Wealth Inequality and the Political Economy of Financial and Labour Regulations

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Abstract

This article studies the interplay between inequality and the effectiveness of financial and labor regulations. We motivate the paper by observing that the cross-country correlation between wealth inequality and the strength of regulations increases with a country's GDP per capita. In poor countries the relationship is negative, but might become positive for rich enough countries. In our model, initial regulations and wealth inequality determine occupational choice and thus create endogenous interest groups. We embed these groups in a political economy model, and use it to endogenize political platforms and explain our observation. We show that increased inequality in a poor country leads in equilibrium to lower creditor and worker protection. In rich countries the effect is reversed and higher inequality means that less advantaged groups can exert more pressure towards laws that work in their favour.

Keywords: wealth distribution, interest groups, political platforms.

JEL: H23, D72, K42.

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1 Introduction

There is a large body of evidence suggesting that institutions play an important role in economic development.[1] Hence, it is not surprising that the question of how inefficient institutional systems may persist has gained prominence in economics. Some explanations rely on historical factors that influence the early development of institutions, such as legal origins (La Porta et al., 1997, 1998) and ethnic fractionalization (Alesina et al., 2003). A different strand of the literature argues that politics are driven by the interests of the economically and politically powerful. Along these lines, inequality has been recognized as an important factor in the design of institutions (e.g. Glaeser et al., 2003). In unequal societies the rich may use their wealth and political power to shape the institutional framework in their favour, with a significant impact on economic outcomes. As a result, increased inequality may worsen regulatory institutions.

This paper adds to the literature on the link between inequality and regulatory institutions by showing that earlier findings on this relation depend on initial country wealth. More specifically, we focus on the interaction of wealth inequality with the political economy of financial and labor regulations. In our background setup, initial regulations and wealth inequality determine occupational choice, and thus endogenous interest groups. We embed these groups into a political economy model with political platforms that determine future regulations. We then explore the effects of a pure increase in wealth inequality on regulations.

Our underlying model generates three endogenous groups: workers, small, and medium-large entrepreneurs. The interaction of financial and labor frictions gives rise to political interests peculiar to each group with regard to creditor and worker protection. Stronger creditor protection loosens credit constraints, which favors small entrepreneurs. This raises the demand for labor, so workers also benefit, but medium and large entrepreneurs are worse off because of the higher wages. On the other hand, only workers favor increased worker protection. Thus the three groups have different political interests. Workers favor both increased worker and creditor protection. Small entrepreneurs share the preference for stronger creditor protection but oppose worker protection. Finally medium and large entrepreneurs oppose both measures.

In our setup, these preferences determine the political platforms of the two political parties as in the probabilistic voting model of Persson and Tabellini (2000). A change in the initial wealth distribution alters the equilibrium political platform by modifying the relative political influence of the different interest groups. Our main result is that the effect of increased inequality on the strength of regulations depends on the initial wealth of the country. In poor countries it is negative, since higher inequality leads to increased influence of the richer elites. This negative effect is decreasing in country wealth. In sufficiently rich countries it becomes positive, and

[1] Knack and Keefer (1995); Hall and Jones (1999); Acemoglu et al. (2001, 2005); Dollar and Kraay (2003).

increased inequality implies that the less advantaged groups can exert relatively more pressure towards laws that work in their favor.

Simplifying the complex effects of increased inequality on the political strength of the different groups, the intuition of our main result is as follows. Consider a mean-preserving spread of the initial distribution in a poor country, i.e., an increase in wealth inequality without changing the mean. In a poor country, on average, agents are not rich enough to become entrepreneurs. This means that increased inequality raises the relative weight of economically powerful groups, and thus the political equilibrium leads to lower creditor and labor protection. These forces work in the opposite way in a rich country.

In general, the theory on inequality and the strength of institutions predicts a negative relationship between these variables, see for example Sonin (2003) and Glaeser et al. (2003). Figures 1 and 2 show a novel feature of cross-country data on inequality and regulations, which is the motivation for this paper. Consistent with the existing literature on this topic, the figures show that the correlation between inequality and institutional strength is negative for most countries (see Chong and Gradstein, 2007, for empirical evidence). The new feature of the data is that after controlling for initial GDP per capita, this negative correlation becomes weaker as a country's initial income is higher. In particular, for countries that were sufficiently wealthy in 2000, the sign of the correlation may become positive.

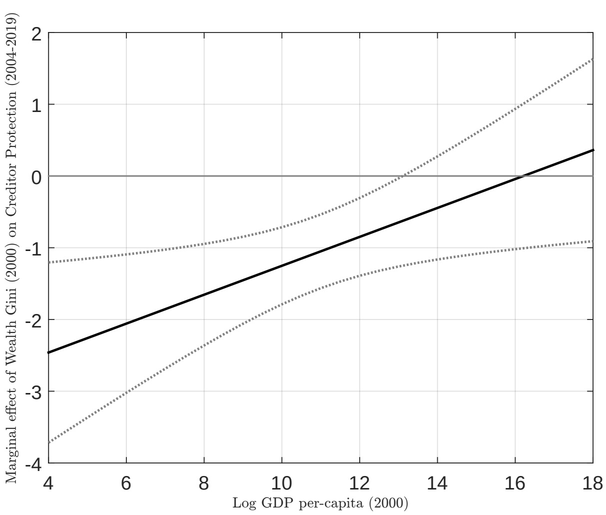

Figure 1: Effect of Wealth Gini on Creditor Protection by GDP per capita

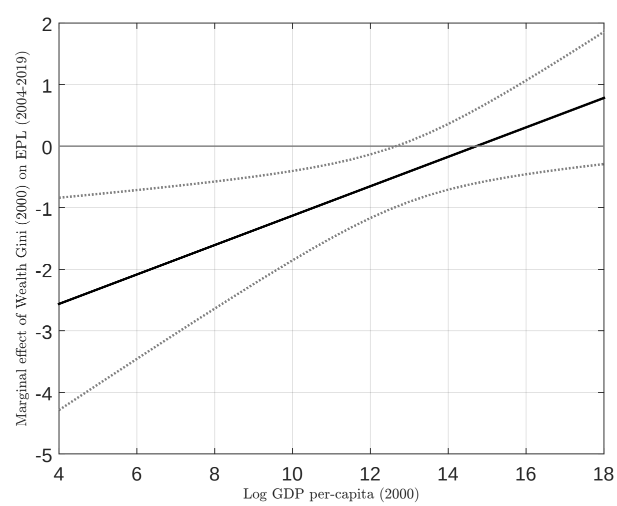

Figure 2: Effect of Wealth Gini on EPL by GDP per capita

In the figures, we measure creditor protection by the loan recovery rate taken from Doing Business (2004-2019) and the strength of labor regulations by the synthetic OECD Employment Protection Legislation Index (EPL, 2004-2015). The figures show the marginal effect of wealth inequality on the strength of regulations, conditional on countries' initial GDP per capita.[2] In the y-axis of figure 1 (2) we show the percentage change in the loan recovery rate (EPL) in response to a 1% increase of the wealth Gini in 2000, conditional on the log of GDP per capita in 2000. The range of these effects runs from -4% to 2%, for both regulatory measures. Due to a dearth of wealth inequality data we cannot construct a panel which includes developing countries. This means that our empirical analysis must be construed as a correlation and not as a causal relation. However, it serves as a motivation for our model, which shows that the effect of wealth inequality on regulations depends on countries' initial wealth.

This article contributes to our understanding of the political economy of inequality and financial and labor regulations in at least four ways. First, it shows that the political theory on the relationship between inequality and regulations is incomplete by providing a model in which this interaction depends on initial country wealth. Second, we develop a political economy model where regulations result from the influence of diverging political interest groups –large and medium sized firms, small firms, and workers– that arise endogenously as consequence of financial and labor frictions. Third, the pure effect of inequality on regulations is examined through fairly general continuous mean preserving spreads distributions without relying on specific functional forms. Finally, it suggests new directions for the empirical study of the link between wealth inequality and the strength of regulatory institutions, once additional worldwide wealth inequality panel data is available.

1.1 Literature Review

Our baseline framework relates to the classical models of occupational choice in which agents decide between becoming workers or entrepreneurs depending on their endowments. Lucas (1978) and Murphy et al. (1991) present models in which more talented individuals become entrepreneurs and hire less able people. Evans and Jovanovic (1989) work in a similar model where people own assets and entrepreneurial ability. Liquidity constraints exclude those with insufficient funds. Thus having capital is crucial for starting a firm, as in our framework. Our setting is also linked to the models where the debt capacity of firms is limited by their capital and by moral hazard in the credit market (e.g. Holmstrom and Tirole, 1997; Repullo and Suarez, 2000).

The political conflicts predicted by our baseline model relate to the literature on the interest group theory, where powerful actors block or push the development of economic institutions

[2]These graphs were obtained after regressing the average creditor protection and EPL against the log of GDP per capita in 2000 (World Bank), the wealth Gini in 2000 (Davies et al., 2011), an interaction between both variables, legal origins dummies (English, Scandinavian, German from La Porta et al., 2008), a measure of ethnic fractionalization (Alesina et al., 2003) and the Electoral Democracy Index in 2000, taken from Coppedge et al. (2020). Standard errors used were clustered by country. The dotted lines are 95% confidence bands. In appendix C we present the regressions that give rise to the figures.

for their convenience. Rajan and Zingales (2003) propose a theory where incumbents oppose to financial development because it breeds competition (see also La Porta et al., 2000). Botero et al. (2004) present a similar viewpoint for the development of labor regulations, which respond to the pressures of trade unions. Using arguments similar to our own, in a one factor model, Shleifer and Wolfenzon (2002) show that there will be opposition to investor protection when the capital markets are closed. Rajan and Ramcharan (2011) present evidence that elites may restrict financial development in order to limit access to finance of tenants and small farmers.

The existing literature on the political economy of financial and labor regulations has shown that countries can be divided into corporatists, with strong employment protection and weak investor rights, and their opposite, the non-corporatist countries. For example, Perotti and von Thadden (2006) argue that when financial wealth is sufficiently concentrated, the median class supports a corporatist institutional platform. In contrast, when financial wealth is more widely distributed, there is political support for a non-corporatist institutional platform. Along the same lines, Pagano and Volpin (2005) propose a theory where proportional and majoritarian electoral systems are conducive to corporatist and non-corporatists countries respectively. Both papers present empirical evidence that accords with their predictions.

We embed our background model into the political economy scheme of Persson and Tabellini (1999). The equilibrium political platform arises as a result of initial inequality and in response to the endogenous interest groups. We use a probabilistic voting to solve cycling problems arising from multidimensional policy space (Lindbeck and Weibull, 1987; Persson and Tabellini, 2000).

Our political economy model is linked to the literature on the political economy of inequality and growth. In our model inequality determines the quality of regulations in a country and these should have an effect on future growth. Persson and Tabellini (1994) and Alesina and Rodrik (1994) present political economy theories on the determination of tax policy in growth models. Distributional effects arise from the balance of power of the political system. Higher inequality leads to higher pressure for redistribution which in turn discourages investment and reduces growth. Benabou (1996) provides a complete review of the early literature on inequality and growth. In general, empirical evidence and theory suggest a negative link between inequality and growth.

The theory on inequality and the strength of institutions predicts a negative relationship between these variables. Sonin (2003) and Glaeser et al. (2003) study models in which regulatory institutions are subverted by the rich for their own benefit. The former focuses on the subversion of public property rights protection and the later concentrates specifically on pressures on the judicial system. A similar viewpoint is presented by Gradstein (2007) for the protection of property rights when political participation is endogenous. Chong and Gradstein (2007) build on Sonin's framework to show that a negative double-causality relationship arises between income inequality and the quality of institutions. They provide empirical evidence consistent with the negative relationship between inequality and institutional quality.

The paper is organized as follows. The next section presents the background model. Section 3 shows the equilibrium. Section 4 studies the conflicts of interests regarding regulatory reforms. Section 5 performs a wealth redistribution analysis. In section 6 we embed the underlying model in a probabilistic voting model and arrive at the main result of the paper. Section 7 concludes.

2 The Background Model

In this section we present a theoretical model of capital and labor market frictions that is embedded in the political structure used to derive our main results in section 6.

In a one-good open economy, a continuum of risk-neutral agents are born, differentiated by their wealth a. They produce output according to the production function $f(k,l) = k^{\alpha} l^{\beta}$, $\alpha + \beta < 1$. The price of the single good is normalized to one. Agents are price takers in the labour and capital markets.

The single period of the model is divided into five stages (see Figure 3). In the first period, agents are born endowed with one unit of inalienable specific capital (and idea, an ability or a project) and an amount of wealth a. The cumulative initial distribution $G(a)$ of wealth among the population has a continuous density $g(a)$ with support in $\mathbb{R}_+$ and mean $\bar{A}$.

Due to financial frictions in the model, there is credit rationing in the financial market. In the second stage, agents excluded from the credit market become workers, supplying labor l^s in response to the equilibrium wage w, depositing their wealth in competitive banks and receiving the world interest rate $1 + \rho$. The disutility cost of providing l^s units of labor is $\varsigma(l^s)$, where $\varsigma' > 0, \varsigma'' > 0, \varsigma''' \geq 0$ with $\varsigma(0) = 0, \varsigma(+\infty) = \infty$.[3] The agents with access to credit become entrepreneurs, hiring labor l and borrowing an amount d of capital from banks.[4] In the next stage, entrepreneurs may choose to abscond with the loan. In this case, only a fraction $1 - \phi$ of the capital is recovered by the legal system and the entrepreneur obtains a private benefit ϕk. Therefore, $1 - \phi$ represents the strength of *ex-ante* creditor protection, or alternatively, the *loan recovery rate.*

In the fourth stage, with probability p the firm is successful and produces output $y = f(k,l)$, where $k = a + d$ is total capital invested. There is a sunk startup cost of a firm $F > 0$. With probability $1 - p$ it produces nothing and becomes bankrupt. In this case, its investment is worth a fraction $0 < \eta < 1$ of the initial value k and is distributed among creditors, i.e., workers and

[3]Imposing nonnegativity conditions on the third derivative is common in these types of models, see for instance Laffont and Tirole (1993, Sec. 2.3).

[4]Note that decision variables may depend on the wealth of the agent, i.e. $l^s \equiv l^s(a), l \equiv l(a), d \equiv d(a)$. We omit indexing to simplify the exposition.

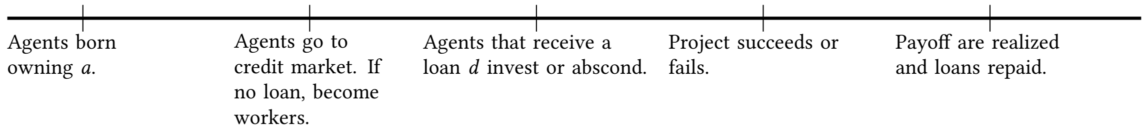

Figure 3: Time line.

banks. If the firm fails, the worker is let go and receives a fraction θ of the wages she is owed wl, while the remainder $\eta k - \theta wl$, if positive, goes to banks.[5] Thus, θ measures the strength of Employment Protection Laws (EPL, hereafter). This assumption imposes a simple but tractable structure for labor protection.

Loans are provided by a competitive banking system which has unlimited access to international funds at the world interest rate ρ. The expected profits of a bank from lending an amount d to an entrepreneur with assets a, at the interest rate $r \equiv r(a)$ is:

$$U^b = p(1+r)d + (1-p)[\eta k - \theta wl] - (1+\rho)d. \tag{1}$$

In the last stage, loans are repaid and payoffs realized. The utility functions of entrepreneurs and workers are, respectively:

$$U^e = p[f(k,l) - wl - (1+r)d] - F, \tag{2}$$

$$U^w = (1+\rho)a + pwl^s + (1-p)\theta wl^s - \varsigma(l^s). \tag{3}$$

3 Equilibrium

While deriving the individual labor supply is straightforward, deriving the aggregate labor supply in equilibrium requires a deeper understanding of the entrepreneur's problem (see subsections 3.1 and 3.2). Maximizing expression (3) with respect to individual labor supply l^s leads to:

$$(p + (1-p)\theta)w = \varsigma'(l^s). \tag{4}$$

Note that individual labor supply l^s is independent of wealth a.

The banking system charges differentiated interest rates, since in case of bankruptcy, the loss to the bank depends on the size of the loan. Imposing the zero-profit condition in (1), the interest rate r charged by banks to an entrepreneur that borrows d, invests k and contracts l units of labor

[5] Throughout this paper we assume that $\eta k - \theta wl \geq 0$. This means that the post-bankruptcy value of assets is always sufficient to pay workers what they are owed in bankruptcy. There is another possibility, the case in which banks receive nothing after the failure of the firm. This second case is simpler to analyze, and not as interesting, so we omit it to shorten the paper.

is:

$$(1+r) = \frac{1+\rho}{p} - \frac{1}{pd}(1-p)[\eta k - \theta w l]. \tag{5}$$

Thus, using expression (2), the utility of the entrepreneur is:

$$U^e = p[f(k,l) - wl] + (1-p)[\eta k - \theta w l] - (1+\rho)d - F. \tag{6}$$

3.1 Perfect Enforcement

Without moral hazard ($\phi = 0$), all agents have access to credit market. They choose debt d and labor l to maximize (6), leading to the first-best investment k^* and labor demand l^*:

$$p f_k(k^*, l^*) = 1 + \rho - (1-p)\eta, \tag{7}$$

$$p f_l(k^*, l^*) = (p + (1-p)\theta)w, \tag{8}$$

where w has been taken as given. In order to determine the equilibrium wage, the aggregate labor supply and demand are required. The entrepreneur's problem also has to take into account the participation constraint:

$$U^e \geq U^w. \tag{9}$$

This condition defines a critical wealth level $\hat{a}$,

$$U^e(k^*, l^*) - U^w(\hat{a}) = 0, \tag{10}$$

such that agents with $a < \hat{a}$ become workers and the ones with $a \geq \hat{a}$ become entrepreneurs. This critical level of wealth exists and is unique for interesting cases.[6]

Therefore, the equilibrium wage w arises from:

$$l^s \cdot G(\hat{a}) = l^* \cdot (1 - G(\hat{a})), \tag{11}$$

where $\hat{a}$ and l^s and l^* are derived from (10), (4), (7) and (8) as functions of the equilibrium values of w.

Hence, in the first-best equilibrium the population is divided among workers and entrepreneurs that operate at the efficient scale. Within this last group, poorer entrepreneurs ($a < k^*$) ask for

[6] If F is sufficiently large, there is no crossing , no firms appear, salaries are $w = 0$ and all agents live from lending their wealth abroad. For sufficiently small F, the fact that $\lim_{a\to 0} \frac{\partial U^e(a)}{\partial a} = +\infty$ and that $U^e(a = 0) < 0$ ensure existence. For uniqueness, note first that $U^e(a)$ is increasing, concave and continuous. To ensure that concavity does not lead to another crossing, observe that $\lim_{a\to +\infty} \frac{\partial U^e(a)}{\partial a} = \lim_{a\to +\infty} \frac{\partial U^w(a)}{\partial a} = 1 + \rho$.

a loan $d = k^* - a$ to operate. The remaining entrepreneurs ($a \geq k^*$), self-finance their firms and deposit their surplus capital at the world interest rate ρ. In the case of perfect enforcement, all agents have access to credit, so there is no jump in utility in forming a firm and obtaining credit

3.2 Imperfect Enforcement

In the imperfect enforcement equilibrium ($\phi > 0$), not all entrepreneurs will be able to reach the optimal operation scale, since loans are limited by moral hazard. The second-best problem includes the incentive compatibility constraint:

$$U^e \geq \phi k. \tag{12}$$

The borrower may decide to abscond –without investing– to finance non-verifiable personal consumption. Thus, investment decisions are non-contractible. On the other hand, entrepreneurs who invest their borrowed capital plus their initial wealth in a firm, receive their returns only after repaying their obligations. This requires that output, labour costs and sales revenue are verifiable and can be pledged to investors, see Balmaceda and Fischer (2010). We first show that in equilibrium there is a threshold level of assets required to have access to the credit market.

Lemma 1 *There exists a minimum wealth $\underline{a} > 0$ required to access the credit market. The triplet $(\underline{a}, \underline{d}, \underline{l})$ is characterized by:*

$$\Psi(\underline{a}, \underline{d}, \underline{l}) = 0, \tag{13}$$

$$\Psi_d(\underline{a}, \underline{d}, \underline{l}) = 0, \tag{14}$$

$$\partial U^e(\underline{a}, \underline{d}, \underline{l})/\partial l = 0. \tag{15}$$

where $\Psi \equiv U^e - \phi k$, $\underline{d} \equiv d(\underline{a}) > 0$ and $\underline{l} \equiv l(\underline{a})$.

Proof: This and the following proofs appear in the appendix ■

As shown in the lemma, there is credit rationing: a rationed borrower ($a < \underline{a}$) may be willing to offer a higher interest rate to lenders in order to obtain a loan or to increase the size of the loan she is offered, but investors will not accept, because they cannot trust the borrower. From condition (14), the marginal return to investment of the first agent with access to credit is $1 + \rho + \phi - (1 - p)\eta$. Thus, this is the highest possible return to investment. As a increases, the return falls until it reaches the return obtained by a firm with the optimal investment k^*, $1 + \rho - (1 - p)\eta$, as in section 3.1. Therefore, as U^e is increasing and continuous in the relevant range, there is a wealth level $\overline{a} > \underline{a}$, such that an entrepreneur having $\overline{a}$ is the first agent that can obtain a loan sufficiently large to invest efficiently:

$$\Psi(\overline{a}, k^* - \overline{a}, l^*) = 0. \tag{16}$$

In equilibrium, these two thresholds define an endogenous range of potential entrepreneurs $[\underline{a}, \overline{a})$ who have restricted access to the credit market, leading them to operate at an inefficient scale. Since in this interval the marginal return of debt is higher than the marginal cost of debt, the agents that decide to form a firm will ask for their maximum allowable debt, given by $\Psi = 0$.

As in the case of perfect enforcement, we can also define the first wealth level at which the utility of an entrepreneur is equal or higher than that of a worker:

$$\hat{a} = \inf_{\{a\}}\{U^e(a, d(a), l(a)) - U^w(a) \geq 0\} \tag{17}$$

In contrast to the case of perfect enforcement, under imperfect enforcement there could be a jump in the utility of entrepreneurs when they obtain access to credit. There are two interesting cases:[7] (i) $\underline{a} = \hat{a}$, thus the first agent that becomes an entrepreneur coincides with the first agent that has access to the credit market; (ii) $\underline{a} < \hat{a}$, which means that $\hat{a}$ defines the first agent –among agents with access to the credit market– that decides to start a firm. Thus there are individuals that could potentially start a firm, but decide not to become entrepreneurs (i.e., those in the range $[\underline{a}, \hat{a}]$). The agent with wealth $\hat{a}$ is indifferent between working and becoming an entrepreneur, in contrast to case (i), where there is a discrete jump in utility. For simplicity, in the rest of the paper we work with the case (i), but in appendix B, we show that the results continue to hold in case (ii).

The labor market equilibrium is given by:

$$l^s \cdot G(\underline{a}) = \int_{\underline{a}}^{\overline{a}} l \; \partial G(a) + l^*(1 - G(\overline{a})), \tag{18}$$

which defines a unique equilibrium wage w, as we show in the lemma below. Note that entrepreneurs with access to credit must have $a \geq \underline{a} > 0$. Otherwise there would be no workers and wages would tend to infinity.

Lemma 2 *There is an unique equilibrium wage in the labour market.*

The endogenous thresholds $\underline{a}, \overline{a}$ and k^* divide agents into different groups. Those agents with $a < \underline{a}$ are excluded from the credit market and become workers. Those with partial access to

[7] We do not analyze the case $\hat{a} < \underline{a}$, because it corresponds to the uninteresting case where poor agents who have no access to loans prefer to start their own firms rather than becoming workers. This group can be interpreted as microentrepreneurs with no access to formal credit markets.

credit ($a \in [\underline{a}, \overline{a})$) have firms with inefficient scale. They ask for their maximum allowable loan d (given by $\Psi = 0$), invest $k = d + a$ and contract an amount of labor l that is efficient given that amount of capital:

$$p f_l(k, l) = w(p + (1 - p)\theta). \tag{19}$$

This segment of entrepreneurs naturally suggests the concept of Small and Medium Enterprises (SMEs). From the policy point of view, an SME is relevant because they usually operate at an inefficient scale and have limited access to credit, as described in Claessens and Perotti (2007). A third group of agents with wealth $a \in [\overline{a}, k^*)$ can access loans of size $d = k^* - a$ that allow them to operate efficiently. A final group of wealthy agents can finance an optimal firm without loans, using their own assets ($a \geq k^*$), and will deposit any surplus capital in the banks. This endogenous classification is summarized in figure 4.

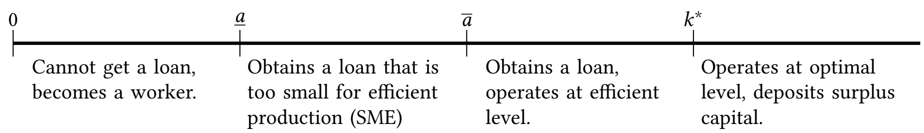

Figure 4: Agents' choices as a function of initial wealth.

Note that our characterisation of SMEs shows several properties that are observed in the real world. First, as described in the Global Financial Development Report, World Bank (2014), the return to capital of SMEs is higher than in larger firms (see also Beck and Demirgüç-Kunt, 2008). Secondly, SMEs are financially more constrained than large firms (Beck and Demirguc-Kunt, 2006).

Lemma 3 *The debt d and hired labor l are increasing and concave in $a \in [\underline{a}, \overline{a})$.*

Thirdly, as shown in lemma 3, the debt and labor of credit restricted firms changes non-linearly after a marginal shock to wealth. In contrast, larger firms do not face such exposure to shocks in a; since they are well-capitalized, they continue operating at the efficient scale. Thus, entrepreneurs with wealth closest to $\underline{a}$ are the ones most sensitive to wealth shocks. This is consistent with the evidence that small firms' employment is more variable than in larger firms when facing general and idiosyncratic shocks (Brock and Evans, 1989).

4 Regulatory Reforms and Political Economy Conflicts

In this section we analyze the effects of regulatory reforms on the different endogenous interest groups, i.e., workers, SMEs and large firms. In this context we define the political platform of the economy as $(1 - \phi, \theta)$, which measures the quality of financial and labor market regulations . A regulatory reform is defined as an improvement in creditor $\uparrow(1-\phi)$ and/or labor protection ($\uparrow\theta$). We begin by analyzing the effects of changes in these parameters on the endogenous variables defining the different classes of agents.

Lemma 4 *If creditor protection improves then the equilibrium wage w increases and the minimum wealth $\underline{a}$ decreases. In the case of labor protection the effects are the opposite.*

As shown in the lemma, the strengthening of creditor protection allows credit restricted agents to improve their access to the credit market. Some previously excluded agents can now obtain a loan to become entrepreneurs, and credit restricted agents are able to borrow more, thus hiring more labor. Wages increase because of the increased demand for labour of restricted entrepreneurs and the reduced labor supply due to the wealthier workers becoming entrepreneurs.

On the other hand, a labor reform reduces the access to credit of smaller firms. First, because raising the payment θwl to workers in case of a firm failure shifts $\underline{a}$ to the right. This means that entrepreneurs with the smallest wealth are denied the loans required to establish a firm. A second effect is that restricted entrepreneurs obtain smaller loans, because if the firm fails, a larger share of remaining assets is paid to workers, leaving fewer assets for banks to recover. Therefore, restricted entrepreneurs demand less labor and wages decline. This last effect partially compensates the increased expected total cost of workers for firms.

Proposition 1 *If labor protection improves, then workers are better off, while all entrepreneurs are worse off. There exist a cutoff $a_\theta \in [\underline{a}, \overline{a})$ such that entrepreneurs with $a \in [\underline{a}, a_\theta)$ suffer relatively more than those with $a \geq \overline{a}$.*

As shown in the proposition, improvements in employment protection create a wedge between classes of entrepreneurs, because the adverse effect on smaller firms is relatively greater than the effect on larger firms. First, the poorest entrepreneurs may become unable to obtain a loan and establish firms. Second, financially constrained entrepreneurs receive smaller loans, reducing their productive efficiency. On the other hand, well-capitalized enterprises can adapt their operations easily to higher labor costs and continue producing efficiently, since they do not suffer the effects of stricter lending constraints. Therefore, the opposition of smaller firms to EPL reforms is stronger than that of larger firms.

Proposition 2 *If creditor protection improves then workers are better off and there exists a cutoff $a_\phi \in (\underline{a}, \overline{a})$ such that entrepreneurs with $a \in (\underline{a}, a_\phi)$ are better off, while entrepreneurs with $a \geq a_\phi$ are worse off.*

Creditor protection reforms generate a conflict between types of entrepreneurs. The most credit constrained entrepreneurs ($a \in [\underline{a}, a_\phi)$) are better off. Some of them, who were constrained before, now have access to loans which allow them to set up firms and enjoy a discrete jump in utility. For entrepreneurs that were highly constrained in the loan amounts they received, the constraints are relaxed, allowing them to have more efficient and profitable firms. These two effects increase the demand for labor and reduce its supply, raising wages. In contrast, agents whose firms were credit unconstrained before ($a \geq \overline{a}$), are worse off, because they were already operating efficiently, but now have to pay higher wages. The wealthier constrained entrepreneurs ($a \in [a_\phi, \overline{a})$) are also worse off. Despite the benefit they receive from looser credit, they lose more by having to pay higher salaries. Thus, the larger SMEs join the efficient large firms in their opposition to improvements in credit markets.

These effects are reflected in a difference in attitude among SMEs towards financial reform. We define Medium Enterprises as a credit constrained firms that oppose financial reforms because of the effect it will have on salaries. A small enterprise is a credit constrained firm that is in favour of improvements in credit markets, notwithstanding the rise in salaries.[8]

The opposition to improvements in finance due to the effect on factor prices has been observed. Rajan and Zingales (2003) in a study of financial development in the twentieth century, propose a factor price explanation for the opposition of incumbents to financial development (see also La Porta et al., 2000).[9] They argue that incumbent firms oppose financial development because it breeds competition and increases finance costs in closed economies. In our open economy case, the factor price channel for the conflict among entrepreneurs is through labour.[10]

5 Wealth Redistribution Effects

We analyze the effects of an *ab initio* wealth redistribution on equilibrium wages. This will be useful once we introduce our political economy model and study the impact of a change in initial wealth inequality on the equilibrium political platform. We study changes in the wealth distribution by mean preserving spreads (MPS) in order to isolate the pure impact of higher inequality. An MPS is equivalent to second order stochastic dominance with the same mean. Note that second order stochastic dominance is equivalent to an ordering according to the Generalized Lorenz curve (Shorrocks, 1983). Thus our comparative statics results can be put in terms of a standard inequality measure.

[8]This is not the legal definition of a medium sized enterprise, which is usually based arbitrarily on the number of workers, or on business volume.

[9]These effects have also been described by Rajan and Ramcharan (2011, p. 1897) in their study of US farming in early twentieth century.

[10]If we had a closed economy the opposition of large firms to improvements of the financial system would be even higher, due to increased interest rates. This is consistent with Shleifer and Wolfenzon (2002) , who show that factor price-based opposition to financial market improvements is smaller in open economies.

Definition 1 *Consider two distributions G_0 and G_1 with mean $\bar{A}$ and support in $\mathbb{R}_+$, G_1 is said to be an MPS of G_0 if:*

1. $G_1(a) > G_0(a)$ *if* $a < \bar{A}$.
2. $G_1(a) < G_0(a)$ *if* $a > \bar{A}$

We use this definition to prove the following result on the effects of increasing inequality.

Proposition 3 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2. If $\underline{a} > \bar{A}$, the equilibrium wage w is higher in country 2. Otherwise, if $\overline{a} < \bar{A}$, this effect is reversed.*

In order to interpret this result, we define a *poor country* as one in which access to credit requires more than the average wealth of the country ($\underline{a} > \bar{A}$) . Similarly, a *rich country* is one in which an agent with less than the average wealth has unconstrained access to credit ($\overline{a} < \mathcal{A}$). According to the proposition, in poor economies, a small regressive wealth redistribution raises wages and the welfare of workers. The reason is that the redistribution increases the mass of firms that get loans ($1 - G(\underline{a})$), increasing labour demand and raising wages. Existing firms are made worse off by the higher expected payments to workers. In the more unequal economy access to credit, aggregate investment and output are higher.[11] These effects are reversed in a rich country.

6 Political Economy Model

We now have a rich environment to introduce our political economy model. Consider a model with three periods. At period $t = 0$, a mass of potential entrepreneurs are born under regulations $(1 - \phi_0, \theta_0)$, where $1 - \phi$ is the level of creditor protection and θ is worker protection. Each agent is endowed with an observable amount of wealth $a \sim G(\cdot)$, having idiosyncratic preferences ν to be described below. In period $t = 1$, elections are held, and each agent a can vote to change regulations according to his economic interests and his political idiosyncracies. Initial conditions at $t = 0$ define the political preferences that each individual considers when voting at this stage. There is proportional voting. Two parties, A and B, compete for votes by proposing a regulatory platform defined by $q = (1 - \phi, \theta) \in [1 - \overline{\phi}, 1 - \underline{\phi}] \times [\underline{\theta}, \overline{\theta}]$. At period $t = 2$, our background model, presented in sections 2–5 operates with the parameters defined by the winning policy platform; some agents become workers and others become entrepreneurs. Payoffs are realized at the end of the period. Figure 5 illustrates the time line.

[11] Balmaceda and Fischer (2010) obtain this result in a fixed investment model. Fischer et al. (2019) show empirical and theoretical evidence for the effect on access to credit, while Brueckner and Lederman (2018) present a similar empirical result for growth.

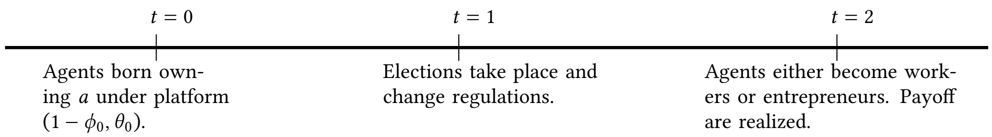

Figure 5: Time line.

As explained in section 4, the model gives rise to three different groups with diverging political preferences: workers, small, and medium-large entrepreneurs. Table 1 summarizes the preferences of each group.

Table 1: Political preferences

Type of agent	Effect of $1 - \phi$ on utility	Effect of θ on utility
Workers (W); $a \in [0, \underline{a})$	+	+
Small entrepreneurs (S): $a \in [\underline{a}, a_\phi)$	+	-
Medium-Large entrepreneurs (L); $a \geq a_\phi$	-	-

Under a multidimensional policy as in our setting, Downsian electoral competition games generally do not have an equilibria. This result is a consequence of cycling problems that arise because parties' objective functions are discontinuous in the policy space. Probabilistic voting smooths the objective functions by introducing uncertainty from the political parties' viewpoint. Thus, the expected number of votes becomes a smooth function of the policy platform (Persson and Tabellini, 2000). We assume probabilistic voting to ensure an equilibrium. The specific sources of uncertainty are explained in detail below.

We embed the groups described in Table 1 into the political economy model used by Persson and Tabellini (1999). We make the necessary adaptation to a model where i) groups and their demographic weights arise endogenously and ii) there is within-group heterogeneity. Parties A and B compete for these three groups of voters by proposing policy platforms q_A and q_B respectively. They act simultaneously and do not cooperate.

In order to avoid cycling problems we assume that there is uncertainty about the preferences of each voter. In particular, for each a there is a continuum of agents (a, v), where v represents idiosyncratic political preferences. We assume that a voter (a, v) belonging to group $j \in \{W, S, L\}$ votes for party A if:

$$U^j(a, q_A) > U^j(a, q_B) + \tilde{\delta} + \sigma_v^j(a), \tag{20}$$

where $\tilde{\delta}$ reflects the general popularity of party B, which is assumed to be uniformly distributed on $[-1/2\varphi, 1/2\varphi]$ and $U^j(a, q)$ is the utility of an agent from group j that owns a when the political platform is q. The value of $\tilde{\delta}$ is realized between the announcement of the party platforms and the election, so there is uncertainty about the results of the election. The term $\sigma^j_v(a) = \bar{\sigma}^j + \tilde{\epsilon}^j_v(a)$ represents the ideological preference for party B of a voter (a, v); where $\bar{\sigma}^j$ is the group specific preference for party B and $\tilde{\epsilon}^j_v(a)$ is the idiosyncratic preference of the voter (a, v), which is assumed to be uniformly distributed in $[-1/2\chi, 1/2\chi]$.[12] Parties know these group-specific distributions when announcing their platforms.

We assume that party A is ideologically close to the preferences of medium-large entrepreneurs, i.e. it is taken as right-wing, while party B is close to workers, i.e. it is a left-wing party. The remaining group of small entrepreneurs (S) on average has no political preference. Formally,

$$\bar{\sigma}^L = -\bar{\sigma} < \bar{\sigma}^S = 0 < \bar{\sigma}^W = \bar{\sigma}.$$

Finally, we assume that voters do not foresee the full general equilibrium effects due to electoral platform changes. Voters for a given policy understand the effects on future wages and on the financial and labor markets, which encompasses almost all the endogenous mechanisms at work in the model. The effects of the selected policies are complex, given their indirect nature: a change in labor or financial regulations also affects the other market until a new equilibrium is reached. Agents have rational expectations of these effects, except for the second order effects on these variables due to the induced change in $\underline{a}$. Note that only a small measure of agents is directly affected by changes in $\underline{a}$. This assumption of voting behavior keeps the proof of lemma 5 tractable.[13]

6.1 Political Equilibrium

Note that in our model, agents within each group have different wealth, adding another source of heterogeneity, in contrast to Persson and Tabellini (1999). Therefore, in each group $j \in \{W, S, L\}$ and for each value of capital a in that group, we can find the voter $v = V$ who is indifferent between the two parties, labelled the 'swing voter':

$$\tilde{\epsilon}^j_V(a) = U^j(a, q_B) - U^j(a, q_A) - \tilde{\delta} - \bar{\sigma}^j. \tag{21}$$

[12]The parameter χ is understood as an index of ideological cohesion. In order to simplify calculations, we assume that it does not vary across groups.

[13]This simplification of second order effects in voting models has been used, for example in Benhabib (1996). In the Extensions section of that paper, current voters have rational expectations about the macro variables of the model except that they do not internalize future voting patterns due to immigration when immigration laws are voted. Calabrese et al. (2006) examine a model of local goods provision with endogenous communities and myopic agents. A survey of research in non-rational voting behavior can be found in Schnellenbach and Schubert (2015). In particular, there can be biases arising from "... (individually rational) ignorance with regard to complex policy issues...".

To ensure that such voter always exists we need to impose that the variance of the ideological preferences is large enough. Otherwise, one group is always committed to one party and there is no uncertainty about the preferred policies of the group.[14]

All voters who own a and with an ideological preference $\epsilon \leq \tilde{\epsilon}^j_V(a)$ vote for party A, while the rest vote for party B. Thus, the fraction of agents in group j who have capital a and vote for party A is:

$$\tilde{p}^j_A(a) = Prob\left[\epsilon \leq \tilde{\epsilon}^j_V(a)\right] = \chi[U^j(a, q_B) - U^j(a, q_A) - \tilde{\delta} - \bar{\sigma}^j] + \frac{1}{2}. \tag{22}$$

Thus, the probability that party A wins the election is:

$$p_A = \text{Prob}\left[\int_0^{\underline{a}} \tilde{p}^W_A(a)\partial G(a) + \int_{\underline{a}}^{a_\phi} \tilde{p}^S_A(a)\partial G(a) + \int_{a_\phi}^{\overline{a}} \tilde{p}^L_A(a)\partial G(a) + \int_{\overline{a}}^{+\infty} \tilde{p}^L_A(a)\partial G(a) \geq \frac{1}{2}\right], \tag{23}$$

where the probability is taken with respect to $\tilde{\delta}$. Integrating with respect to the measure $\tilde{\delta}$ leads to:

$$p_A = \varphi\Bigg(\int_0^{\underline{a}}[U^w(a, q_A) - U^w(a, q_B) - \bar{\sigma}^W]\partial G(a) + \int_{\underline{a}}^{a_\phi}[U^e(a, q_A) - U^e(a, q_B) - \bar{\sigma}^S]\partial G(a) + \int_{a_\phi}^{\overline{a}}[U^e(a, q_A) - U^e(a, q_B) - \bar{\sigma}^L]\partial G(a) + \int_{\overline{a}}^{+\infty}[U^e(a, q_A) - U^e(a, q_B) - \bar{\sigma}^L]\partial G(a)\Bigg) + \frac{1}{2}. \tag{24}$$

The equilibrium has both candidates converging to the same political platform. Formally, they solve the same optimization problem as $p_A = 1 - p_B$ and q_A and q_B enter equation (24) symmetrically, but with opposite signs. This is a characteristic feature of this type of model (e.g. Persson and Tabellini (1999) or Pagano and Volpin (2005)). The intuition is that both parties have the same concave preferences (see the proof of lemma 5 in the Appendix) and the same technology to convert policies into votes.

The maximization problem of party A is equivalent to maximizing the politically weighted social surplus:

$$\overline{U}(q_A) = \int_0^{\underline{a}} U^w(a, q_A)\partial G(a) + \int_{\underline{a}}^{a_\phi} U^e(a, q_A)\partial G(a) + \int_{a_\phi}^{\overline{a}} U^e(a, q_A)\partial G(a) + \int_{\overline{a}}^{+\infty} U^e(a, q_A)\partial G(a). \tag{25}$$

[14]The required condition is that this variance is larger than the variance of party's B popularity, i.e. $\varphi > \chi$, , see footnote 2 in Persson and Tabellini (2000). More specifically, a sufficient condition for the existence of a swing voter is: $\bar{\sigma} < \frac{\varphi-\chi}{2\varphi\chi}$.

Thus, the problem that party A solves is:

$$\max_{q_A=(\phi,\theta)} \overline{U}(q_A)$$
$$s.t \quad \phi, \theta \in [1-\overline{\phi}, 1-\underline{\phi}] \times [\underline{\theta}, \overline{\theta}],$$

which leads to the FOCs:[15]

$$\frac{\partial \overline{U}(q_A)}{\partial \phi} = \underbrace{\frac{\partial U^w}{\partial \phi}}_{\leq 0} G(\underline{a}) + \int_{\underline{a}}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \partial G(a) + \int_{a_\phi}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \partial G(a) + \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} (1 - G(\overline{a})) = 0, \tag{26}$$

$$\frac{\partial \overline{U}(q_A)}{\partial \theta} = \underbrace{\frac{\partial U^w}{\partial \theta}}_{>0} G(\underline{a}) + \int_{\underline{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \theta}}_{<0} \partial G(a) + \underbrace{\frac{\partial U^e(k^*)}{\partial \theta}}_{<0} (1 - G(\overline{a})) = 0. \tag{27}$$

A sufficient condition for the existence of a unique pure strategy Nash equilibrium is that the following assumption on the exogenous parameters of the model holds:[16]

Assumption 1

$$\overline{\phi} < \frac{(1+r^*)(1-\alpha-\beta)}{\alpha\left(2+\frac{1}{\beta}\right) + \frac{2(1-\beta)}{\min\{1, \beta(1+r^*)\}}}$$

with $1 + r^* \equiv 1 + \rho - (1-p)\eta$.

Lemma 5 *Under assumption 1, there exists a political equilibrium* $(1-\phi, \theta)$.

The FOCs (26) and (27) implicitly determine the unique equilibrium political platform $(1 - \phi, \theta)$.

6.2 Wealth Redistribution

In this section we show how the previous analysis provides an explanation for figures 1 and 2. We obtain our main result, proposition 4, from an analysis of the behavior of equations (26) and (27) in response to changes in the initial distribution of wealth. We require the following assumption:[17]

[15] Since the maximand is a continuous function on a compact set, the problem has a solution.

[16] Since the constraint is only on $\overline{\phi}$, we can define $q \in [1-\overline{\phi}, 1] \times [0, 1]$.

[17] The reason for this assumption is that there is a discontinuity in the utility function at $\underline{a}$. The restrictions on the MPSs help us control the effect of this discontinuity on the resulting political platforms. When there is no discontinuity, as in case ii) of section 3.2, this assumption is not required, see appendix B.

Assumption 2 *Let a_1, a_2 be the two crossings of the wealth densities of figures 6 and 7.*

1. *For part i. assume $\underline{a} < a_2$, i.e., economies that are not excessively poor.*

2. *For part ii. assume $\underline{a} < a_1$, i.e., sufficiently wealthy economies.*

Proposition 4 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2.*

i. *If $\underline{a} > \bar{A}$, the equilibrium political platforms $(1-\phi_1, \theta_1); (1-\phi_2, \theta_2)$ satisfy $1-\phi_1 \geq 1-\phi_2$ and $\theta_1 \geq \theta_2$.*

ii. *If $\overline{a} < \bar{A}$, the equilibrium platform shifts in the opposite direction.*

Proposition 4 states that if we consider two poor economies, but not excessively poor (because $\underline{a} < a_2$), the one with higher initial wealth inequality will eventually evolve to a regulatory platform with lower creditor and worker protection. In contrast, in a rich enough country , the effect of higher initial inequality leads to a political equilibrium with better creditor and employment protection.

Recall that in section 3.2, we mentioned case ii), where there was no discontinuity in the utility of the poorest agent that establishes a firm. In case ii) proposition 4 holds without the need for assumption 2. We can restate the proposition as follows in this case: an MPS of the initial wealth distribution leads to lower creditor and worker protection in an initially poor country ($\hat{a} > \bar{A}$). In a wealthy country the converse is true ($\overline{a} < \bar{A}$). For the formal statement and the proof, see proposition 6 in Appendix B.

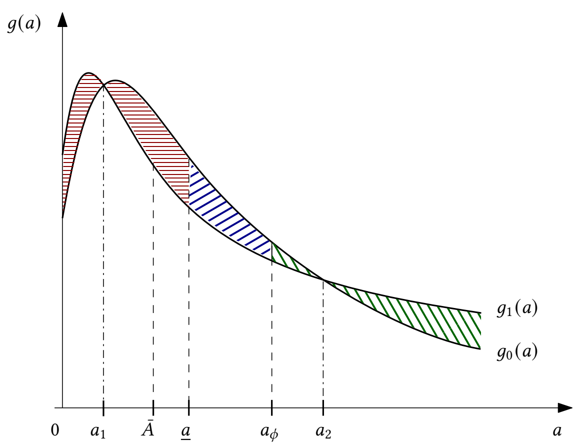

Figure 6: An MPS in a poor economy

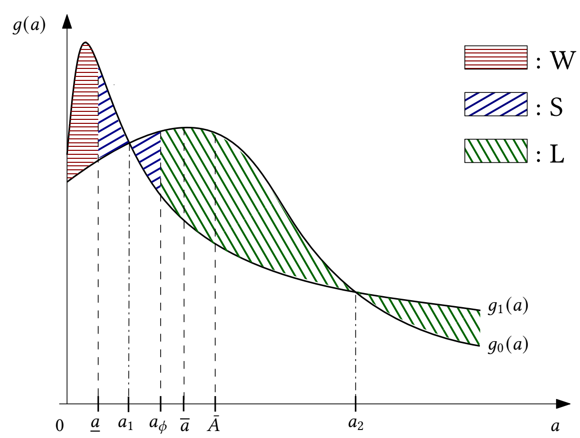

Figure 7: An MPS in a wealthy economy

To see the intuition for the result on $1-\phi$, we use figure 6.[18] It is an imperfect representation, because it shows the changes in areas of the different interest groups due to the MPS but not

[18]The intuition for the effects on θ is simpler, because increases in θ are opposed by all firms. There are only two groups, so the effects of the MPS depend on the impact on the masses of the workers and firms.

the intensity of their preferences, as in equation (72) in the proof of the proposition. The figure describes a poor economy ($\underline{a} > \bar{A}$). The shift from g_0 to g_1 reduces the mass of workers (W), so that the increase to the left of a_1 is smaller than the reduction in workers to the right. This means a reduction in the mass of agents who desire stronger creditor protection. Moreover, the mass of small entrepreneurs (S) also falls, specially those with the strongest preferences for increased creditor protection (those close to $\underline{a}$). Thus the two groups favoring stronger creditor rights fall. On the other hand, there is an increase in the mass of medium and large entrepreneurs (L), who favor weak creditor rights: the small reduction in mass to the left of a_2 is overwhelmed by the large increase in the mass of entrepreneurs to the right of a_2. This shows that higher inequality implies lower creditor protection in a poor economy.

Similarly, consider figure 7, which corresponds to a wealthy economy, i.e. one with $\overline{a} < \bar{A}$. The mass of workers increases, and this leads to pressures for stronger creditor protection. The change in the mass of small entrepreneurs has a positive and a negative component. However, in the proof we show that those close to $\underline{a}$ have the stronger preferences and dominate. Thus the mass of interests groups favoring an improvement in creditor rights increases. Conversely, there is a decrease in the mass of medium and large entrepreneurs, i.e., those against improvement. Hence an MPS leads to stronger creditor protection in wealthy countries.

Proposition 4 provides an explanation for figures 1 and 2 in the introduction, by showing that the correlation between the wealth distribution and measures of credit and labor protection depends on the initial wealth of the economy.

The connection of our political model with the stylized fact presented in figures 1 and 2 deserves some discussion. Our sample includes both democracies and autocracies. Thus if the model were taken literally, we should only consider the sub-sample of countries where voting takes place, i.e., countries with free and fair elections. However, our setting provides a more general interpretation: regulations result from a political process which responds to the pressures of the different interest groups, regardless of whether the country is a pure democracy or autocracy. Thus, what matters for the effect of changes of inequality on the equilibrium platforms is the shift in the relative influence of the different political groups. The political mechanism through which these interests are aggregated, in our case proportional voting, is not key to the qualitative results presented in Proposition 4.[19] In fact, quoting Alesina and Rodrik (1994),

> "Even a dictator cannot completely ignore social demands, for fear of being overthrown. Thus, even in a dictatorship, distributional issues affecting the majority of the population will influence policy decisions."

[19]However, the extent to which citizens can impact policies through elections depends on the democratic standards in a country. This is the reason why we control for an Electoral Democracy Index in figures 1 and 2 (see the Empirical Motivation section in the Appendix).

Our results are quite general, in the sense that they are valid for a wide range of distributions. In general, theoretical studies of the effects of inequality on the political process analyze the outcomes through the variance parameter of a specific distribution, namely the LogNormal (e.g. Chong and Gradstein, 2007). However, when using the Lognormal distribution, changes in the variance parameter (σ) affect both the variance and the mean of the distribution. Thus it is impossible to disentangle the effects that are due to increased inequality from those due to higher average wealth in the economy. By using Mean Preserving Spreads (i.e., Lorenz dominance) to compare distributions, we are able to isolate the effects on the political platforms that are due solely to inequality.

7 Conclusions

We motivate our paper using cross-country data for wealth inequality and the strength of employment and of creditor protection. We find that the correlation between the wealth distribution in the past and the current strength of these regulations depends on the GDP per capita in the past. This correlation is negative for poor countries, but becomes less negative as countries' initial GDP per capita increases. For rich enough countries the correlation may become positive. This regularity has not been analyzed in the political economy literature.

We develop a political economy model of the financial and labor regulations that explains these empirical regularities. In contrast to previous political economy setups that have studied the strength of these regulations, in our model three interest groups appear endogenously. The three groups are workers, small, and medium-large entrepreneurs and they have defined political preferences towards employment and creditor protection. Workers, on average, favor stronger protections in both dimensions. Small entrepreneurs share their preference for stronger creditor rights but are opposed to worker protection. Medium and large entrepreneurs are opposed to the preferences of workers. The equilibrium level of protective regulation arises as a result of a proportional voting under these influences.

The political motivations of the different groups operate through the interaction of financial frictions and the labor market. Stronger creditor protection loosens credit constraints. More agents can form firms, and entrepreneurs that faced credit-restrictions can hire more labor. This means that the pool of available workers shrinks while demand for workers increases. The effect is a rise in wages that hurts medium and large firms. For smaller entrepreneurs, the direct positive effect of easier credit is stronger than the indirect negative effect of higher wages. On the other hand, stronger employment protection hurts entrepreneurs across the board, so they are always opposed. Hence small enterprises vote with workers for stronger creditor protection and against them in the case of employment protection.

We embed these interest groups in a probabilistic voting model, so that the equilibrium levels of both creditor and labor protection arise endogenously, as the result of the voting process and the initial wealth inequality and regulations. Finally, we analyze the effects of increased initial inequality on equilibrium platforms.

This leads to our main result: having more initial wealth inequality leads to weaker creditor and worker protection in poor countries, but this effect is fainter and may be reversed in wealthy countries. This is a novel result which explains the empirical regularity we observed in the introduction. The main result suggests new directions for the study of causal relationships between wealth inequality and the strength of regulations, once more plentiful international wealth inequality panel-data is available. In addition, the background model can be adapted to study conflicts between workers attached to small and large firms as well as between small and large entrepreneurs, which could lead to testable results. The background model can also be used to analyze the political economy of the design of labor regulations as a function of firm size, as occurs in some countries.

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Appendix

A Proofs

Lemma 1 *There exists a minimum wealth* $\underline{a} > 0$ *required to access the credit market. The triplet* $(\underline{a}, \underline{d}, \underline{l})$ *is characterized by:*

$$\Psi(\underline{a}, \underline{d}, \underline{l}) = 0,$$
$$\Psi_d(\underline{a}, \underline{d}, \underline{l}) = 0,$$
$$\partial U^e(\underline{a}, \underline{d}, \underline{l})/\partial l = 0.$$

where $\Psi \equiv U^e - \phi k$, $\underline{d} \equiv d(\underline{a}) > 0$ *and* $\underline{l} \equiv l(\underline{a})$.

Proof: To proceed, define the following auxiliary function:

$$\Psi(a, d, l) \equiv U^e - \phi k = p[f(k, l) - wl] + (1 - p)[\eta k - \theta wl] - (1 + \rho)d - \phi k - F, \tag{28}$$

where $k = a + d$. Intuitively, for a given pair (a, l), there is a debt d that maximizes the incentives to behave, subject to the auxiliary function being nonnegative. In addition, the minimum wealth to obtain a loan defines the first agent that can obtain the minimum loan without having incentives to abscond. For a given $l \geq 0$, this is translated in the following *minimax* problem:

$$\min_{a\geq 0} \max_{d\geq 0} \Psi(a, d, l) \geq 0$$

which is a concave problem in a and d, since Ψ inherits the concavity of f. Therefore, there is some solution $(\underline{a}, \underline{d}), \forall l > 0$. Since the minimization leads to $\Psi = 0$, it is easy to obtain the first and the second conditions of the Lemma using Lagrangian. Note also that for any given pair (a, d) entrepreneurs choose l to maximize U^e , therefore $\Psi_l(a, d, l) = \partial U^e(a, d, l)/\partial l = 0$.

In what follows we show that these three conditions define the unique minimum level of wealth required to gain access to credit (and the associated debt). First, note that because $f_k > 0$, there is at least one debt value d^m such that $\Psi(a, d^m, l) = 0, \forall a > \underline{a}$, i.e., d^m is the maximum loan the firm with assets a can obtain. Moreover, provided $pf_k < (1 + \rho + \phi - (1 - p)\eta)$, d^m is strictly increasing in a:

$$\frac{\partial d^m}{\partial a} = -\frac{\Psi_l \frac{\partial l}{\partial a} + \Psi_a}{\Psi_d} = -\frac{pf_k + (1 - p)\eta - \phi}{pf_k - (1 + \rho + \phi - (1 - p)\eta)} > 0 \tag{29}$$

Furthermore, since $f_{kk} < 0$, we have that $\Psi_{dd} < 0$. Thus, for any a there exists an unique value $\tilde{d}$

that maximizes Ψ, i.e., such that $\Psi_d(a, \tilde{d}, l) = 0$. In particular, the triplet $(\underline{a}, \underline{d}, \underline{l})$ satisfies:

$$\Psi(\underline{a}, \underline{d}, \underline{l}) = U^e(\underline{a}, \underline{d}, \underline{l}) - \phi(\underline{a} + \underline{d}) = 0 \tag{30}$$

$$\Psi_d(\underline{a}, \underline{d}, \underline{l}) = p f_k(\underline{a} + \underline{d}, \underline{l}) - (1 + \rho + \phi - (1 - p)\eta) = 0 \tag{31}$$

thus, $\underline{a}$ is the particular case in which $\underline{d} \equiv \tilde{d}(\underline{a}) = d^m(\underline{a})$.

Now, consider values $a' < \underline{a}$. We must have that, $\tilde{d}(a') > \tilde{d}(\underline{a})$. If not, $k' = a' + \tilde{d}(a') < k(\underline{a}) \equiv \underline{k}$, and then $l(a') < l(\underline{a})$ because of the properties of the production function. Therefore $\Psi_d(a', \tilde{d}(a'), l(a')) = p f_k(a', \tilde{d}(a'), l(a')) - (1 + \rho + \phi - (1 - p)\eta) > 0$. Thus, $\tilde{d}(a') < \tilde{d}(\underline{a})$ is not the debt value that maximizes Ψ at a', and the only possible value of d' that satisfies $\Psi_d(a', \tilde{d}(a'), l(a')) = 0$, is one such that $a' + \tilde{d}(a') = \underline{k}$. Then $\tilde{d}(a') > \tilde{d}(\underline{a})$, for $a' < \underline{a}$.

We argue that in this case $\nexists\, d^m(a') \mid \Psi(a', d^m(a'), l(a')) = 0$. Suppose that there is such $d^m(a')$. Then, it must be true that $d^m(a') > \tilde{d}(a') > \underline{d}$. Moreover, because in this case $f_k(a' + d(a'), l(a')) < 1 + \rho + \phi - (1 - p)\eta, \forall d > \tilde{d}(a')$, condition (29) implies that $\frac{\partial d^m}{\partial a} > 0$ for any $a' < \underline{a}$ and $d > \tilde{d}(a')$. Therefore, it has to be the case that $d^m(a') < d^m(\underline{a}) = \underline{d}$, which is a contradiction with the fact that we showed before that for $a' < \underline{a}$, $d^m(a') > d^m(\underline{a})$.

Hence, no agent with $a' < \underline{a}$ can obtain a loan, that is, $\Psi(a', d, l(a')) < 0$ for any d. We conclude that the triplet $(\underline{a}, \underline{d}, \underline{l})$ defined by conditions (13) to (15) define the first agent with access to credit $\underline{a}$, and $\underline{d}$ is her associated debt. Also, note that condition (13), the participation constraint and lemma 6 imply that debt is always positive:

$$\phi \underline{d} \geq (1 + \rho)\underline{a} + \underbrace{\varsigma'(\underline{l})\underline{l} - \varsigma(\underline{l})}_{\geq 1} \Rightarrow \underline{d} \geq \frac{1 + \rho}{\phi}\underline{a} > 0$$

■

Lemma 2 *There is an unique equilibrium wage in the labour market.*

Proof:

First, from expression (4), the optimal amount of labour supplied by workers l^s satisfies:

$$\frac{\partial l^s}{\partial w} = \frac{p + (1 - p)\theta}{\varsigma''(l^s)} > 0. \tag{32}$$

Consider $a \in [\underline{a}, \overline{a})$, from the FOC of labour in the firm, (19):

$$\frac{\partial l}{\partial w} = \frac{p + (1 - p)\theta - p f_{lk} \frac{\partial d}{\partial w}}{p f_{ll}} < 0, \tag{33}$$

where we have used the fact that differentiation of $\Psi(a, d, l) = 0$ with respect to w leads to:

$$\frac{\partial d}{\partial w} = \frac{-\Psi_w}{\Psi_d} = \frac{(p+(1-p)\theta)l}{pf_k - (1+\rho+\phi-(1-p)\eta)} < 0. \tag{34}$$

Now, suppose that $a \geq \overline{a}$, differentiating expressions (7) and (8) in terms of w:

$$f_{kk}\frac{\partial k^*}{\partial w} + f_{lk}\frac{\partial l^*}{\partial w} = 0, \tag{35}$$

$$p\left(f_{lk}\frac{\partial k^*}{\partial w} + f_{ll}\frac{\partial l^*}{\partial w}\right) = (p+(1-p)\theta)w. \tag{36}$$

Both conditions imply that $\frac{\partial k^*}{\partial w} = -\frac{f_{lk}(p+(1-p)\theta)}{f_{ll}\left(f_{kk}-\frac{f_{kl}^2}{f_{ll}}\right)} < 0$, where we have used the properties of the Hessian of f. Furthermore, equation (35) leads to $\frac{\partial l^*}{\partial w} = -\frac{f_{kk}\frac{\partial k^*}{\partial w}}{f_{lk}} < 0$. Additionally, differentiating condition (13) with respect to w leads to:

$$\frac{\partial \underline{a}}{\partial w} = \frac{-\Psi_w}{\Psi_a} = \frac{(p+(1-p)\theta)\underline{l}}{pf_k + (1-p)\eta - \phi} > 0. \tag{37}$$

where we have used condition (14). Differentiating the labor supply function $\mathcal{S}(w) \equiv l^s \cdot G(\underline{a})$ with respect to w:

$$\frac{\partial \mathcal{S}}{\partial w} = \frac{\partial l^s}{\partial w}G(\underline{a}) + l^s \cdot \frac{\partial \underline{a}}{\partial w}g(\underline{a}) > 0. \tag{38}$$

For the demand of labour, $\mathcal{D}(w) \equiv \int_{\underline{a}}^{\overline{a}} l \partial G(a) + l^*(1-G(\overline{a}))$, we have:

$$\frac{\partial \mathcal{D}}{\partial w} = \int_{\underline{a}}^{\overline{a}} \frac{\partial l}{\partial w}\partial G(a) - \underline{l}\frac{\partial \underline{a}}{\partial w}g(\underline{a}) + \frac{\partial l^*}{\partial w}(1-G(\overline{a})) < 0. \tag{39}$$

Since $\varsigma'' > 0$, $\lim_{l^s \to +\infty} w = +\infty$, and thus the equilibrium exists and is unique. ■

Lemma 3 *The debt d and hired labor l are increasing and concave in $a \in [\underline{a}, \overline{a})$.*

Proof: Define d such that $\Psi(a, d, l(a)) = 0$, with $a \in [\underline{a}, \overline{a})$ and $l(a)$ such that $f_l(k, l) = (p + (1-p)\theta)w$. From condition (29):

$$\frac{\partial d}{\partial a} = -\frac{pf_k + (1-p)\eta - \phi}{pf_k - (1+\rho+\phi-(1-p)\eta)} > 0,$$

where we have used the fact that in this range $pf_k(k,l) \in (1+\rho-(1-p)\eta, 1+\rho+\phi-(1-p)\eta]$. The FOC of labor leads to:

$$\frac{\partial l}{\partial a} = -\frac{f_{kl}\left(1+\frac{\partial d}{\partial a}\right)}{f_{ll}} > 0 \tag{40}$$

Finally, note that: $\frac{\partial^2 d}{\partial a^2} = \frac{p\frac{\partial f_k}{\partial a}(1+\rho)}{(pf_k-(1+\rho+\phi-(1-p)\eta))^2} < 0$, since $\frac{\partial f_k}{\partial a} = \left(1+\frac{\partial d}{\partial a}\right)\left(f_{kk} - \frac{f_{kl}^2}{f_{ll}}\right) < 0$. To show that l is concave observe that:

$$\frac{\partial^2 l}{\partial a^2} = -\frac{\left[\left(f_{klk}\left(1+\frac{\partial d}{\partial a}\right) + f_{kl}\frac{\partial^2 d}{\partial a^2}\right) f_{ll} - f_{kl}\left(1+\frac{\partial d}{\partial a}\right) f_{llk}\right]}{f_{ll}^2} < 0 \tag{41}$$

, where we have used previous results and that $f_{ll}, f_{klk} < 0, f_{llk} < 0$. ■

Lemma 4 *If creditor protection improves then the equilibrium wage w increases and the minimum wealth $\underline{a}$ decreases. In the case of labor protection these effects are the opposite.*

Proof: In order to simplify calculations we define $x = \phi, \theta$. From the equilibrium labour market condition (18) we have:[20]

$$\left(\frac{\partial l^s}{\partial x} + \frac{\partial l^s}{\partial w}\frac{\partial w}{\partial x}\right) G(\underline{a}) + (l^s + \underline{l}) g(\underline{a}) \left(\frac{\partial \underline{a}}{\partial x} + \frac{\partial \underline{a}}{\partial w}\frac{\partial w}{\partial x}\right) - \left[\int_{\underline{a}}^{+\infty} \left(\frac{\partial l}{\partial x} + \frac{\partial l}{\partial w}\frac{\partial w}{\partial x}\right) \partial G(a)\right] = 0. \tag{42}$$

Recall from the proof of lemma 2: $\frac{\partial l^s}{\partial w} > 0, \frac{\partial l}{\partial w} < 0, \frac{\partial \underline{a}}{\partial w} > 0$. In what follows we will show that the direct effects $\frac{\partial l^s}{\partial x}, \frac{\partial \underline{a}}{\partial x}, \frac{\partial l}{\partial x}$ satisfy: $\frac{\partial l^s}{\partial \phi} = 0, \frac{\partial l^s}{\partial \theta} > 0, \frac{\partial \underline{a}}{\partial \phi} > 0, \frac{\partial \underline{a}}{\partial \theta} > 0, \frac{\partial l}{\partial \phi} \leq 0$ and $\frac{\partial l}{\partial \theta} \leq 0$. The sign of the indirect effects through w come later. Condition (4) implies:

$$\frac{\partial l^s}{\partial \phi} = 0, \frac{\partial l^s}{\partial \theta} = \frac{(1-p)w}{\varsigma''(l^s)} > 0$$

Differentiating equation (13) with respect to x leads to:

$$\frac{\partial \underline{a}}{\partial \phi} = \frac{-\Psi_\phi}{\Psi_a} = \frac{\underline{k}}{pf_k + (1-p)\eta - \phi} > 0, \frac{\partial \underline{a}}{\partial \theta} = \frac{-\Psi_\theta}{\Psi_a} = \frac{(1-p)w\underline{l}}{pf_k + (1-p)\eta - \phi} > 0. \tag{43}$$

Now differentiation of $\Psi(a, d, l) = 0$ with respect to ϕ, θ leads to:

$$\frac{\partial d}{\partial \phi} = \frac{-\Psi_\phi}{\Psi_d} = \frac{k}{pf_k - (1+\rho+\phi-(1-p)\eta)} < 0, \frac{\partial d}{\partial \theta} = \frac{-\Psi_\theta}{\Psi_d} = \frac{(1-p)wl}{pf_k - (1+\rho+\phi-(1-p)\eta)} < 0.$$

[20] Throughout this lemma the operator $\tilde{\partial}$ denotes 'total differentiation'. For instance, $\frac{\tilde{\partial}\underline{a}}{\partial x} = \frac{\partial \underline{a}}{\partial x} + \frac{\partial \underline{a}}{\partial w}\frac{\partial w}{\partial x}$, where $\frac{\partial \underline{a}}{\partial x}$ represents the direct effect of x on $\underline{a}$, while the second term represents the indirect effect that occurs through wages. In the remaining proofs, we go back to the usual notation, as the distinction is not required.

Now consider $a \in [\underline{a}, \overline{a})$, then from the FOC of labor (19), we have $\frac{\partial l}{\partial \phi} = -\frac{f_{kl} \frac{\partial d}{\partial \phi}}{f_{ll}} < 0$, and $\frac{\partial l}{\partial \theta} = \frac{w(1-p)-pf_{lk}\frac{\partial d}{\partial \theta}}{pf_{ll}} < 0$, where we used the signs of the expressions just obtained above. If $a \geq \overline{a}$, the FOC of labor (8) leads to $\frac{\partial l^*}{\partial \phi} = -\frac{f_{kl}\frac{\partial k^*}{\partial \phi}}{f_{ll}}$ and similarly for $\frac{\partial l^*}{\partial \phi}$. Following an approach analogous to the one used above, we can determine the signs of the terms $\frac{\partial k^*}{\partial x}$ and we obtain from equation (7) that $\frac{\partial k^*}{\partial \phi} = 0$ and $\frac{\partial k^*}{\partial \theta} < 0$.

Consider now the indirect effects through wages. Suppose that $\frac{\partial w}{\partial x} \geq 0$ then all terms in (42) would be positive and the labour market equilibrium condition would be violated. Therefore, it has to be the case that $\frac{\partial w}{\partial x} < 0$, that is, the equilibrium wage decreases after an increase in ϕ or θ.

To examine the effects on minimum wealth $\underline{a}$ we use the properties of the Cobb Douglas production function. Conditions (14) and (15) can be rewritten as:

$$
\begin{aligned}
p\alpha f(\underline{k}, \underline{l}) &= (1 + \rho + \phi - (1-p)\eta)\underline{k} \\
p\beta f(\underline{k}, \underline{l}) &= w(p + (1-p)\theta)\underline{l}
\end{aligned}
$$

Adding up these conditions, differentiating with respect to x and then rearranging terms leads to:

$$
\underbrace{[f_k(\underline{k}, \underline{l})p(\alpha+\beta) - (1+\rho+\phi-(1-p)\eta)]\frac{\partial \underline{k}}{\partial x} + [f_l(\underline{k}, \underline{l})p(\alpha+\beta) - w(p+(1-p)\theta)]\frac{\partial \underline{l}}{\partial x}}_{>0}
$$
$$
= \frac{\partial(1+\rho+\phi-(1-p)\eta)}{\partial x}\underline{k} + \frac{\partial(w(p+(1-p)\theta))}{\partial x}\underline{l}
$$

where we have used the fact that $\alpha + \beta < 1$ and $p \in [0, 1]$. Evaluating the right-hand side at $x = \phi$ leads to $\underline{k} + \frac{\partial w}{\partial \phi}\underline{l}(p + (1-p)\theta) > 0$, while for $x = \theta$ we obtain that

$$
\frac{\partial w}{\partial \theta}(p + (1-p)\theta) + w(1-p)]\underline{l} > 0 \tag{44}
$$

. Thus, we have that:

$$
\frac{\tilde{\partial} \underline{a}}{\partial \phi} = \frac{\partial \underline{a}}{\partial \phi} + \frac{\partial \underline{a}}{\partial w}\frac{\partial w}{\partial \phi} = \frac{\underline{k} + \frac{\partial w}{\partial \phi}(p + (1-p)\theta)\underline{l}}{f_k - \phi + (1-p))\eta} > 0, \tag{45}
$$

$$
\frac{\tilde{\partial} \underline{a}}{\partial \theta} = \frac{\partial \underline{a}}{\partial \theta} + \frac{\partial \underline{a}}{\partial w}\frac{\partial w}{\partial \theta} = \frac{[\frac{\partial w}{\partial \theta}(p + (1-p)\theta) + w(1-p)]\underline{l}}{f_k - \phi + (1-p)\eta} > 0, \tag{46}
$$

where we have used equations (37) and (43).

■

Proposition 1 *If labor protection improves, then workers are better off, while all entrepreneurs are* *worse off. There exist a cutoff $a_\theta \in [\underline{a}, \overline{a})$ such that entrepreneurs with $a \in [\underline{a}, a_\theta)$ suffer relatively more than those with $a \geq \overline{a}$.*

Proof: For an individual worker we have from (3) that:

$$\frac{\partial U^w}{\partial \theta} = \frac{\partial l^s}{\partial w}\frac{\partial w}{\partial \theta}\underbrace{[(p+(1-p)\theta)w - \varsigma'(l^s)]}_{=0} + \left(\frac{\partial w}{\partial \theta}(p+(1-p)\theta) + w(1-p)\right) l^s > 0.$$

where we used for the sign of the second term in the RHS a result obtained in the proof of lemma 4. For an entrepreneur with $a \in [\underline{a}, \overline{a})$:

$$\Psi = U^e - \phi k = 0 \Rightarrow \frac{\partial U^e}{\partial \theta} = \phi \frac{\partial d}{\partial \theta} < 0, \tag{47}$$

where we have used that

$$\frac{\partial d}{\partial \theta} = -\frac{\Psi_\theta + \Psi_w \frac{\partial w}{\partial \theta}}{\Psi_d} = \frac{[\frac{\partial w}{\partial \theta}(p+(1-p)\theta) + w(1-p)]l}{p f_k - (1+\rho+\phi-(1-p)\eta)} < 0 \tag{48}$$

For an entrepreneur producing efficiently ($a \geq \overline{a}$) we use (6):

$$\frac{\partial U^e}{\partial \theta} = \underbrace{\frac{\partial U^e}{\partial k^*}}_{=0}\frac{\partial k^*}{\partial \theta} + \underbrace{\frac{\partial U^e}{\partial l^*}}_{=0} + \frac{\partial U^e}{\partial \theta} = -l^*\left[\frac{\partial w}{\partial \theta}(p+(1-p)\theta) + w(1-p)\right] < 0 \tag{49}$$

Note that $\lim_{a\to\underline{a}^+} \frac{\partial U^e}{\partial \theta} = -\infty$. Else, if $a \geq \overline{a}$, then $\frac{\partial U^e}{\partial \theta} > -\infty$. Since $\frac{\partial U^e}{\partial \theta}$ is continuous in $(\underline{a}, +\infty)$, there exists a cutoff $a_\theta \in (\underline{a}, \overline{a})$ such that for $a < a_\theta$, $\frac{\partial U^e}{\partial \theta}$ is always more negative than when $a \geq \overline{a}$ (where the slope of the partial derivative of $\frac{\partial U^e}{\partial \theta}$ is zero).

■

Proposition 2 *If creditor protection improves then workers are better off and there exists a cutoff $a_\phi \in (\underline{a}, \overline{a})$ such that entrepreneurs with $a \in (\underline{a}, a_\phi)$ are better off, while entrepreneurs with $a \geq a_\phi$ are worse off.*

Proof: For an individual worker we have: $\frac{\partial U^w}{\partial \phi} = \frac{\partial w}{\partial \phi}(p+(1-p)\theta)l^s < 0$. For an entrepreneur with $a \in [\underline{a}, \overline{a})$, $\frac{\partial U^e}{\partial \phi} = k + \phi\frac{\partial d}{\partial \phi}$ (from $\Psi = 0$), whose sign is ambiguous. In contrast, if $a \geq \overline{a}$, then $\frac{\partial U^e}{\partial \phi} = -(p+(1-p)\theta)l^* \frac{\partial w}{\partial \phi} > 0$ (similarly to (49)). Note that $\lim_{a\to\underline{a}+} \frac{\partial U^e}{\partial \phi} = -\infty$, therefore, by continuity there exists at least some cutoff $a_\phi \in (\underline{a}, \overline{a})$ such that $\frac{\partial U^e}{\partial \phi}\big|_{a=a_\phi} = 0$. Uniqueness of a_ϕ comes from the fact that $\frac{\partial^2 U^e}{\partial a \partial \phi}\big|_{a=a_\phi} > 0$, which we show next. First, note that any a_ϕ such that

$\frac{\partial U^e}{\partial \phi}\Big|_{a=a_\phi} = 0$ satisfies:

$$\frac{\partial d}{\partial \phi}\Big|_{a=a_\phi} = -\frac{k_\phi}{\phi} < 0, \tag{50}$$

$$\frac{\partial w}{\partial \phi}(p + (1-p)\theta) = -\frac{k_\phi}{l_\phi}\frac{p f_k - (1+\rho-(1-p)\eta)}{\phi}, \tag{51}$$

where $k_\phi = a_\phi + d(a_\phi)$ and l_ϕ are the units of labor hired by an entrepreneur with a_ϕ. In order to obtain expression (51) we used that:

$$\frac{\partial d}{\partial \phi} = \frac{-(\Psi_\phi + \Psi_w \frac{\partial w}{\partial \phi})}{\Psi_d} = \frac{k + l(p+(1-p)\theta)\frac{\partial w}{\partial \phi}}{p f_k - (1+\rho+\phi-(1-p)\eta)}, \tag{52}$$

(analogous to (48)) and replaced it into $\frac{\partial U^e}{\partial \phi}\Big|_{a=a_\phi} = 0$.

Secondly, differentiating equation (52) with respect to a :

$$\frac{\partial^2 d}{\partial a \partial \phi} = \frac{\left[1 + \frac{\partial d}{\partial a} + \frac{\partial l}{\partial a}\frac{\partial w}{\partial \phi}(p+(1-p)\theta)\right](p f_k - (1+\rho+\phi-(1-p)\eta)) - p\left[k + l\frac{\partial w}{\partial \phi}(p+(1-p)\theta)\right]\frac{\partial f_k}{\partial a}}{(p f_k - (1+\rho+\phi-(1-p)\eta)^2},$$

which evaluated at a_ϕ leads to:

$$\begin{aligned}\frac{\partial^2 d}{\partial a \partial \phi}\Big|_{a=a_\phi} &= \frac{\left[1 + \frac{\partial d}{\partial a} - \frac{k_\phi}{l_\phi}\frac{p f_k - (1+\rho-(1-p)(1-\theta)\eta)}{\phi}\frac{\partial l}{\partial a}\right] + p\frac{k_\phi}{\phi}\frac{\partial f_k}{\partial a}}{p f_k - (1+\rho+\phi-(1-p)(1-\theta)\eta)} \\ &= \frac{\left(1 + \frac{\partial d}{\partial a}\right)\left[1 + \frac{k_\phi}{l_\phi}\frac{f_{kl}}{f_{ll}}\frac{p f_k - (1+\rho-(1-p)(1-\theta)\eta)}{\phi}\right] + p\frac{k_\phi}{\phi}\frac{\partial f_k}{\partial a}}{p f_k - (1+\rho+\phi-(1-p)(1-\theta)\eta)}\end{aligned}$$

where we have used equations (50) and (51) and that $\frac{\partial l}{\partial a} = -\left(1 + \frac{\partial d}{\partial a}\right)\frac{f_{kl}}{f_{ll}}$. Finally, using this last condition we get:

$$\begin{aligned}\frac{\partial^2 U^e}{\partial a \partial \phi}\Big|_{a=a_\phi} &= \frac{\partial}{\partial a}\left(k + \phi\frac{\partial d}{\partial \phi}\right)\Big|_{a=a_\phi} = \frac{\partial k}{\partial a}\Big|_{a=a_\phi} + \phi\frac{\partial^2 d}{\partial a \partial \phi}\Big|_{a=a_\phi} \\ &= 1 + \frac{\partial d}{\partial a} + \phi\frac{\left(1 + \frac{\partial d}{\partial a}\right)\left[1 + \frac{k_\phi}{l_\phi}\frac{f_{kl}}{f_{ll}}\frac{p f_k - (1+\rho-(1-p)\eta)}{\phi}\right] + p\frac{k_\phi}{\phi}\frac{\partial f_k}{\partial a}}{p f_k - (1+\rho+\phi-(1-p)\eta)} \\ &= -\frac{\left(1 + \frac{\partial d}{\partial a}\right)\left(\frac{1-\alpha-\beta}{1-\beta}\right)(1+\rho-(1-p)\eta)}{p f_k - (1+\rho+\phi-(1-p)\eta)} > 0,\end{aligned}$$

where we used the expression for $\partial f_k / \partial a$ derived in lemma 2 and the properties of the Cobb Douglas production function. We conclude that a_ϕ is unique. ■

Proposition 3 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2. If $\underline{a} > \bar{A}$, the equilibrium wage w is higher in country 2. Otherwise, if $\overline{a} < \bar{A}$, this effect is reversed.*

Proof:

The wealth distribution $G(a)$ can be written as a convex combination of two MPS distributions G_0, G_1: $G \equiv \lambda G_1 + (1-\lambda)G_0$, such that G_1 is an MPS of G_0. Differentiating condition (18) with respect to λ leads to:

$$\frac{\partial l^s}{\partial \lambda} G(\underline{a}) + l^s \cdot [G_1(\underline{a}) - G_0(\underline{a})] + l^s \cdot g(\underline{a}) \frac{\partial \underline{a}}{\partial \lambda} =$$
$$\int_{\underline{a}}^{\overline{a}} \frac{\partial l}{\partial \lambda} \partial G + \int_{\underline{a}}^{\overline{a}} l(\partial G_1 - \partial G_0) - \underline{l}\, g(\underline{a}) \frac{\partial \underline{a}}{\partial \lambda} + \frac{\partial l^*}{\partial \lambda}(1 - G(\overline{a})) - l^*[G_1(\overline{a}) - G_0(\overline{a})].$$

Using the fact that $\frac{\partial l^s}{\partial \lambda} = \frac{\partial l^s}{\partial w}\frac{\partial w}{\partial \lambda}$, $\frac{\partial \underline{a}}{\partial \lambda} = \frac{\partial \underline{a}}{\partial w}\frac{\partial w}{\partial \lambda}$ and $\frac{\partial l}{\partial \lambda} = \frac{\partial l}{\partial w}\frac{\partial w}{\partial \lambda}$, and rearranging terms we obtain that:

$$\frac{\partial w}{\partial \lambda} \underbrace{\left[\frac{\partial l^s}{\partial w} G(\underline{a}) + l^s g(\underline{a}) \frac{\partial \underline{a}}{\partial w} - \int_{\underline{a}}^{\overline{a}} \frac{\partial l}{\partial w} \partial G + \underline{l}\, g(\underline{a}) \frac{\partial \underline{a}}{\partial w} - \frac{\partial l^*}{\partial w}(1 - G(\overline{a})) \right]}_{>0} =$$
$$= \int_{\underline{a}}^{\overline{a}} l(\partial G_1 - \partial G_0) - l^*[G_1(\overline{a}) - G_0(\overline{a})] - l^s[G_1(\underline{a}) - G_0(\underline{a})]. \tag{53}$$

where the sign of the LHS is derived from the signs of expressions obtained in lemma 4. Thus, the sign of $\frac{\partial w}{\partial \lambda}$ depends only on the sign of the right-hand side term:

$$RHS \equiv \int_{\underline{a}}^{\overline{a}} l(\partial G_1 - \partial G_0) - l^*[G_1(\overline{a}) - G_0(\overline{a})] - l^s[G_1(\underline{a}) - G_0(\underline{a})].$$

In what follows we use the fact that labor l is increasing in a (see equation (40)). Additionally, we assume MPS distributions G_0 and G_1 that cross only twice. We denote their crossing points by (a_1, a_2), satisfying $\bar{A} \in (a_1, a_2)$.[21] There are six possible cases depending on the arrangements of $\underline{a}$, a_1, a_2, and $\overline{a}$.

Case 1: $\overline{a} < a_1$.

In this case, we can find an upper bound for RHS:

[21] The proof can also be applied to the case in which there are more than two crossing points.

$$RHS < \int_{\underline{a}}^{\overline{a}} l^* \overbrace{(\partial G_1 - \partial G_0)}^{>0} - l^*[G_1(\overline{a}) - G_0(\overline{a})] - l^s[G_1(\underline{a}) - G_0(\underline{a})],$$

$$= \underbrace{(l^* - l^*)}_{=0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{>0} - (l^* + l^s) \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} < 0.$$

Case 2: $a_1 \in (\underline{a}, \overline{a}), \overline{a} < \bar{A}$.

As in the previous case, we can find a negative upper bound for RHS:

$$RHS < \int_{\underline{a}}^{a_1} l_1 \overbrace{(\partial G_1 - \partial G_0)}^{>0} + \int_{a_1}^{\overline{a}} l_1 \overbrace{(\partial G_1 - \partial G_0)}^{<0} - l^*[G_1(\overline{a}) - G_0(\overline{a})] - l^s[G_1(\underline{a}) - G_0(\underline{a})],$$

$$= \underbrace{(l_1 - l^*)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{>0} - (l_1 + l^s) \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} < 0.$$

Case 3: $\underline{a}, \overline{a} \in (a_1, \bar{A})$.

In this case is straightforward to see that:

$$RHS = \int_{\underline{a}}^{\overline{a}} l \underbrace{(\partial G_1 - \partial G_0)}_{<0} - l^* \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{>0} - l^s \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} < 0.$$

Therefore, we conclude that $\frac{\partial w}{\partial \lambda} < 0$ if $\overline{a} < \bar{A}$. We know consider the case in which $\underline{a} > \bar{A}$. We provide less details in these cases, since they are similar to previous ones.

Case 4: $\underline{a}, \overline{a} \in (\bar{A}, a_2)$.

$$RHS > \underbrace{(l^* - l^*)}_{=0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} - (l^* + l^s) \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} > 0.$$

Case 5: $a_2 \in (\underline{a}, \overline{a}), \underline{a} > \bar{A}$.

$$RHS > \underbrace{(l_2 - l^*)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} - (l_2 + l^s) \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} > 0.$$

Case 6: $\underline{a} > a_2$.

$$RHS = \int_{\underline{a}}^{\overline{a}} l \underbrace{(\partial G_1 - \partial G_0)}_{>0} - l^* \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} - l^s \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} > 0.$$

Thus, we conclude that $\frac{\partial w}{\partial \lambda} > 0$ if $\underline{a} > \bar{A}$. ■

Lemma 5 *Under assumption 1, there exists a political equilibrium* $(1-\phi, \theta)$.

Proof:

According to Lindbeck and Weibull (1987), the sufficient conditions for the existence of a pure strategy equilibrium are:

1. Compactness of the strategy set.
2. Convexity of the strategy set.
3. Continuity of the probability of winning the election.
4. Concavity of the probability of winning the election.

Since the strategy set is $q = (1-\phi, \theta) \in [1-\overline{\phi}, 1-\underline{\phi}] \times [\underline{\theta}, \overline{\theta}]$, conditions 1 and 2 hold. Moreover, as stated in section 6, under uncertainty the expected number of votes becomes a continuous function in the policy space. Thus, condition 3 is also met.

Thus we only need to show that the probability that party A wins the election is concave (condition 4). That is, we require that the politically weighted social surplus that party A maximizes is concave.

First note that:

$$\frac{\partial U^e}{\partial \theta} = [p f_k - (1+r^*)]\frac{\partial d}{\partial \theta} - \frac{\partial \bar{w}}{\partial \theta} l, \tag{54}$$

where we have defined $\frac{\partial \bar{w}}{\partial \theta} \equiv \frac{\partial w}{\partial \theta}(p + (1-p)\theta) + w(1-p)$ and recall that $1 + r^* \equiv 1 + \rho - (1-p)\eta$. Thus, $\frac{\partial d}{\partial \theta} = \frac{\frac{\partial \bar{w}}{\partial \theta} l}{p f_k - (1+r^*+\phi)}$. Equation (54) reads as:

$$\frac{\partial U^e}{\partial \theta} = \frac{\phi \frac{\partial \bar{w}}{\partial \theta} l}{p f_k - (1 + r^* + \phi)}. \tag{55}$$

Differentiating (55) with respect to θ:

$$\frac{\partial^2 U^e}{\partial \theta^2} \propto \left[2(1-p)\frac{\partial w}{\partial \theta} l + \frac{\partial \bar{w}}{\partial \theta}\frac{\partial l}{\partial \theta}\right](p f_k - (1 + r^* + \phi)) - \frac{\partial \bar{w}}{\partial \theta}\frac{\partial (p f_k)}{\partial \theta} l. \tag{56}$$

Note that from the FOC of labor, $p f_l = \bar{w}$, we have:

$$\begin{aligned} p f_{lk}\frac{\partial d}{\partial \theta} + p f_{ll}\frac{\partial l}{\partial \theta} &= \frac{\partial \bar{w}}{\partial \theta}, \\ \Rightarrow \frac{\partial l}{\partial \theta} &= \frac{1}{p f_{ll}}\frac{\partial \bar{w}}{\partial \theta} - \frac{f_{lk}}{f_{ll}}\frac{\partial d}{\partial \theta}, \\ &= -\frac{l^2}{p\beta(1-\beta) f}\frac{\partial \bar{w}}{\partial \theta} + \frac{\alpha l}{(1-\beta)k}\frac{\partial d}{\partial \theta}, \end{aligned} \tag{57}$$

where we have used the properties of $f(\cdot)$. Using (57) in the following expression we get (58):

$$
\begin{aligned}
\frac{\partial(f_k)}{\partial\theta} &= f_{kk}\frac{\partial d}{\partial\theta} + f_{kl}\frac{\partial l}{\partial\theta},\\
\frac{\partial(f_k)}{\partial\theta} &= \left(f_{kk} - \frac{f_{kl}^2}{f_{ll}}\right)\frac{\partial d}{\partial\theta} + \frac{f_{kl}}{pf_{ll}}\frac{\partial\bar{w}}{\partial\theta}\\
&= -\frac{f_k}{(1-\beta)k}(1-\alpha-\beta)\frac{\partial d}{\partial\theta} - \frac{\alpha l}{p(1-\beta)k}\frac{\partial\bar{w}}{\partial\theta}.
\end{aligned}
\tag{58}
$$

Replacing (57) and (58) in (56) leads to:

$$
\begin{aligned}
\frac{\partial^2 U^e}{\partial\theta^2} &\propto \left[2(1-p)\frac{\partial w}{\partial\theta}l - \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{p\beta(1-\beta)f} + \frac{\partial\bar{w}}{\partial\theta}\frac{\alpha l}{(1-\beta)k}\frac{\partial d}{\partial\theta}\right](pf_k - (1+r^*+\phi))\\
&\quad + \frac{\partial\bar{w}}{\partial\theta}\frac{l}{k(1-\beta)}\left[pf_k(1-\alpha-\beta)\frac{\partial d}{\partial\theta} + \alpha l\frac{\partial\bar{w}}{\partial\theta}\right]\\
&= 2(1-p)\frac{\partial w}{\partial\theta}l(pf_k - (1+r^*+\phi)) + \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{1-\beta}\left[-\frac{pf_k-(1+r^*+\phi)}{p\beta f} + \frac{\alpha}{k}\right]\\
&\quad + \frac{\partial\bar{w}}{\partial\theta}\frac{l}{k(1-\beta)}\frac{\partial d}{\partial\theta}\left[\alpha(pf_k - (1+r^*+\phi)) + pf_k(1-\alpha-\beta)\right]\\
&= 2(1-p)\frac{\partial w}{\partial\theta}l(pf_k - (1+r^*+\phi)) + \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{1-\beta}\left[-\frac{pf_k-(1+r^*+\phi)}{p\beta f} + \frac{\alpha}{k}\right]\\
&\quad + \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{\frac{l^2}{k(1-\beta)}\left[\alpha(pf_k - (1+r^*+\phi)) + pf_k(1-\alpha-\beta)\right]}{pf_k-(1+r^*+\phi)}\\
&\propto -2(1-p)\frac{\partial w}{\partial\theta}l(pf_k - (1+r^*+\phi))^2 + \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{1-\beta}\left[\frac{(pf_k-(1+r^*+\phi))^2}{p\beta f} - \frac{\alpha}{k}(pf_k-(1+r^*+\phi))\right]\\
&\quad - \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{k(1-\beta)}\left[\alpha(pf_k - (1+r^*+\phi)) + pf_k(1-\alpha-\beta)\right]\\
&= -2(1-p)\frac{\partial w}{\partial\theta}l(pf_k - (1+r^*+\phi))^2 +\\
&\quad \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l^2}{1-\beta}\left[\frac{(pf_k-(1+r^*+\phi))^2}{p\beta f} - \frac{2\alpha(pf_k-(1+r^*+\phi)}{k} - \frac{pf_k(1-\alpha-\beta)}{k}\right].
\end{aligned}
\tag{59}
$$

Denote the term in square brackets as M and recall that $pf_k \in [1+r^*, 1+r^*+\phi]$ so $pf_k > \phi$. We have that:

$$
\begin{aligned}
M &< \frac{pf_k(pf_k-(1+r^*+\phi))}{p\beta f} - \frac{2\alpha(pf_k-(1+r^*+\phi))}{k} - \frac{pf_k(1-\alpha-\beta)}{k}\text{, since } f_k = \alpha f/k,\\
&= -\frac{1}{k}\left[\frac{\alpha}{\beta}(pf_k-(1+r^*+\phi)) + 2\alpha((pf_k-(1+r^*+\phi)+pf_k(1-\alpha-\beta)\right],\\
&= -\frac{1}{k}\left[\alpha\left(2+\frac{1}{\beta}\right)(pf_k-(1+r^*+\phi)) + pf_k(1-\alpha-\beta)\right].
\end{aligned}
$$

Denote the term in brackets by N and observe that by assumption 1, $\overline{\phi} < \frac{(1+r^*)(1-\alpha-\beta)}{\alpha\left(2+\frac{1}{\beta}\right)}$. Then we have:

$$
N > -\alpha\left(2+\frac{1}{\beta}\right)\overline{\phi} + (1+r^*)(1-\alpha-\beta) > 0, \text{ again because of the range of } pf_k. \tag{60}
$$

Denote (59) by Z. Then we can write:

$$
\frac{\partial^2 U^e}{\partial\theta^2} \propto Z < -2(1-p)\frac{\partial w}{\partial\theta}(pf_k-(1+r^*+\phi))^2 - \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2\frac{l}{k(1-\beta)}N. \tag{61}
$$

Since $\frac{\partial w}{\partial\theta} < 0$ the first term is positive and because $N > 0$, the second term is negative. Thus, the sign of expression (61) is ambiguous. In what follows we show that it is negative. First, note that from the FOC of capital and labor we have,

$$
\begin{aligned}
pf_k &= 1+r \in [1+r^*, 1+r^*+\phi] \Leftrightarrow \frac{p\alpha f}{k} = 1+r,\\
pf_l &= w(p+(1-p)\theta) \Leftrightarrow \frac{p\beta f}{l} = w(p+(1-p)\theta),\\
\Rightarrow \frac{l}{k} &= \frac{\beta(1+r)}{\alpha w(p+(1-p)\theta)}.
\end{aligned}
\tag{62}
$$

Secondly,

$$
\begin{aligned}
\frac{\partial\bar{w}}{\partial\theta} &= \frac{\partial w}{\partial\theta}(p+(1-p)\theta) + (1-p)w,\\
\Rightarrow \left(\frac{\partial\bar{w}}{\partial\theta}\right)^2 &> \left(\frac{\partial w}{\partial\theta}\right)^2(p+(1-p)\theta)^2.
\end{aligned}
\tag{63}
$$

Thirdly, by (44),

$$
\begin{aligned}
&\frac{\partial w}{\partial\theta}(p+(1-p)\theta) + (1-p)w > 0,\\
&\qquad\Leftrightarrow -\frac{\partial w}{\partial\theta}(p+(1-p)\theta) < w(1-p)
\end{aligned}
\tag{64}
$$

Using properties (62), (63) and $1 + r \geq 1 + r^*$ in (61):

$$Z < \frac{\partial w}{\partial \theta}\left(-2(1-p)(pf_k - (1 + r^* + \phi))^2 - \frac{\partial w}{\partial \theta}(p + (1-p)\theta)\frac{\beta(1+r^*)}{\alpha(1-\beta)w}N\right),$$

using that $pf_k \in [1 + r^*, 1 + r^* + \phi]$ and properties (64) and (60),

$$\begin{aligned} Z &< \frac{\partial w}{\partial \theta}(1-p)\left[-2\overline{\phi}^2 + \frac{\beta(1+r^*)}{\alpha(1-\beta)}N\right], \\ &< \frac{\partial w}{\partial \theta}(1-p)\left[-2\overline{\phi} - \frac{\beta(1+r^*)}{(1-\beta)}\left(\alpha\left(2 + \frac{1}{\beta}\right)\overline{\phi} + (1+r^*)(1-\alpha-\beta)\right)\right], \text{ by (60)} \\ &\propto \frac{\partial w}{\partial \theta}(1-p)\left[-\overline{\phi}\left(\alpha\left(2 + \frac{1}{\beta}\right) + 2\frac{(1-\beta)}{\beta(1+r^*)}\right) + (1+r^*)(1-\alpha-\beta)\right] < 0, \end{aligned}$$

after multiplying by $(1-\beta)/(\beta(1+r^*))$. The final inequality follows from $\frac{\partial w}{\partial \theta} < 0$ and assumption 1, $\overline{\phi} < \frac{(1+r^*)(1-\alpha-\beta)}{\alpha\left(2+\frac{1}{\beta}\right)+2\frac{(1-\beta)}{\beta(1+r^*)}}$. Thus, we conclude $\frac{\partial^2 U^e}{\partial \theta^2} < 0$.

Analogously, differentiation of U^e with respect to ϕ leads to:

$$\frac{\partial U_e}{\partial \phi} = [pf_k - (1+r^*)]\frac{\partial d}{\partial \phi} - \frac{\partial \bar{w}}{\partial \phi}l, \tag{65}$$

where $\frac{\partial \bar{w}}{\partial \phi} = \frac{\partial w}{\partial \phi}(p + (1-p)\theta)$. Thus, $\frac{\partial d}{\partial \phi} = \frac{k + \frac{\partial \bar{w}}{\partial \phi}l}{pf_k - (1+r^*+\phi)}$. Then, equation (65) reads as:

$$\frac{\partial U_e}{\partial \phi} = \frac{[pf_k - (1+r^*)]k + \phi\frac{\partial \bar{w}}{\partial \phi}(p + (1-p)\theta)l}{pf_k - (1+r^*+\phi)} = k + \phi\frac{k + \frac{\partial \bar{w}}{\partial \phi}}{pf_k - (1+r^*+\phi)} = k + \phi\frac{\partial d}{\partial \phi}. \tag{66}$$

Differentiating (66) with respect to ϕ:

$$\frac{\partial^2 U_e}{\partial \phi^2} = 2\frac{\partial d}{\partial \phi} + \phi\frac{\partial^2 d}{\partial \phi^2}. \tag{67}$$

Recall that $\frac{\partial d}{\partial \phi} < 0$. Thus, to show that $\frac{\partial^2 U^e}{\partial \phi^2} < 0$, we must show that the second term is no larger than $2\frac{\partial d}{\partial \phi}$. We have:

$$\begin{aligned}
\frac{\partial^2 d}{\partial \phi^2} &\propto \left[\frac{\partial d}{\partial \phi} + \frac{\partial \bar{w}}{\partial \phi}\frac{\partial l}{\partial \phi}\right](pf_k - (1+r^*+\phi)) - \left[k + \frac{\partial \bar{w}}{\partial \phi}\right]\left[\frac{\partial (pf_k)}{\partial \phi} - 1\right], \\
&= \left[\frac{\partial d}{\partial \phi} + \frac{\partial \bar{w}}{\partial \phi}\left(-\frac{l^2}{p\beta(1-\beta)k}\frac{\partial \bar{w}}{\partial \phi} + \frac{\alpha l}{(1-\beta)k}\frac{\partial d}{\partial \phi}\right)\right](pf_k - (1+r^*+\phi)) \\
&\quad + \left[k + \frac{\partial \bar{w}}{\partial \phi}\right]\left[\frac{pf_k(1-\alpha-\beta)}{(1-\beta)k}\frac{\partial d}{\partial \phi} + 1 + \frac{\alpha l}{(1-\beta)k}\frac{\partial \bar{w}}{\partial \phi}\right], \\
&\propto -\frac{\partial d}{\partial \phi}(pf_k - (1+r^*+\phi))^2 - \left[k + \frac{\partial \bar{w}}{\partial \phi}\right](pf_k - (1+r^*+\phi)) \\
&\quad + \left(\frac{\partial \bar{w}}{\partial \phi}\right)^2 \frac{l^2}{1-\beta}\left[\frac{(pf_k - (1+r^*+\phi))^2}{p\beta f} - \frac{2\alpha(pf_k - (1+r^*+\phi)}{k} - \frac{pf_k(1-\alpha-\beta)}{k}\right],
\end{aligned} \tag{68}$$

where we have proceeded in analogous way as we did for θ. Note that the last term of (68) is exactly the same term as the last term of (59). Given assumption 1, we know that this term is negative. Denote the RHS of (68) by R, we have:

$$\begin{aligned}
\frac{\partial^2 d}{\partial \phi^2} &\propto R < -\frac{\partial d}{\partial \phi}(pf_k - (1+r^*+\phi))^2 - \left[k + \frac{\partial \bar{w}}{\partial \phi}\right](pf_k - (1+r^*+\phi)) - \left(\frac{\partial \bar{w}}{\partial \phi}\right)^2 \frac{l^2}{k(1-\beta)}N \\
&\propto -2\left[k + \frac{\partial \bar{w}}{\partial \phi}\right](pf_k - (1+r^*+\phi)) - \left(\frac{\partial \bar{w}}{\partial \phi}\right)^2 \frac{l^2}{k(1-\beta)}N
\end{aligned} \tag{69}$$

Combining expressions (67) and (69) we obtain an expression which we denote by $\tilde{R}$ where:

$$\begin{aligned}
\frac{\partial^2 U^e}{\partial \phi^2} < \tilde{R} &\propto -2\left[k + \frac{\partial \bar{w}}{\partial \phi}\right](pf_k - (1+r^*+\phi))^2 - 2\phi\left[k + \frac{\partial \bar{w}}{\partial \phi}\right](pf_k - (1+r^*+\phi)) - \phi\left(\frac{\partial \bar{w}}{\partial \phi}\right)^2 \frac{l^2}{k(1-\beta)}N, \\
&= -2(pf_k - (1+r^*+\phi))(pf_k - (1+r^*))\left[k + \frac{\partial \bar{w}}{\partial \phi}\right] - \phi\left(\frac{\partial \bar{w}}{\partial \phi}l\right)^2 \frac{N}{k(1-\beta)}, \\
&< 2\overline{\phi}\phi - \phi\frac{N}{1-\beta} = \phi\left[2\overline{\phi} - \frac{N}{(1-\beta)}\right], \\
&< \phi\left[2\overline{\phi} + \alpha\left(2 + \frac{1}{\beta}\right)\overline{\phi} - \frac{(1+r^*)(1-\alpha-\beta)}{1-\beta}\right], \\
&\propto \overline{\phi}\left[2(1-\beta) + \alpha\left(2 + \frac{1}{\beta}\right)\right] - (1+r^*)(1-\alpha-\beta) < 0,
\end{aligned}$$

where in the third line we have used that $pf_k \in [1+r^*, 1+r^*+\phi]$, $\frac{\partial \bar{w}}{\partial \phi} < 0$ and that $-\left(\frac{\partial \bar{w} l}{\partial \phi}\right)^2 < -k^2$, in the fourth line we have used property (60) and in the last line we have used assumption 1. Thus, we conclude $\frac{\partial^2 U^e}{\partial \phi^2} < 0$.

Now note that the FOCs of party A's problem can be written more compactly as,

$$\frac{\partial \overline{U}}{\partial x} = \frac{\partial U^w}{\partial x} G(\underline{a}) + \int_{\underline{a}}^{+\infty} \frac{\partial U^e}{\partial x} \partial G(a) = 0, \quad x = \{\phi, \theta\}. \tag{70}$$

Concavity of the probability of winning an election is equivalent to having concavity in the politically weighted social surplus $\overline{U}$. Using (70), we require that,

$$\frac{\partial^2 \overline{U}}{\partial x^2} = \frac{\partial}{\partial x}\left(\frac{\partial U^w}{\partial x} G(\underline{a})\right) + \int_{\underline{a}}^{+\infty} \frac{\partial^2 U^e}{\partial x^2} \partial G(a) < 0, \quad x = \{\phi, \theta\}. \tag{71}$$

Since agents cannot anticipate second order effects that happen through $\underline{a}$, we have that $\frac{\partial}{\partial x}\left(\frac{\partial U^w}{\partial x} G(\underline{a})\right) \leq 0$. Moreover, given assumption 1 we have shown that $\frac{\partial^2 U^e}{\partial x^2} < 0$, which implies that $\frac{\partial^2 \overline{U}}{\partial x^2} < 0$. Hence, there exists a political equilibrium. ■

Proposition 4 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2.*

i. If $\underline{a} > \bar{A}$, the equilibrium political platforms $(1-\phi_1, \theta_1); (1-\phi_2, \theta_2)$ *satisfy* $1-\phi_1 \geq 1-\phi_2$ *and* $\theta_1 \geq \theta_2$.

ii. If $\overline{a} < \bar{A}$, the equilibrium platform shifts in the opposite direction.

Proof:

In this proof we apply the Topkis's monotonicity theorem. In order to simplify notation define: $\overline{U}_{\phi\theta} \equiv \frac{\partial^2 \overline{U}(q_A)}{\partial\phi\partial\theta}$, $\overline{U}_{\lambda\phi} \equiv \frac{\partial^2 \overline{U}(q_A)}{\partial\lambda\partial\phi}$ and $\overline{U}_{\lambda\theta} \equiv \frac{\partial^2 \overline{U}(q_A)}{\partial\lambda\partial\theta}$. First, observe that $\overline{U}$ is supermodular in (ϕ, θ). Noting that $\lim_{a\to\underline{a}^+} \frac{\partial U^e}{\partial\phi} = -\infty$ (see proposition 2) and the other cross-derivatives are bounded, differentiation of (27) with respect to θ leads to $\overline{U}_{\phi\theta} > 0$.

Secondly, analogously to the proof of Proposition 3, the signs of $\overline{U}_{\lambda\phi}$ and $\overline{U}_{\lambda\theta}$ depend on the different possible arrangements for $\underline{a}, a_\phi, \overline{a}$. Thus, whether $\overline{U}$ is supermodular or submodular in (λ, ϕ) and (λ, θ), depends on whether the economy is poor or wealthy.

In what follows, we obtain bounds for $\overline{U}_{\lambda\phi}$ that allow us to sign it in the different cases. We show the result only for ϕ, since the procedure to determine the sign of $\overline{U}_{\lambda\theta}$ is analogous and simpler. We use the properties of $\frac{\partial U^w}{\partial\phi}$ and $\frac{\partial U^e}{\partial\phi}$ shown in Proposition 2. Differentiating (26) with respect to λ leads to:

$$\overline{U}_{\lambda\phi} = \frac{\partial U^w}{\partial\phi}[G_1(\underline{a}) - G_0(\underline{a})] + \int_{\underline{a}}^{a_\phi} \frac{\partial U^e(a)}{\partial\phi}(\partial G_1 - \partial G_0) + \int_{a_\phi}^{\overline{a}} \frac{\partial U^e(a)}{\partial\phi}(\partial G_1 - \partial G_0) - \frac{\partial U^e(k^*)}{\partial\phi}[G_1(\overline{a}) - G_0(\overline{a})]$$
$$+ \underbrace{\text{Indirect effects due to } \Delta\underline{a}, \Delta\overline{a}, \Delta a_\phi, \text{etc.}}_{=0} \tag{72}$$

The reason the indirect affects are zero is that we study the effects of the change in the wealth distribution on the political platform, but voters decide on the basis of their particular wealth distribution and initial regulations. While an outside observer notices that the change in the distribution alters the values of $\underline{a}$, $\overline{a}$, a_ϕ, etc, these changes are not perceived by voters, who live under one particular wealth distribution. These indirect effects induced by the change in the distribution have no effect on the choice of a political platform, because they are not internalized by agents.

Case 1: $\underline{a} > \bar{A}, \overline{a} \in (\bar{A}, a_2)$.

In this case we can find a positive lower bound for expression (72):

$$
\begin{aligned}
\overline{U}_{\lambda\phi} &= \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} + \int_{a_\phi}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&> \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&= \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} > 0.
\end{aligned}
$$

Case 2: $\underline{a} > \bar{A}, a_2 \in (a_\phi, \overline{a})$

As in the previous case, we can find a positive lower bound for expression (72):

$$
\begin{aligned}
\overline{U}_{\lambda\phi} &= \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} + \int_{a_\phi}^{a_2} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} \\
&\quad + \int_{a_2}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&> \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(a_2)}{\partial \phi}}_{>0} (\partial G_1 - \partial G_0) - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&= \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(a_2)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \underbrace{\left(\frac{\partial U^e(a_2)}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} > 0.
\end{aligned}
$$

where we have used the fact that $\frac{\partial^2 U^e(a)}{\partial a \partial \phi} > 0$, from Proposition 2.

Case 3: $\underline{a} \in (\bar{A}, a_2), a_\phi > a_2$.

$$\begin{aligned}
\overline{U}_{\lambda\phi} &= \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{a_2} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{<0} + \int_{a_2}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} \\
&+ \int_{a_\phi}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&> \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \int_{\underline{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(a_2)}{\partial \phi}}_{<0} (\partial G_1 - \partial G_0) - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0}, \\
&= \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(a_2)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{<0} + \underbrace{\left(\frac{\partial U^e(a_2)}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} > 0.
\end{aligned}$$

where we have used the fact that $\frac{\partial^2 U^e(a)}{\partial a \partial \phi} > 0$.

We conclude that in these three cases, $\overline{U}_{\lambda\phi} > 0$, therefore $\overline{U}$ is supermodular in (ϕ, λ). Topkis's theorem implies that ϕ is weakly increasing in λ, that is, creditor protection decreases when inequality increases.

In what follows we study the three remaining cases when $\overline{a} < \bar{A}$. On the right hand side we write the bounds that determine the signs of $\overline{U}_{\lambda\phi}$. The bounds are obtained using a reasoning similar to the previous case.

Case 4: $\overline{a} < a_1$

$$\overline{U}_{\lambda\phi} < \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} < 0$$

Case 5: $a_\phi < a_1, \overline{a} \in (a_1, \bar{A})$.

$$\overline{U}_{\lambda\phi} < \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(a_1)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} + \underbrace{\left(\frac{\partial U^e(a_1)}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{>0} < 0.$$

Case 6: $\underline{a} < a_1, a_\phi > a_1, \overline{a} \in (a_1, \bar{A})$.

$$\overline{U}_{\lambda\phi} < \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(a_1)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} + \underbrace{\left(\frac{\partial U^e(a_1)}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{>0} < 0$$

where we have used the fact that $\frac{\partial^2 U^e(a)}{\partial a \partial \phi} > 0$. Therefore, in the cases above, $\overline{U}_{\lambda\phi} < 0$, that is $\overline{U}$ is submodular in (ϕ, λ), which implies that the equilibrium ϕ decreases after an MPS. This finishes the proof. ■

B The Case $\underline{a} < \hat{a}$

In this section we provide an overview of the proofs of the main properties of the model when $\underline{a} < \hat{a}$, i.e., where there is no discontinuity in the utility at $\underline{a}$, see section 3.2. We start with lemma 2. The labor market equilibrium is as follows:

$$l^s \cdot G(\hat{a}) = \int_{\hat{a}}^{\overline{a}} l \partial G(a) + l^s(1 - G(\overline{a})), \tag{73}$$

where $\hat{a}$ is defined by:

$$U^e(\hat{a}, \hat{d}, \hat{l}) = U^w(\hat{a}), \tag{74}$$

with $\hat{d} \equiv d(\hat{a}), \hat{l} \equiv l(\hat{a})$. For the proof of lemma 2 to work we need that $\frac{\partial \hat{a}}{\partial w} > 0$. In fact, differentiating condition (74) in terms of w leads to:

$$\frac{\partial \hat{a}}{\partial w} = \frac{\frac{\partial U^w}{\partial w} - \frac{\partial U^e}{\partial d}\frac{\partial \hat{d}}{\partial w}}{\left(\frac{\partial U^e}{\partial a} - \frac{\partial U^w}{\partial a}\right)} > 0, \tag{75}$$

where we have used that $\frac{\partial U^w}{\partial w} > 0$, $\frac{\partial U^e}{\partial d} > 0$, $\frac{\partial \hat{d}}{\partial w} < 0$ (from lemma 3) and that $\frac{\partial U^e}{\partial a} - \frac{\partial U^w}{\partial a} = f_k + (1-p)\eta\hat{k} - (1+\rho) > 0$.

Now we proceed with lemma 4 which is essential for the proofs of propositions 1 and 2. Note that the proof of lemma 4 continues to hold as long as the direct effects on $\hat{a}$ satisfy: $\frac{\partial \hat{a}}{\partial \phi} > 0$, $\frac{\partial \hat{a}}{\partial \theta} > 0$. In fact, differentiating (74) with respect to ϕ and θ leads to:

$$\frac{\partial \hat{a}}{\partial \phi} = -\frac{\frac{\partial U^e}{\partial d}\frac{\partial d}{\partial \phi}}{\left(\frac{\partial U^e}{\partial a} - \frac{\partial U^w}{\partial a}\right)} > 0$$

$$\frac{\partial \hat{a}}{\partial \theta} = -\frac{\frac{\partial U^e}{\partial \theta} + \frac{\partial U^e}{\partial d}\frac{\partial d}{\partial \theta} - \frac{\partial U^w}{\partial \theta}}{\left(\frac{\partial U^e}{\partial a} - \frac{\partial U^w}{\partial a}\right)} > 0$$

where we have used that $\frac{\partial U^e}{\partial d} > 0$, $\frac{\partial d}{\partial \phi} < 0$, $\frac{\partial d}{\partial \theta} < 0$ (see the proof of lemma 4), $\frac{\partial U^e}{\partial \theta} = -(1-p)wl < 0$ and $\frac{\partial U^w}{\partial \theta} = (1-p)wl^s > 0$. These properties allow to replicate the proof of lemma 4.

Given lemma 4, the procedure to prove propositions 1 and 2 is analogous. Note that proposition 1 holds for $\hat{a} < a_\theta$. If $\hat{a} > a_\theta$, all entrepreneurs are worse off after an improvement of worker protection, without the differentiation that appears in proposition 1. This is sufficient to build the political model and show proposition 4. On the other hand, the statement of proposition 2 remains unchanged as long as $\hat{a} < a_{\phi}$. If this does not hold, all entrepreneurs oppose an improvement of creditor protection, i.e., they can all be considered owners of medium or large firms. This last case simpler to work with, since there are only two endogenous groups: workers and Medium-Large entrepreneurs. We still have that $\frac{\partial^2 U^e}{\partial a \partial \phi} > 0, a \in (\hat{a}, \overline{a})$, which is sufficient for proposition 4 to hold.

Proposition 3 remains the same, except for replacing $\underline{a}$ for $\hat{a}$. Its interpretation remains unchanged:

Proposition 5 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2. If $\hat{a} > \bar{A}$, the equilibrium wage w is higher in country 2. Otherwise, if $\overline{a} < \bar{A}$, this effect is reversed.*

Proof:

Condition (53) is now as follows:

$$\frac{\partial w}{\partial \lambda} \underbrace{\left[\frac{\partial l^s}{\partial w} G(\hat{a}) + l^s g(\hat{a}) \frac{\partial \hat{a}}{\partial w} - \int_{\hat{a}}^{\overline{a}} \frac{\partial l}{\partial w} \partial G + \hat{l} \; g(\hat{a}) \frac{\partial \hat{a}}{\partial w} - \frac{\partial l^*}{\partial w} (1 - G(\overline{a})) \right]}_{>0} =$$

$$= \int_{\hat{a}}^{\overline{a}} l(\partial G_1 - \partial G_0) - l^* [G_1(\overline{a}) - G_0(\overline{a})] - l^s [G_1(\hat{a}) - G_0(\hat{a})]. \tag{76}$$

By defining $RHS \equiv \int_{\hat{a}}^{\overline{a}} l(\partial G_1 - \partial G_0) - l^* [G_1(\overline{a}) - G_0(\overline{a})] - l^s [G_1(\hat{a}) - G_0(\hat{a})]$, the proof proceeds as before. The intuition explained in section 5 is the same, but now a *poor country* is one such that $\hat{a} > \bar{A}$. ■

Finally, proposition 4 no longer requires assumption 2. It holds for any *poor country* ($\hat{a} > \bar{A}$) or *rich country* ($\overline{a} < \bar{A}$):

Proposition 6 *Consider a country 1 with an initial wealth distribution with mean $\bar{A}$. Assume we perturb the distribution by an MPS, and call it country 2. If $\hat{a} > \bar{A}$, then the equilibrium political platforms $(1 - \phi_1, \theta_1); (1 - \phi_2, \theta_2)$ satisfy $1 - \phi_1 \geq 1 - \phi_2$ and $\theta_1 \geq \theta_2$. If $\overline{a} < \bar{A}$, these effects are reversed.*

Proof:

The cases 1 to 6 presented in the proof of proposition 4 continue to hold by replacing $\underline{a}$ by $\hat{a}$. The two remaining cases that were not explored in that proof, are shown below:

Case 7: $\hat{a} > a_2$

$$\overline{U}_{\lambda\phi} = \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{<0} + \int_{\hat{a}}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} + \int_{a_\phi}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0},$$

$$> \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{<0} + \int_{\hat{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(\hat{a})}{\partial \phi}}_{<0} (\partial G_1 - \partial G_0) - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0},$$

$$= \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(\hat{a})}{\partial \phi} \right)}_{=0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{<0} + \underbrace{\left(\frac{\partial U^e(\hat{a})}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\overline{a}) - G_0(\overline{a})]}_{<0} > 0,$$

where we have used that $U^w(\hat{a}) = U^e(\hat{a})$ and the cancellation of the second term occurs because $U^w(\hat{a}(\phi)) = U^e(\hat{a}(\phi)), \forall \phi$. Therefore, if $\hat{a} > \bar{A}$, $\overline{U}_{\lambda\phi} > 0$ and the equilibrium ϕ increases after an MPS.

Case 8: $\hat{a} > a_1, \overline{a} \in (a_1, \bar{A})$.

$$\overline{U}_{\lambda\phi} = \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{>0} + \int_{\hat{a}}^{a_\phi} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{<0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} + \int_{a_\phi}^{\overline{a}} \underbrace{\frac{\partial U^e(a)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{>0},$$

$$< \underbrace{\frac{\partial U^w}{\partial \phi}}_{<0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{>0} + \int_{\hat{a}}^{\overline{a}} \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{(\partial G_1 - \partial G_0)}_{>0} - \underbrace{\frac{\partial U^e(k^*)}{\partial \phi}}_{>0} \underbrace{[G_1(\hat{a}) - G_0(\hat{a})]}_{>0},$$

$$= \underbrace{\left(\frac{\partial U^w}{\partial \phi} - \frac{\partial U^e(k^*)}{\partial \phi} \right)}_{<0} \underbrace{[G_1(\underline{a}) - G_0(\underline{a})]}_{>0} < 0$$

Therefore, if $\overline{a} < \bar{A}$, $\overline{U}_{\lambda\phi} < 0$ and the equilibrium ϕ decreases after an MPS.

∎

C Empirical Motivation

In this section we explain briefly the procedure to obtain figures 1 and 2 presented in the Introduction. The empirical approach is as follows:

$$StrReg_i = \beta_0 + \beta_1 Inequality_i + \beta_2 GDPpc_i + \beta_3 Inequality_i \times GDPpc_i + \beta_4 X_i + \epsilon_i$$

where $StrReg_i$ is the strength of creditor or worker protection in country i. The first is measured by the average loan recovery rate from Doing Business (2004-2019), which it is recorded as cents on the dollar recovered by secured creditors through insolvency proceedings . The quality of employment laws is measured by the average synthetic OECD Employment Protection Legislation (EPL) index for both individual and collective dismissals (regular contracts) for 2004 to 2015. $Inequality_i$ is the initial wealth inequality of country i, which is measured as the wealth Gini computed for the 2000s by Davies et al. (2011). $GDPpc_i$ is the GDP per capita in 2000 taken from the World Bank. X_i includes additional control variables identified in the literature. We use the legal origins from La Porta et al. (2008) and a measure of ethnic fractionalization taken from Alesina et al. (2003). Additionally, we use a democracy measure to control for the extent to which citizens can affect policies through elections. We use two variables, a Democracy dummie in 2000 taken from Magaloni et al. (2013) or alternatively, an Electoral Democracy Index in 2000 taken from Coppedge et al. (2020). Figures 1 and 2 were constructed based on columns (4) and (8) of Table 2 respectively. Alternative approaches using columns (1)-(3) and (5)-(7) keep the main empirical results qualitatively unchanged, i.e. $\beta_1 < 0$ and $\beta_3 > 0$.

Table 2: Wealth Inequality and the Strength of Regulations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Loan Recovery Rate (%)				*Employment Protection Law (%)*			
Log GDP per capita (2000's)	-14.07**	0.800	-10.63*	-14.14**	-17.50***	-14.84**	-18.13**	-17.34***
	(6.902)	(8.498)	(6.094)	(5.808)	(6.436)	(5.603)	(6.922)	(6.464)
Wealth Gini (2000's)	-3.528***	-1.224	-2.779***	-3.267***	-3.512***	-3.171***	-3.665***	-3.519***
	(1.185)	(1.331)	(1.027)	(0.949)	(1.176)	(1.091)	(1.308)	(1.227)
Wealth Gini (2000's) x Log GDP per capita (2000's)	0.190*	-0.00483	0.152*	0.202**	0.241**	0.208**	0.250**	0.239**
	(0.0992)	(0.120)	(0.0866)	(0.0833)	(0.0933)	(0.0829)	(0.0985)	(0.0934)
English Legal Origin	14.73***		15.16***	17.46***	-14.74***		-14.65***	-14.84***
	(4.506)		(4.474)	(4.106)	(3.710)		(3.968)	(3.709)
German Legal Origin	45.04***		32.69***	30.52***	5.600		6.735	5.528
	(5.495)		(5.954)	(5.316)	(3.480)		(4.774)	(4.282)
Scandinavian Legal Origin	54.88***		39.50***	36.38***	1.840		3.317	2.167
	(3.862)		(4.805)	(4.152)	(5.299)		(7.734)	(6.593)
Ethnic Fractionalization		-27.15***	-13.32*	-16.09**		-2.521	3.352	3.323
		(7.723)	(7.159)	(6.832)		(9.243)	(10.23)	(9.773)
Democracy			16.79***				-1.677	
			(5.177)				(4.818)	
Electoral Democracy Index				32.94***				2.875
				(6.979)				(6.821)
Constant	285.2***	129.5	223.2***	248.1***	309.5***	280.4***	320.2***	306.6***
	(82.44)	(94.64)	(73.26)	(66.78)	(81.65)	(74.00)	(91.35)	(82.67)
Observations	146	143	131	136	67	67	65	67
R-squared	0.363	0.195	0.488	0.540	0.336	0.161	0.332	0.339

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by country.

D Additional Proofs

Lemma 6 *The cost function* $\varsigma(l^s)$ *satisfies* $\varsigma'(l^s)\frac{l^s}{\varsigma(l^s)} \geq 1; l^s \geq 0.$

Proof: Define the auxiliary function:

$$\Upsilon_{l^s}(\bar{l}) \equiv \frac{\varsigma(l^s) - \varsigma(\bar{l})}{l^s - \bar{l}}; \bar{l} < l^s. \tag{77}$$

Differentiation with respect to $\bar{l}$ leads to:

$$\Upsilon'_{l^s}(\bar{l})(l^s - \bar{l}) = \frac{\varsigma(l^s) - \varsigma(\bar{l})}{l^s - \bar{l}} - \varsigma'(\bar{l}). \tag{78}$$

Note that $\Upsilon'_{l^s}(\bar{l}) \geq 0$. In fact the convexity of $\varsigma(\cdot)$ implies that:

$$\begin{aligned} \varsigma(\lambda l^s + (1-\lambda)\bar{l}) &\geq \lambda\varsigma(l^s) + (1-\lambda)\varsigma(\bar{l}), \forall\lambda \in [0,1] \\ \Rightarrow \frac{\varsigma(\bar{l} + \lambda(l^s - \bar{l})) - \varsigma(\bar{l})}{\lambda} &\leq \varsigma(l^s) - \varsigma(\bar{l}). \end{aligned}$$

Taking the limit $\lim_{\lambda \to 0^+}$ we obtain:

$$\begin{aligned} \varsigma'(\bar{l})(l^s - \bar{l}) &\leq \varsigma(l^s) - \varsigma(\bar{l}) \\ \Rightarrow \Upsilon'_{l^s}(\bar{l})(l^s - \bar{l}) &\geq 0 \Rightarrow \Upsilon'_{l^s}(\bar{l}) \geq 0, \end{aligned}$$

where we have used the fact $l^s > \bar{l}$. This last condition implies that $\Upsilon_{l^s}(\bar{l}_1) \leq \Upsilon_{l^s}(\bar{l}_2), \forall\bar{l}_1 \in [0, \bar{l}_2]$. In particular, it is satisfied for $\bar{l}_1 = 0$ and any $\bar{l}_2 \to l^s$ with $l^s \geq 0$. This is,

$$\begin{aligned} \Upsilon_{l^s}(0) &< \lim_{\bar{l}_2 \to l^s \geq 0} \Upsilon_{l^s}(\bar{l}_2) \\ \Leftrightarrow \frac{\varsigma(l^s)}{l^s} &\leq \varsigma'(l^s), \end{aligned}$$

which proves the the result.

■