Can Market Failure Cause Political Failure?*

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Abstract

We study how inefficiencies of market failure may be further amplified by political choices made by interest groups created in the inefficient market. We take an occupational choice framework, where agents are endowed heterogeneously with wealth and talent. In our model, market failure due to unobservability of talent endogenously creates a class structure that affects voting on institutional reform. In contrast to the world without market failure where the electorate unanimously vote in favour of surplus maximising institutional reform, we find that the preferences of these classes are often aligned in ways that creates a tension between surplus maximising and politically feasible institutional reforms.

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1 Introduction

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 Banerjee and Newman (1993) and Galor and Zeira (1993)). In this literature institutional frictions are taken as exogenous.[1]

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.[2]

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.[3] In our model, in the first-best world with well functioning markets, the electorate unanimously chooses institutions that maximise total surplus. However once a market imperfection in the form of unobservability of entrepreneurial talent is introduced, things change dramatically. The competitive market responds to this imperfection by screening agents based on their wealth. This leads to creation of a class structure in the economy with preferences that are aligned in ways that defeat surplus maximising reforms.

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. [4]

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

[1]See Banerjee (2001) for a survey of this literature.

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

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

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

to poverty traps that are easier to characterise[5], the 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.

Our paper is related to the growing literature on political economy, that looks at two questions: first, which institutions increase the size of the pie, and second, which institutions are more likely to be chosen given a certain distribution of political power?

Boyer and Laffont (1999) 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. Perotti and Volpin (2004) develop a model where wealth inequality and political accountability undermine entry and financial development. Rajan and Zingales (2006) 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. Biais and Mariotti (2009) 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 Caselli and Gennaioli (2008), 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. Lilienfeld-Toal and Mookherjee (2010) 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. Bonfiglioli and Gancia (2011) 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 Jaimocich and Rud (2011), 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 inefficient this equilibrium may be politically feasible since it leads to an increase in low skilled

[5] Micro-lending has been a big theme in this literature. See for example Ghatak and Guinnane (1999).

wage.

At the root of the inefficiencies showcased in these models discussed above 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, we find that the constituencies created in the second-best world also disappear, and the electorate unanimously favours surplus maximising policies.

Even with a fully benevolent government and perfectly competitive markets, in our model there are market frictions arising from informational (i.e., adverse selection) and transactional constraints (limited liability). 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.

2 Model

The economic fundamentals of the model described below are taken for the most part from Ghatak et al. (2007), with some modifications, in particular, the introduction of institutional frictions.

2.1 Technology, Preferences, and Endowments

There are two technologies in the economy: a subsistence technology that yields $\underline{w}$ with certainty for one unit of labour and a more productive 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.

All agents are assumed to be risk neutral with a utility function that is additively separable in effort and money. The disutility of labour effort is $M > 0$ while that of entrepreneurial effort is normalized to zero. We can therefore interpret

M as to include any perks that entrepreneurs enjoy relative to workers such as a comfortable office, or the psychological payoff from not having a boss.

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 θ which is less than one.[6] Assume that

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

This assumption implies that the expected appropriable 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.

Agents are also endowed with illiquid wealth a that is distributed in the population with $g(a)$. As will be clear in section 2.4, wealth is used in the credit market to screen agents when talent is unobservable.

2.2 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. In contrast when talent is unobservable, a market failure arises. The illiquid wealth a, and output, are verifiable. M is also verifiable but is not appropriable since it is the psychological net benefit of being an entrepreneur.

The two institutional parameters in the model are ϕ and τ. The proportion of collateral that is recovered from a borrower when she defaults is denoted by ϕ. This can be thought of as the strength of judicial enforcement of contracts. The property rights parameter τ, is the probability with which the wealth a is expropriated. The efficiency of both these institutions affect the credit contract that an agent is offered in the second-best world as the credit market takes into account the efficiency of the judiciary and the risk of expropriation when accepting

[6] Our results apply *mutatis mutandis* to the case where the high types have talent θ_H such that $1 \geq \theta_H > \theta \geq 0$. In an earlier version we also considered a continuous distribution of talent. The results remain similar to the ones presented here although not as sharp. Note that this set up implicitly assumes that the distributions of wealth and talent are independent.

the agent's wealth as collateral. We discuss this in greater detail in section 3.

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.

2.3 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 up front, where $w \geq \underline{w}$ since working with the subsistence technology is an outside option that all agents have.

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.

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 up front when an entrepreneurial project is set up and the wealth of agents is illiquid. Both markets are assumed to be perfectly competitive. The risk free interest rate is assumed to be zero.

2.4 Credit Contracts

Since the wealth of an agent is illiquid, agents need to borrow from the credit market to become entrepreneurs. The credit market is assumed to be perfectly competitive. The supply of credit is assumed to be perfectly elastic at interest rate equal to 1.

In the first-best world where talent is observable, given our assumption (1), only high types would become entrepreneurs. The wage would depend on whether the economy is talent rich or talent poor (i.e., $\frac{q}{1-q} \geq$ or $< \frac{1}{n}$). If talent is abundant then we get wage $\overline{w} = \frac{R+M}{n+1}$ if not then the equilibrium wage is $\underline{w}$. This is because the wage in the first-best is determined by whoever is on the short side of the market.[7] Since each entrepreneurs requires n workers, the abundance of talent depends on the proportion of high types in the economy relative to n. This leads us to the following observation.

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

The second-best world is characterised by the unobservability of entrepreneurial talent. In all other respects it is identical to the first-best world. Since talent is unobservable, the credit market can no longer offer contracts that are indexed by the agent's talent. However agents are endowed with wealth which they can use as collateral to access credit. Hence the credit contract will be defined by a pair (r, a) that is, interest rate and collateral.

We now discuss the possible credit contracts that can be offered to entrepreneurs and subsequently we characterise the equilibrium in the credit and labour market. The reader who is only interested in the choice of institutions by the electorate in the first and second-best world can see the statements of propositions 1 and 2 in section 2.5 that capture the characterisation of the equilibrium and skip directly to section 3.

2.4.1 Separating Contract

Let us first consider the separating contracts that can be offered to the agents. A separating contract exists if the contract is such that agents have an incentive to reveal their types. Since the probability of success is increasing in type, high types are offered contracts with lower interest rates. This feature of the credit contract creates an incentive to lie for low ability agents. Hence for such contracts to be incentive compatible, agents need to have sufficient wealth that the credit market can use as a screen. The wealth level below which a separating contract is not feasible is determined by the constraint

$$R - rnw \geq 0$$

holding with an equality. This is because below this threshold entrepreneurs earn only M from entrepreneurship which is independent of type. It is therefore impossible to offer an interest rate and collateral pair that will separate the two types.

[7] We require $R > nM$ for the appropriable returns from the project to be large enough to cover the wage payment when the wage is $\overline{w}$.

Since high types succeed with probability one, the zero profit condition implies that the separating interest rate $r_s(a)$ must be equal to one. We can ignore the separating contract for low types since it is clear from assumption 1 that this will not be offered in equilibrium.

2.4.2 Pooling and Semi-Separating Contracts

In addition to a separating contract, there may also exist pooling and semi-separating contracts in this economy. Unlike the separating contract that is only available when $R \geq rnw$, a pooling contract is possible even if this constraint is violated.

Let us first consider the region of wealth such that $R \geq r_p(a)nw$. Any pooling or semi-separating contract that could be offered must satisfy the necessary condition of zero profit for competitive banks:

$$r_p(a)\theta_p(a)nw + (1-\theta_p(a))(1-\tau)\phi a = nw \tag{2}$$

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. The function $\lambda(a)$ is the probability with which low types with wealth a choose entrepreneurship. In a pooling contract $\lambda(a) = 1$ whereas in a semi-separating contract $0 < \lambda(a) < 1$. Note that the formulation of the optimal contract implicitly assumes that all wealth is seized when the agent defaults. It is easy to see that the equilibrium contract will take this form since this is the preferred contract for the high type. High types succeed with a higher probability and hence, relative to less talented agents, prefer contracts that are tougher in the bad state and yield a high payoff in the good state.

Now let us consider the zero profit condition for banks when $R < r_p(a)nw$ for $r_p(a)$ as defined in equation (2). In this region, in addition to the project returns R, the banks also need to be pledged a proportion of collateral for them to break even. The zero profit contract is now defined by

$$\theta_p(a)(R + (1-\gamma(a))(1-\tau)\phi a) + (1-\theta_p(a))(1-\tau)\phi a = nw. \tag{3}$$

where $(1-\gamma(a))$ is 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 appropriable return R but also for the non-appropriable return M. If the latter is large enough, agents would be willing to choose entrepreneurship in exchange for their wealth even in the case when the project succeeds. Indeed a necessary condition for the existence of credit constraints in this model is $M > \underline{w}$. Note that $\gamma(a)$ is increasing in a since banks would have to appropriate a larger share of wealth in the good state to satisfy the zero profit condition when the agent has lower wealth.

Rewriting (3), credit contracts can only be offered when

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

This condition only holds when agents have sufficient wealth. This in turn defines the wealth level $\underline{a}$, 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.

$$\underline{a} = \frac{nw - \theta_p(\underline{a})R}{\phi(1-\tau)}. \tag{4}$$

2.5 Equilibrium

In the previous subsection we have discussed the types of credit contracts that can exist in the economy. We are now ready to characterise the equilibrium.

2.5.1 Equilibrium in the Credit Market

We have shown that pooling, semi-separating and separating contracts are viable. Given that banks can introduce any contract $(r(a), a)$ we will now characterise the equilibrium in the model. We will use the Rothschild and Stiglitz (1976) equilibrium concept that is standard in this literature. An equilibrium is characterised by the following two conditions: *i)* all the contracts in the equilibrium set make non negative profits and *ii)* there does not exist a contract that can be introduced that will make a strictly positive profit. We will assume that $M > \underline{w}$ which in turn implies that $\underline{a} > 0$ (otherwise, low type agents will not be tempted to be an entrepreneur).

To begin with, note that a separating contract is only viable when agents have sufficient wealth. We define this wealth level as

$$\overline{a} = \frac{nw}{(1-\tau)\phi}. \tag{5}$$

Lemma 2 in the appendix shows that a separating contract is not viable for agents with wealth less than $\overline{a}$. This is because wealth is the only instrument here that the credit market can use to screen agents and there is a threshold of wealth below which this is not possible.

For agents with wealth less than $\overline{a}$ a semi-separating contracts will exist in equilibrium. To see this it is convenient to define $v_L(a, r_p(a), w)$ here as the left hand side of the following occupational choice constraint:

$$\theta(R - r_p(a)nw) - (1-\tau)(1-\theta)a + M = w. \tag{6}$$

Whenever a low type agent with wealth a makes a wage payments at the wage rate w, is offered a credit contract with interest rate $r_p(a)$, the net value he receives from entrepreneurship is $v_L(a, r_p(a), w)$. If this makes him indifferent to working for a wage, the following condition holds:

$$v_L(a, r_p(a), w) = w. \tag{7}$$

When a low type is indifferent he randomises with probability $\lambda(a)$ between entrepreneurship and working for a wage. Lemma 1 shows that this probability is uniquely determined in equilibrium and is decreasing in wealth. At $\overline{a}$ it is easy to check that $r_p(\overline{a}) = 1$ since $\lambda = 0$ as all low types have dropped out. As we move to wealth $a < \overline{a}$ entrepreneurship becomes attractive for low types. As low types become entrepreneurs this raises the interest rate and decreases $v_L(a, r_p(a), w)$ and this ensures $v_L(a, r_p(a), w) = w$ continues to hold. This is where $\lambda \in (0, 1)$ and the equilibrium contract is semi-separating. As we move lower down the wealth distribution there may come a point where $\lambda = 1$. This is where a pooling contract may exist. Hence in equilibrium separating and semi-separating contracts must exist whereas a pooling contract may or may not exist. The existence of a pooling contract depends on whether at

$$\underline{a}(\lambda = 1) = \frac{nw - R(q + (1-q)\theta)}{(1-\tau)\phi} \tag{8}$$

$v_L(a(\lambda = 1), r_p(a(\lambda = 1)), w) \geq w$. That is, whether or not the low types find it attractive to become entrepreneurs at this level of wealth. This is shown in Lemma 3. We are ready to characterise the equilibrium.

Proposition 1 (Occupational Choice)**.** *Agents with wealth a where:*

- $\underline{a} > a$ *are credit constrained and hence become workers.*
- $\overline{a} > a \geq \underline{a}$ *and high talent become entrepreneurs. Agents with low talent randomise and choose entrepreneurship with probability* $\lambda(a)$*.*
- $a \geq \overline{a}$ *and high talent become entrepreneurs and the rest become workers.*

Proof: In the appendix.

2.5.2 Equilibrium in the Labour Market

The labour market is 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 1 unit of entrepreneurial and n units of non entrepreneurial labour. Supply is 0 for wage $w < \underline{w}$, and 1 at $w \geq \underline{w}$.

Proposition 2. *A unique wage* $w \in [\underline{w}, \overline{w}]$ *exists.*

Proof: In the appendix.[8]

Note that whenever $w > \underline{w}$, this implies that the economy 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 $\frac{1}{n+1}$. Although 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.

3 Credit Market Institutions

Now we turn to the parameters that capture institutional frictions, namely, ϕ an τ. The parameter τ captures the security of property rights. A high τ implies

[8]In contrast with Ghatak et al. (2007) 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.

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 τ is how tough government is on property related crime and how well it enforces the claims of someone dispossessed of their property. Alternatively, τ can also be thought of as how well the titling system works. To the extent it is easy to bribe the local bureaucrat to get the name on someone's land title changed, τ would be high and vice versa.

The parameter ϕ measures the efficiency of contractual institutions. The treatment of ϕ is somewhat different since it is the proportion of collateralized wealth that can be liquidated. If an agent pledges wealth a as collateral to become an entrepreneur, and his project fails, the bank only recovers ϕa. Hence $(1-\phi)a$ is pure inefficiency and consequently there is a strong case for thinking that $\phi = 1$ will be the surplus maximising policy. However under certain conditions, this effect may be dominated through the inefficiencies caused in the occupational choices since a high ϕ can end up making entrepreneurship attractive to agents who should optimally become workers.

The parameters ϕ and τ capture different aspects of institutional frictions that reduce the efficiency of market transactions involving wealth.[9] The distinction between the two institutions relates to the two key aspects of property rights, namely, use rights and exchange rights.[10] However, in most applications one can think of, ϕ and τ would interact together creating aggregate transaction costs that would dampen the incentives for market transactions involving wealth. For example in the model presented here, both enter multiplicatively when agents post their wealth as collateral to become entrepreneurs. The credit market takes into account both the insecurity of the property right over the collateral and the costs of enforcing the credit contract in case of default.

[9] We have focused only on institutional frictions involving wealth because wealth is the instrument that banks can use to mitigate the inefficiencies due to the unobservability of talent, and we want to show that the political process can fail to choose the right reforms even when there is no redistributive objective.

[10] In Besley (1995) three channels through which property rights affects investment incentives are laid out. These are the security of tenure, the use of property as collateral, and the benefits of gains from trade (e.g., rental). Of these the first one is the channel through which τ would affect investment incentives whereas the second one is the channel through which ϕ would work. The third channel relating to the use of land as collateral is affected by an interaction of τ and ϕ. Of course wealth in our model is exogenous and therefore the issue of investment incentives does not arise.

3.1 Institutions in the first-best World

We now show that in the first-best world the surplus maximising institutions are chosen.

Proposition 3. *When talent is observable, voters unanimously choose surplus maximising institutions, namely,* $\tau = 0$ *and* $\phi = 1$*.*

Proof. Total surplus in the economy is maximized 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:

$$W_{fb} = q(R+M)+\int_0^{\infty}(1-\tau)ag(a)d(a)+\mathbb{1}_{[q(n+1)<1]}\underline{w}(1-q(n+1))+(1-\tau)\int_0^{\infty} ag(a)da \tag{9}$$

Note that $\mathbb{1}_{[q(n+1)<1]}$ 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 is decreasing in τ. Hence $\tau = 0$ is surplus maximising. Since all agents lose a part of their wealth as τ increases, it is at least weakly dominant for all agents to vote for $\tau = 0$ and this is unanimously chosen. Since ϕ does not appear in (9), all values of ϕ are surplus maximising, and hence the proposition is trivially true for ϕ. □

When talent is observable, the preferences of the electorate are unanimously aligned with surplus maximisation. Hence a $\tau = 0$ is chosen because better property rights increase the expected payoff of all agents. Similarly the optimal ϕ would be chosen to the extent there are any contractual transactions involving wealth. Note that in the first-best in our model there are no contractual transactions involving wealth since talent is observable and wealth has no use as a screen. Hence all values of ϕ are optimal in the first-best world.

3.2 Institutions in the second-best World

In the last subsection we showed that in the first-best world the preferences of the electorate are unanimously aligned with surplus maximisation. We will show that as soon as there's a departure from the first-best, the inefficiency of the market gets further amplified by the choices of the electorate that is created in the inefficient market. In the second-best world with unobservable talent, the total surplus is:

$$W_{sb} = (R+M)q(1-G(\underline{a})) + (\theta R + M)(1-q)\int_{\underline{a}}^{\overline{a}} \lambda(a)g(a)da \tag{10}$$

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

$$+(1-\tau)\int_0^{\infty} ag(a)da$$

$$-(1-\tau)(1-\phi)\int\limits_{\underline{a}}^{\overline{a}}\Big((1-\gamma(a))(q+(1-q)\theta\lambda(a)+(1-q)(1-\theta)\lambda(a)\Big)ag(a)da.$$

Note that $\mathbb{1}_{\left[(n+1)\int_{\underline{a}}^{\infty} q+(1-q)\lambda(a)g(a)da<1\right]}$ is an indicator function that is switched on when there'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 $\underline{w}$, and the modern sector where n workers and 1 entrepreneur generate a surplus $R+M$ if the entrepreneur has high ability and $\theta R + M$ if the entrepreneur has low ability. The wage paid to the worker in the modern sector is simply a transfer from the entrepreneur to the worker which 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 (9) captures.

We have a model where individuals differ in talent and wealth, the former being unobservable and the latter being observable. There is adverse selection in talent, which is the source of the market friction in our model. The other dimension of heterogeneity which generates the class structure, is provided by 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 above a certain level 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 $\underline{a}$ will affect the former and any change in $\lambda(a)$ 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 the access to entrepreneurship. There are two possible scenarios. First, the wage stays constant at $\underline{w}$ 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, 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.

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

The first-best can be replicated in the world with incomplete information if all agents have sufficient wealth and can be offered a separating contract. Therefore if the average wealth in this economy is greater than the threshold level of wealth required for separation, a policy of redistribution can restore full efficiency in this economy. If the total level of wealth is insufficient or if the instruments for carrying out such a redistribution are unavailable, then there will always be some inefficiency, since there would be low types who choose entrepreneurship. Moreover when a credit constraint exists, there would also be high types that are forced to work for a wage. To discuss whether endogenous institutions can bring the economy in the direction of higher welfare or not, suppose that all agents can vote in a binary election between a status quo institution (status quo ϕ or τ) and an alternative. When faced with a binary choice, each agent votes sincerely.[11]

The cornerstone to understanding why agents choose non surplus maximising institutions is the following: in this economy there are always at least $\frac{n}{n+1}$ workers. Since $n \geq 1$, a policy that increases wage has support of at least half the population. However policies that increase the wage may not decrease the credit constraint $\underline{a}$ 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. Thus 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 world without market failure where the choice of institutional reform does not affect wage and consequently institutions are chosen optimally.

3.2.1 Support for improvement in judicial enforcement

The parameter ϕ 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.[12] Given the discussion on efficiency and political feasibility, we are ready to state the following proposition.

Proposition 4. *A policy of improving contractual institutions is always politically feasible but may not be surplus maximising.*

Proof. An improvement in contractual institutions is captured by an increase of ϕ. We will first prove that a policy of increasing ϕ is guaranteed majority support.

[11] One could argue that an alternative policy that is aimed at maximising total surplus may not win when put to majority vote. This result in itself is not particularly surprising. Since redistributive instruments are lacking it is to be expected 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. What is interesting here however is that the alignment of interest groups is itself created by the existence of market failure and this alignment takes the economy away even from the second-best world with market failures.

[12] 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 $\theta_p(\underline{a})(R+(1-\tau)\phi a-f)+(1-\theta_p)((1-\tau)\phi a - f) = nw$ where f is the additional fixed cost. Adopting this formulation does not affect our results.

To see this note that the labour demand is weakly increasing in ϕ

$$\frac{\partial L_D}{\partial \phi} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial \phi}\left(q+(1-q)\lambda(\underline{a})\right) + (1-q)\int_{\underline{a}}^{\overline{a}} \frac{\partial \lambda(a)}{\partial \phi} g(a)da\right) > 0 \tag{11}$$

It is easy to see from equation (4) that the credit constraint is decreasing in ϕ. To see that $\frac{\partial \lambda(a)}{\partial \phi} > 0$ note that

$$\frac{\partial v_L(a, r_p(a), w)}{\partial \phi} = \frac{\partial v_L(a, r_p(a), w)}{\partial r_p(a)} \frac{\partial r_p(a)}{\partial \phi} > 0. \tag{12}$$

Since ϕ makes entrepreneurship more attractive by decreasing the interest rate $\lambda(a)$ must decrease to keep $v_L(a, r_p(a), w) = w$ satisfied. This shows that labour demand is increasing in ϕ. The wage is non decreasing in labour demand and hence $\frac{\partial w}{\partial \phi} \geq 0$ must be true. Workers that comprise at least one half of the population support this policy. Furthermore a positive measure of low types who are currently entrepreneurs in the semi-separating region also support this, since they switch to higher payoff as worker as a consequence of the policy. Hence it is guaranteed majority support.

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

$$\frac{\partial \underline{a}}{\partial \phi} < 0 \qquad \text{but} \qquad \frac{\partial \lambda(a)}{\partial \phi} > 0. \tag{13}$$

Lemma 4 shows how $\frac{\partial \underline{a}}{\partial \phi} < 0$ increases total surplus but $\frac{\partial \lambda(a)}{\partial \phi}$ decreases it. The net effect depends on which of the two dominates and is consequently ambiguous. □

We have shown that the equilibrium wage is non decreasing in ϕ, and hence the proposal for increasing ϕ is supported by the majority. However, total surplus may not be increasing in ϕ since the effect of an increase in ϕ on the quality of the pool of entrepreneurs is ambiguous.

To understand why $\phi = 1$ may not be optimal note that if the credit constraint worsens as a result of an increase in ϕ then the total surplus must decrease. Credit constraints can worsen if the effect of ϕ on the increase in the equilibrium wage through an increase in $\lambda(a)$ overwhelms the effect on $\underline{a}$. 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. If this effect on total surplus is larger than the positive effect of easier collateralisability through an increase in ϕ, total surplus must decrease. In short when ϕ 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. If this negative effect dominates the positive effect through easier liquidation of collateral in case of failure, the net effect on total surplus is negative.

This result is quite striking when contrasted against the standard intuition about contracting institutions. Here improving the quality of contracting institutions (increasing ϕ) is not always good since that makes entrepreneurship more attractive and this induces low types to become entrepreneurs. This result arises because there are inherent externalities when agents borrow money: the low type entrepreneurs by their very existence impose an externality on the high types.

3.2.2 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 τ is ambiguous because the effect on the wage is ambiguous.

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

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

$$\frac{\partial L_D}{\partial \tau} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial \tau}\left(q+(1-q)\lambda(\underline{a})\right)+(1-q)\int_{\underline{a}}^{\overline{a}}\frac{\partial \lambda(a)}{\partial \tau}g(a)da\right) \quad (14)$$

The sign of this expression is indeterminate since it depends on the relative magnitude of $\frac{\partial \underline{a}}{\partial \tau} > 0$ and $\frac{\partial \lambda(a)}{\partial \tau} > 0$. It is easy to check that $\frac{\partial \underline{a}}{\partial \tau} > 0$. To see that $\frac{\partial \lambda(a)}{\partial \tau} > 0$, note that due to risk neutrality an increase in τ effectively works as a reduction in the expected wealth of an agent. Equation (25) in lemma 1 shows that $\frac{\partial v_L(a, r_p(a), w)}{\partial a} < 0$. As a result it must be true that $\frac{\partial \lambda(a)}{\partial \tau} > 0$ to keep

$v_L(a, r_p(a), w) = w$ satisfied. This implies the effect of a decrease in τ on the labour demand and consequently on the wage is ambiguous. Hence a policy of reducing τ may not be supported by the majority. This will be true when the median voter is poor enough to care primarily about the effect of τ on the wage.

To see that decreasing τ is surplus maximising note that τ affects total surplus in two ways

$$\frac{\partial \underline{a}}{\partial \tau} > 0 \qquad \text{and} \qquad \frac{\partial \lambda(a)}{\partial \tau} > 0. \tag{15}$$

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

$\square$

Credit constraints are increasing in τ. When τ 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 τ 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 τ 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 τ. Firstly decreasing τ reduces the level of credit constraint. This increases the number of entrepreneurs. Decreasing τ also decreases the attractiveness of entrepreneurship for marginal agents who are in the region where the semi-separating contract operates that is where $v_L(a, r_p(a), w) = w$. As a result of this, $\lambda(a)$ drops, decreasing the number of entrepreneurs. The political feasibility of decreasing τ depends on which of the two effect dominates. However the effect on total surplus is unambiguous since decreasing τ allows more high types to become entrepreneurs and disincentives some low types from 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 contractual institutions are politically feasible they may not be surplus maximising. On the other hand reform of property rights which is always surplus maximising may not be politically feasible.

4 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 we allow the electorate a choice of the efficient value of τ coupled with a subsidy to workers financed through a tax on entrepreneurs. We show that such a bundle may not always be feasible and that the electorate could end up being stuck with an inefficient τ.

4.1 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 s exists such that agents vote for $\tau = 0$.

Proposition 6. *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:

$$v_H(a, 1, w) - t = w + s \tag{16}$$

Note that v_H is independent of wealth and $v_H(0, 1, w) > v_L(0, 1, w)$:

$$R - nw + M - t = w + s > \theta(R - nw) + M - t. \tag{17}$$

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.

Consider the political economy problem. Denote the wage in status quo as $\hat{w}$. Note that all workers strictly prefer this policy to status quo since their payoff is $w + s = \overline{w} > \hat{w}$. Since a fraction $n/(n+1)$ are workers, and $n \geq 1$, the policy is guaranteed a majority support. In the status quo there is a positive measure of agents who are credit constrained. Hence there must be atleast one high type agent who was previously credit constrained and worked for a wage and is an entrepreneur as a result of the policy intervention. This agent prefers the policy to status quo since his payoff after the intervention is $v_H(1, \overline{w}) = \overline{w} > \hat{w}$. Hence the policy is favoured by more than 50% of the population.

To see that this policy is budget balanced, note that in this economy there are n workers for each entrepreneurs. Hence $t = ns$ ensures budget balance. □

This condition guarantees that high types are indifferent between entrepreneurship and working for a wage. Note that since the high wage equilibrium is defined as $\overline{w} = v_H(1, \overline{w})$, in this case it can be checked that $w + s = \overline{w}$.

4.2 Talent Poor Economy

Recall that in a talent poor economy, with $(\frac{q}{1-q} < \frac{1}{n})$, the wage is $\underline{w}$ in the first-best. This is because only high types find it profitable to become entrepreneurs at the actuarially fair interest rate. Since the number of high type agents is small relative to n, not all agents work in the hi-tech sector, and consequently a subsistence sector exists. In the second-best world however, wage can be greater than $\underline{w}$ due to the possibility of low type agents in the pool of entrepreneurs.

We will now show that it is possible for a suboptimal value of τ to be chosen even when there are other instruments present in the economy that could be put to redistributive ends by the electorate. To show this we construct an example of an economy where a vote on decreasing τ is defeated.

Assume there are two wealth classes, the rich with wealth a and the poor with wealth zero. Let the proportion of the rich be $\alpha > \frac{1}{n+1}$ and assume that $a > M - \underline{w}$. This ensures that when $\tau = 0$ rich low types prefer to be workers. Assume that $qR < n\underline{w}$ which ensures that the poor are always credit constrained. To simplify things further assume that low types possess no entrepreneurial talent, that is $\theta = 0$ and that the contractual institutions are perfect, that is $\phi = 1$.

$$M \geq \underline{w} \geq M - n\underline{w}. \tag{18}$$

With the status quo $\tau > 0$ let us assume that rich low types prefer entrepreneurship. The interest rate at this wealth level will be define by the zero profit condition for the banks:

$$\frac{q}{q + (1-q)\lambda} r_p(a) n w + \frac{(1-q)\lambda}{q + (1-q)\lambda}(1-\tau)a = nw. \tag{19}$$

Since the rich low types prefer entrepreneurship, in equilibrium the wage must rise to keep the low types indifferent. Hence for the appropriate λ to arise the following must hold:

$$M - (1-\tau)a = w. \tag{20}$$

Now consider a proposal for improving property rights to $\tau = 0$ through a budget balanced tax on entrepreneurs and subsidy to workers. Budget balance implies $\alpha q t \geq (1-\alpha q)s$. For workers to be indifferent to a policy that reduces their wage, the subsidy they receive must be high enough to offset the loss in their income. That is $s \geq w - \underline{w}$. Similarly the tax on entrepreneurs cannot exceed the increase in surplus they experience as a result of a decrease in τ. Hence $R - n\underline{w} + M + a \geq R - r_p(a)nw + M + (1-\tau)a$. Using these conditions along with budget balance we have

$$\alpha q \left(\frac{nw(q+(1-q)\lambda)}{q} - \frac{a(1-\tau)(1-q)\lambda}{q} + \tau a - n\underline{w} \right) \geq (1-\alpha q)n(w-\underline{w}). \tag{21}$$

Proposition 7. *When n is large enough it is impossible to construct a budget balanced tax and subsidy package that will enable the improvement of property rights institutions.*

Proof: In the appendix.

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. The reason for this is that part of the efficiency gains from a reduction in τ go to rich low types who were previously entrepreneurs. Since these agents switch their occupation in response to a decrease in τ they are not subject to the entrepreneurial tax. The revenues generated from t come only from rich high types since they continue to be entrepreneurs.

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. To get around our inefficiency results the state would need a richer set of instruments. In particular it would need the capacity to condition its policies on not only the occupational choice but also the wealth level of an agent.

5 Conclusion

To summarise our result on institutional efficiency and feasibility, we find that improving contractual institutions is always feasible but may not always be efficient, since improving contracting induces too many low type agents to choose entrepreneurship. On the other hand, we find that improving property right protection institutions increase total surplus but may not always be politically feasible. These results are consistent with Acemoglu and Johnson (2005), who find that property rights institutions have a strong positive impact on the economic outcomes whereas the impact of contractual institutions is less obvious. Moreover our result show why even when the welfare properties of these institutions are well known we may not expect the best policies to be chosen.

When there's a market failure, the competitive equilibrium is no longer guaranteed to be on the Pareto frontier. Our model makes the point that 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 fully representative democracy.

Finally, the last two 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.

Appendix

Lemma 1.

$$\frac{\partial \lambda(a)}{\partial a} \leq 0 \tag{22}$$

Proof. $\lambda(a)$ is jointly determined by the zero profit condition for the banks

$$\left(\frac{q + (1-q)\theta\lambda(a)}{q + (1-q)\lambda(a)}\right) r_p(a)nw + \left(\frac{(1-q)(1-\theta)\lambda(a)}{q + (1-q)\lambda(a)}\right) \phi(1-\tau)a = nw. \tag{23}$$

and the occupational choice condition for low types. In particular $\lambda(a) = 1$ 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 (23) into $v_L(a, r_p(a), w)$ we find

$$v_L(a, r_p(a), w) = \theta R - \frac{q + (1-q)\lambda}{q + (1-q)\theta\lambda} nw - (1-\tau)(1-\theta)a \left(1 - \frac{(1-q)\lambda\phi}{q + (1-q)\theta\lambda}\right) + M \tag{24}$$

This allows us to check that

$$\frac{\partial v_L(a, r_p(a), w)}{\partial a} < 0 \tag{25}$$

Finally since

$$\frac{\partial v_L(a, r_p(a), w)}{\partial \lambda} = \frac{\partial v_L(a, r_p(a), w)}{\partial r_p(a)} \frac{\partial r_p(a)}{\partial \lambda} < 0 \tag{26}$$

λ must decrease as wealth increases for $v_L(a, r_p(a), w) = w$ such that an equilibrium can exist. □

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

Proof. First note that $\overline{a}$is the collateral requirement such that low types with this wealth are unwilling to become entrepreneurs even at interest rate of one. Hence high types can be offered the contract $(\overline{a}, 1)$ and this will make zero profits. To see that this is unique assume a contract $(\overline{a}, r')$ exists that dominates $(\overline{a}, 1)$.For this to be true $r' < 1$ must be true since at a given wealth level the contract with the lowest interest rate dominates. The bank that offers this contract makes losses since the opportunity cost of capital is 1, and hence, this contract will not be offered. But this is a contradiction. This proves that the separating contract $(\overline{a}, 1)$ is viable and unique for wealth $a \geq \overline{a}$.

We will now argue that separating contracts are dominated for wealth $a < \overline{a}$ and will therefore not exist in equilibrium. 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 $a < \overline{a}$. $\square$

Proof for Proposition 1. Note that $\overline{a} > \underline{a}$ since

$$\frac{nw}{(1-\tau)\phi} > \frac{nw - \theta_p R}{(1-\tau)\phi}. \tag{27}$$

The rest of the proof follows from lemma 1, and 2. $\square$

Lemma 3. *A pooling contract exists if and only if* $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1)), w) \geq w$

Proof. If $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1)), w) > w$ then low types prefer entrepreneurship with a pooling contract. Since $\underline{a}(\lambda = 1)$ is defined in a way that ensures banks break even with a pooling contract, this contract is viable. Banks cannot offer a semi-separating contract here since it is not incentive compatible as $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1), w) > w$.

Now we show that if a pooling contract exists in equilibrium it must be the case that $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1)), w) > w$. To see this let us consider whether $\exists a' \neq \underline{a}(\lambda = 1)$ such that a pooling contract is feasible for banks and attractive for agents. First note that $a' < \underline{a}$ is not feasible for banks since this would imply negative profits. Next note that $\frac{\partial v_L(a, r_p(a), w)}{\partial a} < 0$. This implies that if $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1)), w) < w$ then $v_L(a', r_p(a), w) < w$ must also be true. Hence a pooling contract will not exist in equilibrium.

The condition on parameters that corresponds to $v_L(\underline{a}(\lambda = 1), r_p(\underline{a}(\lambda = 1)), w) \geq w$ is

$$R(q + (1-q)\theta) - nw + \phi M \geq w \tag{28}$$

$\square$

Proof for Proposition 2. The Labour Markets are assumed to be perfectly competitive. Labour Supply is 0 for wage lower than $\underline{w}$ and 1 for any wage $w \geq \underline{w}$. Labour demand is given by:

$$(1+n)\left(q(1 - G(\underline{a})) + (1-q)\int_{\underline{a}}^{\overline{a}} \lambda(a) g(a) da\right) \tag{29}$$

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

$$\frac{\partial L_D}{\partial w} = (1+n)\left(-g(\underline{a})\frac{\partial \underline{a}}{\partial w}\left(q+(1-q)\lambda(\underline{a})\right)+(1-q)\int_{\underline{a}}^{\overline{a}}\frac{\partial \lambda(a)}{\partial w}g(a)da\right) < 0 \tag{30}$$

This is true since

$$\frac{\partial \underline{a}}{\partial w} < 0 \qquad \text{and} \qquad \frac{\partial \lambda(a)}{\partial w} < 0. \tag{31}$$

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

This is true because $w = \overline{w}$ implies that $q \geq \frac{1}{n+1}$. To see this note 2 things:

1. Define $v_H(1, w)$ as the value from entrepreneurship that a high type agent gets when the interest rate the bank charges him is 1. It is easy to see that this is independent of his wealth. By definition: $\overline{w} = v_H(1, \overline{w})$. Since $v_H(1, w) > v_L(1, w)$, $\overline{w} > v_L(1, \overline{w})$. This implies that in an economy where the wage is $\overline{w}$ there are no low type entrepreneurs.

2. Note that when $w > \underline{w}$ none of the agents are engaged in the subsistence sector and hence $\frac{1}{n+1}$ are entrepreneurs This is true because in this economy the capacity for entrepreneurship is limited by the size of the population due to the perfect complements production function. When none of the agents are engaged in the subsistence sector ($w > \underline{w}$), only $\frac{1}{n+1}$ will be entrepreneurs and $\frac{n}{n+1}$ will be workers (the population is normalised to 1).

1 and 2 imply that $q \geq \frac{1}{n+1}$. 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 yeilds $\frac{1}{n+1}$ entrepreneurs and $\frac{n}{n+1}$ workers.

Hence a unique $w \in [\underline{w}, \overline{w}]$ exists that clears the market. □

Proof of Proposition 7. Simplifying equation (21) we have

$$\alpha q a \geq (w - \underline{w})(1 - \alpha q(n+1)) + \alpha(M - w)(q + (1-q)\lambda) - \alpha(1-q)\lambda n w \tag{32}$$

Since we are concerned with a talent poor economy with $q < \frac{1}{n+1}$, we can rewrite $q = \frac{\beta}{n+1}$, where $\beta \in (0, 1)$. Similarly we can rewrite $\alpha = \frac{A}{n+1}$ for $A > 1$.

Substituting this into equation (32) we have

$$\beta a + (1-\beta)M \geq (w - \underline{w})\frac{1}{A}\left(1 + \frac{1}{n}\right)(n + 1 - A\beta) + a(1-\tau)\left(\frac{1}{n} + 1 - \beta\right). \quad (33)$$

It is possible to see that the first term on the right hand side is unbounded in n whereas the rest of the equation converges to a constant as $n \to \infty$. Hence the equation will not hold for an n that is large enough. □

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