The de Soto Effect: Markets, Networks, and the Political Economy of Property Rights*

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Abstract

It is widely understood that the operation of markets requires supporting legal structures. However, only recently has this observation been given a central place in studies of economic development. An emerging body evidence on the importance of property rights and legal systems is influencing policy debates and is allied to a resurgent interest in how institutions shape economic prosperity. This paper studies the argument that improving legal systems increases the extent to which wealth can be used as collateral leading to gains from trade and increased productivity. We christen this the *de Soto effect* after the influential commentaries in this area by Hernando de Soto. We develop a workhorse model to look at these issues, with special focus on the link between markets and networks. We also explore the political economy of investments in market-supporting legal institutions emphasizing the roles played by wealth inequality and social networks.

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"What the poor lack is easy access to the property mechanisms that could legally fix the economic potential of their assets so that they could be used to produce, secure, or guarantee greater value in the expanded market...Just as a lake needs hydroelectric plant to produce usable energy, assets need a formal property system to produce significant surplus value." de Soto (2001)

1 Introduction

It is widely understood that the operation of markets requires supporting legal structures. However, only recently has this observation been given a central place in studies of economic development. An emerging body evidence on the importance of property rights and legal systems is influencing policy debates and is allied to a resurgent interest in how institutions shape economic prosperity.

Academic debates are also engaging with influential policy thinkers who are seeking to understand why market development is halting in so many parts of the globe. A key figure is Hernando de Soto who has placed the creation of secure property at the heart of his policy agenda – see de Soto (2000). He argues that many of the assets of the poor are otherwise "dead capital" which cannot be used in the productive process. If assets are used as collateral, they can be leveraged for economic ends. While de Soto is the modern incarnation of this view, it has an important lineage. In his perceptive study of West African trade, Bauer (1954) recognizes importance of poorly developed property rights when he observes that:

> "Both in Nigeria and in the Gold Coast family and tribal rights in rural land is unsatisfactory for loans. This obstructs the flow and application of capital to certain uses of high return, which retards the growth of income and hence accumulation." (page 9).

These ideas are now gaining attention from a host of empirical researchers who are studying these issues in micro-data in the wake of efforts to improve the secure of property rights.[1]

[1] See Pande and Udry (2005) for a review of the literature.

This paper refers to the effect that improved property rights have on productivity and economic performance via enhanced opportunities for collateral, as the *de Soto effect*. It develops a workhorse model to investigate the channels through which this effect works in partial and general equilibrium. It makes three main contributions. First, it formulates a model of de Soto effect when a single supplier and producer contract with one another. Second, it develops a general equilibrium analysis, where producers chose whether to trade in a market or a social network. Third, it considers the optimal level of investment in institutions to enforce property rights and the political incentives to create such investments.

The analysis generates some important sights. It highlights the key role of the wealth distribution in the de Soto effect both in determining the aggregate effects and in policy and political economy. The analysis also emphasizes the importance of embedding the de Soto effect in an economy with private alternatives to formal legal systems. This may affect how resource allocation changes with improvements in formal enforcement and the incentives to generate such investments in the first place.

The remainder of the paper is organized as follows. In the next section, we discuss some related literature and background issues. Section three lays out the model. In section four, we study the first best benchmark. Section five looks at second best contracts – constrained by agency costs and transactions costs. Section six discusses how producers and suppliers sort between markets and networks. In section seven, we discuss policy issues, in particular the decision to invest in improvements in contract enforcement. We also discuss the implications of wealth heterogeneity for policy preferences. Section eight discusses endogenous enforcement in social networks in response to changes in the legal system with section nine concluding.

2 Related Literature

This paper is related to the literatures on property rights and legal systems, credit market development and social networks.

The issue of how legal systems support trade in credit and land markets is a major topic in the development literature. The micro-economic literature has focused to a significant degree on the consequences of titling programs for farm productivity and other household allocation decisions.[2] This literature

[2] See the review in Pande and Udry (2005).

offers some support to the idea that strengthening land titles does improve credit market access and increase productivity. There are also studies that look at how firms access financial markets. For example, Johnson, MacMillan and Woodruff (2002) argue that legal enforcement explains access to credit by firms in Slovakia, Poland, Romania, Russia and Ukraine.

This micro-economic literature is complemented by a macro-economic literature which studies how aspects of legal systems affect the development of financial markets. One distinctive view is the legal origins approach associated with La Porta et al (1998). They argue that whether a country has a civil or common law tradition is strongly correlated with the form and extent of subsequent financial development with common law countries having more developed financial systems. In similar vein, Djankov et al (2006) find that improvements in rights that affect the ability of borrowers to use collateral are strongly positively correlated with credit market development in a cross-section of countries.

The extent of informality is economic transactions is a well-understood feature of development. This phenomenon is particular true in the context of credit markets where much credit comes through informal sources – friends, families, money lenders etc. The historical experience of financial development is a greater reliance on arms length transactions with a concomitant reduction in the importance of personalized trade as development proceeds. There is some debate about the costs and benefits of these two different systems. As Rajan and Zingales (1998) point out, a financial system has tow main roles: (i) to channel resources to the most productive use (ii) to make sure that an adequate portion of the returns accrue to the financier. In an arm's length system the financier is protected by an explicit contract enforceable in a court of law. Relationship based systems tend to work when legal transactions are poorly enforced. "relationship-based systems are designed to preserve opacity, which has the effect of protecting the relationships from the threat of competition."

East Asia thrived on relationship-based lending and this lead to misallocation of capital. They argue that scarcity of capital will tend to keep a relationship-based financing system going. Rajan and Zingales (1998) contrast relationship-based systems of governance which were under attack after the East Asian crisis with arm's length systems. They argue that the former work best when contracts are poorly enforced and capital scarce. They argue that relationship based systems will tend to misallocate capital. This is consistent with a growing body of evidence. For example, Banerjee, DuFlo and Munshi (2003) review studies from India which confirm this.

Our analysis is also related to recent contributions in general equilibrium theory that look at the role of collateral in sustaining trade. This is based on the observation that collateral is widely used in developed financial systems to support market transactions. Geanakoplos (2003) reviews the literature on collateral in general equilibrium.

There is growing interest in how social networks function in the economy. Much of the existing literature, as reviewed in Fafchamps (2005), focuses on how long-term interactions can be a device for supporting personalized trade. These issues are also studied at length in Dixit (2004) which recognizes the importance of networks in governance. This line of work relates to a broader emerging literature on network formation and dissolution which is reviewed in Jackson (2005). One theme in the literature on networks is the importance of externalities across networks and whether or not network formation is efficient. As Jackson (2005) shows, this depends on the specific of the model and how the network formation game is specified.

Perhaps, most closely related to this paper is Banerjee and Newman (1998) which also motivates the existence of an informal (network based) sector built on the informational advantages of more personalize exchange. They study the implications of pecuniary externalities between markets and networks showing that this is important to understand the dynamic evolution of an economy with networks.

The paper is also related to the broad agenda of the so-called *New Institutional Economics* which is has been influential among economic historians. They study the importance of frictions which they refer to as "transactions costs". Often this term is used to include both agency costs due to imperfect information as in Williamson (1975) and to represent problems of government as in the failure to enforce property rights as in North. In the model that we present here, there is clear separation between costs that arise inside the organization due to imperfect information and those that are external due to imperfect contractual enforcement. We show here that there interact in important ways.

The paper is related to an emerging literature on the importance of property rights in fostering trade and production. This explores a number of issues.[3] One is the ability of the state of the state to create such rights without using such powers to expropriate. This may result in rights being

[3] See Besley and Ghatak (forthcoming) for an overview.

granted only to those who have strong political connections as in Acemoglu (2004) and Sonin (2003). Another set of issues surround the possibilities for contract enforcement outside of the legal system using personal reputations as in Grief (1993). This paper looks at the incentives to invest in legal institutions when the state is competent to do so. This is relevant, for example, in modern day India where there are extremely long delays in courts due to under-resourcing of the legal system.

3 The Model

The model is simple and uses specific functional forms to facilitate a closed form solution. It studies contracting between a producer and supplier when the producer has limited wealth creating a limited liability problem. Producer effort is not contractible leading to an agency problem and contract enforcement is limited resulting due to imperfections in the court system.

Economic Actors There are M suppliers labelled $j = 1, ..., M$ and N producers labelled $i = 1, ..., M$ with $N > M$. Each producer owns a unit of land and uses effort $e \in E \equiv [0, \overline{e}]$ and an input $x \equiv X \in [0, \overline{x}]$ (e.g., capital) to produce output. The input x can be supplied by supplier j at unit cost $\gamma_j \in \left[\underline{\gamma}, \bar{\gamma}\right]$. We assume that each supplier has unlimited capacity to supply the market.

Production Technology Output is stochastic and takes the value $q(x)$ with probability $p(e)$ and 0 with probability $1 - p(e)$. The marginal cost of effort is one and the marginal cost of x is γ. Expected surplus is

$$S(e, x) = p(e)q(x) - e - \gamma x.$$

The assumed production technology allows for producer output to have observable and unobservable components. For e we have in mind inputs that are typically not observed in production data, i.e. beyond raw inputs. For x we have in mind traded inputs. A core example in what follows is credit supply where x is some kind of capital that needs to be acquired through securing credit. However, another relevant example would be acquisition of a new technology.[4]

[4] In this case, our model could be viewed as being related to Acemoglu, Antras and Helpman (2006).

Throughout the analysis we make the following regularity assumption which ensures a well-behaved maximization problem with interior solutions.[5]

Assumption 1 *The following conditions hold for the functions $p(e)$ and $q(x)$:*

(i) Both $p(e)$ and $q(x)$ are twice continuously differentiable, strictly increasing and strictly concave for all $e \in E, x \in X$.

(ii) $p(0) > 0$, $p(\overline{e}) < 1$, $q(0) \geq 0$, and $q(\overline{x}) \leq \overline{q}$ where $\overline{q}$ is a finite positive real number.

(iii) The Inada endpoint condition hold for both $p(e)$ and $q(x)$ as $e \to 0$ and $x \to 0$.

(iv) $p(e)q(x)$ is strictly concave for all $e \in E, x \in X$.

(v) $1 + \frac{p'''(e)p'(e)}{\{p''(e)\}^2} \geq 0$ for all $e \in E$.

Most of these assumptions are standard. The final assumption is, however, worth commenting on. It says that the degree of concavity of the function $p(e)$ does not decrease too sharply.

Information and Contracting We assume e is subject to moral hazard. In principle, this can be solved if producers have sufficient wealth. Each producer i is assumed to be endowed with the same level of wealth w. We have in mind a context where this wealth is not directly productive – it is *dead* capital to use de Soto's terminology. There is limited liability. The most that can be taken away from a producer in any state of the world is his wealth and any output that he produces. The input x is fully contractible. Producers and suppliers are assumed to be risk neutral. An input supply contract is a triple (r, c, x) where r is the payment that he has to make when the project is successful and c is the payment to be made when the project is unsuccessful. It will be useful to think of r as repayment and c as collateral.

The payoff of a typical producer is:

$$p(e)\{q(x) - r\} - (1 - p(e))\, c - e.$$

[5]These hold, for example, if $p(e) = e^{\alpha}$ and $q(x) = x^{\beta}$ where $\alpha \in (0, 1)$, $\beta \in (0, 1)$ and $\alpha + \beta < 1$.

and of a supplier is:

$$p(e)r + (1 - p(e))\, c - \gamma_j x.$$

We assume that producer i has an outside option of $u_i \geq 0$. This will be determined endogenously below when we permit suppliers to compete to serve producers.[6]

Property Rights and Contract Enforcement We assume that contracts are imperfectly enforced and/or property rights poorly defined. This affects the producers' ability to pledge his wealth as collateral. After the state of the world k ($k = 1$ if output high, $k = 0$ if output low) is revealed, the producer can refuse to honor contract. In that event, the supplier can appeal to an external "judge". In the context of formal contracting, this can be thought of as going to court. In the case of informal contracting, this can be thought of as approaching an influential person within the network (e.g., the village headman, a local politician, or the mafia). Conditional on observing the true state of the world *and* being able to enforce the contract, the judge awards a fine F_k in state k to the supplier in addition to contractual obligations. Let σ_{ij} probability that the court can observe the true state of the world *and* successfully enforce a contract (measure of court effectiveness). With probability $(1 - \sigma_{ij})$ the arbiter receives an uninformative ("null") signal and/or he receives an informative signal but cannot successfully enforce the contract. In the event the contract cannot be implemented either due to unsuccessful verification or enforcement, we assume that the outcome depends on the relative influence of the supplier and the producer (or, equivalently, the bias of the arbiter). In particular, with probability p_{ij}, the producer gets his preferred outcome and with probability $(1 - p_{ij})$ the supplier gets his preferred outcome. With secure property rights and efficient courts σ_{ij} will tend to be high. For example, if the titling regime is effective, then a producer who defaults on a loan obtained by pledging the title of an asset, will lose it. As we show below, this set-up gives way to a "transactions cost" that affects the set of contracts that can be enforced.

[6] Observe that we are defining producer payoffs net of any consumption value that he gets from his wealth which may, for example, be held in the form of housing.

4 The First Best

As a benchmark, we work out first the allocation that will result in the absence of any informational or contractual frictions. In particular, suppose that effort is contractible and there are no problems of contract enforceability (e.g., $\sigma_{ij} = 1$). In that case the level of effort and the input will be chosen to maximize joint surplus. The first-best (e^*, x^*) is characterized by the following first-order conditions:

$$
\begin{aligned}
p'(e^*)q(x^*) &= 1 \qquad (1)\\
p(e^*)q'(x^*) &= \gamma.
\end{aligned}
$$

Assumption 1 implies that these are interior solutions. Effort and credit are complementary inputs in expected output. Therefore, a fall in γ or any parametric shift that raises the marginal product of effort or capital will raise both inputs. Let the first-best surplus be denoted by

$$S^* = p(e^*)q(x^*) - e^* - \gamma x^*.$$

This surplus can be shared arbitrarily between the producer and supplier depending on the outside options. In the spirit of what comes next, assume that the producer earns his outside option $u \geq 0$. Then the supplier earns $\pi = \max\{S^* - u, 0\}$ where this respects his outside option of zero.

Since property rights are irrelevant in the first best, matching of producers and suppliers is trivial. Each producer will look for a supplier who can supply the input at least cost. So long as there are at least two suppliers with cost $\underline{\gamma}$, then with unlimited capacity, the logic of Bertrand competition implies that the market will be served entirely by low cost suppliers who will earn no rents. Hence, the expressions above will all hold with $\gamma_j = \underline{\gamma}$.

5 Second Best Contracts

The main case of interest is the second best where contracts are constrained by information and enforcement.

5.1 The Optimal Contracting Problem

If effort is not contractible, there is an agency problem in effort supply. Efficient contracts between supplier j and producer i will solve:

$$Max_{\{e,x,c,r\}}\; p(e)\, r + (1 - p(e))\, c - \gamma_j x.$$

subject to

(i) the **participation constraint (PC)** of the producer

$$p(e)\{q(x) - r\} - (1 - p(e))\, c - e \geq u_i. \tag{2}$$

(ii) an **incentive compatibility constraint (ICC)** on effort by the supplier:

$$p'(e)\{q(x) - (r - c)\} = 1. \tag{3}$$

(iii) **enforceability constraints:** these are, in the state L and in state H :

$$-c \geq -\sigma_{ij}(c + F_0) + (1 - \sigma_{ij})(p_{ij}(0) - (1 - p_{ij})\, c). \tag{4}$$

$$(q(x) - r) \geq \sigma_{ij}(q(x) - r - F_1) + (1 - \sigma_{ij})(p_{ij} q(x) + (1 - p_{ij})(q(x) - r)). \tag{5}$$

(iv) **Limited liability constraints**:

$$F_0 \leq w_i - c \tag{6}$$

and

$$F_1 \leq q(x) + w_i - r. \tag{7}$$

5.2 Characterizing the Optimal Contract

Under efficient contracts the fines F_0 and F_1 should be set as high as possible. It is costless to do so since it does not directly affect the payoffs of the supplier and the producer while it relaxes constraints (4) and (5). Using this observation we can combine (6) with (4) and (7) with (5) to write the enforceability constraints as:

$$[1 - \tau_{ij}]\, w_i \geq c \tag{8}$$

and

$$[1 - \tau_{ij}](w_i + q(x)) \geq r, \tag{9}$$

where

$$\tau_{ij} \equiv \frac{(1-\sigma_{ij})\, p_{ij}}{(1-\sigma_{ij})\, p_{ij} + \sigma_{ij}} \in [0,1]$$

is a summary measure of "transactions costs". It depends on two underlying parameters $\{\sigma_{ij}, p_{ij}\}$. In a standard agency model with limited liability $\tau_{ij} = 0$. Thus $\tau_{ij} > 0$, represents very simply how limited enforcement affects the contracts that can be written. We will refer to $(1-\tau_{ij})\, w$ as a producer's *effective wealth*, i.e. the component that can be pledged to the supplier in the contract.

The transactions cost τ_{ij} is zero if the court can perfectly observe the state of the world and successfully enforce contracts: $\sigma_{ij} = 1$. When courts are imperfect, the influence of producers, crudely captured by p_{ij} is important. A more powerful producer, defined as someone who is more likely to get their preferred outcome when the court cannot verify the state and/or enforce the contract, will be viewed as someone associated with higher transactions cost τ_{ij}. Creating formal titles is one way of reducing p_{ij} as it may allow independent recourse to suppliers to claim the assets of the producer after a contractual dispute.

We now characterize the optimal contract between producer i and supplier j. To keep the notation simple, we drop the subscripts. We will focus on the case where the "investor protection" constraint (9) is slack.[7] It is very useful to define the variable

$$v \equiv u + (1-\tau)\, w$$

which we will refer to as the producer's *gross* reservation payoff comprising the sum of his outside option and his effective wealth. For a given reservation payoff u, two producers with different effective wealth levels $(w(1-\tau))$ will have different *gross* reservation payoffs.

Before stating the solution to the optimal contracting problem, we introduce two functions that are important in determining the producer's effort and he level of inputs that are supplied to him. Suppose that the participation constraint (2) and incentive constraint (3) are both binding. Then, substituting one expression into the other and using the definition of v, we see that effort level solves:

$$\frac{p(f(v))}{p'(f(v))} - f(v) = v \tag{10}$$

[7] The proof of Proposition 1 formally states the required condition.

for some increasing function $f(v)$. There is a level of the gross reservation payoff $\bar{v}$ at which the first best effort level is achieved defined by $e^* = f(\bar{v})$. At the other end, there is a lower bound on effort associated with the point at which the participation constraint ceases to bind. We use $\underline{e} = f(\underline{v})$ to denote this case.[8]

Now let $g(v, \gamma)$ be the level of x which equates the marginal product of the input to its marginal cost, γ, when the effort level is determined by (10). Formally:

$$p(f(v))q'(g(v,\gamma)) = \gamma.$$

This is basically as in (1) except for the possibility that effort may be lower. The complementarity between effort and the input implies that $g(v, \gamma)$ is an increasing function of v.

The functions $\{f(v), g(v, \gamma)\}$ given the levels of producer effort and supplier input that correspond to particular values of v. Our key result, the proof of which is in the Appendix, fully characterizes the optimal contract:

Proposition 1 *Suppose that Assumption 1 holds, then the optimal contract when* $\max\{\underline{v}, v\} < \overline{v}$ *is given by:*

$$\begin{aligned} r &= q(g(v,\gamma)) - \frac{1}{p'(f(v))} + (1-\tau)\,w > (1-\tau)\,w \\ c &= (1-\tau)\,w \\ x &= g(v,\gamma) < x^*. \end{aligned}$$

The corresponding effort level is:

$$e = f(v) < e^*.$$

For $v \geq \overline{v}$ *the first-best allocation is attained:* $e = e^*, x = x^*, r = c = \max\{S^* - v + (1-\tau)\,w, 0\}$.

This result is intuitive. For a high enough gross reservation payoff, the first best is achieved. The producer makes a payment to the supplier which is independent of whether his project succeeds, i.e. $r = c$. The producer receives a payoff of $v - (1-\tau)\,w$ while the supplier's payoff is

[8] The proof of Proposition 1 provides the details. There are two possibilities depending on whether autarky or some other outside option that is preferable.

$\max\{S^* - v + (1-\tau)\, w, 0\}$. This will happen when the producer has sufficient wealth. If $w \geq \bar{v}/\,(1-\tau)$, the first best is always achieved while for $w \geq [\overline{v} - S^*]\,/\,(1-\tau)$, then there is *some* value of the producer's reservation payoff for which the first best is achieved.

When wealth is too low, then we have second best outcome where the effort and input committed to the project are below the first-best level. The Proposition shows that the optimal contract has a simple structure. The collateral level is set equal to the producer's effective wealth. He then makes an additional payment to the supplier if the project is successful. The exact choice of r is determined by a trade-off between rent extraction and incentives – a higher r increases the supplier's profit when the project succeeds but reduces the probability of that being the case. The higher is v, the lower is the rent that the supplier can extract, and as a result, the lower is r and the higher are e and x. If v is very low (below $\underline{v}$), then the participation constraint does not bind and the producer is given an "efficiency utility", i.e. a payoff in excess of his outside option.

Let

$$S(v,\gamma) \equiv p(f((v))q(g(v,\gamma)) - f(v) - \gamma g(v,\gamma) \tag{11}$$

be the total surplus in the solution given in Proposition 1. A key property of this is stated as:

Lemma 1: *Total second-best surplus is strictly decreasing in v and decreasing in γ for $v \in [\underline{v}, \overline{v}]$.*

The payoffs of the producer and supplier add up to total surplus, i.e.

$$S(u + (1-\tau)w, \gamma) = \pi + u. \tag{12}$$

From equation (12) define

$$\hat{u} = \hat{u}(\pi, w(1-\tau), \gamma)$$

as the payoff of the producer given a particular value of the supplier's profit.

Proposition 2 *Suppose that Assumption 1 holds. Then $\hat{u}(\pi, w(1-\tau), \gamma)$ is strictly decreasing in γ, and π for $v \in [\underline{v}, \overline{v}]$. It is also strictly increasing and concave in $w(1-\tau)$ for $v \in [\underline{v}, \overline{v}]$.*

This Proposition is useful in defining the constrained Pareto frontier for the contracting problem which is displayed graphically in Figure 1. (**Which cases do we need?)** There are different cases depending the level of wealth and which outside option is relevant. In Figure 1a, where the autarky payoff (denoted by $\underline{u}_a$) is below the point at which the outside option binds (denoted by $\underline{u}_0$). The 45^0 line represents the unconstrained Pareto frontier. Here, for $u \in [\underline{u}_a, \underline{u}_0]$ the participation constraint does not bind, and so the frontier is flat for this range. The figure assumes, that wealth is low enough to ensure that the first best is not achieved. The higher is w the constrained Pareto-frontier shifts out. This is depicted in Figure 1b. For the case $\underline{u}_a < \underline{u}_0$, the participation constraint always binds and so the constrained Pareto-frontier is everywhere downward sloping. This is depicted in Figure 1c. In this case, the first-best is achieved when $\pi = 0$. However, this need not be the case and this is illustrated in Figure 1 d.[9] There is a critical wealth level for above which the first-best is achievable for $\pi = 0$.

Finally, we consider how the utility of the producer depends on its arguments. We are now ready to use the model to explore the consequences of improving the contracting environment by lowering τ.

6 The de Soto Effect

The value of our framework is that we can study comparative statics of the optimal contract, effort and input supply with respect to changes in the transactions cost τ. This will give us an insight into the nature of the de Soto effect as predicted by our model. In terms of observables, these comparative statics have implications for expected output, the amount of inputs traded and the contractual terms of such trades.

Reducing τ raises effective wealth. It can be interpreted as improving property rights in the sense that de Soto envisaged. This has effect on e and x by raising v when $v \in [\underline{v}, \bar{v}]$. Higher effective wealth gives the producer a greater incentive to commit effort as a larger amount of his wealth is committed as collateral. There is also an increase in the purchased input committed to the project – increased effort by the producer raises the marginal product of x since effort and the purchased input are complements. The latter could be measured empirically using data on inputs such as credit or fertilizer depending on the context.

[9] For example if $w = 0$, the first-best is not achieved even for $\pi = 0$.

These effort and input effects are also behind the overall effect on expected output:

$$p(e)q(x).$$

We would expect this to increase due to effects on both observable and unobservable inputs as property rights improve. Effects through higher e would look like TFP improvements in the data.

The de Soto effect can also be looked at in terms of the contracts that are written. There is a direct *collateral* effect – since effective wealth is greater, then so is c. There is also a *repayment* effect – higher effective wealth allows the supplier to collect less when the project succeeds and hence r is lower. (**Note that this is ambiguous**)

Proposition 1 makes clear that whether any of these effects materialize depends on the producer's wealth as well as his outside option. Where $v \leq \underline{v}$, expected output is independent of τ. The benefits of improved property rights now accrue as a transfer to the supplier with no effect on effort or inputs. Hence, a necessary condition to de Soto effect is that producers have a minimum level of collatoralizable wealth and/or bargaining power vis a vis suppliers. There is also no effect of changing τ in the other extreme where $v \geq \overline{v}$. In this case, output is at its first-best level. Thus for for very wealthy producers and those with very good outside options, improving property rights does not affect output, or their net payoff.

Thus, a key message from the model is the need to look for heterogeneous effects of improvements in property rights with a focus on heterogeneity due either to the strength of outside options or the wealth of producers. We summarize this as:

Remark 1: *The size of the De Soto effect depends on the producer's collateralizable wealth. For very poor or very rich producers there are no allocative effects of improving property rights, while for producers with intermediate levels of wealth, improving property rights will increase the use of traded inputs, such as credit, as well as unobservable effort. For the very poor, improving property rights will actually transfer income from producers to suppliers.*

This observation have implications for aggregate effects of property rights improvements. Consider an economy with a group of heterogeneous producers varying in their wealth levels. The aggregate de Soto effect refers to the effect of changing τ on aggregate output. Then, for reasons outlined above, we would expect the impact of improved contracting to depend on the distribution of wealth. Specifically:

Remark 2: *In the aggregate, the size of the de Soto effect depends on the distribution of wealth. If the majority of the population is either very rich, very poor or very unequal (comprising only very rich or very poor) then the aggregate de Soto effect will not be large.*

As we saw above, the effect of improving contracting institutions depends on u – the outside trading opportunities available to producers. Thus a complete understanding of the issues requires specifying a model where u is endogenous. We now turn to this task.

7 Markets and Networks

We consider the following stylized form of interaction between markets and networks. Assume each producer i is matched with a supplier j within an informal network (we can think of this as a "village"). Each producer also has the option of borrowing from a market (we can think of this as going to the "city"). We assume that markets offer a level playing field for all producers, using a common, externally enforced, contracting technology with $\tau_{ij} = \tau_M$.[10] This technology reflects investments in a general public good creating effective disclosure/monitoring (high σ) and/or fines for reneging on contracts (high β). For simplicity we consider only two cost levels $\gamma_j \in \{\underline{\gamma}, \overline{\gamma}\}$.

7.1 Markets

Markets are assumed to be competitive with Bertrand style competition between suppliers. Since the contracting technology is common and there are

[10]The assumption that τ_M is common even with a common court system is quite strong and made for convenience. Even if the underlying parameters $(\sigma_{ij}, \beta_{ij})$ are the same, producers may differ in p_{ij}. So implicitly we are assuming that p_{ij} is common across producers.

no natural entry barriers, this is a reasonable benchmark. However, it is clear that the analysis could be extended to look at various kinds of market imperfections and their implications for the analysis that follows.

Competition leads to all supplier rents being bid away resulting in $\pi_M = 0$ for all market trades along with $\gamma_M = \underline{\gamma}$.[11] The utility of a producer who uses the market (assuming the PC binds) is therefore $u_M = \hat{u}\left(0, w(1-\tau_M), \underline{\gamma}\right)$.

7.2 Networks

Networks are characterized by personalized exchange which, by its very nature, creates entry barriers. To make the contrast with markets as sharp as possible we assume networks are monopolistic with each (active) supplier having some market power. We suppose that superior contract enforcement is the source of network comparative advantage. Given that any producer can always trade with a producer using $\left(\tau_M, \underline{\gamma}\right)$, a necessary condition for a network trade to take place is that $\tau_{ij} < \tau_M$. This could be because the network has better information (higher σ_{ij}) or better enforcement (higher β_{ij}).[12]

We assume that each producer belongs to a single network which is served by a supplier with an exogenously given $\gamma_j \in \left\{\underline{\gamma}, \overline{\gamma}\right\}$. Any rents in networks accrue to suppliers who have to compete with the market. If $\tau_{ij} \leq \tau_M$, then the supplier may be able to earn a surplus by offering a contract which yields a utility level of u_M for the supplier. Whether the participation constraint is binding for the producer depends on the size of τ_{ij} relative to τ_M. If $\gamma_j > \gamma_M$ then $\tau_{ij} < \tau_M$ is a necessary, but not sufficient, condition for trade in the network. This depends on trading the advantage in enforcement with the disadvantage due to increased costs of supplying the input. The issue is whether the supplier can earn a non-negative profit when supplying a producer who earns his outside utility level from the market.

In general, there is a critical level of network enforcement efficiency and supply efficiency at which a network supplier can compete with the market.

[11] If there were binding capacity constraints on low cost suppliers, then rents would remain with some $\gamma_j = \overline{\gamma}$ trades in the market.

[12] We could also have indexed wealth by network, i.e. w_{ij} to denote the possibility that there is some kind of social collateral or wealth that is only valuable in the network. However, we will stick to the more standard formulation of wealth as financial asset.

This is defined by:

$$\hat{u}\left(0, w(1-\tau_{ij}), \gamma_j\right) = u_M.$$

This gives us a negatively-sloped indifference curve in the (τ_{ij}, γ_j) space (see Figure 2). This is due to the fact that $\hat{u}$ is decreasing in γ and τ. Observe also that $(\tau_M, \underline{\gamma})$ is a point on this curve.

Let $\hat{\tau}\left(\gamma_j, w, u_M\right)$ be the value of τ_{ij} that solves the implicit equation that characterizes the indifference curve. For all $\tau_{ij} < \hat{\tau}\left(\gamma_j, w, u_M\right)$, a network will survive even if it has a less technology efficient supply technology. Moreover, the suppliers in this network will earn a rent.[13] In general, increased efficiency of the market will put a squeeze on networks by lowering $\hat{\tau}\left(\gamma_j, w, u_M\right)$. Points that lie below the curve represent viable networks.

7.3 General Equilibrium

Markets play an important role in the network economy, limiting the extent to which suppliers can exploit producers. This is because markets have equality of access. If there were no common exit option for producers then, in principle, network suppliers could exploit producers. Thus even producers who choose to trade in networks have an interest in improving markets as this improves their outside option.

It is now straightforward to study who will trade in a market and who in a network as a function of network opportunities $\left\{\gamma_j, \tau_{ij}\right\}$ and market opportunities $\left\{\underline{\gamma}, \tau_M\right\}$ available to each producer. Let $j(i)$ denote the supplier to whom producer i has access to via a network. We make two observations:

Proposition 3 *If $\tau_{ij(i)} < \hat{\tau}\left(\gamma_j, w, u_M\right)$ then producer i will trade in a network. Otherwise he will trade in the market.*

A straightforward corollary of this is:

Corollary: *If $\tau_{ij(i)} \geq \tau_M$ and $\gamma_{j(i)} \geq \gamma_M$ then producer i will trade in the market.*

[13] It is clear from this analysis that in a non-competitive market, i.e. one where $\pi > 0$, $\tilde{\tau}$ will have a higher value.

This partitions the economy into sectors which parallel what we see throughout the developing world. First, there is a market sector which uses formal contracting and enforcement for the most part. This sector, according to our model, will tend to have more efficient supply of inputs because competition will limit the extent of inefficient supply. The existence of a common τ_M provides "open access" making competition possible.

The other sector is an informal sector which uses personalized and non-uniform enforcement. It may allow high cost suppliers to survive since, with superior enforcement, they can resist market competition. A practical example of this is the prevalence of money lenders throughout the developing world who have little access to capital themselves and yet can earn very high returns from lending.

Is there a result on wealth?

The partition between the market and network sectors described here is Pareto efficient. There is no externality created by one individual shifting from one sector to the other as all contracts are constrained Pareto efficient given limits on collateral and information. Below, we discuss how investments in enforcement can be a source of externalities.

7.4 The "General Equilibrium" de Soto Effect

We now discuss the general equilibrium implications of improving property rights in the formal sector allowing for greater use of collateral. This allows us to capture the link between property rights and the development of the formal sector which is a central theme in De Soto [2000].

To explore this, suppose that there is an improvement in property rights that reduces the transactions costs of trading in the market, i.e., τ_M falls. In section 6, we explored the impact that this has on those who use the market to find inputs. We are interested in how it affects the composition of trade and any interactions between markets and networks.

The additional "general equilibrium" de Soto effects are illustrated graphically in Figure 3 by a move from point A_0 to A_1. Point B represents an informal network. Initially this was viable. But with the decrease in τ_M it is no longer viable. This is a direct effect of improving property rights: it shrinks the size of the informal sector. There is an indirect effect: since the outside option of borrowing from the market has become more attractive those producers who still prefer borrowing from networks will have better outside options and this will have effects along the lines analyzed in the previous section.

This is summarized as:

Remark 3: (efficiency): *A reduction in τ_M makes market trades more attractive and therefore, leads to a shift away from trade in networks. If the participation constraint binds for producers trading in networks, then improved competition from markets leads to an increase in both x and e for those who remain in networks. If the participation constraint is not binding then changes in τ_M have no effect on the informal sector.*

As well as affecting efficiency, changing τ_M has an effect on producer rents in the market. Since u_M goes up, from the previous section we know that π is going to decrease for the case where the PC is binding.[14] Thus we have:

Remark 4: (rent-shifting): *A reduction in τ_M squeezes supplier rents in networks (if the producer's participation constraint is binding).*

This observation will be important when we come to consider the political economy of contract enforcement as this identifies a group with a vested interested in τ_M being large.

This section underlines the importance of thinking how improvements in enforcement can expand outside opportunities for producers. This has a rent shifting benefit which makes all producers better off. It can also lead to efficiency improvements in network trades. The analysis emphasizes the need to study the impact of changing legal systems in the context of the full set of trading available to producers.

7.5 Implications

Our model is consistent with a theory of development based on falling transactions costs which increases the scope for enforceable contracts, expanding

[14] This is also true if the participation constraint does not bind in the network.

competition and reducing market fragmentation. During this process, social networks give way to markets as the basis for trade. Moreover, agency problems in markets are diminished as better contracts can be enforced through collateral. Indirectly, faced with market competition, the monopoly power of lenders in the informal sector is diminished. This gives a further margin for increased productivity.

Our observation on the role of transactions costs here underpins an informal observation by anthropological work on trading networks. For example, Ensminger (1990) observes that "Institutions that have the effect of decreasing transactions costs, such as ... courts to enforce contracts and property rights .. may also increase competition in different sectors of trade" (pages 666-667). In our model this is captured by the change in u_M.

The model is consistent with the patterns of financial development that we discussed above with a division into the formal and informal sector with the latter being relationship based, captured here by the fact that τ_{ij} is specific to the producer-supplier pair. In contrast, the market transactions can be "arms-length" using a common τ_M which is enforced by a formal legal system. The marginal product of capital (if we interpret x this way) will vary across these sectors giving the semblance if different returns, i.e. misallocation of capital that is characteristic of a fragmented financial system.

Although the economy is Pareto efficient, a move towards formality driven by falling transactions costs τ_M will be associated with higher aggregate output and lower financial fragmentation as the rate of return to the input x is equalized across its uses. There is also the possibility of driving out high cost suppliers as they lose their enforcement advantage relative to the market.

8 Policy

In this section, we allow the government to invest in market enforcement affecting the size of τ_M. Thus market enforcement can be thought of as a public good, the costs of which have to be shared according to the tax system in place. We suppose that enforcement in networks is determined privately and constitutes a local public good financed by those who participate in the network. We begin by looking at the optimal choice of τ_M and then consider how this will be determined in political equilibrium depending on the institutions in place.

8.1 Contract Enforcement in the Market

We designate the cost of providing a level of market enforcement τ_M on a "per contract" basis. We denote this cost by $\mu(1-\tau_M)$ with $\mu(\cdot)$ increasing and convex. We assume that $\tau_M \in [\underline{\tau}, \bar{\tau}]$ where $\bar{\tau} < 1$ with $\mu(1-\bar{\tau}) > 0$, $\mu'(1-\bar{\tau}) > 0$ and $\lim_{\tau \to \underline{\tau}} \mu'(1-\tau) \to \infty$. This says that even the worst legal system that can be established can enforce some contracts.[15]

The government must decide how to finance the cost of the legal system used to support contract enforcement. We rule out wealth taxation, although we do return to the issue of wealth redistribution as a policy below. We consider two possible tax systems. The first is where the government imposes a tax on each transaction in the market sector. The use of notarized contracts and stamp duties has been quite common throughout history. This is a form of benefit taxation as the cost of enforcing contracts can be covered by the transaction tax. However, it rules out any kind of redistribution of the cost of providing legal services across different wealth groups. This will serve as our benchmark. Below, we will consider the robustness of our results to financing the legal system using an income tax on producers in the formal, i.e. market, sector.

Even though the cost is borne directly by the supplier, the incidence will fall on the producer in a competitive market who must make sufficient profit to cover $\mu(1-\tau_M)$. We stick with the case from the previous section where $\gamma_j = \{\underline{\gamma}, \overline{\gamma}\}$, and the market is competitive resulting in $\gamma_M = \underline{\gamma}$. For simplicity, we also suppose that the network supplier has $\tau_j \in \{\underline{\tau}, \bar{\tau}\}$ so that $\underline{\tau} < \tau_M < \bar{\tau}$. Given these assumptions, the payoff producer whether in a market or a network is:

$$\hat{u}\left(\mu(1-\tau_M), w(1-\tau_M), \gamma_M\right).$$

The payoff of a producer in a network (assuming that the participation constraint is binding) is:

$$\pi = S\left(\hat{u}\left(\mu(1-\tau_M), w(1-\tau_M), \gamma_M\right) + w(1-\underline{\tau}), \gamma_j\right) - \hat{u}\left(\mu(1-\tau_M), w(1-\tau_M), \gamma_M\right)$$

where we have used the fact that a *necessary* condition for a network to survive is that it has a lower transactions cost compared to the market. We can now characterize the set of Pareto efficient legal systems for our economy.

[15] In applying the insights of the model to the real world, it is useful to bear in mind that there are plenty of reasons why the cost function $\mu(\cdot)$ could vary across time and space. It might, for example, depend on the legal tradition within a country, for example whether a country has a common law or civil law history.

First let

$$\hat{\tau}_M(w) = \arg\max_{\tau\in[\underline{\tau},\bar{\tau}]} \left\{\hat{u}\left(\mu\left(1-\tau\right), w(1-\tau), \gamma_M\right)\right\} \tag{13}$$

be the enforcement level that maximizes the utility of a representative producer who trades in the market given the cost of improving the legal system represented by $\mu(\cdot)$. The At an interior solution the optimal legal system solves:

$$w\frac{\partial S}{\partial v}\left(\hat{v}\left(w\right), \gamma\right) = \mu'\left(1-\hat{\tau}_M\left(w\right)\right). \tag{14}$$

where $S(v,\gamma)$ is the second-best surplus function defined in (11) and $\hat{v}(w) = \hat{u}\left(\mu\left(1-\hat{\tau}_M(w)\right), w(1-\hat{\tau}_M(w)), \gamma_M\right) + \left(1-\hat{\tau}_M(w)\right)$.[16] This expression has a nice interpretation: the investment in property rights equates the marginal social surplus to the marginal cost.

We now analyze the implications of (14). We first give a sufficient condition for there to be a wealth level at which (14) holds with equality. Intuitively, this will be the case when the marginal product of x is high since that raises the demand for collateral to support trade in x. To formalize this intuition, we parametrize the production function as depending on a parameter ρ, i..e. $q(x;\rho)$, where $q_\rho(x;\rho) > 0$. For high enough ρ, we expect the solution to be interior. This is formalized in:

Lemma 4 *Suppose that $\tilde{w} > \gamma_M\mu'(1-\bar{\tau})$,then, for large enough ρ, there exists a wealth level such that $\tau^*_M(w) > \bar{\tau}$.*

We now develop two key comparative statics results for τ. The proof of the following result is in the Appendix:

Proposition 5 *(i) The optimal τ is is creasing in the market input cost – γ_M.*

(ii) The optimal τ is not monotonic in wealth. The worst possible legal system ($\bar{\tau}$) is desired both by very rich and very poor producers.

[16] To derive this expression, use the fact that:

$$\frac{\partial}{\partial\tau}\hat{u}\left(\mu\left(1-\tau\right), w(1-\tau), \gamma_M\right) = \frac{\mu'}{1-\frac{\partial S}{\partial v}} - \frac{w\frac{\partial S}{\partial v}}{1-\frac{\partial S}{\partial v}}.$$

Given that $\frac{\partial S}{\partial v}$ is decreasing, and noticing that $\mu'(\cdot)$ is *de*creasing in τ (it is increasing in $1-\tau$) it is straightforward to check that $\hat{u}\left(\mu\left(1-\tau\right), w(1-\tau), \gamma_M\right)$ is strictly concave in τ justifying the use of the first order condtition.

The first result formalizes precisely the idea that if $\mu'(1-\bar{\tau})$ is small enough then there is some level of wealth at which a legal system with τ below $\bar{\tau}$ is desirable. The second non-monotonicity in wealth is very intuitive. There are two effects of increasing w. The first is a *demand* effect whereby higher wealth increases the demand for collateral. It is represented by the wealth being in numerator of (**??**). The second is an *agency cost* whereby high wealth diminishes the marginal agency cost of dealing with a given producer and *lowers* the demand for contract enforcement. This is represented by wealth appearing in the denominator of (**??**).

This result implies says that high and low wealth economies will be those in which demand for contract enforcement will be weak. However, the reasons at either end of the spectrum are quite different. The first of these arises because even with poor legal enforcement, the first best is attainable. For low enough wealth, it is not worth incurring the cost of investing in a legal system as producers have little or no wealth to use as collateral.

We now turn to suppliers' preference for contract enforcement. Those who trade in competitive markets always ended up with zero profits and hence have no interest in improving τ since all costs are passed on to producers. They are therefore indifferent as to the level of transactions costs. This contrasts with network suppliers who earn rents, the level of which depend on the market opportunities available to producers. For that group, observe that $\pi\left(\hat{u}\left(\mu\left(1-\tau_M\right), w, \gamma_M, \tau_M\right), w, \gamma_j, \underline{\tau}\right)$ is increasing in τ_M for all $\bar{\tau} > \tau_M > \tau_M^*(w)$ and $\gamma_j \in \left\{\underline{\gamma}, \overline{\gamma}\right\}$. An improvement in formal legal enforcement increases the reservation payoff of producers and makes network suppliers worse off leading them to desire a worse formal legal system even though they do not have to pay for it directly.

It is now straightforward to characterize the set of Pareto efficient legal systems in this framework. If $\tau_M^*(w) = \bar{\tau}$, then there is a unique Pareto optimal legal system which is maximally inefficient. This is because network suppliers and producers who obtain their inputs in the market agree that there are no benefits to improving the legal system. More generally, if $\tau_M^*(w) < \bar{\tau}$, then any enforcement level in the interval $\tau \in \left[\hat{\tau}_M(w), \bar{\tau}\right]$ is Pareto efficient. Producers gain while network suppliers lose out as the legal system is improved.

The effects that we have described here arise under the assumption legal services are finance via a use tax. Clearly, there would be a further effect if the cost were also born by those who trade in networks. This would give an extra reason for network suppliers to be worse off if the formal system were to improved.

8.2 Wealth Inequality

We now consider how policy issues are affected by in introducing wealth inequality among the producers We consider, for simplicity, a two point distribution of wealth where $w \in \{W_P, W_R\}$ where $W_R > W_P$ and R stands for 'rich' and P for 'poor'. Let π_R be the fraction of producers with high wealth.

It is clear that the rich and poor will be offered different contracts by their suppliers. As in the models of Banerjee and Newman (1993) and Aghion and Bolton (1997) higher wealth will reduce the agency costs associated with borrowing and hence favor the wealth producers even if the wealth is not itself directly productive. As we observed in the study of optimal contracts, if W_R is high enough, then the rich will achieve the first best level of effort and, hence, expected output.

Sorting between markets and net works will now be different for each wealth group and the critical transactions cost $\hat{\tau}\left(\gamma_j, w, u_M\right)$ varies with w. Paralleling the discussion in the last section, we cannot predict a priori whether high or low wealth individuals prefer markets over networks. .... NEEDS SOME ANALYSIS?

Following the result in Lemma 1, it is clear that wealth differences affect policy preferences. For extreme degrees of wealth inequality, the rich and poor will agree on preferring a very low quality legal system $(\bar{\tau})$. As inequality is reduced, it is possible that both groups start to demand improvements in the legal system. Formally, the result is:

Remark 5: *Suppose that total wealth exceeds* $\left(\frac{q^2\underline{\gamma}}{\left(\underline{\gamma}-1\right)^2}\right)/(1-\bar{\tau})$, *then with sufficient wealth inequality, both rich and poor producers unanimously prefer the worst possible legal system,* $\bar{\tau}$.

The condition stated here says that if there is enough wealth in the economy such that, if it were given to a single rich person, they would achieve the first best when the legal system is very poor. With sufficient wealth inequality and provided that average wealth is low enough, then as long as the condition stated in Lemma 3 holds, then both groups of producers wish to have a legal system where $\tau_M < \bar{\tau}$.

It is interesting briefly to contrast wealth redistribution policies with investment in a legal system using our framework. Suppose that we compress the wealth distribution by transferring wealth from rich to poor. Then for standard reasons that have been covered in the literature on inequality and agency costs, there can be higher output. However, clearly the rich will lose while the poor gain. When the policy is increasing investment in legal institutions then it is possible that provision of legal services can make *all* producers better off, at least when there is initially a moderate level of inequality.

8.3 Political Economy

This section discusses political economy issues from two perspectives. First, we consider conflicts of interest over policy due to differences in wealth. Second, we look at the role of network producers acting as a special interest. All policies that we study are Pareto efficient. Nonetheless, policies will affect the extent of trade, productivity and output in the economy. The analysis will also highlight the central role played by political institutions – affecting how far elites and special interests exercise influence over the policy process. Throughout this section, we maintain our assumption that contract enforcement is financed with a user charge. This abstract from one important conflict of interest that arises in political economy models of public policy where those who use a service are charged for some other citizen's use of legal services.

8.3.1 Wealth Heterogeneity

We begin by studying the case where the only difference across citizens is in their wealth level. We consider for the first pass, the two point wealth distribution studied in the last section. We suppose that $\pi_R < 1/2$, i..e. the poor are a majority. For the purposes of studying political equilibria, we also assume that network producers are a negligible fraction of the population and hence have no influence on the political equilibrium. We study two contrasting institutional settings. The first is an elite model where the rich control policy. This could arise under autocratic rule or limited forms of democracy with restrictions on the franchise and candidate entry. The second institutional setting is a democracy where both wealth groups can propose candidates for office and all are entitled to vote.

Under elite rule, the policy outcome is $\hat{\tau}_M(W_R)$. As observed in the last section, this will equal $\bar{\tau}$ if W_R is large enough. Thus we have:

Remark 6: *Elite rule will result in low levels of market contract enforcement if inequality is large enough. Such economies will tend to have large informal sectors, low productivity and low levels of output per capita.*

The contrast between elite rule and democracy is most striking when $\hat{\tau}_M(W_P) < \bar{\tau}$. This is a case where the poor have sufficient wealth to demand improved contract enforcement. This is the situation that de Soto views as characteristic of many economies in the world where a lack of contract enforcement rather than wealth is holding the economy back. In this case, a move away from elite rule towards democracy should improve contract enforcement. However, if $\hat{\tau}_M(W_P) = \bar{\tau}$ so that the poor have insufficient wealth to benefit from an improved contracting environment, then political institutions may not affect the kind of legal system that is implemented. We summarize this as:

Remark 7: *Transitions to democracy where the poor gain more political influence will improve contract enforcement only if the poor have sufficient collateralizable wealth. Thus democratic transitions in situations of high inequality may have a negligible impact on contract enforcement.*

The last observation makes clear that there may be are important interactions between political institutions and underlying economic preconditions such as inequality. This is a theme in Engerman and Sokoloff (2002) who emphasize the centrality of initial factor endowments and their distribution in shaping policy in Latin America.

Lemma 3 suggests that the demand for contract enforcement is likely to be greatest among middle wealth groups. Many accounts of democracy see the middle class as the pivotal group in democracies. Moreover, the standard median voter insight reinforces this. However, this requires that policy preferences that are single-peaked – the rich (poor) would rather support policies preferred by the middle class to those preferred by the poor (rich).

Lemma 3 makes clear that single-peakedness is not a feature of contract enforcement in our model calling for a non-standard political economy even in a democratic setting with open entry of candidates and universal suffrage. The citizen-candidate approach of Osborne and Slivinski (1996) and Besley and Coate (1997) can handle situations with non-single peaked preferences. We suppose, therefore, that political competition involves the possibility of each group of citizens putting up a candidate for office with (sincere) voting by all citizens over the group of candidates. We assume that there is a small cost to putting up a candidate and that there is a default outcome if no candidate runs which is sufficiently bad for all types of citizens to make running for some citizen worthwhile.

Let the proportions of rich, middle class and poor be (π_R, π_M, π_P) respectively and their wealth levels be (W_R, W_M, W_P). Suppose that $\hat{\tau}_M(W_M) < \bar{\tau}$. We consider two main cases to illustrate what the absence of single-peakedness can matter.

First, consider the "standard" case where the wealth levels are close together and preferences are single-peaked over the policy interval $\tau \in [\hat{\tau}_M(W_P), \hat{\tau}_M(W_R)]$ with $\hat{\tau}_M(W_P) < \hat{\tau}_M(W_M) < \hat{\tau}_M(W_R) < \bar{\tau}$. Then we would invoke a standard median voter style logic where regardless of of the sizes of the three groups, the outcome will involve a single middle class candidate running and winning the election under mild conditions.[17]

Now suppose that $\hat{\tau}_M(W_P) = \hat{\tau}_M(W_R) = \bar{\tau}$ which will be true (using Lemma 3) if W_P is low enough and W_R is large enough. Now if $\pi_P + \pi_R > \pi_M$, then there will be a one candidate political equilibrium where either the rich or the poor put up a candidate. To see this, observe that as long as the default outcome is bad enough, the citizen running will not withdraw. It will not be worthwhile for any other rich or poor citizen to run as he/she does not change the policy outcome and running involves a small cost. Also, no middle class citizen will enter as he/she will not win and running is costly.

The candidate who stands is elected unanimously and implements the

[17] See Besley and Coate (1997, Proposition 2).

policy $\bar{\tau}$.[18] Thus, even though the middle class would like to see an improvement in contract enforcement, they are "beaten" by a coalition of the rich and the poor. If there is sufficient weight of numbers in the middle of the wealth distribution so that $\pi_M > \pi_P + \pi_R$, then the political equilibrium would have a single middle-class candidate standing unopposed and being elected to implement the the policy $\hat{\tau}_M(W_M)$. This is associated with greater productivity, a smaller informal sector and higher output. Unlike the standard median voter this result holds only if the middle class is a large enough group. We summarize this:

Remark 8: *Since policy is not monotonic in wealth, democracy does not necessarily favor middle-class interests. With sufficient wealth inequality, investment in an effective legal system requires that the middle class be a large enough group.*

The bottom line running through all of these examples is that wealth inequality affects the way in which preferences are aggregated via political institutions. Only with sufficient economic and political weight towards the middle of the wealth distribution are we likely to find a political equilibrium with investment in effective contracting institutions.

8.3.2 Lobbying by Network Suppliers

The last section ignored political influence by network suppliers. We now allow suppliers to influence policy by lobbying. To isolate the implications of this for policy, we revert to the case where producers are a homogeneous group with common wealth level W and assume that $\hat{\tau}_M(W) < \bar{\tau}$. This creates a conflict of interest between producers and network suppliers who may earn a rent from having a lower τ_M.

We assume that the a policy maker is drawn from the producer class whose interest she serves. Moreover, she ceases to be a producer herself and receives a fixed wage for being a politician which we normalize to zero. The policy maker may also earn a rent by receiving transfers from an organized group of network suppliers. We assume that the latter is in the form of a

[18] This is reminiscent of the "ends against the middle" result of Epple and Romano (1996) although the logic here is rather different.

policy-contingent transfers $T(\tau_M)$. Thus the preference of the policy-maker is

$$\hat{u}\left(\mu\left(1-\tau\right), W, \gamma_M, \tau\right) + \alpha T\left(\tau\right)$$

where α is a measure of the weight that the policy maker attaches to transfers as in Grossman and Helpman (1994). The lobby is taken as exogenous and comprises a group suppliers who share the cost of contributions $T(\tau)$. We assume that the lobby has n members and acts to maximize the sum of utilities of its members.

We allow the lobby to make a take-it-or-leave-it offer to the policy maker. If the policy make rejects the offer, she will implement her preferred policy outcome $\hat{\tau}_M(W)$. Thus the transfer needed to implement a policy τ makes the policy maker indifferent between this level of τ and $\hat{\tau}_M(W)$. Thus:

$$T\left(\tau\right) = \frac{1}{\alpha}\left[\hat{u}\left(\mu\left(1-\hat{\tau}_M\left(W\right)\right), W, \gamma_M, \hat{\tau}_M\left(W\right)\right) - \hat{u}\left(\mu\left(1-\hat{\tau}_M\left(W\right)\right), W, \gamma_M, \tau\right)\right]$$

is the cost to the lobby of implementing the policy τ.[19] Given this, the lobby will choose

$$\tau_M = \arg\max_{\tau\in[\underline{\tau},\bar{\tau}]} \left\{ n_R \pi\left(\tau_L, \gamma_j, \hat{u}\left(\mu\left(1-\hat{\tau}_M\left(W\right)\right), \gamma_M, \tau\right)\right) - \frac{1}{\alpha}\left[\hat{u}\left(\mu\left(1-\hat{\tau}_M\left(W\right)\right), W, \gamma_M, \hat{\tau}_M\left(W\right)\right) \right.\right.$$

The outcome will be Pareto efficient maximizing a weighted sum of producer and supplier payoffs. The weight depends on two factors: n_R and α. A larger lobby will lead to more weight on supplier payoffs as the cost of paying the policy maker is a local public good shared between the members of the lobby. It will also depend upon how susceptible is the policy maker to being bribed. As α tends to zero, then most weight will be applied to producer utility. If α and n_R are large, then lobbying will lead to $\bar{\tau}$ being chosen in political equilibrium. In general, influence by organized suppliers will tend to lead to a worse legal system than in the presence of lobbies.

This analysis gives a specific analysis of how an entrenched interest can lobby for an output reducing set of legal institutions. This view suggests a dark side of organized social networks and their consequences for development.[20] Networks limit competition which creates rents that can lead

[19] Thus contributions will automatically be truthful in the sense of Grossman and Helpman (1994).

[20] This argument is related to a recent paper by Kumar and Matsusaka (2005) which

network participants to lobby against improvements in market supporting institutions.

The theme that traditional networks can be a source of underdevelopment has echoes in some informal discussions of some economies. Thinkers such as Bauer (1954) and Hayek (1976) clearly understood that traditional forms of economic interaction had limited scope in comparison to markets. It is clear that Bauer understands that this also creates vested interested in maintaining trading networks.

> "Almost every prominent Yoruba, Ashanti and Fanti chief has widespread trading interests, so have many Hausa emirs. In many instances the official attitude has also failed to check, and has at times encouraged, the restrictive aims of sectional interests, possibly for reasons of administrative convenience and because of fear of political unsettlement." (page 41)

Similarly Hayek (1976) develops the idea of market economy as a Great Society where individuals are free to trade with whomever they like rather than an economy that works on the basis of what he refers to as "tribal ethics". Both Bauer and Hayek clearly appreciated the fundamental role that effective property rights and contract enforcement played in the economy and the development of markets.

This has echoes in Rajan and Zingales (1998) analysis of the costs of the relationship-based system of governance that has been prevalent in East Asian economies. They argue that "(t)he opacity and collusive practices that sustain a relationship-based system entrench incumbents at the expense of new potential entrants. Moreover, the lack of transparency also makes it hard for democratic forces to detect all the abuses in the system. This strengthens the hand of incumbents in resisting reform."

9 Concluding Comments

This paper has examined de Soto's central hypothesis that ineffective property rights lead to low levels of wealth collateralization and are a key source

argues that village social capital that supports local trading systems can be a source of underdevelopment, although the specific mechanism discussed here is not one that they discuss.

of under-development. We have developed a simple workhorse model of trade between suppliers and producers which allows us to explore several dimensions of this. By beginning from such a tractable and specific model we have derived policy implications and insights into the political economy of contracting institutions. We have also integrated these ideas into studies of network based trade.

The paper contributes to burgeoning debates about the role of institutions in the process of economic development. That said, the paper is much more specific in comparison to many debates that go on about property rights enforcement and development.[21] However, by focusing on particular mechanism (legal enforcement leading to improved property rights protection) in detail, some lessons emerge. In the case of legal institutions, we find that two basic structural features matter – supplier/producer networks which affect the extent to which trade is carried out in markets where formal legal institutions matter. Strong networks can be a source of rent and hence of inertia in development of formal legal systems. We also find a role for inequality since wealth in our model is a potential bond for contract enforcement, but only when property rights are developed. This supports the general theme in Engerman and Sokoloff (2002) which argues that inequality affects institutional development in a general sense. But the way in which such inequality and networks find their way into policy is dependent on political institutions and the extent to which economic and political elites coincide. The poor may have a demand for effective legal enforcement, but are barred from expressing this wish through defective legal institutions. Thus, in a broader sense out model also supports the centrality of political institutions in this sphere.

While this paper has consisted of a theoretical analysis, it is useful for informing aspects of the empirical study of contracting institutions. The theoretical model gives a guide to the kind of effects that might be found in the data. This is particularly relevant to the burgeoning micro-economic literature on how contracts affect the behavior of households and firms. The model pinpoints some specific channels which could be explored in detail. The model also highlights potential sources of "heterogeneous treatment effects", especially those with respect to wealth and access to non-market opportunities through networks.

The model of the paper is also helpful in thinking through when effects

[21] See, for example, Acemoglu, Johnson and Robinson (2001) and Engerman and Sokoloff (2002).

of property rights improvements can be captured in particular kinds of data, especially if there are important general equilibrium effects of the type emphasized in section 6.3. Looking purely at household level impacts may miss this. Equally, the model emphasizes the difficulty of identifying effects of contract enforcement at the macro-level in a way that is theoretically interpretable. Even in this comparatively simple theoretical setting, there are a range of effects to consider. Moreover, it suggests that it is necessary to control for the depth and strength of social networks when investigating how contractual improvements affect output. As in previous models of credit markets and development, the model also emphasizes the potential for wealth inequality to mediate improvements in contractual institutions.

Concerns about "endogeneity" arise in all kinds of studies of the impact of contract enforcement on the economy. Our the framework suggests a way of thinking through some political economy issues and hence ways of modeling endogenous determination of property rights, albeit in a very specific setting. Political institutions are likely to affect this process by affecting the manifestation of special interests in promoting or retarding market development. Equally, wealth distribution appears likely to be important and our model naturally gives a link to the formation of a middle class and the creation of effective contracting institutions. While this does not offer any magic bullet for achieving identification, it is possible that having a formal structure will help in thinking clearly about the issues.

The ideas of Hernando de Soto on the importance of property rights in sustaining trade have great resonance with policy makers. They identify a problem of development not as poverty per se, but with the way in which assets can be scaled up in the development process. By creating a formal structure for this argument, we find that there are many dimensions to this. But at a general level, it reinforces the increasing realization that the proper study of markets and contracts needs to begin with a study of the legal infrastructure that supports trade and the forces that shape it if we to understand this important dimension of underdevelopment and poverty.

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10 Appendix Proofs

Proof of Proposition 1: We proceed by proving the following preliminary result:

Lemma A: (i) *At the optimal contract* $r \geq c$. (ii) *If* $r > c$ *under the optimal contract, then* $c = (1-\tau)\,w$. (iii) *If* $c < (1-\tau)\,w$ *under the optimal contract then* $r = c$ *and effort is at the first-best level.*

Proof: (i) At the optimal contract $r \geq c$.Suppose not. Consider a small increase in r to $r + dr$ and a small decrease in c to $c - dc$ that keeps the producer's payoff constant. Clearly, this will increase e via the incentive-compatibility constraint. In the exercise, we hold x constant. If the argument goes through with x constant, it will naturally go through when x is adjusted optimally by the supplier. Using the envelope theorem we can ignore the effect of this change on the producer's payoff via e. Then given the expression for the producer's payoff, this is given by

$$p\,(e)\,(dc - dr) - dc = 0.$$

The change in the supplier's payoff is

$$p'(e)\,(r - c)\,de + p\,(e)\,(dr - dc) + dc = p'(e)\,(r - c)\,de$$

as $p\,(e)\,(dr - dc) + dc = 0$ from above. As $r - c$ is negative by assumption, and e goes down (since r goes up and c goes down), this expression is positive and so the supplier is better off, implying a contradiction.
(ii) If $r > c$ under the optimal contract, then $c = (1 - \tau_{ij})\,w_i$. Suppose not.

Then it should be possible to increase c by a small amount, and decrease r (this should be feasible as by assumption $r > c$) so as to keep the producer's payoff constant. However, effort will be higher due to the ICC, and therefore, the supplier will be strictly better off, a contradiction. Therefore, (8) will bind, and so $c = (1 - \tau_{ij})\,w_i$.
(iii) If $c < (1 - \tau_{ij})\,w_i$ under the optimal contract then $r = c$ and so e is at the first-best level. Notice that $r > c$ implies $c = (1 - \tau_{ij})\,w_i$ is equivalent to $c < (1 - \tau_{ij})\,w_i$ implies $r \ngtr c$. Also by Step 1, $r \geq c$, and so $r \ngtr c$ is equivalent to $r = c$.■

Turning now to the proof of the Proposition, we use the ICC, and assuming that (8) binds, so that $c = (1-\tau)\,w$ the optimal contracting problem between supplier j and producer i can now be written in the following modified form:

$$\max_{\{x,r\}} p(e)(q(x) - \frac{1}{p'(e)}) + (1-\tau)\,w - \gamma x \tag{15}$$

subject to

$$\frac{p(e)}{p'(e)} - e \geq v \tag{16}$$

and (9). Observe now that $p(e)/p'(e) - e$ is strictly increasing and positive for all $e > 0$.[22] This implies that the participation constraint will not bind for low values of v. In this case, choosing x and r to maximize (15) yields

$$\begin{aligned} p'(e)q(x) &= 1 + \varepsilon_p(e) && (17) \\ p(e)q'(x) &= \gamma. && (18) \end{aligned}$$

where $\varepsilon_p(e) = \varepsilon_p(e) \equiv -p''(e)p(e)/\{p'(e)\}^2$. Let the solution be denoted by (e_0, x_0). From the ICC, $r_0 = q(x_0) - \frac{1}{p'(e_0)} + (1-\tau)\,w$. Let

$$\underline{v}_0 \equiv \frac{p(e_0)}{p'(e_0)} - e_0.$$

Since $p(e)/p'(e) - e$ is strictly increasing and positive for all $e > 0$, $\underline{u}_0 > 0$. Given that the PC will not bind for $v \in [0, \underline{v}_0], e = e_0, x = x_0, r = r_0$, and $c = (1-\tau)w$ for all v in this interval.

We now state formally the condition required for (9) to be slack. This is the case if τ is not very high, in particular, $\tau \leq \tilde{\tau}$ where $\tilde{\tau}$ solves:

$$(1-\tilde{\tau})\{w + q(x_0)\} = q(x_0) - \frac{1}{p'(e_0)} + (1-\tilde{\tau})\,w$$

which simplifies to

$$\tilde{\tau} \equiv \frac{1}{p'(e_0)q(x_0)}.$$

For $\tau \leq \tilde{\tau}$, the investor protection constraint (9) does not bind. Since it does not bind at the unconstrained optimum in the modified contracting problem, we ignore it for the rest of analysis.

[22] This follows from Assumption 1.

Lemma B: $e_0 < e^*, x_0 < x^*$, and $r_0 > c$.

Proof: $e_0 < e^*$. Otherwise, if $e_0 = e^*$ from (18), $x = x^*$ but this contradicts (17). The ICC can be rewritten as, using (17), From the ICC (and using (17))

$$r_0 = \varepsilon_p(e_0) + (1 - \tau)\, w.$$

As $\varepsilon_p(e) > 0$ (by Assumption 1), $r_0 > c$.■

When the PC binds we have

$$\frac{p(e)}{p'(e)} - e = v.$$

Notice that the slope of the left-hand side is $\varepsilon_p(e) > 0$ for all $e > 0$. Given that e is determined by the binding PC, the supplier's choice of x is given by

$$p(e)q'(x) = \gamma.$$

It is readily verified that:

$$\frac{dx}{de} = \frac{\gamma p'(e)}{\{p(e)\}^2\{-q''(x)\}} > 0.$$

As $\frac{dx}{de} > 0$, $g_v = \frac{dx}{de} f'(v) > 0$. It is straightforward to verify that $g_\gamma\,(v, \gamma) < 0$.

From the ICC

$$r = q(g(v)) - \frac{1}{p'(f(v))} + (1 - \tau)\, w.$$

We now consider the possibility that autarky payoff is the binding outside option. Let

$$\underline{u}_a \equiv \max_e \{p(e)q(0) - e\}\,.$$

Assumption 1 implies that $\underline{u}_a \geq 0$. Let

$$\underline{v} \equiv \max\{\underline{u}_a + (1 - \tau)\, w, \underline{v}_0\}.$$

As $f(v)$ is strictly increasing, for $v \geq \underline{v}$ the PC will bind.

Now define $\overline{v}$ from:

$$\overline{v} \equiv \frac{p(e^*)}{p'(e^*)} - e^*$$

where $e^*$is the first-best effort level (characterized by (1). Given Lemma B, clearly $e^* > e_0$ and correspondingly, $\underline{v} < \overline{v}$.

For $v \geq \overline{v}$, the first-best allocation will be chosen by the supplier simply given the fact that it is feasible, and so by definition it will maximize the supplier's payoff subject to providing the producer a gross payoff of v. Obviously now $r = c < (1-\tau)w$ to reflect that the producer has to be given more surplus.

This completes the argument.■

Proof of Lemma 1: To characterize the constrained Pareto-frontier, observe that

$$\frac{\partial S}{\partial v} = (p'(v)q(g(v,\gamma)) - 1)\, f'(v).$$

For $v \geq \overline{v}$, $p'(e^*)\, q(x^*) = 1$ and also, $f(v) = f(\overline{v})$. Therefore, $\frac{\partial S}{\partial v} = 0$. For $v < \overline{v}$, $p'(v)q(g(v,\gamma)) > 1$ and by Lemma 4, $f'(v) > 0$ and so $\frac{\partial S}{\partial v} > 0$. In the case where the participation constraint does not bind, we have $p'(e_0)q(x_0) = 1 + \varepsilon_p(e_0)$. Also, $f'(v) = \frac{1}{\varepsilon_p(e)}$. Therefore, for $v \leq \underline{v}$, $\frac{\partial S}{\partial v} = 1$.

Using Assumption 1:

$$\frac{\partial^2 S}{\partial v^2} = \frac{\partial}{\partial v}\left(p'(v)q(g(v,\gamma)\right) f'(v) + \left(p'(v)q(g(v,\gamma)) - 1\right) f''(v).$$

First we show that $p'(f(v))q(g(v))$ is decreasing in v. Differentiating with respect to v and using the expressions for $f'(v)$ and $g_v(v,\gamma)$ we find that

$$\frac{dp'(f(v))q(g(v))}{dv} = -\frac{(p')^2}{p}\frac{(q')^2}{(-q'')}\left[\varepsilon_p\varepsilon_q - 1\right]$$

where all expressions are evaluated at $e = f(v)$ and $x = g(v,\gamma)$. By Assumption 2, $\varepsilon_p\varepsilon_q - 1 > 0$ and so the above expression is negative. Next we show that $f''(v) < 0$. As $f'(v) = \frac{1}{\varepsilon_p(e)}$, it suffices to prove that $\varepsilon_p'(e) > 0$. Upon differentiation it is verified that $\varepsilon_p'(e) = -\frac{(p')^2 p''(1+\varepsilon_p) - p(p'')^2\left(1+\frac{p'''(e)p'(e)}{\{p''(e)\}^2}\right)}{(p')^3} > 0$.

To check that $S(v,\gamma)$ is decreasing in γ, differentiate to verify that:

$$\frac{\partial S}{\partial \gamma} = \left(p(f(v))q'(g(v,\gamma)) - \gamma\right) g_2(v,\gamma) - g(v,\gamma) = -g(v,\gamma)$$

by the envelope theorem. This completes the proof. ■

Proof of Proposition 2: From the definition of $\hat{u}$,

$$\begin{aligned} \frac{\partial \hat{u}}{\partial \gamma} &= \frac{\frac{\partial S}{\partial \gamma}}{1 - \frac{\partial S}{\partial \gamma}} < 0 \\ \frac{\partial \hat{u}}{\partial \pi} &= -\frac{1}{1 - \frac{\partial S}{\partial v}} < 0 \\ \frac{\partial \hat{u}}{\partial \left(w(1-\tau)\right)} &= \frac{\frac{\partial S}{\partial v}}{1 - \frac{\partial S}{\partial v}} > 0. \end{aligned}$$

Also,

$$\frac{\partial^2 \hat{u}}{\partial \left(w(1-\tau)\right)^2} = \frac{\frac{\partial^2 S}{\partial v^2}}{\left(1 - \frac{\partial S}{\partial v}\right)^2} > 0.$$

■

Proof of Lemma 2: To prove the first part notice that $\frac{\partial S}{\partial v}$ is increasing in A. A legal system with $\tau < \bar{\tau}$ is desirable at wealth level w if:

$$w\frac{\partial S}{\partial v} > \mu' \left(1 - \bar{\tau}\right).$$

This will hold for large enough A. To guarantee that wealth is below is below the level at which the first best is achieved requires the additional assumption that $\gamma_M \mu' \left(1 - \bar{\tau}\right) < \overline{w}$.

To prove part (ii), recall that $\frac{\partial}{\partial \tau}\hat{u}\left(\mu\left(1-\tau\right), w(1-\tau), \gamma_M\right) = \frac{\mu'}{1-\frac{\partial S}{\partial v}} - \frac{w\frac{\partial S}{\partial v}}{1-\frac{\partial S}{\partial v}}$. As $w \to 0$, $\frac{\partial S}{\partial v} \to 1$ and so $\frac{\partial \hat{u}}{\partial \tau}$ is very large and positive, which is equivalent to saying $\frac{\partial \hat{u}}{\partial (1-\tau)}$ is very large and negative. Thus, by continuity, there exists w_L such that $\tau^*\left(w\right) = \bar{\tau}$ for all $w \leq w_L$. On the other hand, for $w = \overline{w}$, $\frac{\partial S}{\partial v} = 0$ and so $\frac{\partial}{\partial \tau}\hat{u}\left(\mu\left(1-\tau\right), w(1-\tau), \gamma_M\right) = \mu'$. Once again, this implies $\frac{\partial \hat{u}}{\partial (1-\tau)}$ is negative and so there exists w_H such that $\tau^*\left(w\right) = \bar{\tau}$ for all $w \geq w_H$. ■

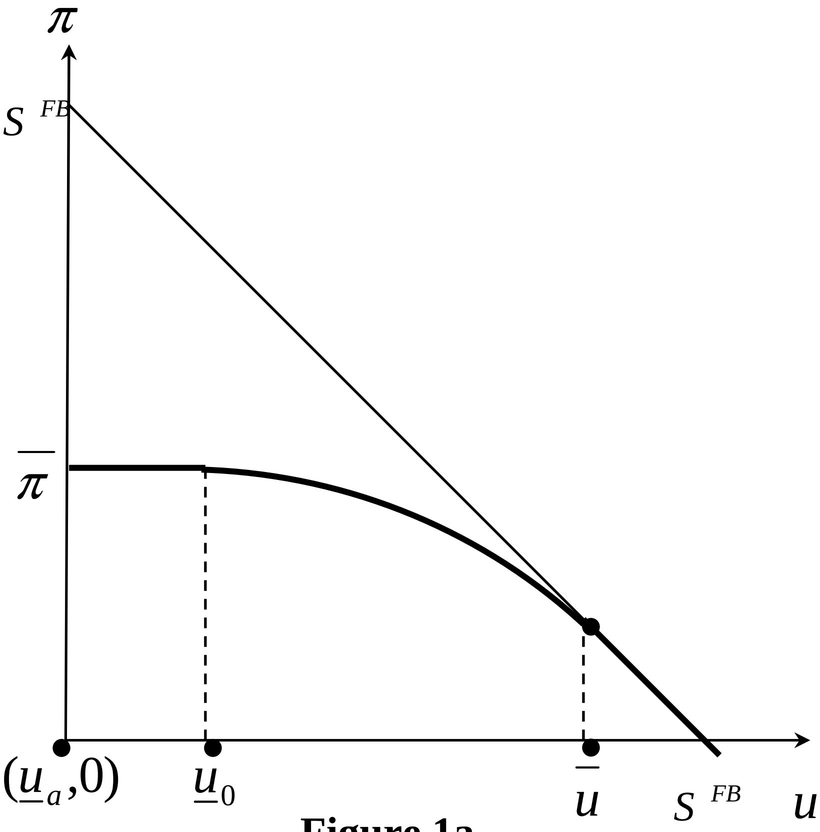

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Figure 1a

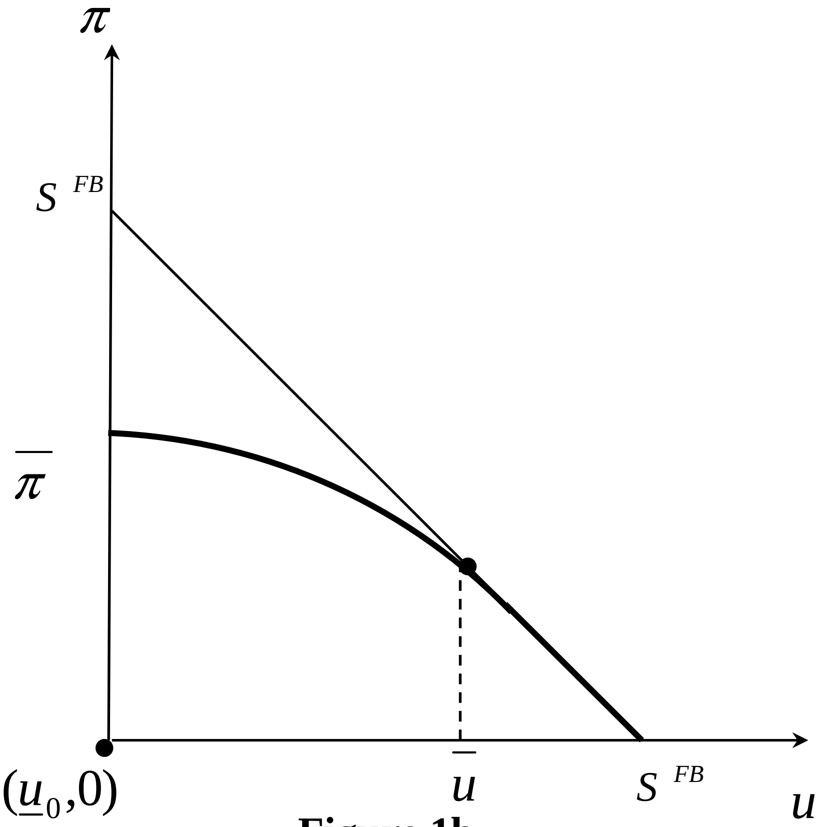


Figure 1b

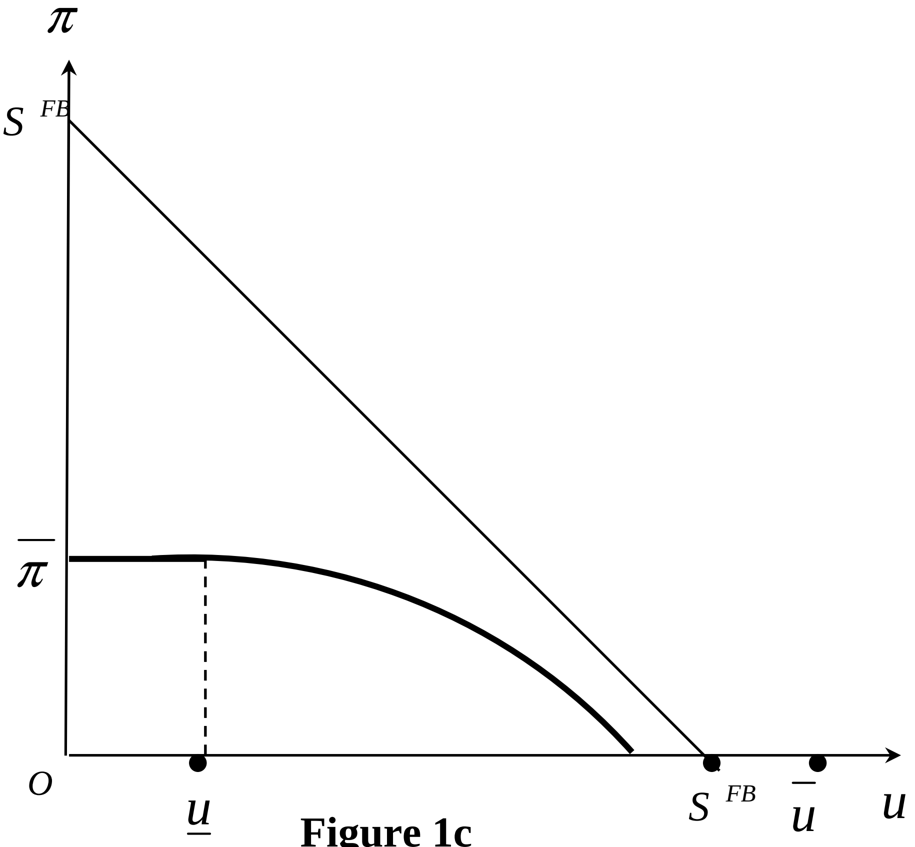
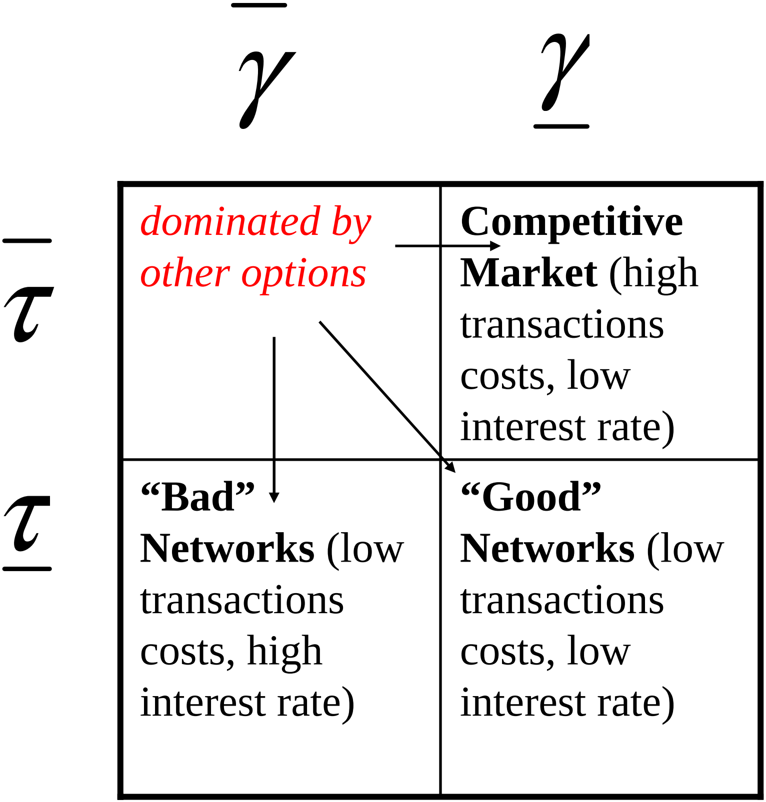
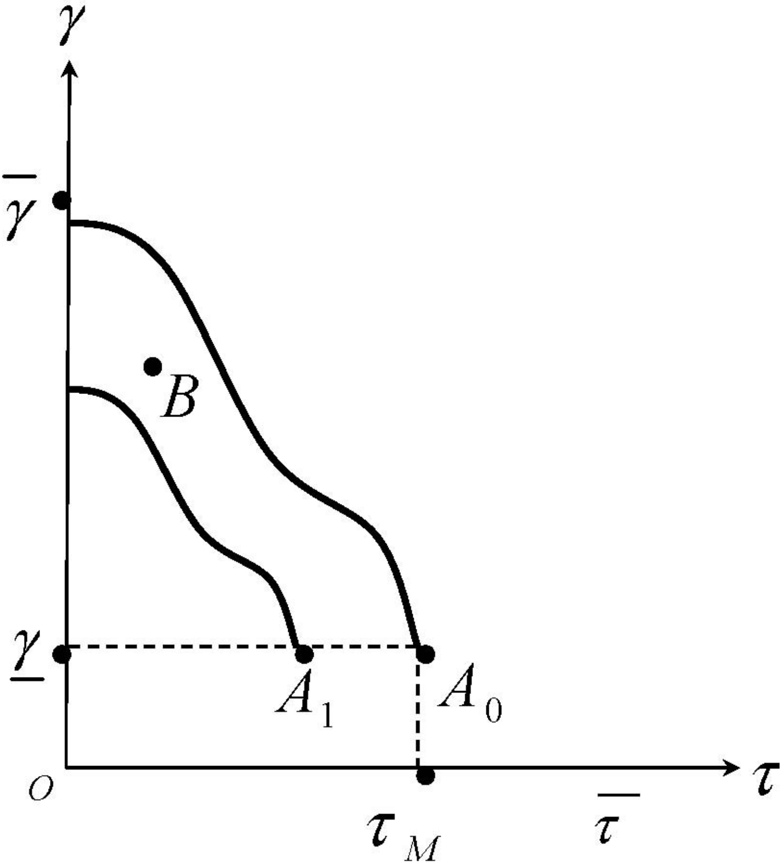


Figure 1c



$\bar{\gamma}$
$\underline{\gamma}$
$\bar{\tau}$
$\underline{\tau}$
dominated by other options
Competitive Market (high transactions costs, low interest rate)
“Bad” Networks (low transactions costs, high interest rate)
“Good” Networks (low transactions costs, low interest rate)

Figure 2a



γ
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Figure 2b