Credit Market Frictions and Political Failure

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October 20, 2013

Abstract

We study how excessively favorable regulatory environment for banks could arise even with a perfectly competitive credit market in a median voter world. We take an occupational choice framework, where agents are endowed heterogeneously with wealth and talent. In our model, market failure due to unobservability of entrepreneurial talent endogenously creates a misalignment between surplus maximising reforms and reforms that are preferred by the median voter. This is in contrast to the world without market failure where the electorate unanimously vote in favor of surplus maximising institutional reform. 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.

JEL Classification numbers: D72, D82, O16

Introduction

The crisis of the last few years in the western world has been described by many as an outcome of an excessively favorable regulatory environment for banks, which were able to lend money with little reserves and were able to liquidate and recover assets faster and with less consequences than other economic institutions, families and firms. Why do banks receive a disproportionately favorable treatment by governments and regulators in western democracies? In this paper we provide a simple benchmark theory for this answer, without invoking the power of banking sector interest groups.

We will consider an economy in which the government can decide to propose reforms on two different dimensions of the economy: on the one hand, the government could focus on reducing

*We would like to thank David Austen-Smith, Tim Besley, Leonardo Felli, Greg Fischer, Mike Golosov, Matias Iaryczower, Ethan Ilzetzki, Ben Jones, James Peck, Torsten Persson, Miltos Makris, François Maniquet, Tomas Sjöström, Daniele Terlizzese and many participants at many workshops for their helpful feedback. The usual disclaimer applies.
the institutional frictions that affect property more broadly, and this type of reform of property rights regulation treats banks at the same level as families and firms; on the other hand, the government could take the view that fixing the banking sector is the first priority and propose reforms that facilitate the operation of banks disproportionately: in particular, a reform of this kind could reduce institutional frictions affecting banks allowing each bank to effectively recover a larger fraction of the assets that borrowers have pledged as collateral for loans, hence inviting more credit.

We will show that even without invoking powerful interest groups, the simple fact that the median voter is typically a supplier of labor implies that governments, of all kinds, policy or office motivated, support reforms aimed to make liquidation easier for banks, even though, as we show, this is not always necessarily welfare enhancing, because excessive liquidation can reduce the quality of the pool of endogenous entrepreneurs too much. On the other hand, even if the government tried to propose the more general reforms aimed to improve property rights, which are always welfare enhancing, under some conditions these reform proposals would be blocked by the median voter. In summary, our model is the first simple median voter model of banking regulation favoritism. Hence the model attempts to make sense of what happened before the crisis – the introduction of excessively favorable environment for banks as a result of median voter preferences.\(^1\) More generally, the model serves also as a clean example about how market failure can feed political failure and back.

The competitive market responds to the problem of unobservable entrepreneurial talent by screening agents based on their wealth. This leads to alignment of preferences of the median voter in ways that defeat surplus maximising reforms. Of course in the real world the political failures causing a debt crisis or an inability to reform the economic system in general depend on several factors. In this paper we isolate one particular channel, namely the effect of market failure on the electorate’s inability to choose surplus maximising reforms.\(^2\)

What we highlight is the misalignment between the welfare properties and actual choice of two kinds of institutional wedges on property related transactions. We look at broad institutional wedges that affect all property related transactions and narrow ones that only affect property related transactions in the credit market, in particular the liquidation of collateral by banks. We find that reducing the broad wedges is always surplus maximising but may not be politically feasible whereas improving wedges that related specifically to credit markets is always politically feasible but may not be surplus maximising.

The simple mechanism at work is as follows: policies in our model are chosen by the median voter, who is typically a worker; hence the criterion for a policy reform to pass must have to

\(^1\)The great attention given to helping banks even after the crisis is related in spirit to the model and the motivation for it, but we do not model bail-out favoritism per se.

\(^2\)In terms of examples of recent events, one could describe our exercise as an attempt to isolate the effects of the market failure component of the recent financial crisis on the sluggish institutional reform response of the subsequent years in the western world. In section 2.3 we will interpret some of our results in this light.
do with its effect on wages. Improving liquidation in the credit market makes entrepreneurship more attractive and this increases the demand for labor and wages. However, the quality of the pool of entrepreneurs may decline, as rich low types may crowd out some poor high types. On the contrary, improving property related institutions more broadly makes wealth more effective as collateral, inducing exit of low types and entry of high types. While this adjustment is efficient, its overall effect on labor demand, and consequently on wages, is ambiguous.

We show that wealth inequality hikes and productivity shocks can further hamper the possibility of good institutional reforms, whereas sometimes the tightening of credit availability can generate an opportunity for efficient reforms that would otherwise be politically unfeasible. Finally we show that in underdeveloped economies where wealth and talent are scarce, the same redistribution policies that can correct market failure and achieve first best in talent rich economies or wealthy economies through income redistribution and wealth redistribution respectively are no longer effective. This suggests that when reforms are subject to democratic implementation constraints, the political feasibility of surplus maximizing reforms goes up with the level of development.

The paper is organized as follows. After analyzing the relationship with the literature, in section 1 we set up the basic model with credit and labor markets, and characterize occupational choice in terms of ability and wealth given the informational and institutional frictions. In section 2 we analyse the political economy of the choice of credit market institutions. In section 2.3 we focus on reform of property rights and derive the predictions of the model about the effect of inequality on reform, and the presence of credit constraints on reform when assumptions are made to pin down the distribution of wealth. Section 3 looks at a wider range of policy choices to test the robustness of our results. Section 4 concludes.

**Relationship with literature**

There is an important distinction between our approach and the existing literature on political economy. Instead of taking political classes or interest groups as exogenous and studying the impact of their alignment on markets, we derive them from economic fundamentals, namely, the nature of technology and the informational environment in the economy. Hence this paper differs from other models of endogenous institutions in that the heterogeneity which causes households to choose inefficient policies is itself the endogenous outcome of asymmetric information.

We argue that in addition to the well known impacts of market failures studied in the literature on poverty traps, there may also be a political impact. The latter problem could turn out to be more persistent since unlike the solutions to poverty traps that are easier to characterise, the

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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 bardhan89 for a review of the common themes in these literatures concerning the theory of institutions.

4 Micro-lending has been a big theme in this literature. See for example ghatakguinnane.
solutions to political failure that are politically feasible may not exist. A more general message emerging from our model is that the fallout of market and political failures may not be simply additive since the two may complement each other in generating economic inefficiencies.

It is well known that market failures abound in the real world. A key insight from the institutional approach to development economics is that capital market failures prevent individuals and economies from reaching their full potential and can lead to poverty traps (see banerjeenewman93 and galorzeira93). In this literature institutional frictions are taken as exogenous.\(^5\)

It is also well known that even fully accountable governments can fail to implement surplus maximising policies when they lack sufficient instruments for compensating losers. Furthermore, the political economy approach to development has emphasized how concentration of political power in the hands of an elite, may allow the elites to distort the market outcome in their favour, and this typically leads to inefficiencies.\(^6\)

In this paper we highlight the reverse link, namely that market failure may create a political failure even when political power is uniformly distributed. We think of political failure as the failure of the electorate to pick surplus maximising policies.\(^7\)

boyerlaffont99 examine which kind of environmental policies will be implemented under information and distribution constraints when there are political constraints such as majoritarianism or intervention from special interests, which shape policy. pervol develop a model where wealth inequality and political accountability undermine entry and financial development. rajzin2006 show how inequalities in endowments together with low average levels of endowment can create constituencies that combine to perpetuate an inefficient status quo against educational reform. biais03 study how bankruptcy laws affect credit and wages in a general equilibrium setting. They show how the interests of the rich and the poor may not be aligned in favour of optimal bankruptcy laws since the rich prefer ones that would lower equilibrium wages whereas the poor prefer the opposite. Another paper that is related to ours is casgen, who study reforms aimed at deregulation. Agents differ in talent and whether their endowment includes a license to run a firm. They show how a mismatch between the two leads to preferences for deregulation and legal reform. mookerjee10 show how it may be efficient to restrict bonded labour clauses in tenancy and debt contracts. They also derive the political feasibility on the restriction to such clauses and show how this depends on wealth and the range of collateral instruments that are available. bonfigl11 propose a model where unobservability of the resources invested in reforms and of the ability of incumbent politicians leads to surplus maximising reforms not being chosen. A recent paper that is related to ours is rud2011, who construct a general equilibrium model where unmotivated agents can end up in the bureaucracy, leading to rent seeking through increasing public sector employment. Although

\(^5\)See banerjee01 for a survey of this literature.

\(^6\)This is most obvious when elites lobby for barriers to entry ([?]). acemoglu2003 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.

\(^7\)For a discussion on somewhat different notions of political failure see besley06.
inefficient this equilibrium may be politically feasible since it leads to an increase in low skilled wage.

At the root of the inefficiencies showcased in the models discussed in the above paragraph are the problems in the political domain such as the informational asymmetries between citizens and political incumbents, rent seeking within the bureaucracy, or the presence of exogenous political alignments that undermine the support for best possible institutions. In our model on the other hand the problem in the political domain is endogenised and the fundamental source of inefficiency lies elsewhere, in the adverse selection problem in the marketplace created by the unobservability of entrepreneurial talent. Institutions, depending on their quality, would mitigate or worsen this problem. Once the adverse selection problem is removed, the constituencies created in the second-best world also disappear, and the electorate unanimously favours surplus maximising policies.

When the main frictions are political, the focus is typically on reforms to improve the quality of candidates and/or improve incentives for incumbents and bureaucrats so that inefficient rent-extracting policies are removed. In contrast, with market frictions the policies are far less easy to characterize, and this is especially so if they interact with the political system, even if such system is otherwise frictionless and the distribution of political power is uniform.

1 Model

1.1 Technology, Preferences, and Endowments

The basic setup for the description of an economy is based on gms. There are two technologies in the economy: a subsistence technology that yields \( w \) with certainty for one unit of labour and a more productive “modern” technology that yields a return \( R \) in case of success and 0 in case of failure and requires \( n \) workers and 1 entrepreneur to run it. The modern sector also yields a non-appropriable benefit \( M \) (non appropriable by others) to the entrepreneur. We can interpret \( M \) as a private benefit from entrepreneurship (e.g., perks that entrepreneurs enjoy relative to workers such as a comfortable office, or the psychological payoff from not having a boss.) Alternatively, we can interpret it as the disutility of labour effort with that of entrepreneurial effort being normalized to zero.

The economy is populated with measure one of risk neutral agents. Agents are endowed with one unit of labour, entrepreneurial talent and illiquid wealth. 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 takes only two values. There are a proportion \( q \) of high types who succeed with probability one and a proportion \( 1 - q \) of low types who succeed with probability \( \theta \) which is
Assume that

$$\theta(R - nw) + M > w > \theta R - nw + M.$$  \hfill (1)

The right hand side of this assumption 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 where talent is observable, only high type agents will choose entrepreneurship. The left hand side of the assumption allows us to focus on the interesting case when entrepreneurship is attractive for low types, when as a result of limited liability low types only bear the full costs when the project is successful. As we will see, this may happen when entrepreneurial talent is unobservable.

Agents are also endowed with illiquid wealth $a$ that is distributed in the population with density $g(a)$. As will be clear in section 1.4, wealth is used in the credit market to screen agents when talent is unobservable. To fix ideas we can think of wealth here as the value of an agent’s house or land, since this is illiquid and may be used as collateral. Agents need to borrow from the credit market to become entrepreneurs. This is because workers have to be paid upfront irrespective of whether the project succeeds or fails later.

### 1.2 Informational and Institutional Frictions

Entrepreneurial ability can be either observable or unobservable. In the first-best world this 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. The illiquid wealth $a$, and output, are appropriable where as $M$, being a private benefit, is not appropriable.

The probability with which an agent expects her wealth $a$ to be expropriated will be used as a measure of how insecure property rights are. This parameter, which we’ll denote by $\tau \in [0, 1]$, affects all institutions, that is firms, households, and banks equally. Hence agents with wealth $a$ only receive an expected payoff of $(1 - \tau)a$ from holding their wealth. In addition to institutional frictions that affect property related transactions broadly, there is another institutional friction that affects the credit market specifically: when a borrower who posts wealth $a$ as collateral defaults, banks only recover a fraction $\phi \in [0, 1]$ of that asset, which therefore has expected value $a(1 - \tau)\phi$. An increase in $\phi$ increases the degree to which collateral can be liquidated.

In addition to these institutional variables, a limited liability constraint also operates in the economy. This implies that in the event an entrepreneurial project fails, the agent can only be liable upto the illiquid asset $a$. In other words agents are guaranteed a non negative payoff in all states of the world.

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Our results apply *mutatis mutandis* to the case where the high types have talent $\theta_H$ 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 not as sharp. Note that this set up implicitly assumes that the distributions of wealth and talent are independent.
The timing of the model is as follows:

1. Agent’s wealth and entrepreneurial type are realised.
2. Vote on institutional reform (i.e., a direct vote on \( \tau \) and \( \phi \)) takes place.
3. Agents make occupational choices.
4. Output is realised. Expropriation of property and liquidation of collateral takes place.
5. Final payoffs realised and consumption takes place.

The model can be solved backwards. We start with stage 3 where agents make their occupational choices and show in Proposition 2 that there exists a unique equilibrium. It is possible to derive comparative statics of the equilibrium pay off of agents with respect to the institutional parameters \( \phi \) and \( \tau \). Consequently, going into stage 2 agents know their expected payoff from the status quo and alternative values of \( \phi \) and \( \tau \) and have well defined preferences over these. In section 2 we show how stage 2 plays out both in the world with complete and incomplete information.

1.3 Occupational Choice

Agents choose their occupation. They can either choose to work in the subsistence sector, become workers, or become entrepreneurs. If they choose entrepreneurship, 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 \( w \) upfront, where \( w \geq w_0 \) since all agents have the option of working with the subsistence technology.

Our assumption that the productive technology requires \( n \) workers and 1 entrepreneur implies that workers and the entrepreneur are perfect complements in the production function. This assumption greatly simplifies our analysis and allows us to get sharp political economy results, although it is not central to our analysis. As we will see in section 2.2 what drives our political economy results is that in equilibrium workers constitute at least half the population. The assumption of \( n \geq 1 \) guarantees this neatly since there will be at least \( \frac{n}{n+1} \geq \frac{1}{2} \) workers in equilibrium.

We will present a general equilibrium model with two markets; the labour and credit market. The need for credit arises as workers need to be paid upfront when an entrepreneurial project is set up and the wealth of agents is illiquid. Both markets are assumed to be perfectly competitive.

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 kind of credit contract she accepts. Next we see what kind of credit contracts are offered.
1.4 Credit Contracts

Since the wealth of an agent is illiquid, agents need to borrow from the credit market to become entrepreneurs as workers need to be paid upfront irrespective of whether the project succeeds or fails later. The credit market is assumed to be perfectly competitive. The supply of credit is assumed to be perfectly elastic at the 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.

1.4.1 First Best

If talent were observable, given our assumption (1), only high types would become entrepreneurs. Since markets are perfectly competitive, the equilibrium would be pareto efficient. In addition, it turns out that in our model the equilibrium with observable talent would also be surplus maximising. The wage would depend on whether the economy is talent rich (i.e. when \( \frac{q}{1-q} \geq \frac{1}{n} \)) or talent poor (i.e., \( \frac{q}{1-q} < \frac{1}{n} \)). In the talent rich case the wage would be \( \bar{w} = \frac{R+M}{n+1} \), while otherwise the equilibrium wage would be \( \bar{w} \). This is because the wage in the first-best is determined by whoever is on the short side of the market. We require \( R > nM \) for the appropriable returns from the project to be large enough to cover the wage payment when the wage is \( \bar{w} \). 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 \( \bar{w} \) if \( \left( \frac{q}{1-q} \geq \frac{1}{n} \right) \) and \( \bar{w} \) otherwise.

1.4.2 Second Best

The second-best world is characterised by the unobservability of entrepreneurial talent. Due to the unobservability of talent, the credit market screens agents based on wealth since contracts can no longer be based on an agent’s talent. Since only the output and wealth of an agent are observable the banks are constrained to rely only on two variables. Note that the principal along with the interest can be repayed only in case the project succeeds. In contrast, a contract where a part of the collateral is seized even when the project is successful is feasible. We impose no restrictions on the kind of contracts that can be offered other than the constraint imposed by the unobservability of talent.

We now turn to discuss the possible credit contracts that can be offered to entrepreneurs and subsequently we characterise the equilibrium in the credit and labour market.

1.4.2.1 Pooling and Semi-Separating Credit Contracts. The banks can screen agents based on collateral. Consider an agent with wealth \( a \). There are two states of the world ex post
— either the project succeeds or fails. Let the wealth that banks take over in the state of failure and success be \( \hat{a}_f \) and \( \hat{a}_s \) respectively. Feasibility imposes the restriction that \( \hat{a}_f, \hat{a}_s \in [0, a] \). In the success state, the banks may also charge interest \( r_p(a) \). In case of failure, there is no interest since there are no appropriable returns from the project.

A high type succeed with a higher probability and hence, relative to low type, prefers a contract that is tougher in the bad state (\( \hat{a}_f \) as high as possible) and yields a high payoff in the good state (\( \hat{a}_s \) 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 at least as long as low types are in the pool of borrowers, banks will offer contracts where \( \hat{a}_f = a \).

1.4.2.1.1 Non-Negative Net Appropriable Returns Let us first consider the region of wealth such that \( R \geq r_p(a)nw \) where the net appropriable returns are large enough to repay the loan with interest even when we set \( \hat{a}_s = 0 \). For the contract to make non-negative profit, the interest rate \( r_p(a) \) must satisfy the following condition

\[
    r_p(a) \theta_p(a)nw + (1 - \theta_p(a))(1 - \tau)\phi a \geq nw
\]

where

\[
    \theta_p(a) = \frac{q + \theta(1 - q)\lambda(a)}{q + (1 - q)\lambda(a)}
\]

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. The function \( \lambda(a) \) is the probability with which low types with wealth \( a \) choose entrepreneurship. Lemma 1 in the appendix shows that \( \lambda(a) \) is decreasing in \( a \). In a pooling contract \( \lambda(a) = 1 \) since all low types choose entrepreneurship, whereas in a semi-separating contract \( 0 < \lambda(a) < 1 \).

Since credit markets are perfectly competitive, equation (2) will hold with an equality yielding a zero profit condition. Rearranging this we can solve out for the pooling interest rate

\[
    r_p(a) = \frac{nw - (1 - \theta_p(a))(1 - \tau)\phi a}{\theta_p(a)nw},
\]

which is decreasing as frictions affecting credit market decrease (\( \phi \) 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 (\( \tau \) goes down).

With this credit contract the payoff of low type entrepreneurs is

\[
    \theta(R - r_p(a)nw) + \theta(1 - \tau)a + M
\]
whereas that of a high type entrepreneur is

\[ R - r_p(a)nw + (1 - \tau)a + M. \]  

(6)

1.4.2.1.2 Negative Net Appropriable Returns Now let us consider the zero profit condition for banks when \( R < r_p(a)nw \) for \( r_p(a) \) as defined in equation (4). In this region, in addition to the project returns \( R \) in the good state and collateral in the bad state, the banks also need to be pledged a proportion of collateral for them to break even and consequently \( \hat{a}_s > 0 \). The zero profit contract is now defined by

\[ \theta_p(a)(R + (1 - \gamma(a))(1 - \tau)\phi a) + (1 - \theta_p(a))(1 - \tau)\phi a = nw \]  

(7)

where \( \hat{a}_s = (1 - \gamma(a))a \) is expressed as the proportion of collateral that is taken over by the bank in case the project succeeds. Hence the contract in this region is defined by the pair \( (\gamma(a), a) \). It is important to note that entrepreneurship is attractive not just because of the appropriated return \( R \) but also for the non-appropriable return \( M \). If the latter is large enough, agents would be willing to choose entrepreneurship even if they need to pay banks a fraction \( (1 - \gamma(a)) \) of their wealth in addition to the full \( R \) in the case when the project succeeds. Indeed a necessary condition for the existence of credit constraints in this model is \( M > w \). Note that \( \gamma(a) \), the proportion of wealth agents retain when successful, is increasing in \( a \) since banks would have to appropriate a smaller share of wealth in the good state to satisfy the zero profit condition when the agent has greater wealth.

With this credit contract the payoff of a low type entrepreneur is

\[ \theta \gamma(a)(1 - \tau)a + M \]  

(8)

and that of the high type entrepreneur is

\[ \gamma(a)(1 - \tau)a + M. \]  

(9)

Setting \( \gamma(a) = 1 \) in (7) it follows that this credit contract can only be offered when

\[ \theta_p(a)R + (1 - \tau)\phi a \geq nw. \]  

(10)

This condition only holds when agents have sufficient wealth. This in turn defines the credit constraint \( a \), such that agents with wealth less than this threshold will not be offered a pooling or semi-separating contract. Note that at this wealth level \( \gamma(a) = 0 \) must hold since agents would
have to forgo their entire wealth in order to secure the credit contract. Therefore, we have:

\[ a = \frac{nw - \theta_p(a)R}{\phi(1-\tau)}. \]  

(11)

1.4.2.2 Separating Credit Contracts. Let us now consider the separating contracts that can be offered to the agents. In a separating contract there is no cross subsidy from high to low types. Given assumption (1) low types will never accept a separating contract as their payoff from entrepreneurship is lower than what they receive working in the subsistence sector. Let the separating interest rate that banks offer at wealth \( a \) be \( r_s(a) \). Since high types succeed with probability one, we will see that the zero profit condition holds at \( r_s(a)nw = nw \) and this implies that \( r_s(a) \), which is the separating interest rate offered to an agent with wealth \( a \), will be equal to one since the credit market is perfectly competitive. From the right hand side of assumption (1) it should be clear that no separating credit contract will be accepted by low types with wealth large enough to allow for separation.

A separating contract is only viable when agents have sufficient wealth. We define this wealth level as \( \bar{a} \) where

\[ \bar{a} = \frac{\theta(R - nw) + M - w}{(1-\tau)(1-\theta)}. \]  

(12)

Lemma 2 in the appendix shows that a separating contract is not viable for agents with wealth less than \( \bar{a} \). This is because low types below this wealth level are attracted to entrepreneurship if they are offered the zero profit separating contract designed for high types. Hence the separating contract specifies that a borrower repays \( nw \) when the project succeeds and that collateral \( \hat{a}_f = \bar{a} \) is taken over by the bank in case of failure. The payoff of a high type entrepreneur with a separating contract is

\[ R - nw + (1-\tau)a + M. \]  

(13)

1.5 Equilibrium

In the previous subsection we have discussed the types of credit contracts that can exist in the economy. We will now characterize the equilibrium wage and credit contract. We will use the stiglitz76 equilibrium concept to characterize the credit market equilibrium. This is also used in gms and is standard in this literature. An equilibrium is characterized by the following two conditions: \textit{i)} all the contracts in the equilibrium set make non negative profits and \textit{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.

We are ready to characterize the equilibrium. For what follows we assume that \( a \) from (11) evaluated at \( w \) is strictly positive. In other words, a credit constraint exists. Note that for this to happen we need

\[ M > w \quad \text{and} \quad nw > (q + (1-q)\theta)R \]  

(14)
and the support of the wealth distribution \( g(a) \) to include zero.

**Proposition 1 (Occupational Choice).** Agents with wealth \( a < \bar{a} \) 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 \( \lambda(a) \in [0, 1] \). Agents with wealth \( a \geq \bar{a} \) and high talent become entrepreneurs and the rest become workers.

Proof: In the appendix.

The labour market is assumed to be perfectly competitive. An equilibrium is characterised by the market clearing condition. It is much easier to characterise the equilibrium by thinking of the labour demand of a firm instead of the labour demand 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: In the appendix.\(^9\)

Note that whenever \( w > \underline{w} \), this implies that 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 entrepreneurs 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. In particular, the increase in wage will affect the average quality of the pool of entrepreneurs in the economy.

\section{2 Institutional Frictions}

Now that we have fully characterized the equilibrium credit contracts and wage in the economy for every pair of institutional parameters \( \tau \) and \( \phi \), we can turn the attention to the preferences and choices over such institutional parameters (stage 2 of the game). The simplest way to model stage 2 is to simply assume that each institutional parameter is chosen separately by pure majority rule, i.e., it must be such that there does not exist any other institution that would defeat it in a direct binary vote.\(^{10}\)

We focus only on institutional frictions involving wealth because wealth is the instrument that 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. We

\(^9\)In contrast with gms there are no multiple equilibria here since firm level labour demand is constant at \( n \). This implies that the intensive margin effect is absent and the labour demand is driven solely by the extensive margin effect.

\(^{10}\)See e.g.perstab for a simple text-book treatment of pure majority rule.
recall that the parameter $\tau$ captures the broad institutional wedges that affect all property related transactions. A high $\tau$ implies that law enforcement is poor and assets are likely to be stolen by thieves or taken over by the local strongman. Hence a straightforward way to think about $\tau$ is how tough government is on property related crime and how well it enforces the claims of someone dispossessed of their property. Alternatively, $\tau$ can also be thought of as how well the titling system works. A high $\tau$ would imply that it is easy to bribe the local bureaucrat to get the name on someone’s land title changed. Hence $\tau$ is a parameter that captures all institutional inefficiency that affects all property related transactions.

$\phi$ is the specific institutional friction that affects credit markets. If an agent pledges wealth $a$ as collateral to become an entrepreneur, and his project fails, the bank only recovers $a(1 - \tau)\phi$. Note that this treatment implies that $\tau$ affects all property related transactions including posting wealth as collateral.\textsuperscript{11} The idea behind this treatment is that once projects fail and collateral passes to banks, banks like other agents are also subject to insecure property rights arising from a positive $\tau$. We could instead assume that collateral is only affected by $\phi$ and not by $\tau$. This would leave our results unaffected. Hence $\phi < 1$ lowers the value of an agent’s wealth as collateral and consequently there is a strong case for thinking that $\phi = 1$ will be the surplus maximising policy. However as we will see in Proposition 4, this effect may be dominated through the inefficiencies caused in the occupational choices since a high $\phi$ can end up making entrepreneurship attractive to low types.

We assume that there is no direct inefficiency from $\tau$ and $\phi$. Here we think of expropriated property $\tau a$ as simply a transfer from an agent to a thief, local strongman, or bureaucrat. Similarly $(1 - \phi)a$ of the liquidated collateral is simply a transfer to lawyers and judges who facilitate the liquidation process. This is a plausible interpretation of our treatment of $\phi$ and $\tau$. We do not explicitly model these thieves and lawyers although it would be quite easy to add a predatory non productive sector to the existing model. It is important to note however that this “no waste” treatment of $\phi$ and $\tau$ is not important. This assumption is useful only because it allows us to focus on the inefficiency caused by the effect of $\phi$ and $\tau$ on occupational choices in the second best world as we will see in section 2.2. There are two alternatives to this treatment. First, we could assume instead that wealth that leaks away as a result of inefficient institutions is simply redistributed to all agents through lump sum transfers. This assumption creates the well understood incentive for a poor median voter to pick inefficient policies since she focuses on policies that increase redistribution rather than ones that are surplus maximising. Since adding this channel will strengthen our results somewhat misleadingly, we shut it down to focus on the inefficiency arising from the median voter distorting institutions for their effect through occupational choices.

\textsuperscript{11}besley95 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 $\tau$ as affecting all three channels where as $\phi$ captures the additional frictions that only affects the use of property as collateral. Of course wealth in our model is exogenous and therefore the issue of investment incentives does not arise.
on the equilibrium wage. Second, we could assume that there is a direct dead weight loss of wealth when it is expropriated or liquidated with some inefficiency. This merely changes the calculation of the total surplus without changing our results qualitatively.

2.1 Institutions in the first-best World

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

**Proposition 3.** When talent is observable, voters unanimously choose surplus maximising institutions, and in particular $\tau = 0$.

**Proof.** Total surplus in the economy is maximised when the most talented agents become entrepreneurs regardless of their wealth. This is equivalent to the quality of the pool of entrepreneurs being maximised. Under the first best the total surplus in the economy is:

$$ W_{fb} = q(R + M) + 1_{\{q(n+1)<1\}}w(1 - q(n + 1)) $$

(15)

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

By inspecting this expression it is clear that the total surplus does not depend on the value of $\tau$ since expropriation of property is simply a transfer from the agents to the thieves. Hence all values $\tau$ are surplus maximising. Since all voting agents lose a part of their wealth as $\tau$ 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 $\tau$. Similarly $\phi$ does not appear in (15) as there is no screening problem in the first best and collateral is unnecessary to secure a credit contract. Consequently all values of $\phi$ are surplus maximising. Since collateral is never posted in the first best agents are indifferent between any value of $\phi$.

When talent is observable, $\tau = 0$ is chosen because better property rights increase the expected payoff of all agents. Similarly the optimal $\phi$ 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 all values of $\phi$ are optimal in the first-best world.\(^{12}\)

2.2 Institutions in the second-best World

We now show that as soon as there’s 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:

\(^{12}\)In the extension of the model where the probability of success for a high type is less than one, $\phi = 1$ is optimal and is chosen by voters when talent is observable.
\[ W_{sb} = (R + M)q(1 - G(a)) + (\theta R + M)(1 - q) \int_{\underline{a}}^{\pi} \lambda(a)g(a)da \] (16)

\[ 1 \left[ (n+1) \int_{\underline{a}}^{\infty} q + (1 - q)\lambda(a)g(a)da < 1 \right] w \left( 1 - (n + 1) \int_{\underline{a}}^{\infty} (q + (1 - q)\lambda(a))g(a)da \right). \]

Note that \( 1 \left[ (n+1) \int_{\underline{a}}^{\infty} q + (1 - q)\lambda(a)g(a)da < 1 \right] \) is an indicator function that is switched on when there’s a subsistence sector in the economy. This happens when the mass of entrepreneurs is insufficient to soak up all the workers in the economy, that is, \( \int_{\underline{a}}^{\infty} q + (1 - q)\lambda(a)g(a)da < \frac{1}{n+1}. \)

In this economy there are two productive activities, the subsistence sector where a worker produces \( w, \) 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 doesn’t enter the total surplus. In the world of full information, the first-best is guaranteed, where all high types become entrepreneurs and the rest become workers. It is possible that there is a subsistence sector in the first-best world if the economy is talent poor. This is what the indicator function in equation (15) captures.

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 in our setting the two institutional frictions that we study, both 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 isn’t enough collateral to solve the adverse selection problem and so 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 proportion of low type who choose entrepreneurship \( \lambda(a) \) will affect the latter. We state this formally in the following lemma.

**Lemma 4.** A policy that decreases \( \underline{a} \) 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 \( w \) as a result of the change. In this case note that 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 labour
demand. Note that 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 assumption made in equation (1) that this increases total surplus.

Now we analyze whether voters, if given the opportunity to do so with pure majority rule, choose the institutions that minimize the loss of total surplus due to the two types of mismatch of talent described above. Since redistributive instruments are lacking, it is possible that agents inefficiently use institutions to redistribute rather than to maximise surplus. Indeed such a choice of institutions is not inefficient in the Paretian sense.\(^{13}\) 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 failures. Hence the creation of political failure highlighted below lies in the fact that the total surplus is even lower when market failure is allowed to contaminate political outcomes through its effect on occupational choice and consequently on preferences.

The key to understanding why agents may choose non surplus maximising 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 \( \tau \) and \( \phi \). A policy of changing \( \phi \) that increases wage enjoys their support which makes up at least half the population since \( n \geq 1 \).\(^{14}\) 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 change in \( \phi \). When these \( \frac{n}{n+1} \) agents have little wealth, the same logic leads to a support for a change in \( \tau \) 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 \( \tau \) to the status quo.

However, policies that increase the wage may not decrease the credit constraint \( a \) and the rich low type entrepreneurs \( \lambda(a) \). As shown in Lemma 4, this would be at odds with surplus maximisation. This is the insight that we will use to generate the results in the rest of this section. Efficient institutions are those that decrease the credit constraint and the mass of low type entrepreneurs, and consequently increase the quality of the pool of entrepreneurs whereas institutions that increase wage are politically feasible. This is in sharp contrast to the first-best

\(^{13}\)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 maximising institution.

\(^{14}\)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.
world without market failure where the choice of institutional reform does not affect wage and consequently institutions are chosen optimally.

2.2.1 Support for reforms specific to banking sector

The parameter $\phi$ in the model denotes the amount of collateral that banks can liquidate in case of default and is the parameter that denotes the quality of the judiciary.\footnote{Alternatively, the quality of the judiciary could be modelled 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 $\theta_{\phi}(q)(R + (1 - \tau)\phi a - f) + (1 - \theta_{\phi})((1 - \tau)\phi a - f) = nw$ where $f$ is the additional fixed cost. Adopting this formulation does not affect our results.} 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 $\phi = 1$ may not be surplus maximising.

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

$$\frac{\partial L_D}{\partial \phi} = (1 + n) \left( -g(a) \frac{\partial a}{\partial \phi} (q + (1 - q)\lambda(a)) + (1 - q) \int_a^\pi \frac{\partial \lambda(a)}{\partial \phi} g(a) da \right) > 0 \quad (17)$$

It is easy to see from equation (11) that the credit constraint is decreasing in $\phi$. Furthermore $\frac{\partial \lambda(a)}{\partial \phi} > 0$ holds since an increase in $\phi$ increases the terms of the credit contract. Since $\phi$ makes entrepreneurship more attractive by decreasing the interest rate $\lambda(a)$ must decrease to keep the occupational choice constraint of a low type entrepreneur satisfied. This shows that labour demand is increasing in $\phi$. The wage is non decreasing in labour 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 support always a higher $\phi$ against a lower $\phi$, 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.

We now show that the effect of an increase in $\phi$ on total surplus is ambiguous. Note that there are two conflicting effect of an increase in $\phi$ on total surplus:

$$\frac{\partial a}{\partial \phi} < 0 \quad \text{but} \quad \frac{\partial \lambda(a)}{\partial \phi} > 0. \quad (18)$$

Lemma 4 shows how $\frac{\partial a}{\partial \phi} < 0$ increases total surplus but $\frac{\partial \lambda(a)}{\partial \phi}$ decreases it. The net effect depends on which of the two dominates and is consequently ambiguous. It is possible to construct examples
where one or the other effect dominates and hence in general the net effect is indeed ambiguous.\footnote{In a previous version we had included this in the paper. It is available upon request.}

We have shown that the equilibrium wage is non-decreasing in $\phi$. This happens because workers and entrepreneurs are perfect complements and an increase in $\phi$ increases the supply of entrepreneurs, which increases the demand for labour. Since the equilibrium wage is increasing in $\phi$, a policy increasing $\phi$ enjoys majority support, and hence $\phi = 1$ is the only value of $\phi$ that cannot be defeated by another value of $\phi$ in a binary vote. However, total surplus may not be increasing in $\phi$ since the effect of an increase in $\phi$ on the quality of the pool of entrepreneurs is ambiguous.

To understand why $\phi = 1$ may not be optimal note that if the credit constraint worsens as a result of an increase in $\phi$ then the total surplus must decrease. Credit constraints can worsen if the effect of $\phi$ on the increase in the equilibrium wage through an increase in the low type entrepreneurs overwhelms the effect on the credit constraint. In this case the proportion of entrepreneurs in the population must stay constant at $\frac{1}{n+1}$ for the wage to have increased even though the credit constraint has worsened. If the credit constraint worsens there would be a positive measure of previously unconstrained high types who would now be forced out of entrepreneurship. Since they must be replaced by rich low types due to an increase in $\lambda(a)$, the average quality of the pool of entrepreneurs must decrease. In short when $\phi$ increases it is possible that rich low types who were previously workers are attracted to entrepreneurship. This can in turn increase the wage and crowd out some high types due to an increase in the credit constraint and this has a negative effect on total surplus.

In our model reducing the frictions banks encounter in liquidating collateral (increasing $\phi$) is not always good in the second best world since it makes entrepreneurship more attractive and this induces low types to become entrepreneurs. This result arises because there are inherent externalities when agents borrow: the low type entrepreneurs by their very existence impose an externality on the high types.

\section*{2.2.2 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 the political support for a change in $\tau$ is ambiguous because the effect on the wage is ambiguous.

\textbf{Proposition 5.} A policy of improving property rights is always surplus maximising but may not be politically feasible.

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

\[
\frac{\partial L_D}{\partial \tau} = (1 + n) \left( -g(a) \frac{\partial a}{\partial \tau} (q + (1 - q)\lambda(a)) + (1 - q) \int_\mathbb{A} \frac{\partial \lambda(a)}{\partial \tau} g(a) da \right). \tag{19}
\]

The sign of this expression is indeterminate since it depends on the relative magnitude of \( \frac{\partial a}{\partial \tau} > 0 \) and \( \frac{\partial \lambda(a)}{\partial \tau} > 0 \). It is easy to check that \( \frac{\partial a}{\partial \tau} > 0 \). To see that \( \frac{\partial \lambda(a)}{\partial \tau} > 0 \), note that due to risk neutrality an increase in \( \tau \) 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 \( \tau \) decreases an agent’s effective wealth. This implies the effect of a decrease in \( \tau \) on the labour demand and consequently on the wage is ambiguous. Hence a policy of reducing \( \tau \) 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 \( \tau \) on the wage.

To see that decreasing \( \tau \) is surplus maximising note that \( \tau \) affects total surplus in two ways

\[
\frac{\partial a}{\partial \tau} > 0 \quad \text{and} \quad \frac{\partial \lambda(a)}{\partial \tau} > 0. \tag{20}
\]

Lemma 4 shows how both these effects go towards reducing total surplus. Hence it is unambiguously surplus maximising to decrease \( \tau \).

Credit constraints are increasing in \( \tau \). When \( \tau \) increases, the effective wealth of an agent decreases, and the interest rate at all levels of wealth increases. This is intuitive since an increase in \( \tau \) decreases the value of wealth as a screen. Since agents are likely to have their wealth expropriated anyway, posting a high collateral is less effective in revealing an agent’s type. Take the limiting case where \( \tau \) goes close to one. In this case the credit market correctly anticipates that all agents are equally eager to post any collateral since they know that their wealth will be expropriated and hence don’t attach any value on recovery of collateral in the event of success and consequent repayment of the loan.

There are two opposing effects on wage of a decrease in \( \tau \). Firstly decreasing \( \tau \) reduces the level of credit constraint. This increases the number of entrepreneurs. Decreasing \( \tau \) also decreases the attractiveness of entrepreneurship for marginal agents who are in the region where the semi-separating contract operates. As a result of this, some low type entrepreneurs drop out and \( \lambda(a) \) falls. The political feasibility of decreasing \( \tau \) depends on the effect on the wage which depends on the magnitude of two opposing effects.\(^{17}\) However the effect on total surplus is unambiguous since decreasing \( \tau \) allows more high types to become entrepreneurs and disincentivizes some low types from entrepreneurship.

\(^{17}\)Like in the case of \( \phi \), it is possible to construct examples where one or the other effect dominates and hence in general the net effect is indeed ambiguous. Examples are available on request.
The intuition for the differential impact of $\tau$ and $\phi$ on a low type entrepreneur’s payoff is the following. As $\phi$ increases we can see from equation (3) that the interest rate an entrepreneur is offered decreases and consequently entrepreneurship becomes more attractive. On the other hand when $\tau$ decreases, there are two effects. First, as in the case of $\phi$, there is a decrease in the interest rate making entrepreneurship more attractive. Second, decreasing $\tau$ 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 $\tau$ induces some low types to drop out of entrepreneurship whereas increasing $\phi$ makes entrepreneurship more attractive for all agents. In a nutshell, leaving aside the general equilibrium effects that arise through changes in wage, reducing frictions that affect liquidation of collateral primarily benefits the entrepreneurs in the modern sector where credit is necessary and collateral plays a role, whereas improving in 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 efficiency of institutional reform. Only reforms that increase wages are politically feasible but these may not correspond to reforms that are surplus maximising. While reforms affecting only the banking sector are politically feasible they may not be surplus maximising. On the other hand broader property rights reforms are surplus maximising but may not be politically feasible.

2.3 Predicting Property Rights Reform

In this section we derive some results about how the possibility of property rights reforms varies with changes in the parameters. To do so we have to make assumptions about the distribution of wealth in the economy that has been left unspecified so far. In particular we analyse how the preferences of the median voter over property rights reforms change with changes in inequality when wealth is assumed to follow a discrete distribution with two wealth levels in the economy (section 2.3.1). We find that the effect of wealth inequality depends on the ratio of appropriable and non-appropriable entrepreneurial returns. If this ratio is small, i.e., if there exist comparatively more rents from entrepreneurship that banks can never appropriate compared to a certain threshold, inequality can lead to reforms in the wrong direction. Thereafter (section 2.3.2) we analyse how an exogenous change in the cost of borrowing arising, for instance as a consequence of a credit crisis, can affect the choice of $\tau$ when wealth is assumed to follow a Pareto distribution. We find that distortion of property rights will happen only if credit market imperfection leads to too much credit in equilibrium rather than when it leads to too little credit through the creation of a credit constraint.
2.3.1 Inequality and Protection of Property Rights

In this section we consider how property rights chosen in a political equilibrium vary with changes in the level of inequality in the distribution of wealth. To pin down ideas we consider the case where the distribution of wealth is discrete. There are the rich with wealth \( a \) and the poor with wealth 0. The poor form a proportion \( p \) of the population where

\[
\frac{1}{2} > 1 - p > \frac{1}{n+1}.
\]

This parametric assumption implies that since more than half the agents are poor, the median voter will also be poor. The right hand side of the assumption implies that there are enough rich agents in the economy such that the labour market can be ‘tight’, that is, the wage must rise above \( w \) if all rich agents prefer entrepreneurship. Assume that \( q < \frac{1}{n+1} \), which implies that the economy is talent-poor. Furthermore assume that \( (q + (1-q)\theta)R < nw \). This ensures that the poor are always credit constrained regardless of the value of \( \tau \).

The occupational choice condition for rich low types is

\[
\theta(R - r(a)nw) + M - (1 - \theta)(1 - \tau)a = w. \tag{21}
\]

From this equation it is clear that the poor who form the majority of the population would like to increase \( \tau \) to induce rich low types into entrepreneurship since this will raise the equilibrium wage. The feasibility condition for the credit market to sanction loans to rich entrepreneurs is

\[
\frac{(q + (1-q)\theta\lambda(w))R}{q + (1-q)\lambda(w)} + (1 - \tau)\phi a \geq nw \tag{22}
\]

where \( \lambda(w) \) is the proportion of rich low types who are entrepreneurs. This equation gives us an upper bound to \( \tau \). The poor who are in the majority would want to vote for a \( \tau \) low enough to satisfy this constraint so that the rich can still access entrepreneurship. Indeed this constraint will hold with an equality because if it doesn’t, the poor can always increase the wage by lowering \( \tau \). Finally the labour market equilibrium is defined by

\[
1 = (n+1)(1-p)(q + (1-q)\lambda(w)). \tag{23}
\]

Equations (21), (22), and (23) jointly determine the proportion of rich low type entrepreneurs \( \lambda(w) \), the equilibrium wage

\[
w = \frac{\phi M + R(\theta + (1 - \theta)(n + 1)(1 - p)q)}{n + \phi} \tag{24}
\]
and the median voter’s preferred $\tau$ which we call $\tau^*$. This is

$$1 - \tau^* = \frac{nM - R(\theta + (1 - \theta)(n + 1)(1 - p)q)}{a(n + \phi)}. \quad (25)$$

Note that $\tau^*$ is increasing in $a$, the wealth of the rich. Moreover we can see the appropriable and non-appropriable components of an entrepreneur’s payoff have different effects on $\tau^*$. As $R$ increases, the feasibility condition for the credit market is relaxed and as a result the workers can distort $\tau$ further to capture some of the gains from high type entrepreneurs. On the other hand an increase in $M$ has no impact on the feasibility condition in equation (22) since $M$ is non-appropriable. Moreover, we can see from equation (24) that an increase in $M$ directly translates into an increase in wage as more of the rich low types choose entrepreneurship and hence there is no need to distort $\tau$. Finally as the productivity of the workers increases and fewer workers are required for each project, $\tau^*$ increases. This is because a fall in $n$ relaxes the feasibility condition for the credit contract which allows the poor to increase $\tau^*$.

Now the main point of this example: let us see what happens as we increase $a$ while keeping the mean wealth level $(1 - p)a$ constant. We find that

$$\frac{\partial \tau^*}{\partial a} = \frac{nM - 2R(1 - \theta)(n + 1)(1 - p)q}{a^2(n + \phi)}. \quad (26)$$

The sign of this is not always positive and depends on whether $\frac{M}{R} > \frac{1}{n} (\theta + 2(1 - \theta)(n + 1)(1 - p)q)$. This indicates that an effect of a change in inequality on $\tau$ depends on the ratio of $M$ to $R$. If this ratio is low enough, an increase in inequality leads to a lower $\tau^*$. On the other hand if the appropriable returns from entrepreneurship are relatively low compared to the non appropriable returns, an increase in inequality will lead to a higher $\tau^*$ being chosen. In a nutshell, this means that when the production technology is not that great (low $R$) wealth inequality hikes can further hamper the ability of a polity to obtain good institutional reforms.

### 2.3.2 Credit Crisis and the Protection of Property Rights

In this section we explore what happens when there is an exogenous shock to the supply of credit. So far we have assumed that the supply of credit is perfectly elastic at interest rate equal to one. We now assume that the supply is elastic at interest rate $\rho \geq 1$. This changes the zero profit condition for the pooling contracts described in equation (11) to

$$\rho w - R(q + (1 - q)\theta) \phi(1 - \tau). \quad (27)$$

The credit constraint bound $\rho$ is increasing in $\rho$. This is intuitive since an exogenous increase in the cost of capital leads to more agents with low wealth being excluded from the credit market.
Recall that with a general distribution of wealth the effect of $\tau$ on the wage is ambiguous. We now assume that wealth follows a Pareto distribution and we obtain:

**Proposition 6.** If wealth follows a Pareto distribution, the equilibrium wage is decreasing in $\tau$ if and only if the economy has a credit constraint bound $a > 0$.

Proof: In the appendix.

In economies where credit is easily available and agents are not excluded from credit when they have no wealth there is an incentive to distort $\tau$ since this will not lead to poor high types being excluded from the market potentially driving down the wage. Indeed the distortion of $\tau$ only leads to more rich low types choosing entrepreneurship and this increases the wage. If the median voter, who must be a worker, is poor enough she would prefer to increase $\tau$ to increase the wage. In this case there will be a distortion of $\tau$ leading to even more low type borrowers. On the other hand in economies with a credit constraint, increasing $\tau$ keeps more poor high types out of entrepreneurship and the effect this has on wage dominates the other effect arising through more rich low types being induced into entrepreneurship. To the extent an exogenous change in the cost of borrowing raises the cost of capital, for example, due to an international financial crisis, $\rho$ will increase. This may create a credit constraint since a large enough increase in $\rho$ will lead to $a > \alpha$, where $\alpha$ is the parameter in the Pareto distribution that characterises its lower bound. Our model then predicts that this will in fact lead to an efficient reform in $\tau$. This result arises due to the downward sloping density function of the Pareto distribution: the effect of the credit constraint always dominates since $g(a) > g(\overline{\tau})$ and it indicates that we should expect inefficient distortion of $\tau$ in economies where credit market imperfection leads to too much lending in equilibrium. Conversely in economies where credit market imperfection leads to too little lending at least for some agents as a result of a credit constraint, we should expect efficient reforms of $\tau$.

These results can be related to some of the lessons of the recent financial crisis. If a financial crisis leads to an increase in the cost of borrowing and makes it difficult to obtain credit, then the pressure and political support for improvements in property rights protection can lead to higher welfare. This is an example of the claim sometimes made that a deep crisis can be an “opportunity for otherwise unfeasible reforms”.

### 3 Introducing More Policies

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. In particular, in section 3.2 we introduce the possibility of wealth

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18 Of course the distortion must not be severe enough to create a credit constraint since, as Proposition 6 shows, this would switch the effect of $\tau$ on wage from positive to negative.
redistribution and in section 3.1 we allow them to vote for a budget balanced subsidy to workers financed by a tax on entrepreneurs.

### 3.1 Tax and Subsidy Package

In this section we attempt to see the effect of allowing income based redistribution on the median voter’s preference for an inefficient $\tau$. In particular we allow the electorate a choice of the efficient value of $\tau$ coupled with a subsidy to workers financed through a tax on entrepreneurs. We show that such a bundle may not always be politically feasible.

#### 3.1.1 Talent Rich Economy

Consider a status quo with $\tau > 0$ that is supported by a majority when the option of voting on entrepreneurial tax $t$ along with wage subsidy $s$ was 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 $q > \frac{1}{n+1}$, then a subsidy $s$ along with a tax $t$ exists such that agents vote for $\tau = 0$.

**Proposition 7.** In a talent-rich economy, a welfare maximising, budget balanced $t$ and $s$ exists 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:

$$R - nw + M + a - t = w + s + a.$$  (28)

$t$ 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

$$w + s > \theta(R - nw - t) + M.$$  (29)

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 $\overline{w} = R - nw + M$ in this case we will have $w + s = \overline{w}$. 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 entrepreneur. Hence \( t = ns \) ensures budget balance. Finally since we have assumed \( R > nM \), that appropriable returns are large enough to cover wage payment even when wage is \( \bar{w} \). Hence the constraint \( t \leq R - nw \) is satisfied.

**3.1.2 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 tie 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 \( \bar{w} \) 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 \( \bar{w} \) 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 \( \alpha_r, \alpha_m \) and \( \alpha_p \). Assume that the following holds

\[
\alpha_r > \frac{1}{n+1}, \quad \frac{1}{n+1} > q\alpha_r + \alpha_m \quad \text{and} \quad \alpha_p > \frac{1}{2}.
\]  

(30)

This implies that the median voter is poor but the proportion of rich is large enough such that the wage will be greater than \( \bar{w} \) 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 \( \bar{w} \) with unobservable talent.

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

\[
M > \bar{w} > M - nw.
\]  

(31)

and (14) modifies to \( qR < nw \) ensuring there is always a credit constraint. 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

\[
q + (1-q)\lambda(a_r) = \frac{1}{\alpha_r(n+1)}
\]  

(32)

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

\[
M - (1-\tau^*)a_r = w(\tau^*),
\]  

(33)
where \( w(\tau^*) \) is the equilibrium wage when \( \tau = \tau^* \). We can see that increasing \( \tau \) would increase the wage. The highest \( \tau \) such that the credit market still lends to the rich must satisfy (11) and hence we must have

\[
a_r(1 - \tau^*) = nw(\tau^*) - \theta_p(a_r)R. \tag{34}
\]

Using (3) we have

\[
\theta_p(a_r) = \frac{q}{q + (1 - q)\lambda(a_r)} \quad \text{and hence} \quad a_r(1 - \tau^*) = nw(\tau^*) - q\alpha_r(n + 1)R \tag{35}
\]

We have two equation in (33) and (35) and two unknowns namely the status quo \( \tau^* \) and the equilibrium wage \( w(\tau^*) \). Solving out for the equilibrium wage we have

\[
w(\tau^*) = \frac{M + q\alpha_r(n + 1)R}{n + 1} \tag{36}
\]

We are now ready to state the result.

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

\[
a_r > M - \frac{w}{\alpha} > a_m \tag{37}
\]

**Proof.** If \( \tau \) changes from \( \tau^* \) to 0, rich low types will drop out of entrepreneurship as a consequence of the left hand side of (37). Since \( q\alpha_r + a_m < \frac{1}{n + 1} \), and the poor are always credit constrained, we must have wage \( w(0) = \bar{w} \) at \( \tau = 0 \). At \( \bar{w} \) we can see from the right hand side of (37) 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 \( qR < nw \) by (14). 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 \( \tau \) since wage falls from \( w(\tau^*) \) to \( \bar{w} \).

This result demonstrates 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 appropiable 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.
3.2 Wealth Redistribution

In this section we attempt to see the effect of allowing wealth based redistribution on the median voter’s preference for an inefficient \( \tau \). In particular we allow agents to vote for a redistribution package that equalizes the wealth in the population coupled with an efficient vote on \( \tau = 0 \).

3.2.1 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

\[
\int_{0}^{\infty} ag(a) da > \bar{w} - \underline{w},
\]

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

**Proof.** Note that \( \bar{w} \) is the highest possible wage in the economy. A median voter’s payoff from voting for \( \tau > 0 \) is at most \( \bar{w} \). 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 (38) 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 \( \tau \) will be always politically feasible.

3.2.2 Wealth Poor Economy

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

\[
\frac{n}{n + 1} > \alpha > \frac{1}{n + 1}.
\]

This guarantees that the median voter is poor but at the same time there are sufficient mass of rich to raise the wage over \( \underline{w} \). Assume further that \( \theta = 0 \). This is similar to the example we constructed in section 3.1.2. In this case we can solve for \( \tau^* \), the value of \( \tau \) that maximizes the equilibrium wage, and the corresponding wage \( w(\tau^*) \) that is supported by \( \tau^* \). 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

\[ w(\tau^*) = \frac{M + q\alpha(n + 1)R}{n + 1} \]  

(40)

**Proposition 10.** If the average wealth in the economy

\[ \alpha a < \min\{w(\tau^*) - w, nw - qR\} \]  

(41)

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

**Proof.** Since the median voter has no wealth, his payoff when he votes for \( \tau^* \) is simply \( w(\tau^*) \). On the other hand if he votes in favor of redistribution all agents receive the average wealth \( \alpha a \). However this is lower than the credit constraint from (11) since \( \alpha a < nw - qR \). This implies that all agents are credit constrained and work in the subsistence sector with wage \( w \). Hence the payoff of the median voter is \( w + \alpha a \), which is less than \( w(\tau^*) \), the payoff from choosing \( \tau^* \).

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 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 \( \tau \) 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 suggests that the political failure we highlight in this model will be harder to overcome in economies poor in wealth and talent.

4 Conclusion

To summarise our result on institutional efficiency and feasibility, 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, we find that improving property right institutions more broadly increase total surplus but may not always be politically feasible.

In the event of a market failure, competitive markets can passively play a political role of creating constituencies. These constituencies can have a preference for inefficient policies. This leads to the inefficiencies of market failure being further amplified by the policy choices that constituencies created in a flawed market make. In this sense our paper provides an additional reason to worry about market failure: market failure may lead to a political failure even in a functioning democracy without powerful interest groups. Moreover, we have shown by example that wealth inequality hikes and lower productivity can exacerbate this political failure effect, while tightening of credit may cause efficient reforms to become feasible.
Finally, the last propositions of the paper highlight the possibility that the feedback effects we uncover between market and political failures generate a kind of “poverty trap”, in the sense that it is only in talent 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.

Acemoglu and Johnson (2005) find 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.

Appendix

Lemma 1.

\[ \frac{\partial \lambda(a)}{\partial a} \leq 0 \]  \hspace{1cm} (42)

Proof. \( \lambda(a) \) 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

\[ \theta_p(a) = \left( \frac{q + (1 - q)\theta\lambda(a)}{q + (1 - q)\lambda(a)} \right) \]  \hspace{1cm} (43)

and

\[ \frac{\partial \theta_p(a)}{\partial a} = \frac{\partial \theta_p(a)}{\partial \lambda} \cdot \frac{\partial \lambda(a)}{\partial a}. \]  \hspace{1cm} (44)

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

\[ \theta_p(a)r_p(a)nw + (1 - \theta_p(a))\phi(1 - \tau)a = nw \]  \hspace{1cm} (45)

and by a low type entrepreneurs occupational choice constraint when he is indifferent between entrepreneurship and working for a wage:

\[ \theta(R - r_p(a)nw) + \theta(1 - \tau)a+ = w + (1 - \tau). \] \hspace{1cm} (46)

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, \( \lambda(a) = 0 \) 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 randomise when indifferent. In this region substituting
the interest rate \( r_p(a) \) using equation (45) into \( v_L(a, r_p(a), w) \) we find that \( \lambda(a) \) is determined by

\[
\theta R - \frac{\theta}{\theta_p(a)} nw - (1 - \tau) a (\theta(1 - \theta) - \theta(1 - \theta_p(a)) \phi) + M = w \tag{47}
\]

Differentiating this expression we find

\[
\frac{\partial \theta_p(a)}{\partial a} = \frac{(1 - \tau)(1 - \theta) \theta_p(a)^2}{nw - (1 - \tau) \phi a} > 0 \tag{48}
\]

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 \( \lambda(a) \) is determined jointly by the zero profit condition

\[
\theta_p(a)(R + (1 - \gamma(a))(1 - \tau)\phi a) + (1 - \theta_p(a))(1 - \tau)\phi a = nw \tag{49}
\]

and by the low types indifference between entrepreneurship and working for a wage

\[
\theta(1 - \tau)a + M = w + (1 - \tau)a, \tag{50}
\]

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 (50) into (49) and differentiate to find

\[
\frac{\partial \theta_p(a)}{\partial a} = \frac{(1 - \tau)\phi(\theta_p(a) - \theta)}{\theta(R - (1 - \tau)\phi \gamma(a)a)}. \tag{51}
\]

Note that \( 1 - \gamma(a)\theta = \frac{M - w}{(1 - \tau)a} \). \( R > (1 - \tau)\phi \gamma(a)a \) is guaranteed by assumption in (1) since \( \theta R + M - (n + 1)w < 0 \) and \( R - nw > 0 \) for \( w \in [\underline{w}, \bar{w}] \). 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.

**Lemma 2.** Only agents with wealth \( a \geq \bar{a} \) are offered a separating contract and this contract is defined by the collateral - interest rate pair \((\bar{a}, 1)\).

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

\[
\theta(R - nw) + M - (1 - \tau)(1 - \theta)\bar{a} = w. \tag{52}
\]

Rearranging this we get equation (12). Hence high types can be offered the contract \((\bar{a}, 1)\) and this will make zero profits. To see that this is unique assume a contract \((\bar{a}, r')\) exists that dominates \((\bar{a}, 1)\). 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 \((\bar{a}, 1)\) is viable and unique for wealth \(a \geq \bar{a}\).

We will now show that separating contracts will not exist in equilibrium for wealth \(a < \bar{a}\). 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 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 \(a < \bar{a}\).

**Proof of Proposition 1.** To begin with note that \(a(w) > 0\) implies that \(a(w) > 0\) for all \(w \geq w\). To see this note from (11) that \(a(w)\) is increasing in \(w\).

Furthermore we must have \(\bar{a} > a\). If not low types with wealth \(a\) 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 \(\theta_p(a)\) defined in (3) equals one since there are only high type entrepreneurs. Plugging \(\theta_p(a) = 1\) into (11) we see that this implies \(nw - R > 0\). This is a contradiction since, by assumption we have \(R - nw \geq 0\) for \(w \in [\underline{w}, \bar{w}]\). Hence if \(a(w) > 0\), we must have \(\bar{a} > a > 0\).

We begin with wealth \(a \geq \bar{a}\). Lemma 2 shows that in this region high type agents are offered a separating contract which they accept. By assumption (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 \(a = \bar{a}\) are indifferent between working for a wage and entrepreneurship. For wealth \(a < \bar{a}\), 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 (11) agents with \(a < \bar{a}\) are credit constrained.

**Proof of Proposition 2.** The Labour markets are assumed to be perfectly competitive. Labour supply is 0 for wage lower than \(w\) and 1 for any wage \(w \geq w\). Labour demand is given by:

\[
(1 + n) \left( q(1 - G(a)) + (1 - q) \int_{\underline{a}}^{\bar{a}} \lambda(a) g(a) da \right).
\]

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

\[
\frac{\partial L_D}{\partial w} = (1 + n) \left( -g(a) \frac{\partial a}{\partial w} \left( q + (1 - q) \lambda(a) \right) + (1 - q) \int_{\underline{a}}^{\bar{a}} \frac{\partial \lambda(a)}{\partial w} g(a) da \right) < 0.
\]
This is true since
\[
\frac{\partial a}{\partial w} < 0 \quad \text{and} \quad \frac{\partial \lambda(a)}{\partial w} < 0. \tag{55}
\]
This implies that there’s a unique \( w \geq \bar{w} \) that clears the market. Wage \( w \) is bounded from above by \( \bar{w} = \frac{R+M}{n+1} \) since even high types would exit entrepreneurship if wages rise above this. If \( w = \bar{w} \) then high types must randomise between entrepreneurship and working for a wage with probability \( p = \frac{1}{q(n+1)} \).

This is true because \( w = \bar{w} \) implies that \( q \geq \frac{1}{n+1} \). To see this note two things. First when \( w = \bar{w} \) there cannot be any low type entrepreneurs since \( \bar{w} = \frac{R+M}{n+1} > M \). Second, note that when \( w > \bar{w} \) 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 randomise and become entrepreneurs with probability \( p \), since the number of agent in the economy is infinite, by law of large numbers, there will be \( pq \) entrepreneurs and \( (1-p)q + (1-q) \) workers in the economy. It is easy to see that this yields \( \frac{1}{n+1} \) entrepreneurs and \( \frac{n}{n+1} \) workers. Hence a unique \( w \in [\bar{w}, \bar{w}] \) exists that clears the market. \( \square \)

**Proof of Proposition 6.** Assume that wealth follows a Pareto distribution such that
\[
G(a) = 1 - \left( \frac{\alpha}{a} \right)^\beta \tag{56}
\]
where \( \alpha > 0 \) is the lower bound of the distribution and \( \beta > 0 \) is the shape parameter. Recall that the labour demand is
\[
(1+n) \left( q(1-G(\bar{a})) + (1-q) \int_a^{\bar{a}} \lambda(a)g(a)da \right). \tag{57}
\]

We will first analyse sufficiency of \( a > \alpha \) for the effect of \( \tau \) on wage to be negative. Since \( \lambda(a) \in [0,1] \), the labour demand is at its highest if \( \lambda(a) = 1 \). This simplifies the labour demand to
\[
L_D = (n+1) \left( q(1-G(\bar{a})) + (1-q)(G(\bar{a}) - G(\bar{a})) \right) \tag{58}
= (n+1)(q - G(\bar{a}) + (1-q)G(\bar{a})). \tag{59}
\]

Substituting for \( G(a) \) using the Pareto distribution we find
\[
L_D = (n+1) \left( \left( \frac{\alpha}{\bar{a}} \right)^\beta - (1-q) \left( \frac{\alpha}{\bar{a}} \right)^\beta \right). \tag{60}
\]
Taking the derivative with respect to $\tau$

$$\frac{\partial L_D}{\partial \tau} = \frac{\beta(n + 1)}{1 - \tau} \left( - \left( \frac{\alpha}{a} \right)^\beta + (1 - q) \left( \frac{\alpha}{\bar{a}} \right)^\beta \right) < 0. \quad (61)$$

This expression holds since we assume that $a < \bar{a}$.

This shows that even when $\lambda(a)$ takes the maximum possible values, the effect of $\tau$ through the second term in equation (57) is still dominated by the effect on the first term.

Now we show the necessity of the existence of credit constraint for the effect of $\tau$ on wage to be negative. Consider the case where $\bar{a} \leq \alpha$. The labour demand simplifies to

$$L_D = (n + 1) \left( q + (1 - q) \int_\alpha^{\pi} \lambda(a) g(a) da \right). \quad (62)$$

Now since $\lambda(\bar{a}) = 0$ and $\lambda(\alpha) = 1$ we can see that

$$\frac{\partial L_D}{\partial \tau} = (n + 1)(1 - q) \int_\alpha^{\pi} \frac{\partial \lambda(a)}{\partial \tau} g(a) da. \quad (63)$$

This is positive since $\frac{\partial \lambda(a)}{\partial \tau} > 0$. \hspace{1cm} \square