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Credit market frictions and political failure ☆

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Abstract

We study how an excessively favorable regulatory environment for banks could arise even with a perfectly competitive credit market in a median voter world. In our occupational choice model with heterogeneous wealth endowments, market failure due to unobservability of entrepreneurial talent endogenously creates a misalignment between surplus maximizing reforms and reforms that are preferred by the median voter, who is a worker. This is in contrast to the world without market failure where the electorate unanimously vote in favor of surplus maximizing institutional reforms. This paper illustrates how market failure could lead to political failure even in the benchmark political system that is free from capture by interest groups.

Keywords: occupational choice, adverse selection, property rights, asset liquidation, political failure, market failure. D72, D82, O16

1. Introduction

Capital market failures arising due to informational and institutional frictions prevent individuals and economies from reaching their full potential and can lead to poverty traps (Banerjee and Newman (1993) and Galor and Zeira (1993)). Similarly, governments can fail to implement surplus-maximizing policies due to political economy reasons, which we can refer to as *political failure*. However, the interplay of market failure and political failure is an understudied subject, and an important one for policy makers.

The political economy approach to development has emphasized how concentration of political power in the hands of an elite may allow the elite to distort the market outcome in their favour, and this typically

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leads to inefficiencies.[1] In this paper we highlight the reverse link, namely that market failure may lead to political failure even when political power is uniformly distributed.[2]

In our model, entrepreneurial talent and wealth endowments are independently distributed. When talent is unobservable there is adverse selection in the credit market, since the probability of repayment depends on the entrepreneur's talent. The competitive market responds to this imperfection by screening agents based on their collateralizable wealth. Thus, occupational choice (wage labor versus entrepreneurship) is affected by both endowments and general equilibrium prices. The Stiglitz and Weiss (1981) credit rationing problem for poor but talented agents and the de Meza and Webb (1987) over-lending distortion for agents who are neither poor nor talented can simultaneously exist in our economy. Some high-ability agents who would be entrepreneurs in a full-information world become workers as they are credit-rationed from lack of collateral. Conversely, some low ability agents who would be workers in a full-information world become entrepreneurs in a pooling equilibrium, where they receive the same interest rate as high ability entrepreneurs with the same collateral.

Asymmetric information about the quality of entrepreneurs generates a misalignment of interests between total surplus, which depends on the quantity and quality of firms, and the share of surplus going to workers, which depends only on the demand for labor determined by the quantity of firms. We show that this leads to preferences over policies that defeat surplus-maximizing reforms, even though markets are competitive and no group earns economic rents.

Given that the median voter in our economy is a worker and not an entrepreneur, the feasibility of an institutional reform depends on its effects on workers' welfare. We focus on two types of institutional reform: one aimed at improving the security of property rights in general, versus another aimed at facilitating the liquidation of assets used as collateral. A general property rights protection reform makes wealth more effective as collateral, inducing exit of low types and entry of high types. This is always desirable in terms of total surplus because it does not alter occupational choices. While this adjustment is efficient, its overall effect on labor demand, and consequently on wages, is ambiguous. As a result, these reform proposals may be blocked by the median voter.

The second type of reform helps banks directly by making liquidating collateral easier, which raises efficiency. It also indirectly raises labor demand by allowing expansion of loans to more firms, which leads to lower average firm quality. Therefore, even without invoking bankers' interest group power, liquidation

[1]This is most evident when elites lobby for barriers to entry (Djankov et al. (2002)). Acemoglu (2003) makes the argument that concentration of political power may lead to distortion of the market through manipulation of factor prices in ways that benefit the political elites.

[2]For a discussion of somewhat different notions of political failure see Besley (2006).

reforms receive political support because they raise labor demand and wages. However, as we show, this is not always necessarily welfare enhancing. Excessive liquidation can reduce the quality of the pool of entrepreneurs, as rich low types crowd out poor high types.

On the one hand, a general property rights protection reform increases surplus but may not benefit the median voter. On the other, a banking reform always appeals to the median voter, but has an ambiguous effect on surplus. This is the main message of this paper - surplus maximizing policies may not be politically feasible while politically feasible policies may not be surplus-maximizing due to the effect of information asymmetries in the financial sector and its effect on the labor market via occupational choice.

In order to realign the median voter's incentives with total surplus maximization, a property rights protection reform should be accompanied by a redistributive scheme that eliminates the occupational choice distortions. The optimal redistribution mechanism needs to make taxes conditional on two things: occupational choice and collateral. If the government does not possess information about the value of collateral of different entrepreneurs, the only transfer mechanisms that are feasible are standard redistributive taxes without such conditionality. In this case we show that for countries that are poor in terms of aggregate wealth and human capital, the efficient reforms remain infeasible even when allowing for transfers. This suggests that when reforms are subject to political feasibility, the likelihood of surplus-maximizing reforms goes up with the level of development.

Instead of taking political classes or interest groups as exogenous and studying the impact of their alignment on various inefficiencies, we derive the potential inefficiencies in the political alignment directly from economic fundamentals, namely, the nature of technology and the informational environment in the economy.[3] Hence this paper differs from other models of endogenous policies in that the heterogeneity which causes households to choose inefficient policies is itself the endogenous outcome of asymmetric information.[4] Moreover, market failures and political failures may complement each other in generating economic inefficiencies.

In terms of the model of the economy, there are other papers that deal with occupational choice and financial development in a general equilibrium setting, but ours is the first paper to analyze the consequences for political alignments on property rights protection reforms.[5] Our result that efficient financial reforms are more difficult to pass by majority rule in economies with low wealth and low human capital may remind the reader of similar findings in Rajan and Zingales (2006). They show how low average levels of endowments

[3]In this regard, the mechanism that our paper identifies relates to a theme present in both Marxist and Neo-Classical theories of institutions, namely, economic forces shape the base over which the political superstructure is built. See Chapter 1 in Bardhan (1989) for a review of the common themes in these literatures concerning the theory of institutions.

[4]See e.g. Boyer and Laffont (1999), Perotti and Volpin (2004), and Caselli and Gennaioli (2008)

[5]See for example Ghatak et al. (2001), Ghatak et al. (2007), and Buera et al. (2011), and the references therein.

can create constituencies that combine to perpetuate an inefficient *status quo* against educational reform. The main mechanism in our paper, namely the contrast between workers' welfare and total surplus when it comes to property rights protection, is present in a different form in Biais and Mariotti (2009), where the induced inefficiencies are on bankruptcy reforms.

The possibility of workers blocking technological improvements through unions has been studied (e.g., Schmitz (2005) and Alder et al. (2014)), but the channel we emphasize highlights the pivotality of workers' political interests and preferences even when there are no unions.

The paper is organized as follows. We set up the basic model with credit and labor markets in section 2, and characterize the equilibrium contracts and occupational choice in terms of ability and wealth given the informational and institutional frictions in section 3. In section 4 we analyze the political economy behind the choice of credit market institutions. Section 5 discusses the redistributive schemes that in some cases can realign efficiency and incentives. Section 6 concludes.

2. Model

2.1. Basic assumptions

The basic setup for the description of an economy is based on Ghatak et al. (2007) . There are two technologies in the economy: a subsistence technology that yields $\underline{w}$ per unit of labor and a more productive "modern" technology that yields a return $y = R$ in case of success and $y = 0$ in case of failure. The latter requires n workers and 1 entrepreneur to run it. The modern technology also yields a non-appropriable benefit M to the entrepreneur. We can interpret M as a private benefit from entrepreneurship, for example, perks that entrepreneurs enjoy relative to workers such as the psychological payoff from not having a boss. Alternatively, we can interpret it as the disutility of labor effort, where the disutility of entrepreneurial effort is normalized to zero.

The economy is populated with risk neutral agents of measure one. Agents are endowed with one unit of labor, entrepreneurial talent and illiquid wealth. We assume that wealth and talent are independently distributed. The talent of an agent is the probability of success of the more productive technology if she becomes an entrepreneur. We assume that the distribution of talent is binary. There are a proportion q of agents who succeed with probability one and a proportion $1 - q$ of agents who succeed with probability θ which is less than one.[6] We refer to these two types of agents as "high" and "low" types.

[6]Our results apply *mutatis mutandis* to the case where the high types have talent θ_H such that $1 \geq \theta_H > \theta \geq 0$. In an earlier version we also considered a continuous distribution of talent. The results remain similar to the ones presented here although the characterization is less sharp.

Agents are also endowed with illiquid wealth a that is distributed in the population with density $g(a)$. To fix ideas we can think of this wealth as the value of an agent's house or land. Agents need to borrow to become entrepreneurs, because of initial fixed costs or because workers are paid up-front. We assume capital fixed costs are equal to zero as these do not alter the key messages of the paper. The initial liquidity necessary to become an entrepreneur is therefore only due to the need to pay workers up-front a flat wage of w. We first simply assume this, so that the initial amount of liquidity necessary to run a firm equals nw. At the end of section 3, we argue that such a necessity emerges in equilibrium in an augmented model where entrepreneurs can choose whether to offer workers an initial unconditional wage or a contract involving payments conditional on the success of the firm.

Workers and entrepreneurs are perfect complements in the production function. Denoting f as the number of firms operating, given that the population is of size 1, we must have $f(n+1) \leq 1$, or, $f \leq \frac{1}{n+1}$. The assumption that $n > 1$ guarantees the worker is the median voter. This greatly simplifies our analysis and allows us to get sharp political economy results.[7]

Entrepreneurial ability can be either observable or unobservable. In the first-best world talent is observable and the first welfare theorem operates, ensuring that the competitive equilibrium is Pareto efficient. When talent is unobservable, a market failure arises, as M, the non-appropriable component of entrepreneurial output, induces even low types to choose entrepreneurship when it is efficient for them to work for a wage. Consequently the credit market uses an agent's wealth as a screen. This is discussed in section 3.

In addition to asymmetric information about entrepreneurial quality, we introduce two institutional frictions. The first relates to the quality of property rights: agents with wealth a only receive an expected payoff of $(1-\tau)a$ from holding their wealth. This could reflect insecure property rights, with τ being the probability that the owner loses the property. It could also reflect legal and institutional frictions that make it costly to hold property, with τ being a proportional measure of these transaction costs. The second institutional friction is specific to the credit market and affects the ease with which collateral can be transferred from a borrower to the bank. When a borrower who posts wealth a as collateral defaults, banks only recover a fraction $\phi \in [0,1]$ of that asset. ϕ reflects the degree to which collateral can be liquidated, e.g., how easy it is to foreclose on a mortgaged property.

We treat τ and ϕ symmetrically and independently. Both τ and ϕ are deadweight losses, with no redistributive component (one agent's loss is not another's gain), and both occur independently. If a is

[7] However all our political economy results go through even when $n = 1$, as we can always find at least a tiny measure of entrepreneurs (typically low types) who side with the workers when they vote. This is shown explicitly in the proofs of the results on voting.

pledged as collateral then $a(1-\tau)\phi$ is the expected collateral value to the bank. To make our argument in a particularly stark way, we assume that it is costless to choose any value of τ or ϕ. In particular, as it is possible to choose $\tau = 0$ and $\phi = 1$ at no direct resource cost, and no one *directly* gains from having these frictions, it helps focus on why voters may choose other values of τ and ϕ due to their indirect effect on the credit and labor markets. We return to a further discussion of these parameters in section 4.

In addition to these institutional variables, a limited liability constraint also operates in the economy. If an entrepreneurial project fails, the agent can only be liable up to the amount of illiquid asset she owns, namely, a. In other words, agents are guaranteed a non-negative payoff in all states of the world.

We assume that

$$\theta(R - n\underline{w}) + M > \underline{w} > \theta R - n\underline{w} + M. \tag{1}$$

The right hand side of inequality (1) implies that the returns from the project are not high enough to cover costs when the project is run by a low type entrepreneur. Hence in the first-best allocation, only high types should choose entrepreneurship. The left hand side of inequality (1) allows us to explore the interesting case when entrepreneurship is attractive for low types when, as a result of limited liability, they only bear the full costs when the project is successful.

Agents can either choose to work in the subsistence sector, become workers, or become entrepreneurs. As entrepreneurs, their payoff depends on their type, which is the probability of the entrepreneurial project being successful. To set up a firm, an entrepreneur needs to hire n workers and pay them a wage w up-front, with $w \geq \underline{w}$ to be determined endogenously. The payoff of an agent who works for a wage is $w + (1-\tau)a$ regardless of type. Her payoff if she chooses entrepreneurship depends on the credit contract she accepts.

2.2. Timing

The timing of the model is as follows:

1. Wealth and entrepreneurial talent of agents are realized.
2. Agents vote on institutional reform (i.e., a direct vote on τ and ϕ).
3. Agents make occupational choices.
4. Output is realized, and expropriation of property and liquidation of collateral takes place.
5. Final payoffs are realized and consumption takes place.

The model is solved backwards. We start with stage 3 where agents make their occupational choices and show that there exists a unique equilibrium. Consequently, going into stage 2 agents know their expected payoff from the *status quo* and alternative values of ϕ and τ and have well-defined preferences over these. In section 4 we show how stage 2 plays out both in the world with complete and incomplete information.

3. Credit contracts and equilibrium

Agents need to borrow from the credit market to become entrepreneurs, as their wealth is illiquid and workers need to be paid up-front irrespective of whether the project succeeds or fails later. Supply of credit is assumed to be perfectly elastic at a gross interest rate equal to 1. We impose no restrictions on the type of contract that can be offered by a bank other than the condition that it does not make negative profits in expectation.

3.1. First best

If talent were observable, given inequality (1), only high types would become entrepreneurs. This is because the left-hand side of inequality 1 ensures that $R - n\underline{w} + M > \underline{w}$, which implies that in the first-best world only high types will choose entrepreneurship. Therefore, in equilibrium the number of firms will be, $f = q$.

Since markets are perfectly competitive, the equilibrium would be Pareto efficient. Also, it turns out that the equilibrium with observable talent would also be surplus maximizing. The wage would depend on whether the economy is talent-rich (i.e., when $q\,(n+1) \geq 1$, or, $\frac{q}{1-q} \geq \frac{1}{n}$) or talent-poor (i.e., $q\,(n+1) < 1$, or $\frac{q}{1-q} < \frac{1}{n}$). A talented entrepreneur prefers entrepreneurship to being a worker (in the world of observable talent) if and only if $R - nw + M \geq w$. Therefore, $\bar{w} \equiv \frac{R+M}{n+1}$ is the upper bound for wages, beyond which nobody would want to be an entrepreneur. In the talent-rich case, the wage would be $\overline{w}$. The equilibrium wage would instead be $\underline{w}$ in the talent-poor economy. This is because the wage is determined by whoever is on the short side of the market. We assume $R > nM$ for the appropriable returns from the project to be large enough to cover the wage payment when the wage is $\overline{w}$. Since each entrepreneur requires n workers, the abundance of talent depends on the proportion of high types in the economy relative to n. This leads us to the following observation.

Observation 1. *When talent is observable only high types choose entrepreneurship. The equilibrium wage is $\overline{w}$ if $\frac{q}{1-q} \geq \frac{1}{n}$ and $\underline{w}$ otherwise.*

3.2. Second best

The project return $y \in \{0, R\}$ is verifiable for the bank, and so is the wealth of an agent, a. However, talent is not observable. Therefore, a credit contract can be described by a pair $\{r(a), c(a)\}$ where the transfer from an agent with wealth a to the bank is $r(a)$ when $y = R$, and $c(a)$ when $y = 0$. Limited liability implies that the upper bound on $r(a)$ and $c(a)$ is given by $R + a$ and a, respectively.

A high type succeeds with higher probability and hence, relative to a low type, prefers a contract that is worse in the bad state ($c(a)$ as high as possible) and yields a high payoff in the good state ($r(a)$ as low as possible). From assumption (1) we know that low types will never accept an actuarially fair contract and hence it is unprofitable to lend to them. This implies that if low types are in the pool of borrowers, which they will be in a pooling or a semi-separating equilibrium, banks will offer contracts where $c(a) = a$. Recall that if a is pledged as collateral, then $a(1-\tau)\phi$ is the expected collateral value to the bank.

To ensure that credit constraint binds in equilibrium for low wealth agents we assume that

$$M > \underline{w} \qquad \text{and} \qquad n\underline{w} > (q + (1-q)\theta)R \tag{2}$$

and the support of the wealth distribution $g(a)$ includes zero. This set of assumptions guarantees that there exists a wealth level $\underline{a} > 0$ such that agents with wealth below that are unable to obtain credit and hence are forced to be workers. The role of M is to make entrepreneurship attractive to agents even when the appropriable returns are low so as to create the adverse selection problem. In particular, with $\underline{w} > M = 0$, low type agents will always prefer to work for a wage and the adverse selection problem disappears.

We will use the Rothschild and Stiglitz (1976) equilibrium concept to characterize the credit market equilibrium. This is also used in Ghatak et al. (2007) and is standard in this literature. The following two conditions characterize an equilibrium: i) all the contracts in the equilibrium set make non-negative profits, and ii) there does not exist a contract that can be introduced that will determine a strictly positive profit. If this does not hold, low type agents will not be attracted to entrepreneurship. Let us denote by $\bar{a}$ the upper bound of wealth endowment for a low type to be interested in entrepreneurship, and denote by $\lambda(a)$ the fraction of low types who choose entrepreneurship among those showing to have wealth a.

Whenever a bank expects a positive fraction $\lambda(a)$ of low types with wealth a to be among the borrowers, for the contract to make non-negative profits, the interest rate $r_p(a)$ must satisfy the following condition

$$r_p(a)\theta_p(a)nw + (1-\theta_p(a))(1-\tau)\phi a \geq nw \tag{3}$$

where

$$\theta_p(a) = \frac{q + \theta(1-q)\lambda(a)}{q + (1-q)\lambda(a)} \tag{4}$$

is the average talent in the pool of entrepreneurs at wealth level a. This average talent in the pool at a given wealth level is endogenously determined by the demand for credit by low types at that level of wealth. Notice that $\theta_p(a)$ is decreasing in $\lambda(a)$ because $\theta < 1$. This is what we would expect: the greater the fraction of low types in the pool, the lower the average quality of the pool.

When the return from entrepreneurship for a low type exceeds that of being a worker, $\lambda(a) = 1$, while $\lambda(a) = 0$ when it is the other way around. The indifference condition for a low type between entrepreneurship and working for a wage is

$$\theta\left(R - r_p(a)nw\right) + \theta(1-\tau)a + M = w + (1-\tau)a. \tag{5}$$

In this case, $\lambda(a)$ will lie between zero and one as low-types will randomize when they are indifferent.

Since credit markets are perfectly competitive, equation (3) will hold with equality, yielding a zero profit condition. Rearranging this we can solve for the pooling interest rate for borrowers with wealth a:

$$r_p(a) = \frac{nw - (1-\theta_p(a))(1-\tau)\phi a}{\theta_p(a)nw}. \tag{6}$$

We can solve for $\lambda(a)$, $r_p(a)$, and $\theta_p(a)$ explicitly by simultaneously solving (3), (5), and (4).

We proceed proving our main result by first establishing two technical steps, namely Lemmas 1 and 2.

Lemma 1.

$$\frac{\partial\lambda(a)}{\partial a} \leq 0 \qquad a \in [\underline{a}, \infty) \tag{7}$$

Proof. Note first that since agents below $\underline{a}$ are credit constrained, $\lambda(a) = 0$ for $a < \underline{a}$. For $a \in [\underline{a}, \infty)$, $\lambda(a)$ is jointly determined by the zero profit condition for the banks and the occupational choice condition for low types. Before we begin, note that the average quality of entrepreneurs at wealth a is

$$\theta_p(a) = \left(\frac{q + (1-q)\theta\lambda(a)}{q + (1-q)\lambda(a)}\right) \tag{8}$$

and

$$\frac{\partial\theta_p(a)}{\partial a} = \underbrace{\frac{\partial\theta_p(a)}{\partial\lambda}}_{-ve} \cdot \frac{\partial\lambda(a)}{\partial a}. \tag{9}$$

Hence we need to show $\frac{\partial\theta_p(a)}{\partial a} \geq 0$. Let us consider the region of wealth where $R - r_p(a)nw > 0$. In this region the interest rate $r_p(a)$ is determined by

$$\theta_p(a)r_p(a)nw + (1-\theta_p(a))\phi(1-\tau)a = nw \tag{10}$$

and by a low type entrepreneur's occupational choice constraint when he is indifferent between entrepreneurship and working for a wage. Define $v_L(a, r_p(a), w) := \theta(R - r_p(a)nw) - (1-\theta)(1-\tau)a + M$. We must have $\lambda(a) = 1$ when $v_L(a, r_p(a), w) > w$ since low types strictly prefer entrepreneurship, and $\lambda(a) = 0$ for $v_L(a, r_p(a), w) < w$ since low types strictly prefer working for a wage. In these regions $\frac{\partial\lambda(a)}{\partial a} = 0$. Lastly $\lambda(a) \in [0, 1]$ when $v_L(a, r_p(a), w) = w$ since low types randomize when indifferent. In this region substituting the interest rate $r_p(a)$ using equation (10) into $v_L(a, r_p(a), w)$ we find that $\lambda(a)$ is determined by

$$\theta R - \frac{\theta}{\theta_p(a)} nw - (1-\tau)a \frac{(\theta_p(a)(1-\theta) - \theta(1-\theta_p(a))\phi)}{\theta_p(a)} + M = w. \tag{11}$$

Differentiating this expression we find

$$\frac{\partial \theta_p(a)}{\partial a} = \frac{(1-\tau)(1-\theta)\theta_p(a)^2}{nw - (1-\tau)\phi a} > 0 \tag{12}$$

since $nw > a(1-\tau)\phi$. Hence in this region we have $\frac{\partial \lambda(a)}{\partial a} < 0$.

Now consider the region where $R - r_p(a)nw < 0$. In this region $r(a) = R + (1-\gamma(a))a$ where $1-\gamma(a)$ is the proportion of collateral transferred to the bank in the success state. $\lambda(a)$ is determined jointly by the zero profit condition

$$\theta_p(a)(R + (1-\gamma(a))(1-\tau)\phi a) + (1-\theta_p(a))(1-\tau)\phi a = nw \tag{13}$$

and by the low type's indifference between entrepreneurship and working for a wage

$$\theta\gamma(a)(1-\tau)a + M = w + (1-\tau)a, \tag{14}$$

through its effect on pool of entrepreneurs $\theta_p(a)$. Define $v_L(a, \gamma(a), w) := M - (1-\theta\gamma(a))(1-\tau)a$. When low types are indifferent we have $v_L(a, \gamma(a), w) = w$. Similar to the previous case when this indifference does not hold we must have $\lambda(a) \in \{0, 1\}$ and $\frac{\partial \lambda(a)}{\partial a} = 0$. When the indifference does hold we can substitute for $\gamma(a)$ from (14) into (13) and differentiate to find

$$\frac{\partial \theta_p(a)}{\partial a} = \frac{(1-\tau)\phi(\theta_p(a) - \theta)}{\theta(R - (1-\tau)\phi\gamma(a)a)}. \tag{15}$$

Note that $1 - \gamma(a)\theta = \frac{M-w}{(1-\tau)a}$. $R > (1-\tau)\phi\gamma(a)a$ is guaranteed by assumption in inequality (1) since $\theta R + M - (n+1)w < 0$ and $R - nw > 0$ for $w \in [\underline{w}, \overline{w}]$. Since $\theta_p(a) > \theta$, we have $\frac{\partial \theta_p(a)}{\partial a} > 0$ and consequently $\frac{\partial \lambda(a)}{\partial a} < 0$ in this region. $\square$

The intuition is as follows: as a goes up, in the pooling equilibrium, the pooling interest rate falls as loans are better collateralized and this also reduces the incentive of low types to borrow. To keep them indifferent, the proportion of low types must fall so that the pooling interest rate falls.

Let us define the wealth threshold $\overline{a}$:

$$\overline{a} \equiv \frac{\theta(R - nw) + M - w}{(1-\tau)(1-\theta)}. \tag{16}$$

This threshold is determined by the indifference condition for low types in terms of occupational choice when only high types are expected to be entrepreneur (separating equilibrium) and hence the interest rate is 1. We then show:

Lemma 2. *Only agents with wealth $a \geq \overline{a}$ are offered a separating contract and this contract is defined by $r(a) = nw$ and $c(a) = \overline{a}$.*

Proof. First note that $\overline{a}$ is the collateral requirement such that low types with this wealth are unwilling to become entrepreneurs even at interest rate of one. That is

$$\theta(R - nw) + M - (1-\tau)(1-\theta)\overline{a} = w. \tag{17}$$

Rearranging this, we get expression for $\overline{a}$ in equation (16) in the paper. Hence high types can be offered the contract $r(a) = nw$ and $c(a) = \overline{a}$, that is the collateral in case of failure and the interest rate in case of success will be $(\overline{a}, 1)$, and this will make zero profits. To see that this is unique assume a contract $(\overline{a}, r')$ exists that dominates $(\overline{a}, 1)$. For this to be true, $r' < 1$ must be true since at a given wealth level the contract with the lowest interest rate dominates. The bank that offers this contract makes losses since the opportunity cost of capital is 1, and hence, this contract will not be offered. But this is a contradiction. This proves that the separating contract $(\overline{a}, 1)$ is viable and unique for wealth $a \geq \overline{a}$.

We will now show that separating contracts will not exist in equilibrium for wealth $a < \overline{a}$. To see this note that at wealth a the contract $(r_p(a), a)$ makes use of the entire wealth as collateral. A separating contract (r', a) for $r' < r_p(a)$ will make losses since $r_p(a)$ is already a zero profit interest rate. A separating contract (r', a) for $r' > r_p(a)$ will be dominated by the contract $(r_p(a), a)$. This rules out a separating contract with collateral requirement a. Finally a separating contract with a collateral requirement $a' < a$ for an agent with wealth a will not be incentive compatible since for any interest rate it would be more attractive for low types if it is attractive for high types. Hence no separation is possible for wealth $a < \overline{a}$. □

For wealth levels higher than $\overline{a}$, low types strictly prefer being workers and therefore the contract described above does constitute a separating equilibrium. In the proof of this Lemma we show that it is the unique equilibrium for this wealth range, and also that for agents with $a < \overline{a}$ there does not exist a separating equilibrium.

For wealth levels below $\overline{a}$, the equilibrium is pooling with interest rate given by $r_p(a)$. With this credit contract the payoff of low type entrepreneurs is

$$\theta(R - r_p(a)nw) + \theta(1-\tau)a + M, \tag{18}$$

whereas that of a high type entrepreneur is

$$R - r_p(a)nw + (1-\tau)a + M. \tag{19}$$

As a goes down, the fraction of low types borrowing ($\lambda(a)$) goes up since the cost of default goes down. If credit constraints bind, there will be a threshold wealth below which no loans will be given due to the decline in the quality of the pool of borrowers. The maximum interest rate a bank can charge in a pooling equilibrium is $\theta_p(a)R$. Therefore, this threshold, $\underline{a}$, is obtained from the break-even condition for banks:

$$\underline{a} \equiv \frac{nw - \theta_p(\underline{a})R}{\phi(1-\tau)}. \tag{20}$$

Now we are ready to prove the main result characterizing the occupational choices and the credit contracts offered for any given wage:

Proposition 1 (Occupational choice). *All agents with wealth $a < \underline{a}$ are credit constrained and hence become workers. Agents with wealth $a \in [\underline{a}, \bar{a}]$ and high talent become entrepreneurs, whereas agents in the same wealth bracket but with low talent randomize and choose entrepreneurship with probability $\lambda(a) \in [0,1]$ decreasing in a. Among agents with wealth $a \geq \overline{a}$, those with high talent become entrepreneurs and the rest become workers.*

Proof of Proposition 1. To begin with, note that $\underline{a}(\underline{w}) > 0$ implies that $\underline{a}(w) > 0$ for all $w \geq \underline{w}$. This follows from the observation that in (20), $\underline{a}(w)$ is increasing in w.

Furthermore we must have $\overline{a} > \underline{a}$. If not, low types with wealth $\underline{a}$ would not choose entrepreneurship since their wealth will be greater than what is required to offer high types a separating contract which they will accept (Lemma 2). This would mean the quality of the pool of entrepreneurs $\theta_p(\underline{a})$ defined in (4) equals one, since there are only high type entrepreneurs. Plugging $\theta_p(\underline{a}) = 1$ into (20) we see that this implies $nw - R > 0$. This is a contradiction since, by assumption, we have $R - nw \geq 0$ for $w \in [\underline{w}, \overline{w}]$. Hence if $\underline{a}(\underline{w}) > 0$, we must have $\overline{a} > \underline{a} > 0$.

We begin with wealth $a \geq \overline{a}$. Lemma 2 shows that, in this region, high type agents are offered a separating contract, which they accept. By inequality (1), low types must become workers in this region. This implies that $\lambda(a) = 0$ in this region of wealth. Low type agents with wealth $a = \overline{a}$ are indifferent between working for a wage and entrepreneurship. For wealth $a < \overline{a}$, we see from Lemma 1 that the proportion of low types who choose entrepreneurship increases as $\frac{\partial \lambda(a)}{\partial a} < 0$. Finally from (20) agents with $a < \underline{a}$ are credit constrained. $\square$

The intuition is as follows. If agents possess sufficient wealth, then separating contracts are possible by setting a high enough collateral requirement. Pooling equilibria emerge for middle wealth levels under which, for a given wealth level, both high and low types agent borrow. For lower wealth levels, the cost of default goes down, and so the adverse selection problem is amplified. This results in higher and higher pooling interest rates. There exists a certain low-wealth threshold below which no borrower gets a loan: the break-even pooling interest rate is too high for high types to find taking a loan worthwhile.

It is clear upon inspection that $r_p(a)$ is decreasing as frictions affecting the credit market decrease (ϕ goes up). This is because increasing the proportion of collateral that can be liquidated allows banks to break even at a lower interest rate. Similarly, the interest rate decreases as the protection of property rights improves (τ goes down). We can see that $\underline{a}$ is increasing in τ and decreasing in ϕ. These are properties that we will return to when we analyze welfare and policies.

3.3. Equilibrium

The labor market is assumed to be perfectly competitive, so equilibrium is characterized by a market clearing condition. We start by thinking of the labor demand of a firm instead of the labor demanded by an entrepreneur. A firm demands one entrepreneur and n workers. Aggregate supply is 0 for wage $w < \underline{w}$, and 1 for $w \geq \underline{w}$.

Proposition 2 (Labor market)**.** *A unique market clearing wage $w \in [\underline{w}, \overline{w}]$ exists.*

Proof of Proposition 2. The labor markets are assumed to be perfectly competitive. Labor supply is 0 for wage lower than $\underline{w}$ and 1 for any wage $w \geq \underline{w}$. Labor demand is given by:

$$(1+n)\left(q(1-G(\underline{a})) + (1-q)\int_{\underline{a}}^{\overline{a}} \lambda(a)g(a)da\right). \tag{21}$$

First we will see that the labor demand is monotonically decreasing in the wage.

$$\frac{\partial L_D}{\partial w} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial w}\left(q + (1-q)\lambda(\underline{a})\right) + (1-q)\int_{\underline{a}}^{\overline{a}} \frac{\partial \lambda(a)}{\partial w} g(a)da\right) < 0. \tag{22}$$

This is true since

$$\frac{\partial \underline{a}}{\partial w} < 0 \qquad \text{and} \qquad \frac{\partial \lambda(a)}{\partial w} < 0. \tag{23}$$

This implies that there is a unique $w \geq \underline{w}$ that clears the market. Wage w is bounded from above by $\overline{w} = \frac{R+M}{n+1}$ since even high types would exit entrepreneurship if wages rise above this. If $w = \overline{w}$ then high types must randomize between entrepreneurship and working for a wage with probability $p = \dfrac{1}{q(n+1)}$.

As $w = \overline{w}$ implies that $q \geq \frac{1}{n+1}$. To see this note two things. First, when $w = \overline{w}$ there cannot be any low type entrepreneurs since $\overline{w} = \frac{R+M}{n+1} > M$. Second, note that when $w > \underline{w}$ none of the agents are engaged in the subsistence sector and consequently fraction $\frac{1}{n+1}$ of the population must be entrepreneurs. This implies that the economy is talent rich, that is, $q \geq \frac{1}{n+1}$. If high types randomize and become entrepreneurs with probability p, there will be pq entrepreneurs and $(1-p)q + (1-q)$ workers in the economy, which yields $\frac{1}{n+1}$ entrepreneurs and $\frac{n}{n+1}$ workers. Hence a unique $w \in [\underline{w}, \overline{w}]$ exists that clears the market. $\square$

Note that whenever $w > \underline{w}$, the labor market is tight in the sense that there is no subsistence sector. Workers are on the short side of the market and the wage must rise to equilibrate the demand and supply of workers. The number of firms (and entrepreneurs), f, in such an economy is $\frac{1}{n+1}$. Whenever the wage increases, the proportion of entrepreneurs in the economy must stay constant at $\frac{1}{n+1}$. Even though the wage increase does not affect the relative proportions of the population engaged in the two sectors, it does affect the composition. [8] In particular, the increase in wage will affect the average quality of the pool of entrepreneurs in the economy.

Having completed the unique equilibrium characterization it is important to clarify the role of banks in this model. Given that capital is only used to pay workers, the bank is simply an intermediary facilitating the exchange between firms and workers. Therefore, it is reasonable to ask whether results would change substantively if banks were eliminated and workers were to be paid after output is realized (and not up-front). If there were no banks, workers could effectively "lend" their labor directly to firms. However, this process too would be subject to the information frictions that banks face in our model. Agents would choose between entrepreneurship and being "labor-lenders". For expositional ease, to begin with assume that $n = 1$ such that each entrepreneur needs to be matched with just one labor-lender. With this modification, when a labor-lender works for an entrepreneur, he offers his labor in exchange for a promise to be paid $r(a)$ in case of success of the project and $c(a)$ in case of failure. If, analogous to the assumption that credit market is perfectly competitive, we assume that the market where labor-lenders and entrepreneurs are matched is perfectly competitive, the equilibrium contract $(r(a), c(a))$ derived in our model will be preserved. Recall that all equilibrium credit contracts yield nw in expectation by the zero profit condition in the credit market. Hence, in expectation all labor-lenders earn w in expectation when $n = 1$. Since the voting stage introduced

[8] In contrast with Ghatak et al. (2007) there are no multiple equilibria here since firm level labor demand is constant at n. This implies that the intensive margin effect is absent and the labor demand is driven solely by the extensive margin effect.

in the next section precedes the stage where output is realized, and agents are risk neutral, agents who expect to be workers will vote in exactly the same way as they would in our model where the credit market is present. Now consider the case where $n > 1$. In this case an entrepreneur contracts with each of his n workers independently to supply labor in exchange of a promise to be paid $\frac{r(a)}{n}$ in case of success and $\frac{c(a)}{n}$ in case of failure. Once again, since the equilibrium credit contract makes zero profits, in expectation, these contracts yield a payoff of w to the labor-lender. As such it is possible to relabel the bank along with workers as "labor-lenders" and all our results are preserved.

An alternative way to show that the assumption that workers are paid up-front is not driving our results, would be to consider an augmented model in which entrepreneurs can choose between paying a wage at the start (hence having to borrow from a bank) or a wage conditional on project returns (in which case no borrowing is necessary). In this augmented model with this additional choice, we can show that the equilibrium would be identical to the one we have characterized. This is because, with standard assumptions on off-equilibrium beliefs, any entrepreneur who deviates by offering contingent wages and not borrowing would signal to workers that she is a low type, and hence workers would not accept the offer.

4. Institutional frictions

Having fully characterized the equilibrium credit contracts and wage in the economy for every pair of institutional parameters τ and ϕ, we turn to the preferences and choices over such institutional parameters (stage 2 of the game). The simplest way to model stage 2 is to assume that each institutional parameter is chosen separately by *pure majority rule*. That is, they are chosen such that there does not exist any other institutional parameter that would defeat it in a direct binary vote.[9]

We only consider institutional frictions involving wealth, since it is the instrument banks use to screen agents when talent is unobservable, and we want to show that the political process can fail to choose the right reforms even when there is no redistributive objective. Recall that the parameter τ captures the broad institutional wedges that affect all property-related transactions. A high τ implies that law enforcement is poor and assets are likely to be lost to external predators (e.g., roving bandits as in Olson (1993)). Similarly, to the extent τ captures transaction costs, we interpret them as passive waste as opposed to corruption (e.g., Bandiera et al. (2009)). Hence τ is a parameter that captures all institutional inefficiencies that affect asset ownership, and is independent of occupational choice.[10]

[9]See, for example, Persson and Tabellini (2000) for a simple text-book treatment.

[10]Although property rights protection problems could apply to incomes also, we restrict our attention to the effect of property rights on wealth to make the comparison with ϕ as sharp as possible. If τ is allowed to affect incomes, either wage or appropriable entrepreneurial returns or both, the political feasibility and surplus maximizing property of $\tau = 0$ varies from case to case, but the main message that surplus maximization does not coincide with political feasibility is very robust.

The institutional friction parameter ϕ affects credit markets directly, and reflects the costs of foreclosing on collateral. If an agent pledges wealth a as collateral to become an entrepreneur, and her project fails, the bank only recovers $a(1-\tau)\phi$. A fraction $(1-\phi)$ disappears due to the legal process of foreclosing on property. Note that under our assumptions, τ affects all property-related transactions, including posting wealth as collateral.[11] Wealth that is posted as collateral is either expropriated with probability τ or a fraction τ of its value disappears due to transaction costs and the banks take this into account when negotiating the collateral amount. Hence $\phi < 1$ lowers the value of an agent's wealth as collateral and consequently, one would think that $\phi = 1$ will be the surplus maximizing policy. This may not be true in the second-best world because of its effect on wages, as we shall see in the analysis below.

It is important to note that our results hold under different assumptions about what happens to resources lost due to ϕ and τ distortions. We could assume instead that wealth lost due to inefficient institutions is redistributed to all agents through lump-sum transfers or the provision of some public good funded by the revenue from what then is a "wealth tax". This assumption creates the well-understood incentive for a poor median voter to pick inefficient policies, since she focuses on redistribution rather than surplus maximization. Adding this channel will strengthen our results somewhat misleadingly, so we shut it down. We focus instead on the inefficiency arising from the median voter distorting institutions for their effect through occupational choices on the equilibrium wage. We could also assume that there is no deadweight loss when wealth is expropriated or liquidated - what is someone's loss is another person's gain either as extortion or bribes (in the case of τ) or fees (in the case of ϕ). For reasons of parsimony, we did not take this route (because we have to then model these other occupations) but it would merely change the calculation of the total surplus without changing our results qualitatively.

4.1. Institutions in the first-best world

In the first-best world the surplus-maximizing institutions are chosen.

Proposition 3. *When talent is observable, voters unanimously choose surplus maximizing institutions, that is $\tau = 0$.*

Proof. Under the first best the total surplus in the economy is:

$$W_{fb} = q(R+M) + \mathbb{1}_{[q(n+1)<1]}\underline{w}(1-q(n+1)) - \tau \int_0^\infty ag(a)da. \tag{24}$$

[11] Besley (1995) discusses the three channels through which property rights affects an agent's payoff. These are the security of tenure, the use of property as collateral, and the benefits of gains from trade (e.g., rental). To map this to our model, we think of τ as affecting all three channels whereas ϕ captures the additional frictions that only affect the use of property as collateral. Of course wealth in our model is exogenous and therefore the issue of investment incentives does not arise.

$\mathbb{1}_{[q(n+1)<1]}$ is an indicator function that is switched on if there is a subsistence sector in the economy. This happens whenever the economy is talent poor, that is $q < \frac{1}{n+1}$.

It is clear upon inspection that the total surplus is decreasing in τ. Hence $\tau = 0$ is surplus maximizing. Since all voting agents lose a part of their wealth as τ increases, it is at least weakly dominant for all agents to vote for $\tau = 0$ and this is unanimously chosen in any binary choice against any other value of τ. $\square$

In this economy there are two productive activities: the subsistence sector where a worker produces $\underline{w}$, and the modern sector where n workers and 1 entrepreneur generate a surplus $R + M$ if the entrepreneur has high ability and $\theta R + M$ if the entrepreneur has low ability. The wage paid to the worker in the modern sector is simply a transfer from the entrepreneur to the worker, which does not enter the total surplus. Under full information, the first-best is guaranteed, where all high types become entrepreneurs and the rest become workers. If the economy is talent poor, there may also be a subsistence sector. This is what the indicator function in equation (24) captures.

When talent is observable, $\tau = 0$ is chosen because better property rights increase the expected payoff of all agents. Similarly the optimal ϕ would be chosen to the extent there are any transactions involving wealth with banks. Note that in the first-best in our model since talent is observable, wealth is no longer used as collateral to screen agents. Hence ϕ does not affect total surplus and all values of ϕ are consistent with surplus maximization in the first-best world.

4.2. Institutions in the second-best world

We now show that as soon as there is a departure from the first best, the inefficiency of the market is further amplified by the choices of the electorate due to the preferences induced by the inefficient market. In the second-best world with unobservable talent, the total surplus is:

$$\begin{aligned} W_{sb} = \quad & (R+M)q(1-G(\underline{a})) + (\theta R + M)(1-q)\int_{\underline{a}}^{\overline{a}} \lambda(a)g(a)da \\ & + \mathbb{1}_{\left[(n+1)\int_{\underline{a}}^{\infty}(q+(1-q)\lambda(a))g(a)da<1\right]}\underline{w}\left(1-(n+1)\int_{\underline{a}}^{\infty}\Big(q+(1-q)\lambda(a)\Big)g(a)da\right) \\ & -\tau\int_0^{\infty} ag(a)da - (1-\phi)(1-q)(1-\tau)(1-\theta)\int_{\underline{a}}^{\infty} a\lambda(a)g(a)da. \end{aligned} \tag{25}$$

Note that $\mathbb{1}_{\left[(n+1)\int_{\underline{a}}^{\infty}(q+(1-q)\lambda(a))g(a)da<1\right]}$ is an indicator function that is switched on when there is a subsistence sector in the economy. This happens when the mass of entrepreneurs is insufficient to absorb all the workers in the economy, that is, $\int_{\underline{a}}^{\infty}(q + (1-q)\lambda(a))g(a)da < \frac{1}{n+1}$. The last two terms capture the passive waste created by $\tau > 0$ and $\phi < 1$. The first of these is the same as in the first-best world, namely, the loss of surplus due to imperfect property rights. The other term captures the waste created by $\phi < 1$ which only arises when a project run by a low ability entrepreneur fails and collateral needs to be liquidated.

The explanation for the specific expression is as follows. The fraction of low types is $(1-\theta)$ and for any $a \geq \underline{a}$ a measure $\lambda(a)$ of them are entrepreneurs. A fraction $(1-\tau)$ of their wealth remains as potential collateral that could be collected by banks in the event of default. The probability of default is $(1-q)$ and a fraction $(1-\phi)$ of the amount of collateral collected disappears due to transactions costs. The last term captures this deadweight loss.

Notice that in the second-best world, in addition to the direct effect of poor institutions on surplus captured in the last two terms, there are indirect effects on total surplus through $\underline{a}$ and $\lambda(a)$.

The dimension of heterogeneity that generates the preference for inefficient policies is wealth, which is observable and can be used as collateral but has no other productive use. However both the institutional frictions we study have to do with impediments to hold on to (or to transfer) wealth. As expected, very poor agents are credit constrained independent of talent, and have to be workers. Also, rich agents can post enough collateral so that the adverse selection problem is solved and so only those with talent choose to be entrepreneurs. For agents with moderate levels of wealth, there is not enough collateral to solve the adverse selection problem. Because of this, pooling contracts are offered such that low talent agents might become entrepreneurs, which would not be the case if they were either very rich or very poor. As a result we have both types of distortions: talented agents who become workers because they are poor, and non-talented agents who become entrepreneurs because they have some moderate level of wealth. Any change in the credit constraint $\underline{a}$ will affect the former and any change in $\lambda(a)$, which is the proportion of low types with wealth a who choose entrepreneurship, will affect the latter. We state this formally in the following lemma.

Lemma 4. *Holding all else constant, a policy that decreases $\underline{a}(\phi, \tau)$ or $\lambda(a)$ increases total surplus.*

Proof. First consider a policy that decreases $\underline{a}$. This will increase access to entrepreneurship and consequently increase labor demand. There are two possible scenarios. First, the case when the wage stays constant at $\underline{w}$ as a result of the change. In this case agents who do not change their occupation remain unaffected since wage or the credit contract they receive remains unchanged. The low and high type agents who switch from being workers to being entrepreneurs as a result of being unconstrained must be better off by revealed preference since the wage stays unchanged. Second, consider the case when the wage increases as a result of increased labor demand. The proportion of entrepreneurs in the population must stay constant at $\frac{1}{n+1}$ for wage to increase. In this case since high types who were previously entrepreneurs remain so, the change in composition of entrepreneurs must come from rich low types who are replaced by poor high and low types who were previously constrained. Consequently the increase in the proportion of high types in the pool of entrepreneurs increases the average quality of entrepreneurs in the economy thereby increasing total surplus.

Next, consider a policy that decreases $\lambda(a)$. This reduces the number of low type entrepreneurs at wealth level a. It is clear by the assumption made in equation (1) that this increases total surplus. $\square$

The coexistence of $\underline{a} > 0$ and $\lambda(a) > 0$ indicates the coexistence of under-lending and over-lending in this model. Lemma 4 captures these two main effects through which policy may affect surplus. The first effect is through a change in the credit constraint. All else constant, increasing the credit constraint $\underline{a}$ reduces total surplus, as previously unconstrained high type entrepreneurs are forced to become workers.[12] We can think of this as the SW effect (after Stiglitz and Weiss (1981)). In line with Stiglitz and Weiss (1981) this is the effect that leads to under-lending relative to the full information case.[13] The second effect is through a change in the proportion of low type entrepreneurs: all else constant increasing the proportion of low type entrepreneurs $\lambda(a)$ decreases total surplus as fewer low types choose their optimal occupation of working for a wage. We can think of this as the DW effect (after de Meza and Webb (1987)). In line with de Meza and Webb (1987) this is the effect that leads to over-lending relative to the full information case. Hence in equilibrium both over-lending, for regions of wealth where $\lambda(a) > 0$, and under-lending for wealth less than $\underline{a}$, coexist.

Now we analyze whether voters choose the institutions that minimize the loss of total surplus due to the two types of mismatch of talent described above. In the absence of redistribution policies, it is possible that agents inefficiently use institutions to redistribute rather than to maximize surplus. Indeed such a choice of institutions is not inefficient in the Paretian sense.[14] What is interesting here however is that the alignment of interest groups is itself created by the existence of market failure and this alignment may take the economy away, in terms of total surplus, even from the second-best world with market failure.

The key to understanding why agents may choose non-surplus-maximizing institutions is the following: in this economy there are always at least $\frac{n}{n+1}$ agents who expect to be workers under the status quo values of τ and ϕ. A policy of changing ϕ that increases the wage therefore enjoys the support of at least half the population, since $n \geq 1$.[15] This is because the payoff of agents who expect to be workers under the *status quo* institutions can only go up as a result of an increase in wage due to a change in ϕ. When these $\frac{n}{n+1}$ agents have little wealth, the same logic leads to a support for a change in τ that increases the wage. As long as any negative impact on their wealth is small compared with the increase in their wage, they will support the alternative τ to the status quo.

[12] Although increasing $\underline{a}$ also leads to some low type entrepreneurs being credit constrained, lemma 4 shows that the net effect of increasing the credit constraint on total surplus is still negative.

[13] de Meza and Webb (1987) show that the Stiglitz and Weiss (1981) model implies that there is under-lending in the asymmetric information equilibrium relative to full information.

[14] The political process (here simplified to a binary vote) is merely picking a point on the constrained pareto frontier, but the chosen institution may induce lower total surplus than the surplus maximizing institution.

[15] In Propositions 5 and 4 we show how there is also an additional mass of agents that supports the policy such that the proportion of population in favour of the policy is always strictly greater than one half.

However, policies that increase the wage may not decrease the credit constraint $\underline{a}$ and the measure of rich low type entrepreneurs, $\lambda(a)$. As shown in Lemma 4, this would be at odds with surplus maximization. This is the insight we use to generate the results in the rest of this section. Efficient institutions are those that decrease the credit constraint and the proportion of low type entrepreneurs, and consequently increase the quality of the pool of entrepreneurs, whereas institutions that increase the wage are politically feasible. This is in sharp contrast to the first-best world without market failure where the choice of institutional reform does not affect wage and consequently institutions are chosen optimally.

4.2.1. Support for reforms specific to banking sector

The parameter ϕ in the model denotes the fraction of collateral that banks can liquidate in case of default and can capture the quality of the judiciary.[16] Given the discussion on efficiency and political feasibility, we are ready to state the following proposition.

Proposition 4. $\phi = 1$ *is always selected by pure majority rule when talent is unobservable, but may not be surplus maximizing.*

Proof. A reduction in institutional frictions that affect liquidation of collateral by banks is captured by an increase in ϕ. We will first prove that a policy of increasing ϕ is guaranteed majority support. To see this note that the labor demand is weakly increasing in ϕ

$$\frac{\partial L_D}{\partial \phi} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial \phi}\left(q + (1-q)\lambda(\underline{a})\right) + (1-q)\int_{\underline{a}}^{\overline{a}} \frac{\partial \lambda(a)}{\partial \phi} g(a)da\right) > 0 \tag{26}$$

It is easy to see from equation (20) that the credit constraint $\underline{a}$ is decreasing in ϕ. Furthermore $\frac{\partial \lambda(a)}{\partial \phi} > 0$ holds since an increase in ϕ increases the terms of the credit contract. Since ϕ makes entrepreneurship more attractive by decreasing the interest rate, $\lambda(a)$ must increase to keep the occupational choice constraint of a low type entrepreneur satisfied. This shows that labor demand is increasing in ϕ. The wage is non-decreasing in labor demand and hence $\frac{\partial w}{\partial \phi} \geq 0$ must be true. Agents who expect to become workers under the *status quo* comprise at least one half of the population, and always support a higher ϕ against a lower ϕ, and this monotonicity guarantees that $\phi = 1$ is chosen at stage 2. Furthermore there is always a positive measure of low types who expect to be entrepreneurs in the semi-separating region under the status quo, who also support this, since they switch to a higher payoff as a consequence of the policy. Hence it is guaranteed majority support.

[16] Alternatively, the quality of the judiciary could be modeled as a combination of fixed and variable costs that need to be paid for seeking liquidation. In such a model the credit constraint would instead be determined by the zero profit condition $\theta_p(\underline{a})(R + (1-\tau)\phi a - f) + (1-\theta_p)((1-\tau)\phi a - f) = nw$ where f is the additional fixed cost. Adopting this formulation does not affect our results.

We now show that the effect of an increase in ϕ on total surplus is ambiguous. The first effect of an increase in ϕ is to reduce the passive waste that arises in liquidation which is captured in the last term in (25). This leads to an increase in total surplus. The increase in ϕ also affects total surplus through a change in $\underline{a}$ and the function $\lambda(a)$. We can see that

$$\frac{\partial \underline{a}}{\partial \phi} < 0 \qquad \text{but} \qquad \frac{\partial \lambda(a)}{\partial \phi} > 0. \tag{27}$$

Lemma 4 shows how $\frac{\partial \underline{a}}{\partial \phi} < 0$ increases total surplus but $\frac{\partial \lambda(a)}{\partial \phi}$ decreases it. The net effect of an increase in ϕ on total surplus depends on which of these three dominates and is consequently ambiguous. It is possible to construct examples where negative effect on surplus as a result of an increase in $\lambda(a)$ dominates the other effects.[17] $\square$

This shows that the equilibrium wage is non-decreasing in ϕ. This is because both the SW and the DW effect work in the same direction to increase lending, and consequently the wage. Workers and entrepreneurs are perfect complements, so an increase in the supply of entrepreneurs increases the demand for labor. Since the equilibrium wage is increasing in ϕ, a policy increasing ϕ enjoys majority support. However, total surplus may not increase in ϕ since the effect of an increase in ϕ on the quality of the pool of entrepreneurs is ambiguous.

To understand why $\phi = 1$ may not be optimal, note that the SW and the DW effects work in opposite directions when it comes to total surplus as ϕ increases. Although increasing ϕ leads to less under-lending to agents who deserve to receive credit (SW effect), it also leads to more over-lending to low types (DW effect). If the negative DW effect on total surplus is large enough to dominate the SW effect and the reduction in passive waste, the net effect of an increase in ϕ on total surplus will be negative. In this model reducing the frictions banks encounter in liquidating collateral (increasing ϕ) is not always good in the second-best world since it makes entrepreneurship more attractive and this induces low types to become entrepreneurs.

4.2.2. Support for improvement in property rights

Imperfect protection of property rights reduces the value of wealth. This in turn makes entrepreneurship more attractive since agents do not place as much weight on default and consequent loss of collateral. We show that political support for a change in τ is ambiguous because the effect on the wage is ambiguous.

Proposition 5. *A policy of improving property rights is always surplus maximizing but may not be politically feasible.*

[17] In a previous version we had included an example that illustrates that an increase in ϕ leads to a decrease in total surplus. It is available on request.

Proof. An improvement in property rights institutions is captured by a decrease in τ. We will first prove that the effect on a decrease in τ on wage is ambiguous and hence it may not enjoy majority support.

$$\frac{\partial L_D}{\partial \tau} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial \tau}\left(q+(1-q)\lambda(\underline{a})\right) + (1-q)\int_{\underline{a}}^{\overline{a}} \frac{\partial \lambda(a)}{\partial \tau} g(a)da\right). \tag{28}$$

The sign of this expression is indeterminate since it depends on the relative magnitude of $\frac{\partial \underline{a}}{\partial \tau} > 0$ and $\frac{\partial \lambda(a)}{\partial \tau} > 0$. It is easy to check that $\frac{\partial \underline{a}}{\partial \tau} > 0$. To see that $\frac{\partial \lambda(a)}{\partial \tau} > 0$, note that due to risk-neutrality an increase in τ effectively works as a reduction in the expected wealth of an agent. Lemma 1 shows that the relative payoff from entrepreneurship is decreasing in wealth for low types. As a result $\frac{\partial \lambda(a)}{\partial \tau} > 0$ as τ decreases an agent's effective wealth. This implies that the effect of a decrease in τ on the labor demand and consequently on the wage is ambiguous. Hence a policy of reducing τ may not be supported by the majority. This will be true when the median voter is poor enough to care primarily about the effect of τ on the wage.

To see that decreasing τ is surplus maximizing, note that τ affects total surplus in two ways. First there is a direct effect of reducing surplus through destruction of wealth. By inspecting the last two terms of (25), we see that this effect is negative. The second effect of τ on total surplus is through its effect on the equilibrium values of $\underline{a}$ and the function $\lambda(a)$. We can see that

$$\frac{\partial \underline{a}}{\partial \tau} > 0 \qquad \text{and} \qquad \frac{\partial \lambda(a)}{\partial \tau} > 0. \tag{29}$$

Lemma 4 shows how both these effects reduce total surplus. Hence it is unambiguously surplus maximizing to decrease τ.

□

The effect of τ on the equilibrium wage is ambiguous. This is because the SW and the DW effects work in opposite directions when it comes to the effect on aggregate lending. A decrease in τ leads to less under-lending (SW effect) since the credit constraint relaxes for some agents. This drives up the number of entrepreneurs and consequently the demand for labor. On the other hand a decrease in τ also leads to less over-lending (DW effect) since it increases the outside option to entrepreneurship for low type workers as wealth becomes more valuable, inducing some of them to drop out. This drives down the number of entrepreneurs and the labor demand for workers. Hence the net effect on labor demand and equilibrium wage is ambiguous. Consequently the political feasibility of a decrease in τ is also ambiguous, and it is easy to construct examples where a poor median voter would oppose a decrease in τ due to a reduction in equilibrium wage.

To understand why $\tau = 0$ is optimal (maximizes total surplus) note that the SW and DW effects work in the same direction when τ decreases. A decrease in τ leads to less under-lending (SW effect) which increases the total surplus as more high types join the pool of entrepreneurs. A decrease in τ also leads to less over-lending (DW effect) as a decrease in τ effectively increases an agent's wealth and this makes working for a wage more attractive for low types relative to entrepreneurship, where the agent loses his wealth in case of project failure.

The intuition for the differential impact of τ and ϕ on a low type entrepreneur's payoff is the following. As ϕ increases, we can see from equation (6) that the interest rate an entrepreneur is offered decreases and consequently entrepreneurship becomes more attractive. On the other hand when τ decreases, there are two effects. First, as in the case of ϕ, there is a decrease in the interest rate making entrepreneurship more attractive. Second, decreasing τ increases an agent's effective wealth irrespective of occupational choice. This second effect makes entrepreneurship less attractive to rich low types since they prefer to become workers rather than risking the loss of their increased expected wealth in the event of project failure. It turns out that this second effect always dominates the first, and consequently decreasing τ induces some low types to drop out of entrepreneurship whereas increasing ϕ makes entrepreneurship more attractive for all agents.

Leaving aside the general equilibrium effects that arise through changes in wage, reducing frictions that affect liquidation of collateral primarily benefits entrepreneurs for whom credit is necessary and collateral plays a role. However, improving property rights more broadly increases an agent's effective wealth regardless of occupational choice, inducing low types to drop out of entrepreneurship.

Propositions 4 and 5 seen together bring into sharp relief the trade-off between political feasibility and the efficiency of institutional reform. Only reforms that increase wages are politically feasible but these may not correspond to reforms that are surplus maximizing. While reforms affecting only the banking sector are politically feasible they may not be surplus maximizing. On the other hand broader property rights reforms are surplus maximizing but may not be politically feasible.

5. Feasible transfers and the role of development

In this section we expand the set of policies that the electorate can vote on. This allows us to examine whether an increased set of fiscal instruments allows the electorate to escape the negative results derived in Proposition 5.

First, in section 5.1 we show that when taxes can be conditioned both on occupational choice and the wealth of an agent, the problem of an inefficient choice of τ disappears. Next, in section 5.2, we show that if the set of fiscal instruments is limited to a tax based on income or occupational choice, it may not be possible for the electorate to avoid a choice of an inefficient τ.

5.1. *Taxes conditional on wealth and occupational choice*

We can ensure that the median voter supports $\tau = 0$ by constructing a wealth tax schedule that is only paid by entrepreneurs.

Proposition 6. *For any $\tau > 0$, it is possible to construct a tax schedule for entrepreneurs conditional on wealth, which coupled with $\tau = 0$, is preferred by the median voter.*

Proof. Note that $\tau > 0$ is only preferred to $\tau = 0$ when $w(\tau > 0) > w(\tau = 0)$. Also note that since the credit market always makes zero profits, and the net surplus generated by low type entrepreneurs is negative, the increase in wage for $\tau > 0$ is a redistribution from high type entrepreneurs to workers. It is therefore possible to construct a tax schedule $t(a)$ that is conditional on wealth, that is paid only by entrepreneurs to finance a subsidy to workers s such that $s + w(\tau = 0) = w(\tau > 0)$ such that the median voter votes in favor of $\tau = 0$. □

In reality, although property taxes exist, we do not observe taxes on property that depend on occupational choice. Although it is hard for the government to collect information and levy taxes on wealth for the whole population at a centralized level, at a decentralized level it is easier for an individual bank to assess the value of an individual borrower's pledgeable wealth. Moreover agents have an incentive to underestimate their wealth to the government (if it is taxed) but not to banks (if it is used as collateral). While it is easy to pretend to have less wealth than you really do, it's hard to lie in the opposite direction. Given this, and the cost of complexity of tax-transfer schemes that depend both on occupational choices and wealth endowments, in what follows we assume that there is a political constraint such that only transfers without such a double conditionality are feasible.

5.2. *Income taxes and subsidies*

In this section we attempt to see the effect of allowing income based redistribution (but without conditionality on wealth) on the median voter's preference for an inefficient τ. In particular we allow the electorate a choice of the efficient value of τ coupled with a subsidy to workers financed through a tax on entrepreneurs. We show that such a bundle may not be politically feasible, particularly in a talent poor economy.

5.2.1. *Talent-rich economy*

Consider a *status quo* with $\tau > 0$ that is supported by a majority when the option of voting on an entrepreneurial tax along with a wage subsidy is not available. We want to see if it is possible to induce the electorate to vote in favour of $\tau = 0$ by introducing a more efficient channel of compensation for the workers. The following proposition shows that when $q > \frac{1}{n+1}$ (talent-rich economy), then a wage subsidy s along with an entrepreneurial tax t exists such that agents vote for $\tau = 0$.

Proposition 7. *In a talent-rich economy, a welfare maximizing, budget balanced t and s exist that would increase total surplus and would at the same time be supported by the majority.*

Proof. Consider a subsidy that makes a high type entrepreneur with an arbitrary wealth level indifferent between working for a wage and being an entrepreneur at interest rate 1:

$$R - nw + M + a - t = w + s + a. \tag{30}$$

t must also satisfy the constraint $t \leq R - nw$ since t must come from the appropriable returns of the project. To ensure that all low types choose to be workers s and t must satisfy

$$w + s > \theta(R - nw - t) + M. \tag{31}$$

This ensures that even a low type agent with zero wealth prefers to work for a wage when paid a subsidy s. Since the attractiveness of entrepreneurship is decreasing in wealth for low types, it must be the case that all low types prefer working for a wage. A package of t and s satisfying these constraints will ensure that high types would prefer entrepreneurship and low types will prefer paid employment.

Now consider the political economy problem. Denote the wage in *status quo* as $\hat{w}$. This must be less than $\overline{w}$ for there to be some low types in the pool of entrepreneurs. Since the highest possible wage is defined as $\overline{w} = R - n\overline{w} + M$ in this case $w + s = \overline{w}$. Note that all workers strictly prefer this policy to *status quo* since their payoff is $w + s = \overline{w} > \hat{w}$.

To see that this policy is budget balanced, note that in this economy there are n workers for each entrepreneurs. Hence $t = ns$ ensures budget balance. Finally since we have assumed $R > nM$, appropriable returns are large enough to cover wage payment even when wage is $\overline{w}$. Hence the constraint $t \leq R - nw$ is satisfied. □

5.2.2. Talent-poor economy

In this section we construct an example with a talent-poor economy where it will not be possible to ensure a vote in favor of $\tau = 0$ even when the electorate link it with a subsidy to workers financed through a tax on all entrepreneurs. Recall that in a talent-poor economy, with $\frac{q}{1-q} \leq \frac{1}{n}$, the wage is $\underline{w}$ in the first-best since there are only high type entrepreneurs. Since the number of high type agents is small relative to n, not all agents work in the modern sector, and consequently a subsistence sector exists. In the second-best world however, the wage can be greater than $\underline{w}$ due to the possibility of low type agents in the pool of entrepreneurs.

Assume there are three wealth classes, the rich with wealth a_r, the middle class with wealth a_m and the poor with wealth zero. Let the proportions of the rich, middle, and the poor in the population be α_r, α_m and α_p. Assume that the following holds

$$\alpha_r > \frac{1}{n+1}, \qquad \frac{1}{n+1} > q\alpha_r + \alpha_m \qquad \text{and} \qquad \alpha_p > \frac{1}{2}. \tag{32}$$

This implies that the median voter is poor but the proportion of rich is large enough such that the wage will be greater than $\underline{w}$ if all the rich decided to become entrepreneurs. However, the proportion of rich high types together with the middle class is not large enough for wage to rise above $\underline{w}$ with unobservable talent.

To simplify things assume that low types possess no entrepreneurial talent, that is $\theta = 0$. Using assumption (1), this implies that

$$M > \underline{w} > M - n\underline{w}. \tag{33}$$

and (2) modifies to $qR < n\underline{w}$ ensuring that the credit constraint binds. Also assume that $\phi = 1$.

Consider a situation where only the rich are entrepreneurs. Since $\alpha_r > \frac{1}{n+1}$, the wage must rise to ensure that rich low types must be indifferent between entrepreneurship and the equilibrium wage. As a result the pool of entrepreneurs must be of size $\frac{1}{n+1}$. Hence we must have

$$q + (1-q)\lambda(a_r) = \frac{1}{\alpha_r(n+1)}, \tag{34}$$

where $\lambda(a_r)$ is the proportion of rich low types who choose entrepreneurship. The following occupational choice condition must hold for the rich low types

$$M - (1-\tau^*)a_r = w(\tau^*), \tag{35}$$

where $w(\tau^*)$ is the equilibrium wage when $\tau = \tau^*$. We can see that increasing τ would increase the wage. The highest τ such that the credit market still lends to the rich must satisfy (20) and hence we must have

$$a_r(1-\tau^*) = nw(\tau^*) - \theta_p(a_r)R. \tag{36}$$

Using (4) we have

$$\theta_p(a_r) = \frac{q}{q + (1-q)\lambda(a_r)} \qquad \text{and hence} \qquad a_r(1-\tau^*) = nw(\tau^*) - q\alpha_r(n+1)R. \tag{37}$$

We have two equations in (35) and (37) and two unknowns, namely the status quo τ^* and the equilibrium wage $w(\tau^*)$. Solving out for the equilibrium wage we have

$$w(\tau^*) = \frac{M + q\alpha_r(n+1)R}{n+1}. \tag{38}$$

We are now ready to state the result.

Proposition 8. *In a talent poor economy it may be impossible to construct a budget balanced tax and subsidy package that will enable the improvement of property rights institutions.*

Proof. We show that in the talent poor economy constructed in this section, it is impossible to construct a budget balanced tax and subsidy package that will enable the improvement of property rights institutions if

$$a_r > M - \underline{w} > a_m. \tag{39}$$

If τ changes from τ^* to 0, rich low types will drop out of entrepreneurship as a consequence of the left hand side of (39). Since $q\alpha_r + \alpha_m < \frac{1}{n+1}$, and the poor are always credit constrained, we must have wage $w(0) = \underline{w}$ at $\tau = 0$. At $\underline{w}$ we can see from the right hand side of (39) that a low type middle class agent strictly prefers to be an entrepreneur.

Note that the appopriable returns for middle-class entrepreneurs are negative since $qR < n\underline{w}$ by (2). This implies that in the event of success the returns R are fully pledged to the bank and consequently a positive tax on entrepreneurs would violate the limited liability constraint for middle class entrepreneurs. However there must be a positive subsidy to induce a poor median voter ($\alpha_p > \frac{1}{2}$) to vote for a change in τ since wage falls from $w(\tau^*)$ to $\underline{w}$. □

This result demonstrates with an example that it is not possible to always avoid a choice of inefficient institution by constructing a budget balanced package of wage subsidy and entrepreneurial tax. When M, the non-appropriable return from entrepreneurship is large enough, agents are attracted to entrepreneurship even when the appropriable returns are low. In this case it is not possible to tax entrepreneurs since all the appropriable returns are already pledged to banks. This proposition acts as a robustness check to our results. It shows that a simple package of tax and subsidy that is conditioned on occupational choices is insufficient to avoid the inefficiency of Proposition 5.

5.3. Wealth taxes and subsidies

In this section we study the effect of allowing wealth-based redistribution rather than income redistribution. We allow agents to vote for a redistribution package that equalizes the wealth in the population coupled with an efficient vote on $\tau = 0$. We show that a vote in favor of $\tau = 0$ may not be politically feasible if the economy is wealth poor.

5.3.1. Wealth-rich economy

If the average wealth in the economy is sufficiently high, a vote on wealth redistribution tied to an efficient reform of $\tau = 0$ is always politically feasible. We show this formally in the following proposition.

Proposition 9. *If the average wealth in the economy exceeds $\overline{w} - \underline{w}$, i.e.,*

$$\int_0^\infty ag(a)da > \overline{w} - \underline{w}, \tag{40}$$

the median voter always chooses redistribution coupled with $\tau = 0$ over any other value of τ without redistribution.

Proof. Note that $\overline{w}$ is the highest possible wage in the economy. A median voter's payoff from voting for $\tau > 0$ is at most $\overline{w}$. On the other hand if wealth is redistributed equally with all agents receiving average wealth, wage may fall but will be at least $\underline{w}$. Hence the payoff of the median voter is at least $\int_0^\infty ag(a)da + \underline{w}$. The inequality in (40) ensures that the payoff from redistribution always dominates. □

This result shows that regardless of the distribution of wealth and talent, if the average wealth in the economy is high enough, tying redistribution of wealth to efficient reform of τ will always be politically feasible.

5.3.2. Wealth-poor economy

In this section we construct a simple example of a wealth poor economy where tying an efficient vote of τ to redistribution of wealth will not work. Assume that the distribution of wealth is discrete. A proportion α of agents have wealth a and the rest have no wealth. Assume also that

$$\frac{n}{n+1} > \alpha > \frac{1}{n+1}. \tag{41}$$

This guarantees that the median voter is poor but at the same time there are sufficient rich agents to raise the wage over $\underline{w}$. Assume further that $\theta = 0$. This is similar to the example we constructed in section 5.2.2. In this case we can solve for τ^*, the value of τ that maximizes the equilibrium wage, and the corresponding wage $w(\tau^*)$ that is supported by τ^*. The solution to these two can be found by solving the occupational choice constraint for the rich low types and the credit constraint threshold. Hence we have

$$w(\tau^*) = \frac{M + q\alpha(n+1)R}{n+1}. \tag{42}$$

Proposition 10. *If an economy is wealth poor, the median voter may not choose redistribution coupled with $\tau = 0$ over τ^* without redistribution.*

Proof. We show that if the economy constructed in this section is wealth poor such that

$$\alpha a < \min\{w(\tau^*) - \underline{w}, n\underline{w} - qR\}, \tag{43}$$

the median voter never chooses redistribution coupled with $\tau = 0$ over τ^* without redistribution.

Since the median voter has no wealth, his payoff when he votes for τ^* is simply $w(\tau^*)$. On the other hand if he votes in favor of redistribution all agents receive the average wealth αa. However this is lower than the credit constraint from (20) since $\alpha a < n\underline{w} - qR$. This implies that all agents are credit constrained and work in the subsistence sector with wage $\underline{w}$. Hence the payoff of the median voter is $\underline{w} + \alpha a$, which is less than $w(\tau^*)$, the payoff from choosing τ^*. □

We have seen that enriching the set of available policies helps in the case of a talent rich or a wealth rich economy. In particular in a talent rich economy, allowing for a subsidy to workers financed through a tax on entrepreneurs allows for the wage to increase to $\overline{w}$, thereby eliminating the incentives to vote for values of $\tau > 0$. Similarly in a wealth rich economy, allowing for redistribution of wealth ensures that efficient reform of τ is politically feasible. However we have shown that in an economy that is poor in both wealth and talent, neither of these two policies will work. As such these results suggest that the political failure we highlight in this model will be harder to overcome in economies poor in wealth and talent.

6. Conclusion

To summarize our main results on efficiency and feasibility of institutional reforms, we find that reforms that affect the banking sector are always feasible but may not always be efficient, since they induce too many low type agents to choose entrepreneurship. On the other hand, improving property rights institutions more broadly increases total surplus but may not always be politically feasible.

In the event of market failure, even competitive markets can passively play a political role of creating constituencies. These constituencies can have a preference for inefficient policies. This leads to inefficiencies being further amplified through policy choices made by constituencies that are generated due to market failure in the first place. In this sense our paper provides an additional reason to worry about market failure. It may lead to a political failure even in a functioning democracy without powerful interest groups.

A transfer mechanism necessary to restore alignment between total surplus maximization and workers' incentives to reform would require taxes on entrepreneurial income that also depend on the collateral pledged by them. If a government is instead constrained (for information reasons) to use transfer mechanisms without such a double conditionality, we have shown that the feedback effects between market and political failures generate a kind of "poverty trap", in the sense that it is only in rich economies that the introduction of transfers or bundling of policies can eliminate the possibility of a democratic endogenous choice of bad property right protection laws.

Our paper highlights some potentially fruitful avenues of future research that look at this two-way interaction between market and political failure. For example, consider the finding of Acemoglu and Johnson (2005) that property rights institutions seem to have a first-order impact on long run economic growth, whereas contractual institutions do not. An extension of our model could supply an explanation as to why such a correlation may arise: the majority may have incentives to focus on contractual institutions even when they do not increase welfare and neglect welfare enhancing reforms of property rights institutions.

Another potentially interesting extension of our results would be to investigate the link between the level of development and democratization. In particular, the more developed an economy is, the less the elite are worried about democratization, as they anticipate that their property rights will be protected. On the other hand, democratization at early stages of development may be opposed by the elites because of the additional fear of weakened property rights. Hence, if initially a wealthy elite controls the nation, they may be more likely to support democratization if the economy is more prosperous, creating a causal relationship from the level of development to democratization.

Finally, it may also be interesting to explore how results in the model are affected when we consider multiple countries with mobility of labor across countries. In particular, tax competition across countries could constrain the degree to which taxes can be imposed on entrepreneurs to substitute away from inefficient choice of property rights institutions. Consequently, such competition could exacerbate the kind of inefficiency analyzed in this paper.

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