without redistribution. Finally, in stage 3 poor agents' endowment exceeds I. For stages 1 and 2 the equilibrium wage rate is $\widetilde{w}$ while $w = \overline{w} = \Pi(\overline{w}) - I$ once the economy has advanced to stage 3. In what follows, we will consider the net benefits of redistribution in the three different stages:

Stage 1 ($0 \leq t \leq \overline{T} - 1$):

[13] Note that the initial distribution of endowments may be such that one of the intervals in stage 1 or 2 is empty.

At this stage, radical redistribution destroys investment opportunities for all members of society, and since no production takes place without entrepreneurs, this drives all agents' incomes to zero. As a consequence, a poor agent's end–of–life wealth after redistribution amounts to $\overline{x}_t - C_t$. On the other hand, the poor agents' end–of–life wealth is $x_t^P + \widetilde{w}$ if they refrain from redistribution. Hence, the poor strictly benefit from an equal society if and only if

$$x_t^P + \widetilde{w} < \overline{x}_t - C_t \quad \Leftrightarrow \quad C_t < \overline{x}_t - x_t^P - \widetilde{w}. \tag{14}$$

For $0 \leq t \leq \overline{T} - 1$, the threshold level of distribution costs is therefore given by $\widetilde{C}_t = \overline{x}_t - x_t^P - \widetilde{w}$, and the associated probability of radical redistribution is $G(\widetilde{C}_t)$. Whether this hazard rate declines or increases over time during stage 1 clearly depends on the evolution of the difference, $\overline{x}_t - x_t^P$, which is described by equation (11). Theorem 3 has shown that, under Assumption 4, this measure of inequality increases over time as long as $t \leq \overline{T} - 1$, and the widening gap between rich and poor is associated with rising social tensions and a growing likelihood of radical redistribution.

<u>Stage 2 ($\overline{T} \leq t \leq T^P - 1$):</u>

At the beginning of this stage, the likelihood of radical redistribution increases dramatically. This results from the fact that, apart from providing the poor with an immediate net transfer $\overline{x}_t - x_t^P$, an equalization of endowments also generates income perspectives that did not exist before: by replacing the missing capital markets, redistribution allows poor agents to become entrepreneurs and to earn either $\Pi(\overline{w}) - I$ or the wage $\overline{w}$. On the other hand, the poor would be confined to earn the lower wage $\widetilde{w}$ under the status quo. Comparing the benefits of redistribution to its costs, the representative poor agent therefore prefers redistribution if and only if

$$x_t^P + \widetilde{w} < \overline{x}_t + \overline{w} - C_t \quad \Leftrightarrow \quad C_t < \overline{x}_t - x_t^P + \overline{w} - \widetilde{w}. \tag{15}$$

Hence, for $\overline{T} \leq t \leq T^P - 1$, the critical value of redistribution costs is $\widetilde{C}_t = \overline{x}_t - x_t^P + \overline{w} - \widetilde{w}$. Comparing (14) and (15) and using Theorem 3 i), which states that the difference $\overline{x}_t - x_t^P$ is increasing during stages 1 and 2, we find that the threshold value of C_t in period $\overline{T}$, $\widetilde{C}_{\overline{T}}$, is *strictly larger* than all critical values before $\overline{T}$.

<u>Stage 3 ($T^P \leq t$):</u>

Once $t \geq T^P$, the borrowing constraint ceases to bind for the poor under the status quo, and they do not need redistribution to finance entrepreneurship. This eliminates differences in incomes although, of course, the two classes still differ in their endowments. Hence, during stage 3, the representative poor agent prefers radical redistribution if and only if

$$x_t^P + \overline{w} < \overline{x}_t + \overline{w} - C_t \quad \Leftrightarrow \quad C_t < \overline{x}_t - x_t^P, \tag{16}$$

and $\widetilde{C}_t = \overline{x}_t - x_t^P$ for $t \geq T^P$. Note that whether $\overline{x}_{(T^P-1)} - x_{(T^P-1)}^P + \overline{w} - \widetilde{w}$ is larger than $\overline{x}_{T^P} - x_{T^P}^P$ is not in general clear, that is, the critical value $\widetilde{C}_t$ may both decrease and increase during the transition from stage 2 to 3. However, once stage 3 is reached, it follows from Theorem 3 ii) that economic inequality and thus the incentives to redistribute decline monotonically and vanish in the long–run. In fact, since both classes converge to the same wealth level the threshold value $\widetilde{C}_t$ and the likelihood of radical redistribution approach 0 from above.[14]

The following theorem summarizes the preceding analysis and states our paper's central result:

Theorem 4 *Under Assumptions 1 to 4, the sequence of threshold costs, $(\widetilde{C}_t)_{t\in\mathbb{N}_0}$, satisfies the following properties:*

i) It is strictly increasing for $t \in [0, T^P - 1]$.

ii) It is strictly decreasing for $t \geq T^P$.

iii) Whether $\widetilde{C}_{T^P} < \widetilde{C}_{(T^P-1)}$ or $\widetilde{C}_{T^P} \geq \widetilde{C}_{(T^P-1)}$ cannot be decided generally.

Equivalently, we could have stated the result of Theorem 4 in terms of the likelihood of redistribution. The corresponding sequence of hazard rates, $(G(\widetilde{C}_t))_{t\in\mathbb{N}_0}$ is strictly increasing while $t \leq T^P - 1$ and strictly decreasing for $t \geq T^P$. Two forces are crucial in generating this non–monotonicity: first, the difference $\overline{x}_t - x_t^P$ determines the size of the net transfer which results from radical redistribution. According to Theorem 3, it is strictly increasing for $t \leq T^P - 1$ and strictly decreasing for $t \geq T^P$. Second, redistribution affects agents' earning prospects: during stage 1, leveling endowments deprives even rich agents of the possibility to become entrepreneurs and drives production to zero, thus diminishing all agents'

[14] Of course, the vanishing of wealth differences is rarely observed in the real world. In our framework, we could introduce persistent inequality by allowing for differences in initial productivities across individuals. If there is no perfect correlation between these productivities and the wealth endowments, there is social mobility, and the long–run wealth distribution is non–degenerate and independent of the initial distribution.

incomes. During stage 2, average wealth exceeds I, and redistribution creates investment opportunities for the poor, thus raising their earning prospects. In stage 3, the credit constraint is no longer binding anyway, and equalization of the initial endowments does not influence agents' incomes. Hence, at that stage the only benefit from redistribution is the direct transfer resulting from differences in initial endowments.

To illustrate how the effect on earning prospects affects the attractiveness of redistribution *ceteris paribus*, we take the distance $\overline{x} - x^P = a$ as given, but vary the absolute size of the variables $\overline{x}$ and x^P. For some constant $(1 - n^P)I < a < I$, we consider $\widetilde{C}$ as a function of $y > 0$ with $\overline{x} = (1 + y)a$ and $x^P = ya$. It follows from (14) – (16) that

$$\widetilde{C}(y) = \begin{cases} a - \widetilde{w} & \text{if} \quad y < I/a - 1 \\ a + \overline{w} - \widetilde{w} & \text{if} \quad I/a - 1 \leq y < I/a \\ a & \text{if} \quad y \geq I/a. \end{cases}$$

Figure 4 depicts the graph of this function and shows that the threshold $\widetilde{C}$ is a non–monotonic function of y, being maximal at intermediate values of y. This demonstrates that, even if absolute wealth differences between the two classes remain constant, the incentive to redistribute is highest at intermediate levels of per–capita wealth.

INSERT FIGURE 4 ABOUT HERE

The figure also indicates that the likelihood of radical redistribution is greater for $y \geq I/a$ than for $y < I/a - 1$. This reflects the fact that, at a very low level of per–capita wealth, redistribution deprives the entire population of the possibility to invest. As a consequence, incomes are zero for *everybody*, and the redistribution of initial wealth comes at the expense of future earnings.[15] Note, however, that in our example we have kept $\overline{x} - x^P$ constant, thus abstracting from the (endogenous) evolution of inequality, which in reality may reinforce the incentive to redistribute at low levels of per–capita wealth while dampening it at high levels.

3.3 A numerical example

Figures 5 and 6 illustrate the results derived in the previous sections for a parameterized example. In particular, we assume that $F(L) = L^\beta$ with $\beta = 0.5$, that

[15] In Perotti's (1993) paper, a similar tradeoff constrains the extent of redistribution desired by a poor minority.

$n^P = 0.9, I = 0.8, x_0^P = 0.1, x_0^R = 2.0$, and $\alpha = 0.85$. It is straightforward to show that this specification satisfies Assumptions 1 – 4. The solid line in Figure 5 depicts the time path of average wealth $\overline{x}$, while the dashed line represents average income $n^P w + (1 - n^P)(\Pi(w) - I)$. Average wealth increases monotonically, and at $t = T^P$, when the borrowing constraint ceases to be binding for poor dynasties and average income jumps to a higher level, the growth rate of $\overline{x}$ increases temporarily. Note, finally, that the time path of per–capita *consumption* is given by $\overline{c}_t = (1 - \alpha)\overline{x}_{t+1}$.

The solid line in Figure 6 demonstrates that inequality –defined as the difference $(\overline{x}_t - x_t^P)$– increases until $t = T^P$. At that point in time, the poor dynasties have acquired enough wealth to finance the formation of firms, such that net profits and wages are equalized. As a result, differences in wealth endowments start to decrease. The dashed line in Figure 6 shows how the critical costs of redistribution evolve over time, and since the distribution function of C is strictly increasing, this also reflects the evolution of the hazard rate of redistribution. The plot demonstrates that there is a dramatic increase of $\widetilde{C}_t$ at $t = \overline{T}$, i.e. when the society's accumulated wealth is large enough to make redistribution a source of greater social mobility.

4 Discussion

4.1 Relaxing assumptions

4.1.1 No convergence of wealth levels

Under Assumption 3, there is a finite number T^P that indicates the point in time when poor dynasties' initial endowments start to exceed I. If this assumption does not hold –for example because the bequest ratio α is too low– x_t^P converges to a steady state level below I, and members of poor dynasties are *never* able to fund entrepreneurship out of their inherited wealth. The consequences for the evolution of per–capita income, wealth, inequality, and the likelihood of radical redistribution are straightforward: since profit incomes and wages are never equalized, such an economy is stuck in an equilibrium with low per–capita wealth and drastic differences in wealth endowments. More specifically, the poor dynasties' wealth endowments converge to the steady state value of $\widetilde{w}/(1/\alpha - 1)$, while the rich dynasties' wealth approaches $\widetilde{\pi}/(1/\alpha - 1)$, provided that Assumption 2 holds and that $\widetilde{\pi}/(1/\alpha - 1) > I$, i.e. that members of rich dynasties never become credit–constrained. As a result, wealth inequality is much more pronounced than in an economy that satisfies Assumption 3, and instead of growing towards a stage with high per–capita incomes and vanishing social conflict, the economy finds itself in a 'poverty trap', characterized by intense social cleavages and a high likelihood of redistribution.

4.1.2 No Kuznets–curve dynamics

Under Assumption 4, initial differences in wealth levels are reinforced by differences in earnings, and inequality grows until the economy has reached a point where the borrowing constraint is no longer binding for poor agents. Relaxing this assumption abolishes this property – however, without necessarily challenging the key property of our paper: even if $(\overline{x}_t - x_t^P)$ constantly *decreases* over time, the net benefits of redistribution may still be highest at intermediate levels of per–capita wealth, that is, when inequality has already started to fall. This is due to the fact that the attractiveness of wealth equalization not only depends on the size of the net transfer but also on the effect it has on agents' earning prospects, which is strongest at $t = \overline{T}$. Figures 7 and 8 illustrate this possibility for our numerical example, setting $x_0^R = 4$ and leaving all other parameters unchanged, thus violating Assumption 4. The time path of the threshold level for redistribution costs shows that this threshold (and thus the hazard rate of redistribution) is still highest at intermediate level of average wealth although inequality is monotonically *decreasing*. This confirms that the result in Theorem 4 does not merely rely on the time path of wealth inequality having a Kuznets–curve shape.

4.2 Historical evidence

Historians and political scientists have frequently pointed out that many of the great social revolutions of the past were preceded by periods of rapid economic growth and rising prosperity. An early example is Alexis de Tocqueville who, in his analysis of the French revolution, states that in the last decades of the Ancien Regime, "... the country did grow richer and living conditions improved throughout the land" (De Tocqueville 1857, quoted from Davies 1971:95). However, "... this steadily increasing prosperity, far from tranquilizing the population, everywhere promoted a spirit of unrest". A similar observation is made by Brinton (1965) and by Skocpol (1999) in her detailed account of the (failed) Russian revolution of 1905: while industrialization in Russia had just started at the end of the 19th century, the decades preceding the revolution witnessed exceptional growth and wealth accumulation. Between the peasants' liberation in 1865 and the outbreak of revolt in 1905, the index of industrial production in Russia grew at an average annual rate of 5.4 percent. In more developed Germany, the average growth rate was 3.8 percent, while it was 2.1 percent in the U.K. (Mitchell 1975). Over the same time interval, raw cotton consumption in Russia (as a proxy for aggregate consumption) grew at an average annual rate of 6.1 percent, while it grew at a rate of 5.5 percent in Germany and 2.3 percent in the U.K (Mitchell 1975). A more recent example of a social revolution that took place against the background of rising prosperity is the Iranian revolution of 1979: while Iran still was a developing country by the end of the 1970s, the Shah's massive industrialization campaign had resulted in spectacular growth rates, and between 1960 and 1975 Iran's real per–capita income had grown at an average rate of 4.7 percent.[16]

Despite obvious differences, the revolutions we mentioned share the property that they did not take place in an environment of abject poverty and despair. Instead, the existing social and political order was challenged when countries could look back at some decades of impressive growth. Our model offers an interpretation for this pattern by stating that these countries were ripe for revolution when average wealth had reached a level where the incentive to redistribute was fuelled both by existing inequalities and by the perspective of enhanced social mobility.

At first glance, one might question the notion that the great revolutions of the past increased social mobility by fostering entrepreneurship. Instead, there are many cases in which radical redistribution was initially associated with a general abolition of private property. However, when the dust of the revolution's radical phase had settled, governments frequently reintroduced market institutions and encouraged the emergence of an entrepreneurial class consisting to a large extent of the formerly deprived.[17] Moreover, the key result of our paper does not rely on the specific worker–entrepreneur antagonism we chose. If we had adopted the framework of Maoz and Moav (1999), in which borrowing constraints prevent children of poor parents from acquiring education we would have come to similar conclusions –namely, that redistribution may be attractive not only because it levels existing inequalities, but also because it offers earning opportunities that would not have existed under the status quo. However, for the second incentive to

[16]A detailed account of the Iranian revolution is given by Milani (1988). It is noteworthy that in the years immediately preceding the revolutions, both France, Russia, and Iran, after growing rapidly for an extended period, experienced sharp recessions. This fact, which has already been pointed out in the seminal study of Davies (1962), could be easily captured by our model –e.g. by introducing economic shocks that asymmetrically affect labor and profit incomes and thus affect the net benefits of radical redistribution.

[17]A good example is the shift to the 'New Economic Policy' in the wake of the Russian revolution, which resulted in a mushrooming of small businesses and promoted the emergence of a new middle class (Gregory and Stuart 1990).

be effective the economy has to have reached a minimum level of average wealth and prosperity.

5 Summary and conclusions

In this paper we have shown that the intensity of social conflict –defined as the likelihood of radical redistribution implemented by a poor majority– may be a non–monotonic function of per–capita wealth. This suggests that, while growing out of a stage of poverty, societies may enter a phase where the incentive to challenge the existing social and economic order is highest, and reconciles the observed social stability of industrialized countries with the fact that many social revolutions of the past took place after periods of rapid economic growth and wealth accumulation. While our result is partly driven by a 'Kuznets–curve' evolution of wealth inequality, this is not the only factor that generates the hump–shaped time path of redistribution probabilities: in fact, the role of redistribution as a substitute for missing capital markets may result in a 'hump' even if wealth inequality is steadily decreasing.

For the sake of transparency, we have abstracted from a number of important factors: first, we have drastically simplified the political process by assigning all political power to the poor class. A more sophisticated analysis would follow Grossman (1991, 1994) in modeling the decision to challenge the existing social order as the result of rational agents' optimizing resource allocation, and it would have to account for the apparent free–riding problem associated with collective (revolutionary) action.[18]

Moreover, we have assumed that members of the rich class remain entirely passive, despite the obvious risk of being expropriated. If we dropped this assumption, we would have to describe how rich agents respond to the anticipated danger of radical redistribution. Two interesting possibilities come to our mind: first, the rich could choose a milder form of 'preemptive redistribution' in order to reduce the poor agents' incentives to revolt (see Grossman 1994, 1995). An alternative would be to relax borrowing constraints and to reduce the attractiveness of redistribution as a substitute for missing capital markets. While these extensions are beyond the scope of this paper, we believe that they outline an interesting direction of future research.

[18] For a collection of studies that investigate the behavior of 'rational rebels', see Taylor (1988).

6 References

Acemoglu, D. and Robinson, J.A. (2000): "Why did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective", *Quarterly Journal of Economics* 115, 1167–1199.
Alesina, A. and Rodrik, D. (1994): "Distributive Politics and Economic Growth", *Quarterly Journal of Economics* 109, 465–490.
Benabou, R. (1996): "Inequality and Growth", NBER Macroeconomics Annual 11, MIT Press, Cambridge, 11–74.
Benhabib, J. and Rustichini, A. (1996) "Social Conflict and Growth", *Journal of Economic Growth* 1, 129–146.
Brinton, C. (1965): *The Anatomy of Revolution*, revised and expanded edition, Random House, New York.
Davies, J.C. (1962), "Toward a Theory of Revolution", *American Sociological Review* 6, 5–19.
Davies, J.C. ed. (1971): *When Men Revolt and Why: A Reader in Political Violence and Revolution*, The Free Press, New York.
Drazen, A. (2000): *Political Economy in Macroeconomics*, Princeton University Press, Princeton.
Esteban, J. and D. Ray (1999): "Conflict and Distribution", *Journal of Economic Theory* 87, 379–415.
Freeman, S. (1996): "Equilibrium Income Inequality among Identical Agents", *Journal of Political Economy* 104, 1047–1064.
Galor, O. and Zeira, J. (1993): "Income Distribution and Macroeconomics", *Review of Economic Studies* 60, 35–52.
Gregory, P.R. and R.C. Stuart (1990): *Soviet Economic Structure and Performance*, Harper and Row, New York.
Grossman, H. (1991): "A General Equilibrium Model of Insurrections", *American Economic Review* 81, 912–921.
Grossman, H.I. (1994): "Production, Appropriation, and Land Reform", *American Economic Review* 84, 705–712.
Grossman, H.I. (1995): "Robin Hood and the Redistribution of Property Income", *European Journal of Political Economy* 11, 399–410.
Gurr, T.R. (1970): *Why Men Rebel*, Princeton University Press, Princeton NJ.
Huntington, S.P. (1968): *Political Order in Changing Societies*, Yale University Press, New Haven CT.
Kuznets, S. (1955), "Economic Growth and Income Inequality", *American Economic Review* 45, 1–28.

Lane, P. and Tornell, A. (1998): "Voracity and Growth", *CEPR Discussion Paper No. 2001.*

Lichbach, M.I. (1990): "Will Rational People Rebel against Inequality? Samson's Choice", *American Journal of Political Science* 34, 1049–76.

Maoz, Y.D. and Moav, O. (1999): "Intergenerational Mobility and the Process of Development", *Economic Journal* 109, 677–697.

Matsuyama, K. (2000): "Endogenous Inequality", *Review of Economic Studies* 67, 743–759.

Matsuyama, K. (2001): "On the Rise and Fall of Class Societies", *Northwestern University, The Center of Mathematical Studies in Economics and Management Science Discussion Paper, No. 1326.*

Midlarsky, M. (1988): "Rulers and the Ruled: Patterned Inequality and the Onset of Mass Political Violence", *American Political Science Review* 82, 491–509.

Milani, M.M. (1988): *The Making of Iran's Islamic Revolution*, Westview Press, Boulder CD.

Mitchell, B.R. (1975): *European Historical Statistics 1750–1970*, Macmillan, London.

Olson, M. (1963): "Rapid Growth as a Destabilizing Force", *Journal of Economic History* 23, 529–552.

Perotti, R. (1993): "Political Equilibrium, Income Distribution, and Growth", *Review of Economic Studies* 60, 755–776.

Perotti, R. (1996): "Growth, Income Distribution, and Democracy: What the Data Say", *Journal of Economic Growth* 1, 149–187.

Persson, T. and Tabellini, G. (1994): "Is Inequality Harmful for Growth? Theory and Evidence", *American Economic Review* 48, 600–621.

Skocpol, T. (1999): *States and Social Revolutions: A Comparative Analysis of France, Russia, and China*, Cambridge University Press, Cambridge.

Somanathan, E. (2002) "Can Growth Ease Class Conflict?", *Economics and Politics* 14, 65–81.

Taylor, M. (ed.)(1988): *Rationality and Revolution*, Cambridge University Press, Cambridge.

De Tocqueville, A. (1857): *L'Ancien Regime et la Revolution*, Levy, Paris.

Tornell, A. and Velasco, A. (1992): "The Tragedy of the Commons and Economic Growth: Why Does Capital Flow from Poor to Rich Countries?", *Journal of Political Economy* 100, 1208–1231.

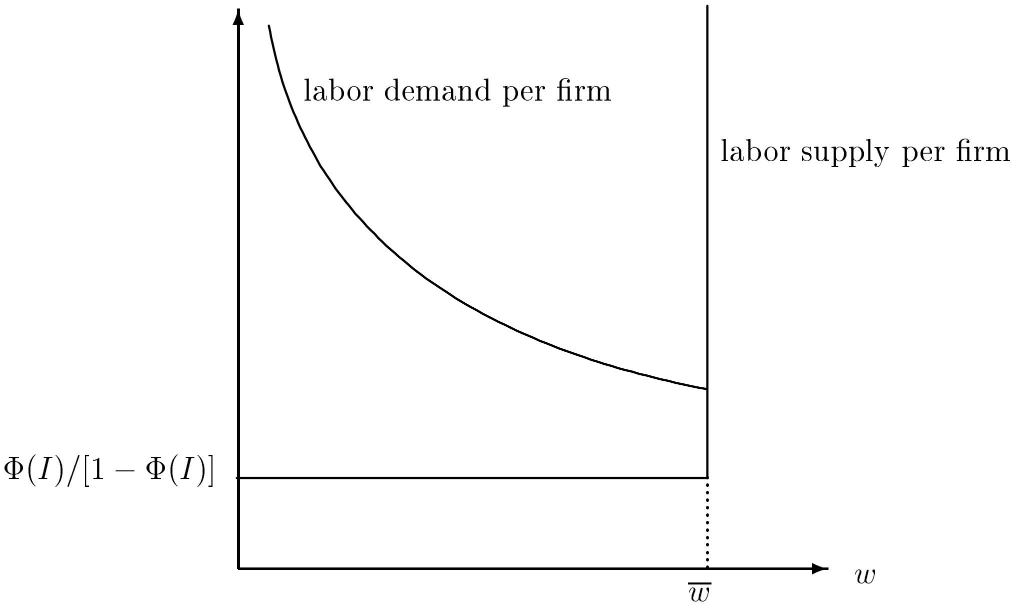

Figure 1: Equilibrium wage $w = \overline{w}$.

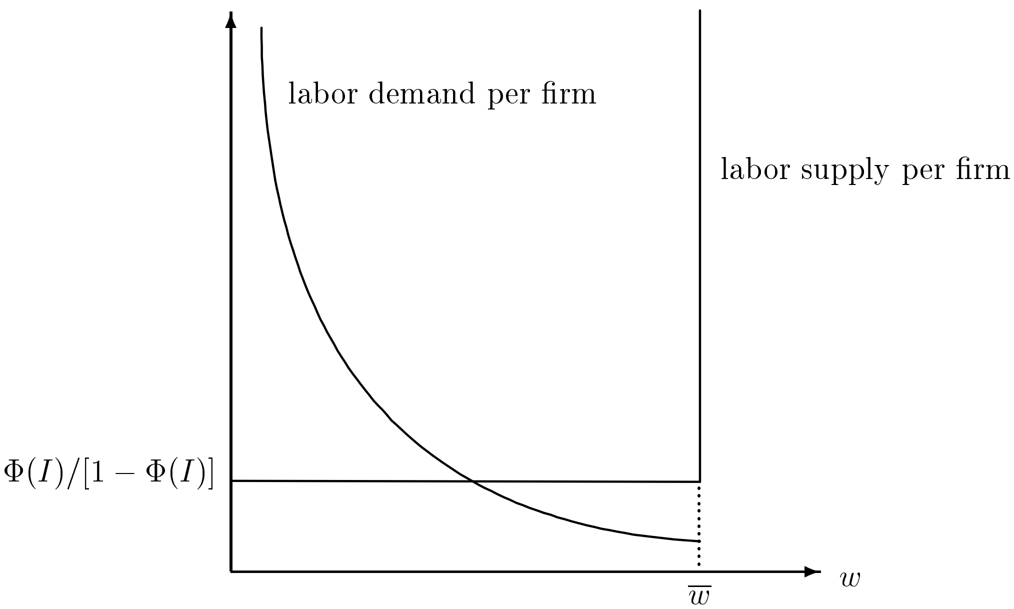

Figure 2: Equilibrium wage $w < \overline{w}$.

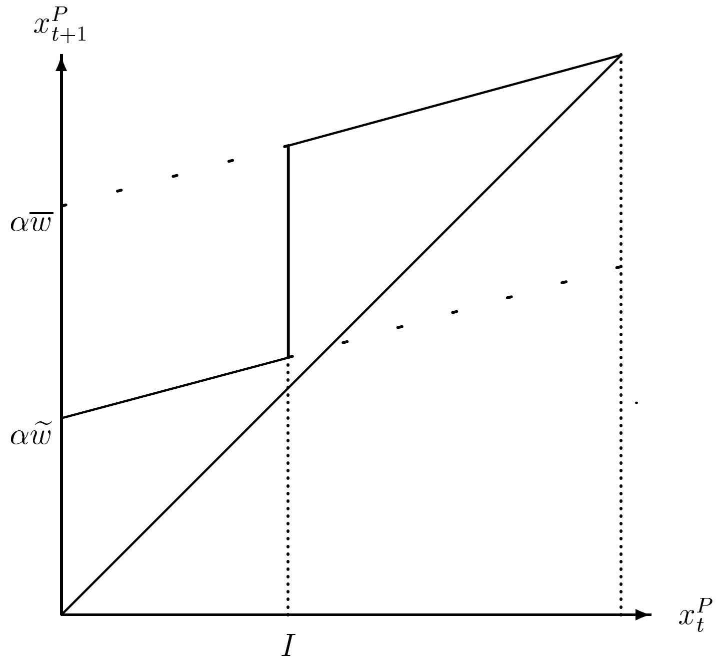

Figure 3: The graph of the difference equation governing the dynamics of wealth for poor dynasties.

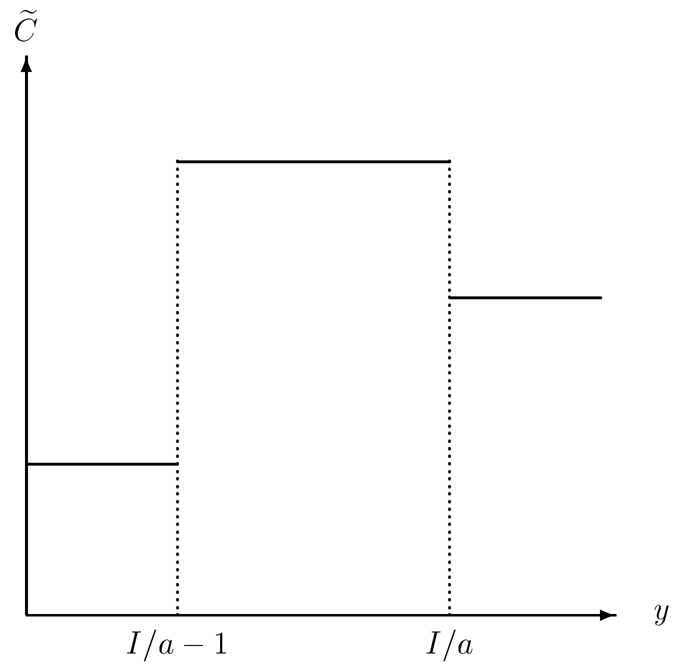

Figure 4: The graph of $\widetilde{C}$ as a function of y when $\overline{x} = (1+y)a$ and $x^P = ya$.

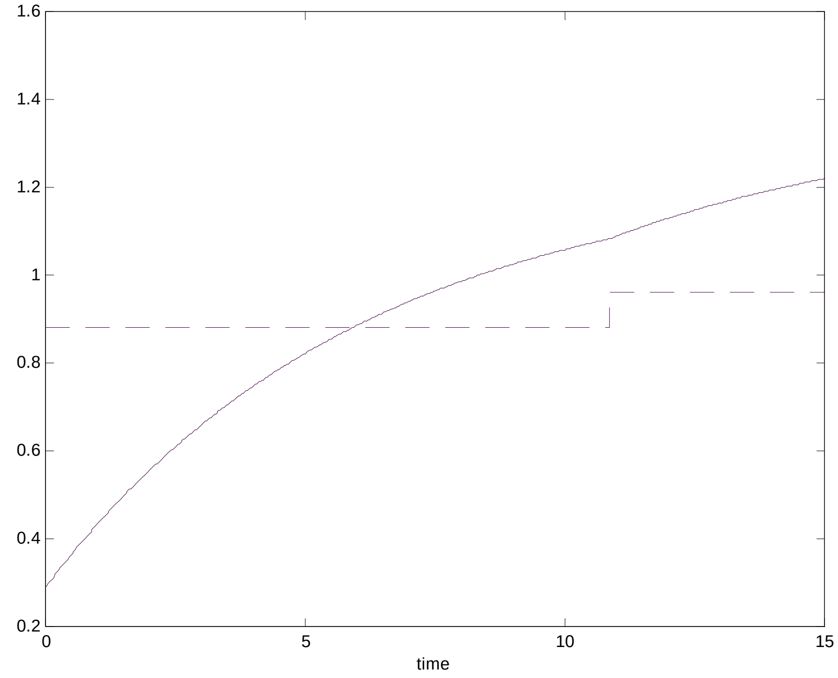

Figure 5: The evolution of average wealth $\bar{x}_t$ (solid line) and per-capita income $n^P w_t + (1-n^P)[\Pi(w_t) - I]$ (dashed line).
(Per-capita income has been multiplied by four to facilitate representation.)

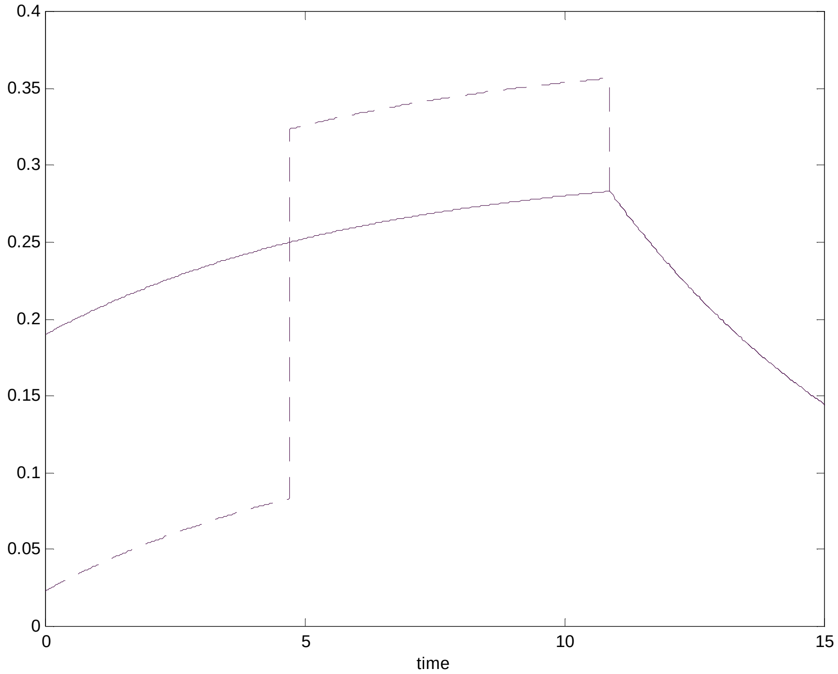

Figure 6: The evolution of inequality $\bar{x}_t - x_t^P$ (solid line) and the critical costs of redistribution $\tilde{C}_t$ (dashed line).

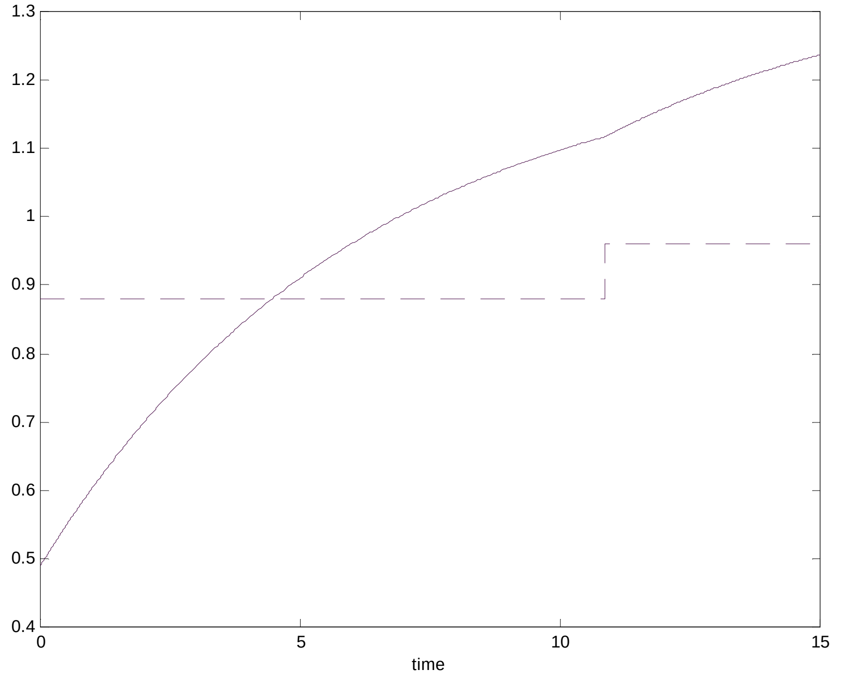

Figure 7: The evolution of average wealth $\bar{x}_t$ (solid line) and per-capita income $n^P w_t + (1 - n^P)[\Pi(w_t) - I]$(dashed line) if Assumption 4 is violated. (Per-capita income has been multiplied by four to facilitate representation.)

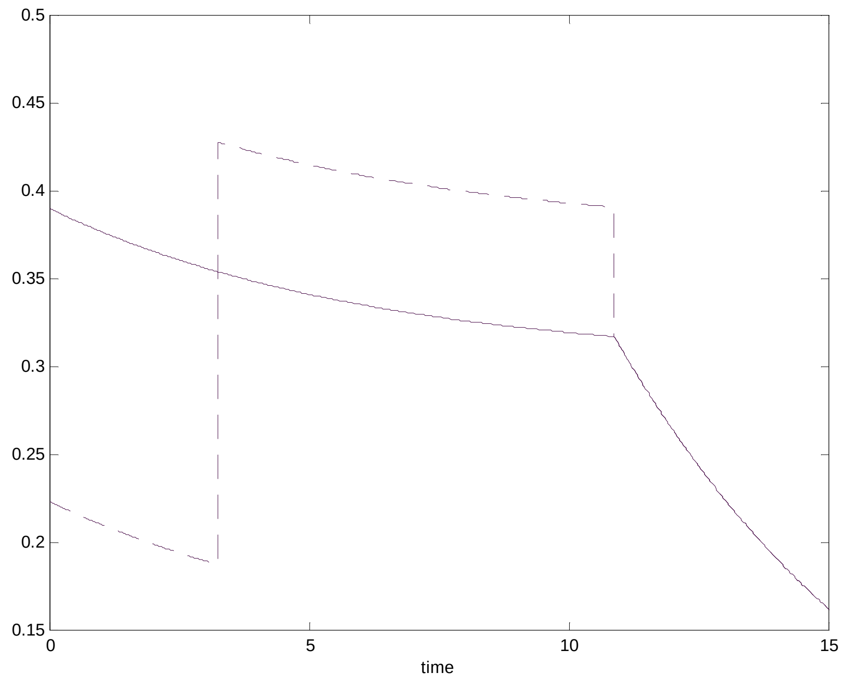

Figure 8: The evolution of inequality $\bar{x}_t - x_t^P$ (solid line) and the critical costs of redistribution $\tilde{C}_t$ (dashed line) if Assumption 4 is violated.