I hereby declare and confirm that this thesis is entirely the result of my own work except where otherwise indicated. I gratefully acknowledge the supervision and guidance I have received from Professor Dr. Sripad Motiram at the Indira Gandhi Institute of Development Research in Mumbai. This thesis is not used as part of any other examination and has not yet been published. I furthermore confirm the word count of 15576, including footnotes.
“Surely, there is no need for growth strategies, development policies or grand projects of any kind, but only for an appreciation of the protection and enforcement of property rights in a given institutional framework.” Enrico Colombatto (2004, p.253)
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Abstract

Much evidence has been presented that legal institutions, and particularly property rights, cause economic growth. Yet, precisely for those countries with the most urgent need for development, we know less about the direction of causation and the functional form of the association between the strength of legal property rights and per-capita incomes. A seminal work in this literature, by Acemoglu, Johnson and Robinson (2000), provides optimistic outlooks, whereby also the Least Developed Countries could grow out of poverty if they implemented strong legal property rights.

In this paper, we challenge two of Acemoglu et al’s findings. First, we derive a range of micro-mechanisms suggesting that the relationship between the strength of legal property rights and output may not be linear as asserted by Acemoglu et al and a number of other scholars. Instead, our mechanisms imply the existence of a weak relationship between these variables in the lowest stages of development and a structural break after early growth. Second, we suggest why the direction of causation may turn around after early development.

We confirm these predictions of our small models with non-parametric, instrumented regressions. Our results hold not only for Acemoglu’s dataset but across a range of measures for property rights protection. Property law is shown to matter greatly for Mid-Income Countries but it is important not to overestimate its potential for the Least Developed Countries. We must not stop searching for the causes of growth in the earliest stages of development; property reform alone does not resolve the poorest nations’ poverty traps.
1 Introduction

1.1 Acemoglu’s Black Box\textsuperscript{1}

The contribution by legal institutions to economic growth has long been downplayed in macroeconomics. This dramatically changed when two of the most-cited macroeconometric papers in modern history\textsuperscript{2} showed direct causal effects by institutions for long-run per-capita incomes (Hall & Jones 1999, Acemoglu, Johnson & Robinson 2000). As empirical studies, however, they lacked connection with the Law & Economics micro-foundations: in particular, the relation between property rights and growth remained a “Black Box”, in Acemoglu et al’s words. Scholars of Law and Economics (LE) have filled much of this “Box” with content (e.g. Cooter & Schäfer 2011), but there remain issues at its edges that the LE literature has not yet addressed adequately. Because these side-issues turn out to be of particular relevance for countries at the lowest stages of economic development, this paper analyses and rectifies two of Acemoglu et al’s findings regarding the relation between property rights and growth for the subset of the Least Developed Countries\textsuperscript{3}. We challenge

\textsuperscript{1}The paper we refer to is by Acemoglu, Johnson and Robinson. The short title is hence not quite correct but was born out of my enthusiasm over Acemoglu’s Marshall Lectures in 2009 at Cambridge, whereafter I decided to study Law & Economics to learn about the contents of the institutional “Black Box” he lectured about.

\textsuperscript{2}according to http://ideas.repec.org/top/top.item.nbcites.html, retrieved on 15/08/2011

\textsuperscript{3}Since UN Resolution 2768 (XXVI), the term “Least Developed Countries” describes the poorest nations, below the status of a “Developing Country”. The number of countries classified this way by the UN Economic and Social Council varies, but affects about a quarter of nations (http://www.unohrls.org/en/ldc/25/, retrieved on 15/08/2011). The IMF has a similar classification system which includes about one third of countries (http://www.imf.org/external/np/exr/facts/prgf.htm, retrieved on 15/08/2011). In this paper we use “Least Developed Countries” to describe nations at the “lowest stages of economic development” (Rostow 1960) that have not yet attained “early growth”.

3
their findings that

1. the direction of causation would run from legal property rights to growth for countries at all stages of development.

2. the relationship between the strength of legal property rights (measured in composite indices) to the variation in output levels would be linear. (Acemoglu et al. 2000, p.15, p.66)

Their first finding implies that countries at all stages of development should strengthen legal property rights to raise growth, and the second finding means that for a given rise in property rights indices countries could expect similar growth-dividends.

These statements provide full support to arguments that legal centrists have made for decades. In this paper we present micro-mechanisms contradicting both findings for countries at the lowest stages of development. We argue that the relation between property law and growth would be positive, but not linear, with the growth-dividend for improvements of legal property rights being low in the Least Developed Countries (LDCs). As a second contribution we provide mechanisms to explain why, in the poorest economies, the direction of causation runs predominantly from growth to legal property rights, with a turn-around in that relation for countries coming at Rostow’s kick-off stage, where law becomes the driver of growth.
1.2 Literature Review

In challenging the generalisability of Acemoglu et al.’s results for LDCs, we are aware that a substantial body of Law and Economics literature does support their findings in entirety:

Authors such as Colombatto (2004, p.251) see little disagreement on the direction of causation in the LE literature: "The importance of property rights as the engine of growth remains beyond dispute". Libecap (2004, p.108) supports this assessment of the literature, as does the World Development Report 2005, which sees a "large number of studies all reaching the same conclusion" on the property rights-growth relation (World Bank 2005, p.80), which the report implies to be causal and unidirectional (Pavcnik 2006, p.184).

For many of these authors, a country’s stage of development does not matter for the direction of causation: Olson (1996) regards institutions as the cause for underdevelopment across all countries. Scully (1988, p.661f.) and De Soto (2001, l.57) compare this relation with natural laws, thus claiming universality. Consistently, Scully (1988, p.657, p.661; 1997, p.313f., p.319) assumes a linear relation, and also De Soto (2000) as well as his UNDP commission with Albright (2008) exclude the possibility that the contribution of property law to growth might be weaker at low stages of development. 63 think tanks have furthermore jointly issued reports under De Soto’s guidance claiming that various measures of property rights would all be linearly related to economic output (Strokova et al. 2009, pp.42-47; Jackson et al. 2010, pp.42-47).

These findings clash, however, with scholars who studied the property rights - growth relation in a second-best context. Considering only best-feasible options, Stiglitz (2009) concludes that strong property rights could actually hinder growth in the
Least Developed Countries. Musembi (2007) agrees for the case of Africa, as do Besley and Ghatak (2009) for financial markets with irremovable constraints. These authors even see wide-spread growth-benefits from organised expropriation: Besley and Burgess (2000), Banerjee et al. (2002), Lipton (2009) and El-Ghonemy (2009, pp.15-29) review redistributionary land reforms and find that - compared to actual counter-factuals rather than unattainable first-best “alternatives” - these expropriative policies have raised growth in LDCs, or laid the foundation for the on-setting of significant growth (Sen 2006, p.42).

Between these two camps, we find the positions that Cooter and Schäfer (2011), Posner (1998) and the World Development Report 1997 have taken on causation and linearity of the property rights - growth relation at early development stages. All regard “securing property rights as part of the first step for countries’ development” (World Bank 1997, p.27; Cooter and Schäfer 2011, p.21 agree), but argue that using the law to attain this security “is a tall order indeed for countries in the earliest stages of development” (World Bank (1997, p.41)), due to indivisible sunk costs. And according to Posner (1998, p.2), incurring these costs may not even raise growth relative to counter-factuals. “Intermediate institutions and policy can substitute for weak law” (Cooter and Schäfer 2011, p.262). This substitution can happen through bureaucracies (ibid) or social norms (Kim 2007; Van den Brink et al. 2006, p.5f.) which in dense, early network economies can come at lower transaction costs than formal law (Moore and Schmitz 2008). These authors therefore argue that early growth can occur without property law, but “state enforcement [in the protection of property rights] becomes more important, when parties engage in long lasting and complex contracts with high asset specificity or related to complex goods” (Cooter and Schäfer 2011, p.263), which characterises an economy in which growth has already started\(^4\). While Rowstow’s kick-off stage

\(^4\)Some may argue here that the production of complex goods may also occur in Least Developed
for growth may thus occur without law, "new industries [the offspring of this initial growth] create demand for more complex institutions, which in turn enable the industry to develop further" (World Bank 1997, p.43). But this would imply, contrary to Acemoglu et al’s linear relation, that - in the earliest stages of development - growth causes formal property rights; only afterwards are formal property rights needed to cause continued growth! Such a synthesis is in line with Rapaczynski’s (1996) and Chang’s (2002) empirical investigations of legal history, as well as evaluations of recent reform projects by Davis and Trebilcock (2001, p.33), Van den Brink et al. (2006, p.48) and Hendley (1999). While these authors would disagree with each other on the mechanisms causing the change in the direction of causation, and while they would equally disagree on when the law should come in, they do all recognise a non-linearity at early development stages. Unfortunately, there are few formal mechanisms in these papers that could directly rectify Acemoglu et al’s findings. Cooter and Schäfer, for example, make the above-quoted statements in their conclusion, left for future research, and none of these papers provides econometric evidence. It is not clear how many countries are affected by reverse causation, when exactly property law becomes important in the stages of development, what exogenous factors might cause a non-linear relation between the strength of legal property rights and growth and what mechanisms could provoke a turn-around in the direction of causation between these two variables.

Countries (through export-led growth), so that LDCs might not achieve even early growth without strong property law. It is hard to see any examples, however, of the production of complex goods in countries in the bottom third of the Human Development Index, including in export processing zones (EPZs). Consider for example Sudan’s and Madagascar’s failed attempts to set up EPZs (Collier 2008) or the low-complexity productions that Bangladeshi EPZs are able to attract. It is developing countries where we see successful EPZs, producing more complex goods, for example the various EPZs in China’s Pearl River Delta.

Hendley’s empirical results for legal reform in Russia imply that we cannot assume Say’s Law for rules: just supplying rules does not cause their demand. Demand needs exogenous triggers, the law needs a market-maker. But this means that the market-making, i.e. the earliest stage of development, needs to be attained through another mechanism (e.g. some form of Big Push development across initial transaction costs through a government), so early causation is from growth to the use of property law.
The literature therefore offers three very different views on the relationship between property rights and growth at the earliest development stages. Many agree with Acemoglu et al that property rights cause growth irrespective of a country’s development stage, and that the strength of this relation should not be weaker for poor countries. They face a radical critique, however, by academics who argue that, in the Least Developed Countries, organised expropriative redistribution could raise growth and strong property rights protection could be a hindrance to growth at the earliest stages of development. A third group of scholars sees property rights as generally causing growth, but not necessarily at the rock-bottom of a country’s development, where the direction of causality could run more from early growth to legal property rights. For the poorest economies, these authors see a positive but weaker relationship between legal property rights and growth. This article makes a case for the third group’s view; to my knowledge it is the first formalisation and empirical testing of mechanisms driving the turn-around in causation and directly tackling the view of a linear relation in Acemoglu et al’s results across all development stages.

1.3 Structure of this Paper

This thesis consists of seven chapters. Chapter 2 specifies our methodological framework, before, in the third chapter we focus on dynamic mechanisms which suggest that the contribution of legal property rights to growth depends on the development stage of a country. The fourth chapter considers the interrelation of legal property rights and social norms across development stages, before the fifth chapter considers miscellaneous static effects supporting a non-linear relation. The sixth chapter tests our findings empirically; the seventh chapter concludes.
2 Methodology

2.1 Our setup and what is derived from it

Since many other papers on property law have already considered expropriation by governments, we instead focus on variations in the strength of property rights arising from private forms of theft. We therefore assume benevolent lawmakers whose objective is to raise growth by providing a safe investment climate through the strengthening of property rights. To this end, lawmakers use various transmission mechanisms for the prevention of theft. We show how the effectiveness of these transmission mechanisms is impacted by constraints that are specific to countries at particular stages of development. Due to this variation of constraints, the impact of policies to raise the protection of legal property rights as well as the optimal amount of legal protection differs between poor and rich countries. As a result, the pursuit of “pro-property rights” policies would not have the same growth-effects in the poorest economies as in all other countries.

2.2 Cost-benefit Analysis of theft

2.2.1 Relation of lawmakers’ constraints to thieves’ CBA

Many of these stronger constraints faced by lawmakers in the poorest economies arise from the cross-country variation of individuals’ endowments of income relative to other sources of utility. The distribution and size of these endowments changes
individuals’ cost-benefit analysis (CBA) of theft. Unfortunately, we find that LE’s
traditional basis for CBA of criminal behaviour (Becker 1968) is not sufficient for
capturing many of these constraints. Becker does recognize that endowments play
an important role, but lumps these factors together in a “portmanteau variable”
(Becker 1968, p. 177). Furthermore, his equations do not explicitly recognize that
realistic utility functions are concave\(^1\), that they contain features besides income,
and that these features co-vary for many criminal actions. In order to capture the
constraints faced by lawmakers striving against expropriation, we need, therefore,
an extended model of CBA for theft.

In the following, we sketch out such a more holistic CBA. In doing so, we strive to
make our model consistent with both Behavioural LE and Rational Choice LE. We
identify hidden areas of consensus in the current clash of both schools, and make
them the basis of our model.

2.2.2 Wide utility functions

I argue that, despite the cleft within LE about the role of Behavioural Economics,
we seem to approach a consensus that behaviour should be modelled with wide
utility functions. “A concern for fairness is part of most agents’ utility function”
but equally nominates a candidate for self-contained sources of utility that would
need to be included in utility functions: esteem. For Richard (1997b, p.366) and
Eric Posner (2002), esteem affects utility directly. Denoting this source of utility by
\(s_1\), Richard Posner seems to argue for utility functions of type \(U = f(y, s_1, s_2...\)),
instead of the traditional models \(U = f(y)\), where these factors might only affect

\(^1\)see neuro-economic results of tMRI brain scans (Trepel et al. 2005; Park and Zak 2007, p.50)
utility through the intermediary of income (or consumption), i.e. $y = g(s_1, s_2, ..., p)$.

Then there is a direct impact of changes in esteem on utility $\left( \frac{\partial U}{\partial s_1} = \frac{\partial f}{\partial s_1} \right)$, instead of only an indirect impact $\left( \frac{\partial U}{\partial s_1} = \frac{\partial U}{\partial y} \frac{\partial y}{\partial s_1} \right)$. Hence there is disagreement on the actual arguments to be included but both camps point out the need for widening utility functions in some heterodox aspect. We use wide utility functions in our CBA of theft, and we argue that the above readings suggest that this approach is consistent with both the Behavioural and the Rational Choice proponents in LE.

### 2.2.3 Multiple axes

Besides multiple arguments inside utility functions, our model also assumes that utility functions have *multiple axes/dimensions*. An axis of a utility function is an argument that is denominated in its own numéraire. For example: If an agent cares about income $y$, and some other sources of utility $s_1, s_2, s_3$ (for instance esteem, liberty, fairness), his utility function could still consist of only one axis if all $s_j$ can be fully expressed in terms of income-equivalents. If, however, non-marketed goods like liberty cannot be adequately expressed in monetary terms, then they need to be valued in their own terms. McAdams (1997), Posner (1997a, 2001), Jolls et al. (1998, 2001), Stiglitz et al. (2009) and Sen (2004, p.26ff; 2009, p.272-274) seem to support the second view. This assumption of multiple dimensions differentiates our view of the CBA for theft from Becker’s (1968) equations, which assume that, for the decision to commit crime, all differences in agents’ endowments can be expressed by money-equivalents (ibid, p.177, p.180). While Becker’s model of theft can hence be described by figure 2.1, our approach uses a utility function which rises in several dimensions, for which figure 2.2 provides an example.
Figure 2.1: If, in the Beckerian model, an individual finds that, after deducting the present expected value of all money-denominated costs and benefits incurred by theft, there is a positive expected gain $E[dy]$, then theft is forthcoming.

2.2.4 What a thief maximises

Overall utility for the individual is then the sum of the contributions from each of these sources, represented in figure 2.2 by the vertical axis. Optimising a multi-dimensional utility function implies maximising that vertical bar. If an agent’s cost-benefit analysis implies that he could raise his overall position on this axis by stealing, he will do it.

A lawmaker who seeks to prevent agents from deciding to steal can then apply sanctions on the different sources of utility if an agent steals. If the expectation of such sanctions leads the agent to the conclusion that theft does not raise total utility, he will not steal, and his utility stays whatever corresponds to his initial endowments.
2.2 Cost-benefit Analysis of theft

Figure 2.2: We illustrate an agent who has some endowment of income $\bar{y}$, but also further endowments in other sources of utility (e.g., esteem and liberty), which he values in their own terms. The vertical axis expresses the total utility derived from all arguments. We assume additive form.

2.2.5 Non-seperability

If an agent expects that his theft may cause sanctions in terms of other sources of utility besides income, then utility sources co-vary for criminal behaviour. For example: If a lawmaker punishes thieves through criminal law (reducing thieves expected utility gained from liberty $s_2$), then agents contemplating theft will take into account how the effects of stealing might change their positions on both the $y$-axis and the $s_2$-axis of their utility function.

This means that in the cost-benefit analysis for theft, individual arguments in expected utility functions co-vary. Cross-derivatives (e.g. $E[\frac{\partial u}{\partial s_1 y}]$, $E[\frac{\partial u}{\partial s_2 y}]$ etc.) are
not zero\textsuperscript{2} or, technically: utility functions are “non-seperable”.

But not only the existence of lawmakers will make sources of utility co-vary. If an agent boosts his income by expropriating others, social sanctions may apply. Stealing may reduce the expected amount of esteem $s_1$ that a thief receives from his community (given that there is a chance of detection) and from himself (self-esteem; since he may feel either proud or ashamed of his theft, and is unlikely to have no view about it). The expected amount of $s_1$ will then co-vary with the gain in income. CBA will then be a maximisation across co-varying gains and losses along different dimensions of utility, all affected by theft. Figure 2.3 illustrates this conception. This theory unites Posner (1997a, 2001, p.268) with Jolls et al. (1998, p.20).

\textsuperscript{2}N.B. Becker (1968, p.175) assumed zero cross-derivatives in part of his argument: for simplicity to avoid corner solutions.
2.2 Cost-benefit Analysis of theft

Figure 2.3: We consider here an individual with a wide utility function who is engaged in theft. He forms an expectation of the amount of income that he will gain, $E[dy]$, and the amount of utility this financial benefit will get him by moving him higher up on the income-axis. He also forms expectations regarding how theft may change his positions on other axis of his utility function. If there are such knock-on changes, then he takes them into account in forming his expectation of the total net benefits of theft. He counts everything together on the vertical axis (the dotted lines representing values after the action occurred, the continuous lines before).

Not all dimensions of utility may co-vary: Theft will have influences on many things about which an agent cares, but not necessarily all (for illustration we added a dimension $s_n$ where his position does not change with the gain of stolen income). Neither do we need to assume that the slopes on the different functions are the same. All that will matter for his maximisation problem is that some sources of utility co-vary and that their impact on total utility is concave.
2.2.6 Limiting factors

The maximum total utility for a wide utility function is generally given where marginal returns are equal across all sources of utility\(^3\). An agent will therefore strive to find and expand on those sources where his marginal returns are highest, until all yield the same marginal rate of return. In biology this concept is called “limiting factor” and implies that while an organism’s expansion path relies on various inputs, at any particular state on that path only a subset of those sources matters: the most limiting factors. Once expansion has occurred on the most limiting factor, the organism shifts to the next most limiting factor; moving from one bottleneck to the next. This implies that an agent will be likely to steal if income is his limiting factor for expanding total utility: either because he cares about income greatly in marginal and absolute terms (the projection of his utility function measuring the partial utility gained through the income-axis is steep for all relevant sizes of \(y\)), or just in marginal terms (he has a low endowment such that he is on the steep segment of a concave function). This idea is illustrated in figure 2.4.

In a case where income is not an agent’s limiting factor he would check whether stealing anyway causes any knock-on effects on those axes of his utility function that *are* the limiting ones, where related changes could have strong marginal effects. He would then compare these costs and benefits, thus calculating which sources of utility preponderate, and take his stealing decision accordingly. This will mean that impacts of law on rational CBA vary fundamentally between countries where agents have different endowments. Figure 2.3 considers such CBA with an income gain from theft that is being compared to knock-on effects that the thief experiences on other axes of his utility function.

\(^3\)If \(U = f(y, s_1, s_2...s_n)\), unconstrained optima yield \(\frac{\partial f}{\partial y} = \frac{\partial f}{\partial s_1} = ... = \frac{\partial f}{\partial s_n}\)
2.2 Cost-benefit Analysis of theft

Figure 2.4: In the above picture we momentarily isolate one of the multiple axes to show two different determinants of the importance that an agent attaches to any argument in his utility function: the schedules of preferences and the endowments of the agent. In the above example, agents A and B both have a high marginal valuation for income: A is on a steep slope because his endowment $y_A$ is low, and B because he generally values income highly compared to other agents.

2.2.7 Participation constraint

Mathematically these ideas imply the following cost-benefit analysis.

We denote the financial gains that an agent expects from theft after deduction of probability-weighted and discounted sanctions by $E[dy]$. We assume his income before the theft was $\bar{y}$. This endowment will be different across individuals. The expected utility gain from the resulting expansion on his income axis is then given by

$$E \left[ \frac{\partial u(y)}{\partial y} \bigg|_{y=\bar{y}} dy \right]$$

(2.1)

Simultaneously, an agent contemplating theft considers any argument in his utility function that co-varies when stealing. For $n$ potential co-varying sources of utility
Chapter 2 Methodology

$s_j$, we express the sum of expected knock-on changes as

$$E\left[ \sum_{j=1}^{n} \frac{\partial u(s_j)}{\partial s_j} \left|_{s_j=\bar{s}_j} \frac{\partial y}{\partial y} \right|_{y=\bar{y}} dy \right]$$

(2.2)

CBA then implies combining expected utility gains from stolen income with knock-on costs of theft. If the decision to steal is binary, theft is rational if

$$T = 1 \left( E\left[ \frac{\partial u(y)}{\partial y} \big|_{y=\bar{y}} dy > - \sum_{j=1}^{n} \frac{\partial u(s_j)}{\partial s_j} \left|_{s_j=\bar{s}_j} \frac{\partial y}{\partial y} \right|_{y=\bar{y}} dy \right] \right)$$

(2.3)

This participation constraint, which we built on theories that the Behavioural and Rational Choice schools of LE share, has the following implications:

- For any amount of expected stolen income $E[dy]$, other sources of utility may co-vary ($E[\frac{\partial u(s_j)}{\partial s_j} \frac{\partial y}{\partial y} dy]$). The severity of costs inflicted by this co-varying of utility sources depends on the size of the agent’s endowment for these sources (effect of $|_{s_j=\bar{s}_j}$). The expected utility gain from the stolen income depends on the income endowment before theft as well ($|_{y=\bar{y}}$). Whether theft raises total utility therefore depends on relative endowments: concavity implies that those sources of utility that the agent lacks the most (the limiting factors) get larger attention in his cost-benefit analysis.

- We retain Becker’s view that theft arises out of cost-benefit analysis: the indicator function (outside the bracket) implies that theft is a rational decision that is entirely based on CBA. This retains Posner’s view that there is no “irrational” behaviour: when net benefits become positive the decision to steal flips immediately, without buffers in responsiveness implied by bounded rationality. At the same time the equation allows for Behavioralists’ observations that agents will not pick up just any opportunity to steal, and their behaviour will be determined by a wider range of considerations than implied by utility.
maximisation in Becker’s original 1968 setting. And rather than lumping the impact of endowments into an unspecified “portmanteau variable”, they come centre stage, deciding which costs/benefits agents give most attention to.

- Making theft $T$ a boolean variable reflects the fact that stealing decisions are zero-inflated for most of the population: for a model of behaviour, the big question is not how much to steal in optimum, but whether to steal at all, and $T$ captures this.

2.3 Conclusion on methodology

We considered researchers representing opposite camps in current methodological discussions on the modelling of behaviour in LE. We ascertained that, despite all the differences, there are two positions shared: the necessity of wide utility functions and the interrelation of arguments within those functions. We used these two shared elements to derive in figure 2.3 and equation 2.3 how CBA used by an agent contemplating theft changes compared to Becker’s 1968 benchmark. Given this foundation we are now ready to consider the effects of property law on growth, with a model of decision making for theft that should be acceptable to both camps in the current methodological debate.
3 Dynamic mechanisms for a non-linear property rights - growth relation

3.1 Investor’s decision

The classic dynamic argument for strengthening property rights in all societies is that doing so raises growth through extra investment. In a first-best capital market where only incentives are holding back investment, investors are enticed to increase their investment by reducing expropriation. Let us illustrate this classical argument with a small model.

The setup
Consider an investor who faces no uncertainty and derives utility from income and other sources $s_1$ to $s_n$ at a positive but diminishing rate, so that \( \frac{\partial u}{\partial y} > 0 \), \( \frac{\partial^2 u}{\partial y^2} < 0 \), \( \frac{\partial u}{\partial s_j} > 0 \ \forall j \), \( \frac{\partial^2 u}{\partial s_j^2} < 0 \ \forall j \)

He lives for two periods, the second of which he discounts by factor \( \beta \). The present value of total lifetime utility at the beginning of period 1 is hence given by

\[
U = u(y_1) + \sum_{j=1}^{n} u(s_{j1}) + \beta \left( u(y_2) + \sum_{j=1}^{n} u(s_{j2}) \right) \quad (3.1)
\]

The agent’s problem is to determine investment, which reduces \( y_1 \) relative to some

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1 This model is semi-formal. The fully worked out, rigorous model is omitted in the interest of space but available on request.

2 See for example Cooter and Schäfer (2011) or Besley and Ghatak (2009).
Chapter 3 Dynamic mechanisms for a non-linear property rights - growth relation

exogenous endowment $\bar{y}$.

\[ y_1 = \bar{y} - i \quad (3.2) \]

Through investing he can increase his income in the second period beyond this endowment. This increase would be the principal itself and a rate of return $r$ in case there were no expropriation, but unfortunately theft exists and the proportion of the investment that is stolen is given by $\gamma$. Not all of what is stolen is lost though: institutions exist that recapture a portion of it and the efficiency of these institutions (measured as the proportion of stolen income recaptured) is expressed by $\delta$. As $\gamma$ and $\delta$ are both proportions, we have $0 \leq \gamma \leq 1$, $0 \leq \delta \leq 1$.

Income in the second period is then

\[ y_2 = \bar{y} + (1 + r) (1 - \gamma \cdot [1 - \delta]) i \quad (3.3) \]

**Private optimum** The investor maximises his lifetime utility with respect to the amount invested. The result resembles the inter-temporal Euler equation\(^3\).

\[ \frac{\partial u(y_1)}{\partial y_1} = \frac{\partial u(y_2)}{\partial y_2} \beta (1 + r) (1 - \gamma \cdot [1 - \delta]) \quad (3.4) \]

The higher the rate of expropriation $\gamma$, the smaller is the right-hand side of equation 4, and hence the smaller is the marginal utility derived from income in the first period $\frac{\partial u(y_1)}{\partial y_1}$. With a concave utility function this lower marginal utility for income in the first period implies that $y_1$ is high, which is the case if the agent is investing little of his endowment $\bar{y}$. Similarly, $\frac{\partial u(y_1)}{\partial y_1}$ rises if institutions recapture a larger proportion

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\(^3\) Deriving the first-order condition we assume that the act of investment - unlike stealing - does not alter the amount received from other sources of utility. This should not be an unreasonable assumption in most societies where stealing is associated with shaming, so esteem co-varies, but where the reverse is not true in that investors do not receive “public appreciation”. Similarly for fairness.
of what was stolen. We hence have the classical result that the amount of investment falls the amount of expropriation\(^4\) and rises in the efficiency of institutions. And if growth is defined as the increase in income between both periods, then expropriation reduces growth, efficient institutions raise it.

**Universality** This finding does not vary with any factor connected with the development stage of this economy. Hence we get the standard conclusion that to raise growth we should protect the property rights of investors everywhere; all countries could benefit from such protection alike, irrespective of their development stage. From a first-best model of the investor’s decision we can therefore uphold Acemoglu et al’s view on causation and the linearity between property rights protection and growth outcomes.

### 3.2 Lawmaker’s decision

Assume a benevolent lawmaker who sees the opportunity to raise growth via extra investment. How could he proceed to strengthen property rights?

#### 3.2.1 Breaking thieves’ participation constraints

In chapter 2 we derived that theft is rational if

\[
T = 1 \left( E \left[ \frac{\partial u(y)}{\partial y} |_{y=\overline{y}} dy > - \sum_{j=1}^{n} \frac{\partial u(s_j)}{\partial s_j} |_{s_j=\overline{s}} \frac{\partial s_j}{\partial y} |_{y=\overline{y}} dy \right] \right) \tag{3.5}
\]

\(^4\)If we add the further assumption of log-utility functions, then this inverse relation becomes even clearer. Substituting for \(y_1\) and \(y_2\) and solving for \(i\) we obtain the optimal amount of investment as \(i^* = \frac{\beta}{1+\theta} - \frac{1}{(1+\gamma)(1-\delta)} \). Thus \(\frac{\partial i^*}{\partial \beta} < 0\). If everything is expropriated, investment is at its minimum: \(\lim_{\gamma \to 1} i^* = 0\). Investment rises in \(\delta\). If expropriation is fully prevented or if institutions recapture all, we get Euler’s inter-temporal optimum.
This participation constraint gives us a glimpse into the tool set of a lawmaker fighting expropriation risk. If a lawmaker changed any of the above variables, he could break the inequality so that further participation became irrational for the thief. As a result, an investor would face a lower expropriation risk and raise investment accordingly. We proceed analysing the impact when the lawmaker changes any of these variables and derive how their effect has non-linear growth effects depending on the endowments that agents in countries at different development stages typically have.

To do so we need assumptions as to what non-traditional sources of utility $s_j$ exactly entails. We assume that esteem and liberty are part of the set, label them $s_1$ and $s_2$ and assume that the expected amounts that an agent receives from these other sources of utility respond negatively to theft.

3.3 Protecting property by preventing dis-equilibria

3.3.1 Raising $\bar{y}$, without raising $E[dy]$

One mechanism by which the lawmaker can prevent expropriation is changing the thief’s $\bar{y}$. Consider the effect of such a policy graphically: Figure 3.1. displays an agent with low $\bar{y}$ compared to his higher position on those axes of his utility function that we expect to respond negatively to potential theft. Due to this distribution of endowments he faces a large marginal rate of return to gains on the income-axis of his utility function but much lower slopes on the projections for axes $s_1$ and $s_2$. He is in disequilibrium: utility maximisation would require him to equalise the marginal returns across all axes of his utility function. Theft is a tool to achieve this

\[ \lim_{\bar{y} \to 0} \frac{\partial u(y)}{\partial \bar{y}} = \infty \] (Inada 1963).

\[ \text{until } E\left[\frac{\partial u(y)}{\partial \bar{y}}|y=\bar{y}\right]dy = -\sum_{j=1}^{n} \frac{\partial u(s_j)}{\partial s_j}|s_j=s_j, y=\bar{y}dy\]
3.3 Protecting property by preventing dis-equilibria

adjustment: by stealing, he can push his income beyond $\bar{y}$ and lower his marginal rate of return to $y$ due to the concavity of his utility function. Simultaneously this theft will make him suffer reductions in the expected amount of esteem and liberty he enjoys, so $s_1$ and $s_2$ would be pushed below his original endowments into regions where the marginal utility with respect to these arguments is higher. An agent in disequilibrium can hence use theft for redistribution across the axes of his utility function.

To combat theft, the lawmaker may then seek to kill the incentive for such “redistribution inside the utility function” at root-causes by preventing initial dis-equilibria in the first place. He is unlikely to be in a position to change individuals’ endowments with respect to esteem and liberty, however, so the only way to prevent dis-equilibria would be changing $\bar{y}$. Figure 3.2. gives an example: after raising $\bar{y}$
theft “does not pay” any more even if the amount of money to be gained is held constant.

For this strategy to be effective, however, the lawmaker must raise $\bar{y}$ of those where income is likely to be the limiting factor - i.e. the income of that section of the poor that does have the opportunity to steal - (e.g. the urban poor) without raising the money amount $E[dy]$ that agents expect to gain from theft. This could be achieved if the income of those from whom income is stolen (e.g. the rich) does not rise simultaneously.
3.3 Protecting property by preventing dis-equilibria

3.3.2 Non-linearity with redistributive institutional reform

3.3.2.1 Transfers

One way to raise \( \bar{y} \) without raising \( E[dy] \) would be through poverty relief campaigns. But these must be financed, and some of those arguing most strongly for a linear property rights-growth relation regard taxation per se as expropriation. If redistributive poverty relief policies were the solution, this expropriative element of taxation means that countries would first need to engage in expropriative policies (taxation) to afterwards gain extra security for property. Particularly in countries with mass poverty there would then not be a clean property rights growth relation. We could then not argue that all forms of expropriation would always worsen investment climates and would need to be specific on country characteristics when arguing what property rights protection would be optimal. Statements such as "Should pressure [for redistribution] come too early [in economic development], property rights would be violated and economic progress would come to a standstill" (Colombatto 2004, p.266; similarly Fleck 2000) do not take account of this exception.

3.3.2.2 Titling

How this "pro-property policy" could raise growth Instead of taxation, De Soto recommended “titling” to raise the \( \bar{y} \) of the poor: urban squatters should be given secure titles to the property they possess, particularly land. He presents six justifications for this policy but a seventh applies here: Granting titles to squatters raises their income-endowment without directly changing any income of the rich from which marginalised agents might steal, leaving \( E[dy] \) unchanged. His titling policy should therefore lift the poorest up and break their participation constraint.

\(^7\) Colombatto (2004) or Fleck (2000) are strong cases.
for theft. For poor and rich alike, property rights would then be strengthened, thereby raising investment and growth. Unfortunately, De Soto’s medicine does not cure initial dis-equilibria in all countries:

Why titling has lower returns in the Least Developed Countries  Today’s LDCs are characterised by high rates of rural-urban migration. And this migration stream is not exogenous; it responds to policy. In these dual economies, Harris and Todaro’s (1970) migration model lays down why titling will not remove dis-equilibria in endowments. Providing today’s squatters with titles will raise the returns expected by the marginal rural-urban migrant who therefore comes into the city with just the same low \( \bar{y} \). Theft is then not combated, and investment has not become safer. Stiglitz (2009) argues it may even become less safe.

The problems of this “pro-property” policy are not the same for all countries, though: De Soto finds good effects for Lima and Cairo. We are not surprised. With Peru and Egypt in the middle of HDI tables the rates of rural-urban migration in these cities have levelled off and are now much lower than in LDC metropolises like Lagos. In mid-income countries, equipping squatters with titles may then indeed raise the lowest incomes - and hence disincentivise theft - without attracting many new migrants. In medium-income countries, strengthening property rights through titling then does appear as an engine of growth, but this does not hold true for the least developed economies.

There is a second source of non-linearity in the impact of titling on growth. Giving

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8Take Kenya for example. In the 1970s Nairobi followed a policy resembling De Soto’s advice for LDCs: Efforts were undertaken to get the urban poor into the formal sector. As a result, the better conditions in the city attracted even larger numbers of migrants to more than outweigh the increase in the formal sector (Fields 2007).

9Even though these results are contested by Stiglitz (2009).
titles to squatters involves accrediting past expropriation, often of government lands. In an LDC with a continuous stream of rural-urban migration, a titling policy will not be seen as a one-off event: it creates expectations for future legalisation given the continued stream of current expropriations. Those expectations in turn will not contribute to building a safer investment climate in LDCs.

3.3.3 Non-linearity with non-redistributive institutional reform

Suppose the lawmaker wishes to avoid the criticism that redistributive property rights reform is itself expropriative and instead vamps-up his institutions (e.g. better judiciary), financed by levying flat lump-sum taxes on each citizen regardless of their \( y \). Such non-redistributive reform, however, runs into problems of non-linearities as well! Suppose two countries of different development stages both pursue this policy: there are then two reasons why the same policy must be less effective in the poorer one of the two countries:

1. As the tax pushes down the endowment of all agents by the same factor, the number of persons where this measure brings equation 3.5 to hold is larger in poor countries. This is because more of their citizens are, in any case, close to income being the limiting factor; giving incomes a final push downwards will flip more people over to the condition where theft pays. Hence poor countries face a trade-off between the benefit from new institutions and the added incentives for the poorest financiers of these institutions to steal some income.

2. Two persons with different income endowments also differ in the utility loss suffered due to the same absolute reduction in their incomes. On concave
functions, a person whose initial income was lower is pushed down a steeper slope than a relatively richer person. Figure 3.3 illustrates the situation. Poor agents suffer disproportionately more from the same cost, providing also disproportionately large incentives to start stealing others’ property.

![Figure 3.3](image)

Both reasons indicate that developing economies face larger trade-offs for institutional change so that the same legal improvement will not lead to the same growth effects, let alone a linear relation.

### 3.3.4 Endogenous improvement of institutional quality

#### 3.3.4.1 Reverse causation

Considering initial dis-equilibria also gives us a glimpse at the direction of causation in Acemoglu et al’s Box:

As a country gets richer, equation 3.5 implies that it will face less theft cases (endogenously) because individuals’ $\overline{y}$ rises (independent of policy), so stealing income becomes less attractive due to its lower marginal rate of return ($\frac{\partial u(y)}{\partial y} y^{\overline{y}} < 0$). This lower number of people satisfying equation 3.5 also implies that the judicial system
will be less swamped with theft cases. Now, the reader might agree that in most courts a lower number of cases could improve the quality of adjudication: courts get better when they are less overloaded with cases. As a result, a court with lower case-load may improve its protection of property rights in the remaining cases. This result means that after growth has occurred a country may improve its effective protection of property rights even if the government does not pursue an explicit policy.

The strength of this reverse causation is not the same across all countries. Concavity of utility functions also implies that boosting incomes in a poor country reduces the number of rational thefts at a faster rate than in rich countries (the same mechanisms as for a lump-sum tax apply in reverse). Therefore, the endogenous improvement of institutional quality per dollar of growth must also be higher in poor countries (holding all variables for a country apart from incomes constant\(^{10}\)). As a result we expect this form of reverse causation to play a greater role in the Least Developed Countries than in advanced economies.

### 3.3.4.2 Turn-around in causation

Consider the miracle happening to an LDC that has managed a first growth wave which has caused this endogenous improvement of property rights: Property rights then take over, causing a second wave of growth. Let us illustrate this.

From equation 3.4 we know that investment rises in \( \delta \) (the effectiveness of the judicial system in recovering stolen property) and falls in \( \gamma \) (the proportion of investment

\(^{10}\)One important factor that may diverge between countries and destroy this mechanism is differences in the inclusiveness of growth. If an LDC is less able than advanced economies to attain equal sharing of growth dividends (for example by following Colombatto 2004, p.266 and Fleck (2000)), then the poor’s \( \overline{y} \) would rise less and the endogenous improvement in institutional quality may not be stronger in LDCs.
stolen). So if growth lowers the number of agents stealing and raises the quality of adjudication, such that expropriated owners expect to get a larger proportion of their lost investment back due to better institutions, equation 3.4 tells us that investment will rise (twice). Increased investment of course raises growth. This means that early growth in an LDC causes an improvement of property rights and this change in turn causes further growth. We hence have a turn-around of the direction of causation between property rights and growth at the kick-off stage in economic development.

### 3.4 Protecting property via financial sanctions ($\Delta y^e$)

**How equation 3.5. captures financial sanctions** If the lawmaker puts high financial sanctions on theft and increases the effective apprehension rate, it may reduce the expected financial gain from stealing $E[dy]$ to a point where the inequality in equation 3.5 cannot hold irrespective of agents’ internal disequilibrium.

**Effectiveness across development stages** This Beckerian mechanism of crime prevention relies, of course, on the assumption that agents are not judgement-proof (liability constrained). In the poorest countries this problem is clearly due largely to low mean incomes. But the problem also applies to medium-income countries since those are close to the vertex of the Kuznets Curve where inequality is higher (Kuznets 1955) so that the median-earner may still be still judgement-proof despite the higher output. Financial sanctions will then be more effective in advanced economies, since their higher mean incomes and lower vertical positions on the Kuznets curve imply that limited liability constraints will be slack for the majority.
3.5 Protecting property via criminal sanctions ($\Delta s^e_2$)

These constraints imply that the growth dividend for improvements in private law relying on financial sanctions will be asymmetric between countries at different development stages. Suppose two countries at different development stages made the same legal change in protecting property rights through larger financial sanctions for expropriation: The poorer of the two economies should face a lower growth dividend for implementing the same legal change.

### 3.5 Protecting property via criminal sanctions ($\Delta s^e_2$)

**How equation 3.5. captures criminal sanctions** In addition to the other transmission mechanism, also the criminal law could be used to break the participation constraint for rational theft. An increase in criminal sanctions implies a reduction in the expected utility derived from personal liberty $s^e_2$. And changing $s^e_2$ has the advantage that agents cannot be judgement-proof. Unfortunately, it is nevertheless a more forceful tool in advanced economies as we will show.

**Effectiveness across development stages** Any LE-textbook will argue that in criminal law it is more dangerous to make type-2 errors ($\beta$) than type-1 errors ($\alpha$). Erroneously imprisoning is more inefficient than falsely acquitting. And we also know that the ability of judiciaries in LDCs is lower, or in technical terms: we also know that the "power of the test" ($1-\beta$) of adjudication in LDCs is lower than in more advanced economies; i.e. more $\alpha$ and $\beta$ errors are made. Furthermore, when we assess social hazards we normally use convex cost functions. Let us consider what all this together implies for attempts to strengthen the protection of property rights through the criminal law in the Least Developed Countries.
Improving the protection of property rights involves reducing $\alpha$. But it is impossible to lower the probability of a type-1 error without increasing the chance for a type-2 error. Of course this mathematical trade-off holds in all countries, but if for LDCs -due to their less powerful institutions- this rise in $\beta$ occurs from a higher initial level of $\beta$ than in advanced economies, the social cost incurred is asymmetrically larger. With convex functions for social costs, the marginal loss from increasing $\beta$ is higher in LDCs than in advanced economies, due to their different starting positions.

If then the optimal amount of protection for property rights is given at the amount where the marginal benefit of another unit of protection equals its marginal cost, then this amount is not the same for all countries. Instead LDCs would face a bitter trade-off for lowering $\alpha$ and should then efficiently settle for a lower optimal level of protection. A judge in countries at different development levels would therefore vary the optimal amount he would deduct from a thief’s $s_2$-axis. But that differentiation is at odds with a linear property rights-growth relationship, as under a linear relationship stronger property rights should always be better.
4 Social norms and non-linear property rights - growth relations

4.1 Protecting property via social norms ($\Delta s_1^c$ & $\Delta s_3$)

The Law and Social norms literature suggests that informal social norms make an important contribution to the stabilisation of society, alongside with formal law. Figure 2.3 illustrates this. If, in a community, agents give esteem ($s_1$) to each other as McAdams (1997) argued, and if the community reacts to cases of theft by reducing the $s_1$ provided to delinquents, then such 'social sanctions' discourage theft according to equation 3.5. According to Taylor (1985), this form of sanction also varies in its effectiveness between countries at different development stages. But in contrast to legal sanctions he implies that social sanctions are more effective in communities with dense social networks: and these are more likely to be found found in countries at low development stages (Dasgupta 2005).

Taylor further argues that social norms in communities and the intrusion of the state through formal law would crowd each other out. If this is true, then this inverse relation between social norms and law together with developing countries’ comparative advantage in social punishment would imply that the optimal amount of legal property law would again depend positively on the development stages of a country. In this chapter we consider these claims in detail.
4.2 Norms stability across development stages

4.2.1 Definition of norms

We define a social norm as a Nash equilibrium of behaviours which is sustained by a social network operating a punishment agreement that anyone deviating from the agreed course of action is sanctioned by members withholding benefits from further interaction\(^1\).

4.2.2 Conditions for a norm preventing theft

Under this definition, a network is able to use social norms to prevent theft only if it satisfies the following two Nash equilibria\(^2\).

There must be a credible threat that the network will punish thieves. If the community agrees, for example, to punish thieves by deducting esteem \(s_1\) from them, this constitutes a credible “punishment equilibrium” when the following conditions hold simultaneously:

1a If all other members of a network punish thieves, then it would not be rational for any member to be the only one failing to supply that punishment.

1b It is rational for all network members to believe that all other members will supply the agreed punishment of thieves.

If these conditions hold, potential thieves are certain that they would be punished if their theft were detected. That means they will associate any expected gain from theft on the income axis of their utility function with an expected loss along

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\(^1\)This definition is based on a combination of Harsanyi, Schelling and Selten’s application of Nash equilibria in social behaviour as summarised in Dasgupta and Building (2005); Dasgupta (2007) with Latour’s (2007) Actor-Network Theory.

\(^2\)These ideas are derived from ?.
4.2 Norms stability across development stages

other utility sources. This expectation may prevent all expropriation in a “no-theft equilibrium” if and only if it is also the case that

2a If nobody else is stealing as well, equation 3.5 is not satisfied for any network member.

2b No agent has reason to believe that equation 3.5 is satisfied for any other network member.

These Nash conditions are obviously not fulfilled in many countries. Instead their applicability varies across development stages, and this has implications for the functional form and the direction of causality in the relation between property law and growth.

4.2.3 Applicability of these conditions across stages of development

The existence of a punishment equilibrium is more likely in countries at low stages of development. If in early development stages agents rely on smaller, denser and longer-lasting networks such as kinship, their greater frequency of interaction provides them with more opportunities to punish defectors from community agreements, thus providing the conditions for stable social norms. Latour (2007) supports this point through Actor-Network Theory; game theory derives it through the Folk Theorems; Ellickson (1991) and Ostrom (1990, p.8) provide empirical evidence and Posner (1997b, p.366) and Dasgupta (2007) theoretical illustration.
4.3 Implications for property law in the LDCs

If in the Least Developed Countries there is then a greater chance of securing property rights through social norms, the additional stability gained from formal property law should be less. Indeed Granovetter (1978), Ellickson (1991) and Buscaglia (1998, p.566) argue that in economies characterised by strong networks the law is ignored. This would imply that the relation between the strength of legal property rights and output may be flat at early development stages. In any case, this relation would not be linear across development stages.

4.4 Implication for property law in Developing and Mid-income Countries

4.4.1 Reverse causation

If the Least Developed Countries have the best conditions for the applicability of social norms, then we would expect a progressive destruction of these norms through development. Changes of “reference group” due to technology expansion (Dasgupta 2007), increases in monitoring cost due to the dissolving of communal living (ibid), greater individualism due to professional specialisation, widening of networks due to space-time convergence (Codrington 2007) and through larger, infrequently interacting threshold population for high-order goods (ibid), together with rises in inequality along the Kuznets curve all contribute to the weakening of networks after early growth. Consequently, norms against theft may fail, and states need to rely on property law instead. But that in turn suggests that early growth causes the creation of property law. Only after the first development occurred would property law cause growth.
4.4 Implication for property law in Developing and Mid-income Countries

4.4.2 Structural break in the property rights - growth relationship

We might expect that a transition from social norms against theft to formal property law would occur gradually, so that the statistical relation between the strength of property rights indices and per-capita incomes would rise smoothly with development stages. We will now develop a theory why there will not be such a smooth relation. Rather than being linear or exponential, the true relation between property rights and per-capita incomes will contain a structural break at the kick-off stage of development.

4.4.2.1 Setup

Assume the reason why people punish thieves is that one of the axes of their utility function rises in “fairness” as implied by Jolls et al. (2001). When an agent punishes thieves, he derives some utility $s_3$ from experiencing himself as a “fair” citizen enforcing their community’s agreement. Assume that just as for other axes in Figure 2.3 the utility gained from $s_3$ is positive but diminishing and that furthermore the intensity with which agents care for fairness varies: some have a higher projection for the partial utility gained from $s_3$ than others (see figure 2.4). The punishment is executed by reducing the amount of esteem $s_1$ conferred to people who steal.

4.4.2.2 Threshold due to second-mover advantages

With this familiar setup the agent gains more utility from punishing the first thief compared to the second ($\frac{\partial u}{\partial s_3} > 0$, $\frac{\partial^2 u}{\partial s_3^2} < 0$), and if the number of thieves to be punished rises further, there comes a point where marginal utility gains with respect
to $s_3$ are zero; so he stops punishment\textsuperscript{3}. And if agents vary in the extent to which they care for fairness (along figure 2.4), then they reach this point of zero marginal returns at different amounts of thieves punished. Consequently, the first thief is punished by a larger number of persons than the second and so on, meaning that the amount of $s_1$ deducted from the first thief is high (as everyone is shunning him), whereas the amount of that sanction falls for later thieves where the number of punishers is less. This means that for the thieves, second-mover advantages apply: while thieves will obviously always seek to avoid punishment, they would particularly fear being the first one punished.

And these second-mover advantages are large. Not only does the second thief receive less punishment than the first, he also feels it less severely. Consider again figure 2.3. As a general principle, an agent who enjoys some source of utility at a diminishing rate is also hurt in an exponential fashion when it is taken way from him. So the amount of utility that the second thief loses is not only less because the distance by which the community pushes him down on his $s_1$-axis is less ($\Delta s_1^{first} > \Delta s_1^{second}$), he is also incurring a lower average reduction in utility per unit of $s_1$ that he is pushed down ($\frac{\Delta u^{first}}{\Delta s_1^{first}} < \frac{\Delta u^{second}}{\Delta s_1^{second}}$).

\textbf{4.4.2.3 Bandwagon effect away from a No-theft Equilibrium}

Under social norms there are hence non-linearities both in the supply and the reception of social punishment and they combine to a strong second-mover advantage for expropriators. The second thief is deriving a significant external benefit from there being somebody stealing before him. And this leads to the usual problems in the supply of collective goods: All potential thieves face an incentive to free-ride,

\textsuperscript{3}We assume for simplicity that stopping to supply fair punishment does not cause others to punish him.
so a “dragging of the feet”-effect occurs whereby nobody wants to be the first to break a social norm of not stealing. Nobody will provide those with an interest in stealing with the “public good” (from the point of view of the prospective thieves) of breaking the ice. This creates a threshold to theft and lends social norms against expropriation a certain stability\(^4\). But once this threshold is broken others have an incentive to follow. Since every additional thief lowers the barriers for yet another to join, expropriation once triggered feeds on itself in a process of positive feedback. It is a bandwagon effect in which the social norm -and the stability for investment derived from it- is progressively weakened.

### 4.4.2.4 Kink in the property-rights growth relation

Once the destruction of a social norm is embarked upon, there arises abruptly a great need for formal property law, without which investment could capsize due to sudden rampant expropriation. As social sanctions on the \(s_1\)-axis of thieves’ participation constraints become defunct, formal property law must be introduced in order to break thieves’ participation constraint along other axes of their utility functions.

I thus suggest that after a kick-off stage in economic development, where social norms against expropriation are suddenly not strong enough to prevent a few agents from theft, legal property rights suddenly become crucial for keeping a safe investment climate for continued growth and not letting a country drop into chaos.

\(^4\)This stability holds until there is a “privileged group”, in the terminology of Olson (1974). An individual who derives such a large benefit from theft that he is also willing to incur the large initial expected cost of sanctions, thereby providing a collective good of weakening the social norm for all thieves who come after him. In fact it is the difference in the probability of such a “privileged group” existing that lies at the heart of the stability of social norms in the least developed countries.
5 Static mechanisms for non-linearity

5.1 Overview

In this chapter we consider three miscellaneous reasons why the relationship between the strength of legal property rights and economic growth may not be linear. Having considered in the previous two chapters cases where property rights reform today could impact on changes in output over time, we focus here on effects that property reform can have on one-off adjustments to the output level. Again, we consider whether increasing the strength of property rights may have greater effects for mid-income and advanced economies than for the least developed ones.

We start off with the analysis of an argument for strong property rights based on the principle of revealed preference/demonstrated preference and consider why this classic Austrian argument has systematically less validity in countries at early stages of development. The following section looks at Calabresi’s and Melamed’s (1972) “Cathedral”, asking what this LE-classic indicates for the optimal strength of property rights in developing countries. The final section considers optimal abidance to international patent law across countries and derives a case where second-best efficiency is raised when firms facing forward falling supply curves disobey certain patent law. We also derive what policy changes would be needed to avoid this unfortunate scenario.
5.2 Inapplicability revealed preference principle to property rights in LDCs

5.2.1 The classic argument for strong property rights everywhere

A universalist theory for strong protection of property rights is that goods are worth most if held by their original owners. By this theory, any expropriation will necessarily destroy value, leading to a static reduction of economic output. This view can be based on the principle of revealed preference:

Under the assumption that current endowments of property arose via a competitive market, and under the added assumption of constant marginal valuation of money, the principle of revealed preference implies that, at the time of appropriation, the current owner was the one valuing his widget most since he outbid everyone else. To take the good from him directly after he acquired it must then reduce social wealth, regardless of who then receives it. Under the further assumption of low transaction costs, the principle of revealed preference would also imply that at any time after acquisition the owner is still the one valuing the good highest; otherwise he would have sold it. Subject to these assumptions, arbitrage would ensure that current endowments perfectly map relative valuations to titles, so keeping a widget with its owner must –by assumption of its appropriative process– be optimal for total welfare maximization. This argument is essentially a version of the Coase theorem.

In this section we show why the principle of revealed preference is much less applicable to the situation of property rights in the Least Developed Countries than it is in advanced economies. As a result, the principle’s implication that strong property rights would be optimal to boost total wealth everywhere is also much less applicable to LDCs. Such arguments can still be made based on other justifications1, but

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1 A second argument is endowment effects: Owners value a widget partially just because they own it, so valuation can arise from the act of appropriation independent of the fundamentals causing...
the frequent use of the revealed preference principle -for example through De Soto’s Property Rights Alliance or in Austrian LE\(^2\)- should not be applied to the least developed economies.

**5.2.2 Sensitivity to assumptions on appropriative processes**

**5.2.2.1 Assumption on competitive original appropriation**

When we apply the revealed preference principle to infer that current owners generally have the highest valuation, we are assuming that current endowments arose through a competitive process and have no connection to past expropriations. This is because the revealed preference principle, when applied to expropriators, has a very different meaning: an expropriator’s act of taking possession expresses that his net valuation (including all costs incurred through the act) is positive, which is a relative valuation in terms of those cost and benefit arguments inside his own utility function that are affected by the act; it is not a valuation relative to other market participants. From an expropriation we can therefore infer only that the perpetrator’s own output rose, not that of society. To get the clean revealed preference principle, we thus always assume that current property rights have been based on acquisition through the market\(^3\).

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\(^1\) it. The occurrence of this effect is empirically supported by evidence of non-substitutability between estimates of Willingness to Pay and Willingness to Accept in Contingent Valuation (Arrow et al 1996; Stiglitz et al. 2009) and by both lab experiments and field studies of Behavioural LE (Jolls et al. 1998), but has been questioned based on research biasses (Posner 2001).

\(^2\) there called “demonstrated preference”, but the conditions we develop apply equally well

\(^3\) Also Besley and Ghatak (2009, p.26, p.34) stress the effect of this frequent assumption.
5.2.2.2 Conditions for the applicability of this assumption

Legacy and frequency of exchange  How reasonable this assumption is depends on the frequency with which a widget typically changes hands as well as the assumptions we make about history. If we observe that transactions in our current time are mostly voluntary, through the market system, and we see that widgets are frequently exchanged, then the assumption is justified. If, on the other hand, the previous period was characterised by a greater proportion of expropriative exchanges and widgets are exchanged infrequently, the number of current owners who still hold their widgets due to expropriation will also be higher. In the first case we may use the revealed preference principle to argue the efficiency of the status quo and hence the case for universally strong property rights protection; in the second case the argument will need greater differentiation.

Heterogeneity across goods  Which of these cases holds will clearly vary depending on the goods considered: the owner of a car - a durable with rather frequent exchanges - will more likely have acquired his widget in the current period, while the same person’s ownership of real estate might derive from a long inheritance chain and thereby have a greater chance of stemming from initial expropriation. But this means that the applicability of the revealed preference principle as a defence of the efficiency properties of strengthening property rights depends on the type of widget considered. *Per se* statements with respect to the relationship of strengthening property rights to economic efficiency may then require differentiation: what area of property rights do we mean; what goods exactly do we mean when arguing that ownership protection promotes static efficiency? The variation of the risk of past expropriation across different types of goods would then suggest a variation in
the efficiency effects of strengthening different areas within the bundle of effective property rights held by an agent\textsuperscript{4}.

\subsection*{5.2.2.3 Variation across development stages}

We would then expect a variation of the applicability of the revealed preference argument across countries.

\textbf{Example} As the likelihood that the current owner of a widget has acquired it by expropriation varies between, for instance, post-colonial Botswana and Zimbabwe, we would not expect a strengthening of effective property rights on goods held today to have the same effects on static efficiency in both countries. For the Republic of Botswana, as a lower mid-income country with an uninterrupted history of organised market exchanges\textsuperscript{5}, the revealed preference-based argument would suggest greater gains from preventing expropriation today\textsuperscript{6}, since current owners are also likely to be the ones with the greatest valuation of their assets. The case is different for Zimbabwe (one of the Least Developed Countries) with its numerous cases of expropriation in the near past. There, our theory indicates that the efficiency gains of protecting current owners may be much less because the association between title and valuation would be lower since a greater proportion of current possessors have not appropriated their holdings through market processes.

\textit{Inheritance chains cause path dependence} The case of Botswana and Zimbabwe is an example of path dependency. Even if today expropriations were over, the past

\textsuperscript{4}And Chang (2006) argues New Institutional Economics would never provide such breakdowns.

\textsuperscript{5}We base this example on the account of Botswana’s property rights history given by Acemoglu et al. (2002).

\textsuperscript{6}given the other assumptions made for the revealed preference principle to guide policy choice and not considering dynamic effects and distribution.
remains determinative through inheritance chains. The past affects to what extent the revealed preference argument for universally strong property rights is applicable in a country. For goods which are infrequently exchanged it is therefore apparent that the optimal policy on the protection of current property rights depends on each country’s legacy of property rights protection in the past. It will not be the same relationship for every nation.

**Case of land** A wide-spread expropriative policy in developing countries is land reform. If there were a linear relationship between property rights and long-run output variations, expropriations of land, too, also at low development stages, would be costly. This cost would even be disproportionately high for LDCs, where the worth of land is a larger share of total output. Yet it is precisely for those countries that Besley and Burgess (2000), Banerjee et al. (2002), Sen (2006, p.42), Musembi (2007), Lipton (2009) and Stiglitz (2009) argue that expropriative redistribution of land could enhance output. Why? The literature provides a number of reasons\(^7\), but our analysis suggests a further one: land is less frequently exchanged than most goods and in the least developed economies the original appropriation of land was often expropriative. Hence the revealed preference-argument for strong property rights across all countries is particularly inapplicable to land in countries at the lowest stages of development. As Besley and Ghatak (2009, p.26) put it “the current owner may not be the most efficiency potential user of an asset”, and we have worked out two criteria which seem to be particularly relevant in the case for land. The practice of land reform therefore appears to be a particularly important example of expropriative policy which will have different impacts on economic growth in countries at different stages of development. This in turn contradicts the existence

\(^7\)See Lipton (2009) for an excellent overview of other causes.
of a linear relation between composite indices of property rights (which such land reform would always reduce) and growth for countries at all stages of development.

**The exception that proves the rule?** In LDCs, there are other areas besides land where the case for applying the revealed preference principle to property also looks bleak. Consider the frequency of exchange of items: of course the thick markets in advanced economies enable a faster rate of exchange than in early network economies. Consider then also the legacy of exchanges: most LDCs were colonised in an “extractive manner”, as Acemoglu et al rightly have pointed out, so the initial distribution of many assets was through expropriation. Both of these observations suggest that the revealed preference principle is generally less applicable to property in LDCs. The principle provides a good argument for strong property rights in advanced economies though, but that only reinforces the case that the property rights - growth relation is unlikely to be linear.

**5.3 Acemoglu’s Box in The Cathedral**

**5.3.1 Liability versus property rules**

As shown by Calabresi and Melamed (1972), one important determinant of the strength of property rights is whether ownership is protected through property rules or liability rules. Property rules are all laws that allow exchange of property only with the consent of the owner and liability rules are those laws that allow the expropriation of the owner upon payment of an ex-post, court-determined level of compensation. Since property rules award better protection, Calabresi and Melamed argue that they should be the standard. In a limited number of situations, however,
they recommend the use of liability rules. It turns out that these situations are more common in countries at low levels of development, which provides another reason why the optimal strength of property rights protection may be lower in these countries.

5.3.2 Conditions for liability rules

Calabresi and Melamed (1972) showed that liability rules are more efficient if transaction costs are very large, such as in a hold-up due to bilateral monopoly. One textbook example for such hold-ups is infrastructure projects; a related, while not identical, case is projects with a very large number of diffusely distributed participants, while another case of very high transaction costs is “patent thickets” (SCM Corp. v. Xerox Corp).

5.3.3 Relation of these conditions to development stages

5.3.3.1 Infrastructure

New infrastructure projects are clearly a bigger problem for those countries that do not have much infrastructure yet. The more pressing the need for new infrastructure projects, the larger the social loss in case of hold-up problems would be.

In China, the rising problem of hold-ups recently gave rise to the neologism “dīngzhīhù”. It means the practise of keeping a hut blocking the way of a large-scale construction project to extract payments from developers. Also in India, Madhava Menon (2011), founder of India’s National Law School, emphasised hold-ups in construction works as a significant contemporary problem. And the solution would not just require
liability instead of property rules; it would even require particularly harsh types of liability rules!

He criticised the position of LE-scholars, contending that it would be an “ivory tower position” to demand market price compensation for victims of expropriation through liability rules, and impossible for less developed countries.

Compared to China and India, how much more then will the Least Developed Countries need strong liability rules, given their even greater need for infrastructure projects?

Even if we may disagree on how harsh the liability rules need to be, it is clear that, with a large proportion of the population needing better infrastructure, the Least Developed Countries in particular have a greater need, at least when compared to advanced economies, for the use of liability rules in case of genuine hold-ups.

### 5.3.3.2 Patent thickets

The phrase “patent thicket” describes a case where a company is not able to legally bring its product onto the market, because the net of patents to be acquired is so dense that it is not realistically possible to get all the necessary permits. Clearly this problem will affect those already in the market differently to those who are trying to enter it.

A patent thicket is a barrier to entry, and hence awards protection to incumbent companies. For an advanced economy there will be industries where patent thickets protect one’s own industries, and other cases where they protect another advance country, thereby hindering one’s own expansion into new products. For such countries, the costs and benefits may then balance so that the net cost of upholding patent thickets through property rules might not be high.
The Least Developed Countries, by contrast, may only ever find themselves in the position of the excluded entrant. Honouring patent thickets could come at significant costs. The Indian pharmaceutical and IT industries might be good examples: they did not honour all patents while starting up. And Chang (2002) provides a study of the history of patents across today’s developed economies, to show that, in the early stages of their development, late starters systematically broke patents owned by early movers. This ranges from the company Philips’ breakthrough by ignoring General Electrics’ patent on the light bulb, to Switzerland not respecting any patents until the 1920s (ibid). Not all patents are patent thickets of course, and the past practice of today’s OECD countries provides guidance for today’s policy only under strong assumptions on rationality. Nevertheless, there remains a case for saying that - if liability rules are efficient against patent thickets at all - then, certainly, in the Least Developed Countries rather than in advanced economies.

5.3.4 Conclusion on asymmetry in the need for liability rules

Patent thickets are asymmetrically a problem for developing countries since they need to access new patent-protected markets rather than defend existing ones. And the problem of hold-up in infrastructure projects is - of course - faced more by countries that face greater need to expand their network: so, again, poor countries. Therefore, developing countries rather than more advanced economies face a need for Calabresi’s liability rules instead of property rules. Such measures, however, will put LDCs at lower positions in the property rights indices used by Acemoglu and others. But to conclude from this lower position on these property rights indices that lower output levels will be achieved in the long-run would be the wrong direction of causation. That aspect of the lower position of LDCs in property rights indices that
is related to a stronger use of liability instead of property rules may actually promote growth. And of course, this part of the relation between property rights and growth—unlike the proclaimed linear relation—would vary depending on development stages.

5.4 Cross-country expropriation and entry foreclosure

5.4.1 The Setup

5.4.1.1 Problem

Consider in Figure 5.1 the example of a global industry with a forward-falling world supply curve. There is an oligopoly of incumbent firms who each produce $q_I$ and a
of the incumbent, so it is the most efficient producer. When entering, however, the entrant needs to buy a number of patents from the incumbent. There is no bilateral monopoly, as the incumbents are not colluding, but the costs for the patents next to those for setting up a factory still mean that the entrant’s fixed costs for starting production are high. As a result of these fixed costs the increasing returns to scale in this industry are steep so that the entrant would not be competitive on its first units of output. It can either enter big \( q \geq q_{min}^E \) or it cannot enter at all. If it manages to enter, it will be able to supply much of the market and society gains from the higher efficiency. If it does not manage to enter, inefficient production may persist forever\(^8\).

### 5.4.1.2 First-best solution

In a first-best world, the above situation is no problem. In a functioning market for capital, the efficient entrant could acquire the Big Push (Gerschenkron) needed through some Coasian rent-sharing with investors. In the least developed economies, by contrast, firms do not get large capital upfront, which can mean that even an efficient firm cannot gain entry, thereby foreclosing development.

### 5.4.1.3 Ambiguous role of property rights

Chang (2002, 2003, 2007) and, particularly, Bello (2004) see the honouring of foreign property rights by companies in the Global South as part of this foreclosure problem. They argue that less developed countries should therefore have laxer protection of overseas property rights, including of patents. In that case, the entrant in our

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\(^8\)For related real-world examples see David (1985) on QWERTY or Chang (2008) on Lexus and Nokia.
diagram could lower his fixed costs somewhat, so the minimum efficient scale needed also becomes attainable with less finance.

Cooter and Schäfer (2011, p.15) turn the argument the other way round: “What determines a country’s stage of finance? We have a simple answer: effective law.” By their theories, the problem for entrants in LDCs would not be that their countries enforce property rights too much, but too little. If property rights are strong, they argue, the entrant will be able to attract “relational finance”. If in addition contract law were strong, “private finance” would supply another push. If, furthermore, business law were strong as well, full access to capital markets could succeed. By this token, no efficient entry from LDCs would be foreclosed if only effective law were in place.

These authors’ recommendations to LDCs are hence diametrically opposed. In line with Acemoglu et al, the second position should be right for countries at all stages of development, at least in the long-run. Is it?

5.4.2 Endogenous constraints

Let us recapitulate that, due to a forward-falling industry supply curve with high intercept, the entrant in our example needs a one-off large loan. Small instalments do not help at all; the entrant needs one Big Push to the minimum competitive scale of production $q^E_{min}$. We proceed to show why, in an LDC, he is unlikely a position to obtain the required large start-up finance, even if the right law is in place.
5.4.2.1 Asymmetries in optimal risk

Imagine two agents who both lend part of their income to some firm. They are identical in all aspects apart from their wealth. Agent $A$ is somewhat less rich than agent $B$. Consider what effect that might have on their investment portfolio:

Since $A$ is on a steeper section of the income-axis of his utility function, he would suffer more from the default of a borrower than $B$. This makes $A$’s lending decision to the marginal borrower more risk-averse than $B$’s. As a result, $A$ has a larger interest in portfolio diversification than $B$; he would not want to “put many eggs in one basket”. On the margin, he would then rather make many small loans than one large one.

If lenders are “small” in LDCs\textsuperscript{9}, then our entrant has therefore little chance to get his one-off Big Push. Not just because domestic lenders command less funds in total, but also because a greater incentive for risk-diversification prevents them from concentrating whatever is available onto few borrowers.

This constraint to big borrowing is then endogenous in the size of the economy, which would constitute a trap. A country may not grow because even its most efficient firms cannot get big finance to access markets with increasing returns to scale, but in order to attain that finance the country would have needed to grow so that it has sufficiently large loan providers. Law may change many constraints, but if the lender’s portfolio size does not change, he may still make few large-scale loans.

\textsuperscript{9}and this assumption may be justified. Lists of “high-value individuals” published by the Forbes Magazine contain many individuals from countries in transition but few agents from Least Developed Economies. And Sovereign Wealth Funds, an institutionalised form of large scale lenders, are found exclusively in mid-income and advanced economies.
5.4 Cross-country expropriation and entry foreclosure

5.4.2.2 Asymmetries in mark-ups

If the number of lenders in poor countries is lower$^{10}$, then they can demand higher mark-ups. As a result, it would not be enough for an entrant from an LDC to just be a little more efficient than the incumbents: the efficiency gap must be large enough to accommodate a larger mark-up. Again this constraint is endogenous in growth.

5.4.2.3 Asymmetries in international lending

Some would argue that the law can provide the basis for lending by large international financiers, as in the case of the International Lending Facility of Thailand in the 1990s. Yet LDCs are never able to borrow in domestic currency from international money markets, so any overseas borrowing leads to liability dollarization (Calvo 2001). At the same time, LDCs often cannot guarantee exchange rate stability, so the borrower faces large risk costs, from the real value of his debt varying. And, foreseeing the effects on default risk, international markets are unlikely to lend large sums, either.

Our efficient LDC-entrant therefore still gets no Big Push. That just leaves Development Finance, but the World Bank is known not to support projects based on infant industry arguments; a theoretical comparative advantage will not help.

5.4.3 Second-best conclusions

Lipsey and Lancaster (1956) famously showed that the best-feasible policy, in a case where there are “irremovable constraints” outside the reach of a policymaker,

\(^{10}\)which it clearly is in LDCs, due to lower incomes but also in transition economies (due to higher Gini coefficients moving along the Kuznets curve).
can sometimes be the opposite of what the policymaker would optimally do if he only faced removable constraints. Their conclusion may apply to the protection of property in an LDC that has a potential entrant in the situation we have considered. There are so many constraints to obtaining large finance in LDCs, irrespective of the efficiency of an entrant, that property law may not be able to affect the limiting factors. And if changes in the law may then have no beneficial effect on our entrant, because his ability to obtain the required financing is held back by irremovable constraints anyway, then it may well be optimal for a country at the lowest stages of development to ignore international property rights to some degree. That way, the entrant can lower some of his fixed costs through stealing.

Maybe through this course the entrant achieves the necessary break-through (like Philips did), and establishes itself in the market. If so, its rise could help to expand its small LDC along the way. Then, after the earliest growth in this LDC has been achieved, some constraints might have loosened (we showed they are endogenous in growth), so it is worth considering again if, in this second development stage, following the law may now be optimal. Indeed that would be Chang’s (2002) analysis (within OECD countries the backward stole from the early movers, thereby caught up, and then improved their laws).

But again if this policy is second-best efficient, that would contradict a linear relation between the strength of property rights and growth at all stages of development. Respect at least for international property law, according to this view, should become a driver of growth after the kick-off stage in development, not before.
5.4 Cross-country expropriation and entry foreclosure

5.4.4 A Big Push through global institutions?

Of course everyone wants LDCs to also play according to the law, and LE scholars have pointed out a number of mechanisms why a violation of international property rights has very negative consequences (e.g. Cooter and Schäfer 2011). But, to avoid these consequences, efficiency would require that conditions be changed so that the entrant can achieve his goal through legal means. The first-best must be attainable. An entrant such as the one in our example must be able to get the Big financial Push needed to be able to enter the market also by legal means. If he is not put in a position to obtain finance, even where an LDC does abide by the law, then it is in international institutions much more than local ones where the rules of the game need to change. If international institutions supplied a Big Push to the least developed economies, they could be lifted over the stage of development where abiding by the law does not raise growth. Economists at the Club of Rome have long called for such a “Global Marshall Plan” (Radermacher 2004). Such an initiative would effectively use “expropriative taxation” and North-South redistribution to lift the poorest economies across the kick-off stage. Afterwards, we could then well argue that stronger property rights support growth at all development stages, after cutting off the lowest levels in the country-spectrum. Before such a policy, however, we need to recognise that also the optimal amount of enforcement for overseas property rights varies between countries at different stages of development.
6 Empirical analysis

In this section, we empirically test our theory that the relationship between the strength of legal property rights and economic performance is non-linear, with a significantly weaker relationship at early stages of development. We also carry out a test on our arguments for a turn-around in the direction of causation at the kick-off stage of development. We find that the data does support our predictions.

6.1 Data

6.1.1 Estimation in levels

Theoretically, we could run regressions both on levels or rates of change in output and property rights. Acemoglu et al. (2000) use levels, which they argue gives insight into long-run growth effects (Acemoglu et al. 2004). Hall and Jones (1999, p.85) point out that levels capture the difference in average growth rates over time. Therefore “recent contributions to the growth literature point toward a focus on levels instead of growth rates” (ibid). Such an approach would also avoid the problem raised by Easterly et al. (1993) that growth rates across decades are poorly related, while levels capture the general relation across time. Hence we follow this consensus and use the levels of income per capita and property rights, and not their rates of change.
6.1.2 Measures of property rights

Indices  Since we are testing theories of a linear relation advanced by Acemoglu et al, as well as De Soto and his co-authors, we try as much as possible to use the same data as they did.

For all parts of Acemoglu et al. (2000) where property rights are proxied with “protection against expropriation risk”, we can use exactly the same data, from the authors’ website\(^1\). This includes the IV regressions.

A second measure of property rights, which Acemoglu et al use for robustness checks, is a property rights index computed by the Heritage Foundation. We are unable to obtain the 1995-data used by Acemoglu and use instead the 2010 data of that index.

For the matching output data we use GNI/cap for 2010 from the World Bank.

For further robustness checks, we use the “International Property Rights Index” prepared annually by the “De Soto Fellows” of the “Property Rights Alliance”\(^2\) under his guidance, also for 2010 and with the same World Bank data for output.

Interaction with contract law  Cooter and Schäfer (2011) have pointed out a number of ways in which property law can become more powerful if it is matched by strong contract law\(^3\). If our study now shows that property law alone is not much associated with income differences for LDCs, then one counter-argument could be

\(^1\)http://econ-www.mit.edu/faculty/acemoglu/data

\(^2\)an association of 63 libertarian think tanks

\(^3\)Of course although further types of law matter. Cooter and Schäfer (2011) provide ample reasons, however, why property and contract law matter already at earlier stages of development than-for example- business law. And there is much evidence, in their book and also in Besley and Kudamatsu (2007) that growth can occur also in countries with low civil liberties. Hence property and contract law seem more hopeful candidates for a linear relation with growth in LDCs than other sources of law which may become more crucial in later stages. The only obvious counter-candidate would be public law but interacting this with property law would test totally different theories of development than the one advanced by the property school Cooter and Schäfer (2011, ch. 11).
that this is really because what matters for all countries alike is the match of strong contract and property law.

To test this we use a key indicator of the World Bank’s survey “Doing Business”: the average times needed for registering property and for enforcing a contract. This provides us with the following interaction term:

$$\theta = \text{(time taken for property registration)} \cdot \text{(time taken for contract enforcement)}$$

### 6.1.3 Descriptive Statistics

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<th>Measures of the strength of legal property rights</th>
<th>Name</th>
<th>Year*</th>
<th>Scale: lowest to highest</th>
<th>Sample size</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Min</th>
<th>Max</th>
<th>Source</th>
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<td>7.21</td>
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<td>3.5</td>
<td>10</td>
<td>Acemoglu's website/ PSR rating agency</td>
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<td>1 - 100</td>
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<td>5</td>
<td>95</td>
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<th>Output measure in PPP</th>
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### 6.2 Estimation technique

#### 6.2.1 The need for non-parametric estimation

To honestly test for non-linearity, we need an estimation technique that does not impose functional restrictions on the data. One way to avoid such assumptions is non-parametric regressions. These have the advantage of avoiding pressing the data into a single trendline for countries at all development stages, instead estimating a moving average for each individual data point, using a specified bandwidth of neighbouring data points. The disadvantage of this technique is that it does not provide us with the usual regression statistics, as it is effectively running hundreds of regressions for different sub-samples. We can just represent the results graphically, laying them over the original scatter plots.

#### 6.2.2 Choice of weights and bandwidth

We do not have any theoretical justification to exclude any country from the sample or to give it less weight, so we use a non-weighted regression.
6.2 Estimation technique

Furthermore, to avoid arbitrarily constructing a relation where none might exist, we do not want to “smooth over” too many data-points in constructing our trend line. At the same time, constructing too large a number of separate regressions with too few data points in each one would be sensitive to outliers. Given that the sample size in cross-country property rights indices is not large to start with, this is particularly important. In order to resolve this trade-off, we follow the rule of thumb that a regression should, at its very least, contain 20 data points, and set the bandwidth accordingly to ensure that, for each dataset considered, we always keep this quantity of data for all the regressions run.

6.2.3 Tests on linearity

We use two tests to investigate the null hypothesis of a linear relationship between our measures of the strength of property rights and output:

**Need for Big Pushes or Constant Returns to Scale?** First, we consider the full sample of each measure of property rights, and see whether the relationship estimated appears linear. We do this in order to see whether a country that has weak property rights to start with could benefit from a marginal improvement by a similar magnitude to the marginal revenue for a country that starts off from a better position. If Acemoglu’s theory of a linear relation holds, we would expect such a finding of constant returns to scale.

**Linear relation or plateau for LDCs and sudden rise for mid-income countries?** Second, we split each of the datasets into two sub-samples: one sample for those
economies that are in the bottom third of economic output, and one sample for the top two thirds. If there is a linear relation, the trendline between both sub-samples should be similar; if instead our theories are correct, there should be only a weak relation in the sub-sample restricted to LDCs and a kink upwards in the sub-sample for the top two thirds of economies, with the structural break at the position of the mid-income countries.

### 6.2.4 Two-stage regressions for causal inference

To attribute causal effects we need to instrument our measures of the strength of property rights against endogeneity. Hence we execute two-stage regressions, in which we first regress our respective measure of property rights on the instrumental variable used in Acemoglu et al (settler mortality rates), and use the predicted values from that regression as our measure of the strength of property rights purged from endogeneity.

If it is true that property rights *cause* growth, then we should see a positive relation for countries at all development stages. If, however, all datasets show that for the Least Developed Economies there is no relation, then we can reject the $H_0$ of causation being the same at all development stages. Note, however, that we cannot directly test whether causation runs the other way for poor countries, because the use of an IV exactly cleans the data from reverse causation.

Besides these instrumented regressions we also want, however, to consider the results from using just raw data. This is important because there is reason to doubt whether Acemoglu et al.’s instrumental variable is in fact valid (Glaeser et al. 2004). Hence we consider each estimation both with and without instrumentation.
6.3 Results

6.3.1 Test on Constant Returns to Scale

Figure 6.01 presents data points through which Acemoglu et al. (2000, p.66) draws a linear trendline. When we fit a non-parametric trendline to this data, it does not look linear. Focus on the bottom section of figures 6.01-6.06: in all the datasets we see a plateau in the bottom part of the trendline. For those regressions where we did not instrument against endogeneity (on the left of the page), this plateau affects two quintiles of the data, as shown by the vertical stripes. In the instrumented regression, this proportion is less but still affects 20% of each dataset.

The flat relation in this segment of the data suggests that a country with a large expropriation problem might just gain from property rights reform if it can make one big boost, right up to the structural break. And to the extent that a country has too few resources for such a big institutional change, it may need early growth to enable property rights reform of a sufficient size to carry growth further afterwards.

Figure 6.01-.02: Acemoglu et al’s main indicator, raw versus instrumented data
6.3.2 Difference in the relation between country groups

On page 69, we split each dataset into their bottom tier and top two thirds in output, and consider whether the poorest economies can benefit as much from improvements in their property rights as the richer ones. For the poorest countries (displayed on the left-hand side), there is hardly any relation between property rights and per-capita incomes, and this holds for all datasets alike and irrespective of whether we instrument.
6.3 Results

Figures 6.07-08: Acemoglu et al’s main indicator, raw data

Figure 6.09-10: Index by Heritage Foundation, raw data

Figure 6.11-12 Index by Property Rights Alliance, raw data
This relation looks very different for countries that have already attained a certain stage of development. Consider the right hand side of page 69, which displays regressions on raw data: in stark contrast to the situation for the Least Developed Countries, we can confirm a close-to-linear relation for more advanced economies!

When we instrument this data to protect against endogeneity, however, we do not see a linear relation across the whole dataset excluding LDCs either: instead, figures 6.08, 6.10 and 6.12 all show a threshold level from which property rights suddenly have a large causal impact on output differences.

![Graphs showing regression analysis for different scenarios](image)

**Figures 6.07-08:** Acemoglu et al’s main indicator, instrumented data

**Figure 6.09-10:** Index by Heritage Foundation, instrumented data
6.3 Results

Figure 6.11-12: Index by Property Rights Alliance, instrumented data

And this structural break is in each case positioned just after the lowest sections: countries just on the transition between low and mid-income (where our model predicted social norms might unravel, giving rise to a sudden need for property law) display this kink.

6.3.3 Test for identification error due to interaction

We can also confirm that these non-linear effects and this lack of causal power does not arise just because we erroneously failed to consider the interrelation of property law with contract law.

The estimation of the interaction term from section 1.1.2 does not lead to any different results. Consider first the inapplicability of constant returns to scale: returns to improvements in those countries with the weakest law (longest time taken for property registration and contract enforcement) are much lower than in more advanced countries.
There is not much to gain for these countries unless they have the capacity to make large leaps. If this is not the case, legal reform may cost and not raise output.

Again, it is 20% of the dataset that is affected, and this holds whether or not we employ the instrumental variable.

Also, when considering a break-up of the data into LDCs and more developed economies, we get a similar picture to before. There is no clear relation at low development stages: indeed the slopes for the regression on raw data and data cleaned from endogeneity contradict each other. For countries in mid-stages of development, however, we again get the result that the law drives output.
6.3 Results

6.15-.16: Interaction term based on World Bank “Doing Business” data, raw

7 Conclusion

For most countries, it is uncontested that a positive relationship exists between the strength of legal property rights and economic performance. But can we say as well that stronger legal property rights would cause early growth, at the lowest stages of development? And will their contribution to growth be as strong as in more developed countries?

Acemoglu, Johnson and Robinson (2000) answer both questions in the affirmative. Across all stages of development, the direction of causation would run from property rights to per-capita incomes, and the relationship between both variables would be linear. These authors are uncertain, however, about the underlying mechanisms, calling them a “Black Box”.

We derive a range of mechanisms for how strengthening legal property rights can raise growth, but show that their effectiveness is lower at early stages of development, with a structural break thereafter. This contradicts Acemoglu et al’s finding of a linear relationship. Furthermore, we derive mechanisms for why, in the Least Developed Countries, growth causes the establishing of legal property rights and endogenous institutional change; only after a certain level of development is attained do property rights cause further growth.

We test these predictions empirically, using Acemoglu et al’s dataset, besides composite measures of legal property rights issued by two libertarian institutes that support his call for stronger legal property rights everywhere. With non-parametric, non-weighted regressions that do not impose any assumptions on functional form, we
confirm the existence of only a weak relationship for countries in the bottom of the income-spectrum, and a structural break for lower middle-income countries. Using Acemoglu et al’s instrumental variable, we confirm that these relations are causal: for at least 20% of countries in all datasets, raising the legal protection of property rights would do little to raise output.

Our analysis suggests that property law is an important engine of growth after a country has attained certain stages of development, but it is not a panacea: we need to keep searching for the causes of early development.
Bibliography


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