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A Critique of the Cross-national  
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**Property Rights Reform and Development: A critique of the cross-national regression literature<sup>1</sup>**

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**Abstract:** The legal protection of property rights is increasingly viewed as a crucial, if not the crucial, condition for economic growth and pro-poor development. Empirical support is generally based on cross-national correlations between measures of secure property rights and good development outcomes in the long-run. However, whether these associations hold in the short- and medium-run has, to our knowledge, not been studied. In this paper, we evaluate the relationship between the protection of property rights and growth using three property rights indices from the Heritage Foundation, Fraser Institute and World Economic Forum covering the experience of 162 countries between 1995 and 2005. While we find a strong correlation between the *level* of country property rights protections scores and economic growth, when we evaluate the *change* and *improvement* in country ranking scores of property rights, this positive association disappears. These findings could be interpreted as indicating either that there is i) no causal relationship between property rights and growth (at least in the short-run), or that ii) the property rights indices have poor validity.

## 1. Introduction

The overwhelming importance attached to property rights protection as a condition for growth among new institutional economists is well known (Rodrik et al, 2004). Scholars from the entire political spectrum endorse some version of the view that a secure property rights regime is a fundamental capitalist institution that facilitates growth and reduces poverty. There is some disagreement about the mechanism and conditions under which property rights protection generates growth and reduces poverty, but, the proposition that secure property rights leads to good economic outcomes is largely unquestioned<sup>2</sup>.

Recently, the protection of property rights has been increasingly emphasized in the development literature as well. We refer to this as the property rights movement, which seeks to grant legal title to the poor for their de facto property as a developmental program. This consensus is based on the logic that property rights programs can turn a vast amount of assets held by the poor into legal title. This act will simultaneously increase incentives to invest as well create a credit-worthy asset that can be used to raise capital. Although empirical evidence exist for the benefits of secured property rights, correlation might not show causality, since growth might have come before property rights, and acted as a spur to their formation.

We address this issue by looking at the change and improvement of ranking scores in commonly used property rights indicators. After replicating dominant findings that secure property rights correlate with higher growth and lower poverty levels as indicated by infant mortality rates, we show that this positive relationship disappears once we look at the *change*, as oppose to the *level*, in property rights

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<sup>2</sup> See for example: Acemoglu et al, 2001; Barro, 1991; Clague et al, 1999; De Long and Shleifer, 1993; Goldsmith, 1995; Hall and Jones, 1999; Hanke and Walters, 1997; Keefer and Knack, 1995; Leblang, 1996; North and Thomas, 1970; Powell, 2002; Rodrik et al, 2004; Svensson, 1998; Torstensson, 1994; Zak, 2002.

protection. Likewise, in a multivariate regression analysis, the level of property rights indices is associated with either negative, none, or minimal growth depending on which indicator is used. These findings however lose significance if we look at *improvements* in property rights reforms. In view of these findings, a lack of robust association between growth and development indicators and changes and improvements in three major measures of property rights casts critical doubts on their validity and usefulness. Either there is no clear support for the benefits of increasing the protection of property rights, at least in the short or medium term, or the indicators aren't capturing the actual evolution of property rights.

To further elaborate on these findings, the rest of the paper is as follows. Section two briefly reviews the theoretical and empirical debate on the protection of property rights. In the third section, we introduce a critical approach to the analysis and understanding of the topic of this study. Section four describes our empirical analysis to test for the alleged positive property rights protection effects. We conclude with some implications and suggestions to properly evaluate the progress of property rights in order to better assess their economic and social effects.

## **2. The Property Rights Movement**

The most well known champion of the property rights movement is Hernando de Soto (2000). De Soto argues that the solution to the problem of underdevelopment and global poverty is the extension of formal property rights to those that have held their land in informal and communal systems. Although most of the poor have no legal title to their assets, de Soto and his team of researchers believe they actually control vast amounts of resources. For example, de Soto claims that the poor in Egypt hold \$241 billion in real-estate assets, only they do not have legal title over this

property. If this was legal property, it would be the equivalent of 30 times the value of the Cairo Stock Exchange (de Soto, 2000). De Soto claims that throughout the world the poor “own” some 9.3 trillion dollars in informal property. If only the poor had legal title to this land, it could be used as collateral to obtain credit, which would lead to development.

Turning customary or *de facto* tenure into *de jure* property, de Soto argues, injects “life” into “dead” capital. It permits for the security of property rights, which is essential for the creation of incentives that are conducive towards investing capital and labor in the property in order to generate value. In addition, these newly legal assets can be used to secure the credit that will provide further investment capital. The flow of credit will stimulate small scale capitalism and help produce economic growth in a way that particularly benefits the poor (so called pro-poor growth). Thus, de Soto’s work adds to the appeal of new institutional economics, which holds that property rights are highly crucial for a capitalist economy (see the discussion in Chang, 2007).

Significantly, the United Nations, International Monetary Fund and World Bank as well as other International Financial Institutions (IFIs) have enthusiastically endorsed property rights reform. The World Bank (2003) noted that formalizing property rights is “a main vehicle for investing, accumulating wealth, and transferring it between generations.” This seems to be a promising solution to poverty that, in de Soto’s metaphor, raises “dead” capital making possible the petty-capitalist path to development. Given the legal-bootstraps of secure property, the poor can proceed to use them to pull themselves up from poverty.

To support these pro-property rights arguments, a very large body of macro and micro level literature has emerged. Cross-country panel data-driven studies have

made the case for a positive association between property rights levels and higher incomes per capita (Acemoglu et al, 2001; Acemoglu and Johnson, 2005; Powell, 2002; Zak, 2002;). Bernhard Heitger found using the Fraser Institute's index that a doubling of the property rights index more than doubles per capita income (Heitger, 2004). Others have also found a positive association between secured property rights and lower levels of inequality (Calderón and Chong, 2000; Hanke and Walters, 1997). Likewise, Paul Zak finds that insecure property rights can cause countries to be caught in a poverty trap, since these countries lack the institutions that sustain sound and growing economies (Zak, 2002). Heitger finds that countries that respect the rights of private property are more likely to raise the accumulation of not only physical but also human capital (Heitger, 2004). Finally, better respect for private property rights correlate with longer life expectancies as well as higher marks on the United Nations Human Development Index (Powell, 2002).

A substantial body of research using household surveys also supports de Soto's claims about the usefulness of property rights reform as a developmental program. In examining a titling program in Peru, Erica Field (2007) exploited a program evaluation survey dataset and found that individuals with secured land titles tend to allocate their time more efficiently by spending fewer hours guarding property and shifting away from work at home to engage in entrepreneurial and formal labor activity essential for household income. Along the same lines, Thomas Schweigert (2007) concluded through a household survey that Guatemalan families with formal farm land titles produce greater output and invested more quality labor towards generating higher future output.

Although evidence on the effect of property rights and access to credit is mixed, quantitative studies exploiting household surveys in the Philippines, Ghana,

Brazil, Nicaragua, and Peru further reveal that families with secured land titles, independent of having access to credit, increased household and land investments to improve their dwelling conditions and increase the value of their assets (Alston et al, 1996; Besley, 1995; Field, 2005; Field and Torero, 2006; Laiglesia, 2004; Lynn and Struyk, 1983). Likewise, other studies suggest that access to land titles allows families to directly increase their level of human capital. These programs were also found to lower fertility rates among the young poor and reduce child labor in Peru (Field, 2003, 2007). Galiani and Scharrotsky (2004, 2005) exploited a natural experiment and found that urban poor families with formal land titles in Argentina were more likely to improve the health and educational performance of their children.

### **3. A Critical View to Property Rights Reform**

Overall, many have associated property rights reform with favourable socio-economic outcomes. But what is the causal relationship between property rights protection and development? Does development cause secure property rights or does secure property rights cause development? Or is there an inverse U-shaped relationship between property rights and development – that both very low and very high levels of property rights protection could be inimical to economic growth (see Chang, 2007; Kurtz and Schrank, 2007)? Too great a protection of property rights means that resources will go un-utilized, and less value will be created (e.g. in less developed countries patents get protected, making the cost of certain inputs too expensive for local use, or absentee landlords are able to evict productive squatters, reducing aggregate output and denying people their ability to meet their subsistence needs).



Moreover, there seems to be little doubt that capitalist development leads to more secure property rights over time (Heitger, 2004). The emergence of capitalists and small property holders generate actors with an interest in creating formal rights to their property that is backed up by state institutions. In addition, greater wealth allows for greater education, which combines to create the possibility of a professional bureaucracy which in turn both upholds, and further extends, the rule of law. The possibility for reverse causality must be taken seriously given the fact that there are prominent examples of successful capitalist development in systems with weak property rights, such as the massive corruption of the Gilded Age in the United States and the current rapid growth in China –a country with famously mixed and vague property rights.

Aside from this uncertain causal direction of this relationship, what also remains almost entirely unexamined is the process of granting legal title and improving the security of property in the manner proscribed by de Soto and international institutions. Classical sociology suggests that this process itself might have enormously disruptive implications for society. Marx (1887) and Weber (1968) wrote about the separation of workers from the means of subsistence (the “so-called primitive accumulation”) in the early stages of capitalism, whereby people lost their access to the land they needed to meet their subsistence needs. Both theorists pointed out that this process created enormous stress and dislocation for the new working class. Durkheim (1933) used the language of the “forced division of labor” to capture this phenomenon, and believed it led to the surge in anomie that he associated with suicide and other social problems. Karl Polanyi (1944) theorized this as the fictitious commodification of land which created markets whose impersonal forces rip the traditional fabric of society apart. Drawing inspiration from these classical theorists,

we can suggest the hypothesis that the process of granting formal legal property rights will generate both winners along with many losers as it destroys the communal basis of resource allocation.

These classical theories potentially validate a large body of micro-studies that have surfaced to suggest that the formalization of property rights via the security of title can increase socio-economic hardship through various mechanisms. For example, middle and upper classes might manage to usurp the legal title from the poor. The lack of protective and equal measures in the formalization process can permit those with power, information and resources to exploit land title programs to amass the newly titled property (see for example: Platteau, 2000; Mitchell, 2006; Benjaminsen et al, 2008). Moreover, if the poor do get legal title to their assets, particularly in poorly functioning markets, this might rapidly produce indebtedness leading to loss of the property. This is especially true because obtaining and maintaining formal property means incurring ongoing costs associated with property taxes and fees to access public services (see for example: Burns, 2006; Cousins et al, 2005; Davis, 2007; Manji, 2007; Mitchell, 2006; Neuwirth, 2006). Thus, the enforcement of property rights can have the consequence that the poor lose access to their productive assets. If some of these assets are not utilized by others, this will lead to less production and thus lower growth.

#### **4. Data, Methods and Results**

Beyond considering a critical view to the process of protecting and formalizing property rights, it is also imperative to re-assess past cross-national correlations between measures of secure property rights and good development outcomes. Our methodological strategy to address the issue of causality is straight

forward. First, we will examine the relationship between property rights protection and development in static and dynamic models. That is, we will look at the correlation between the *level* of property rights protection and development, as well as the correlation between the *change* in property rights protection and development. After addressing causality concerns with this exercise, we carry out a simple multivariate growth model to test for positive or negative effects of property rights using the *level* and *improvement* of property rights rankings of three of the most commonly used indices (see Table 1).

### *Data*

These indicators of property rights include: those produced by the US think tank The Heritage Foundation<sup>3</sup>, the Canadian think tank Fraser Institute<sup>4</sup>, and the World Economic Forum<sup>5</sup>, the network which most famously sponsors the Davos meetings, and is a self-consciously global organization that promotes “entrepreneurship in the global public interest” (World Economic Forum, 2009) (from website [[http:// www. weforum. org/en/about/History%20and% 20 Achievements /index.htm](http://www.weforum.org/en/about/History%20and%20Achievements/index.htm)], accessed May 18, 2009).

At the Heritage Foundation, the property rights ranking scores are arrived at based on the judgement of Heritage Foundation researchers as well as journalists with country-level expertise at the Wall Street Journal. The other two think tanks/policy networks produce their scores with a similar procedure, using academics/experts to make statistical analysis based on a wide variety of data. It is important to note that

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<sup>3</sup> Studies which use the Heritage Foundation property rights index include: Acemoglu and Johnson, 2005; Claessens and Laeven, 2003; Goldsmith, 1995; Hanke and Walters, 1997; Johnson et al, 1998; Norton, 1998; Powell, 2002.

<sup>4</sup> Studies with use the Fraser property rights index include: Butkiewicz and Yanikkaya, 2007; Claessens and Laeven, 2003; Hanke and Walters, 1997; Heitger, 2004; Powell, 2002.

<sup>5</sup> Studies which use the World Economic Forum property rights index include: Claessens and Laeven, 2003; Desai et al, 2003; Freeman, 2003; Hanke and Walters, 1997; Hur et al, 2006.

these property rights scores are sub-indices of the overall indicators that these organizations formulate on an annual basis. (These include the Heritage’s Index of Economic Freedom, Fraser’s Economic Freedom World Index and the World Economic Forum Global Competitive Index).

[Table 1 about here]

As we can see from Table 2 below, these three indicators are highly correlated. That is as it should be, since they are all supposedly measuring a similar bundle of factors that guarantee secured “property rights”.

[Table 2 about here]

Aside from employing these indices, we carry out a simple multivariate growth model to re-examine the relationship between property rights reform and growth, controlling for initial GDP per capita by using a global panel, comprising 162 countries, with data from the World Bank World Development Indicators 2008 edition.

### *Methods*

Our model specification for GDP per capita growth is based on the augmented Solow growth model (Solow, 1956). This gives rise to the following two regression models:

$$(1) \quad \gamma_{i,t} = \alpha + \beta_1 PR_{i,t} + \beta_2 INFL_{i,t} + \beta_3 FDI_{i,t} + \beta_4 GDS_{i,t} + \beta_5 OPEN_{i,t} + \beta_6 INITIALGDP + \mu_i + \mu_i * t + \varepsilon_{i,t}$$

$$(2) \quad \gamma_{i,t} = \alpha + \beta_1 IMP_{it} + \beta_2 INFL_{i,t} + \beta_3 FDI_{i,t} + \beta_4 GDS_{i,t} + \beta_5 OPEN_{i,t} + \beta_6 INITIALGDP + \mu_i + \mu_i * t + \varepsilon_{i,t}$$

Here  $i$  is country and  $t$  is year;  $\gamma$  is the percentage growth in real GDP per capita; PR is one of the three measures of property rights protections; INFL is log inflation in the

consumer price index; FDI is foreign direct investment as a percentage of GDP; GDS is gross domestic savings as a percentage of GDP; OPEN is trade openness, measured as the sum of imports and exports as a percentage of GDP; INITIAL GDP is the level of GDP per Capita in 1995;  $\mu_i$  is a country-specific fixed effect and  $\mu_i * t$  is a set of country-specific time trends which strengthen the robustness of results. In the second model, IMP is a dummy variable representing *improved* property rights scores within the indices employed in this study. IMP takes on the value of one if the country improved in protecting property rights in a specific year, and zero otherwise.

Despite our concern regarding the validity of the property rights indices used in this study, we nevertheless assess which model estimator is the most appropriate for our analysis by using a set of diagnostic tests proposed by econometric analysis for cross-sectional time-series data. We first estimate the Breusch and Pagan (1980) Lagrange Multiplier (LM) test for random effects to assess the variance of country specific effects and see whether we accept the null hypothesis indicating no unobserved heterogeneity. Running the LM test in our model tells us that we cannot accept the null hypothesis and therefore cannot ignore the presence of unobserved heterogeneity.

Thus, the unobserved effect of each panel regression is assessed in fixed and random effects models where standard errors are clustered by country to reflect non-independence of sampling and for robustness to serial correlation. A Hausman-like test of fixed vs. random effects using the stata *xtoverid* command (Schaffer and Stillman, 2006) is then conducted to test if the coefficients estimated in both random and fixed effects models are the same. Following the *xtoverid* test, we find that fixed and random effects are different and therefore, fixed effects are more valid to report as they always give consistent results. But taking into account that fixed effect might

not however be efficient, we report both random and fixed effects in Tables 5 and 6.

### *Level versus Change in Property Rights Protection*

Although property rights indices highly correlate in full variation, the pattern reverse or change when we look at the dynamic versions of the variables (see Table 3). Changes in the Heritage Foundation are very mildly correlated with the Fraser Institute, but have no relationship to changes in the WEF indicator. *Changes in the Fraser Institute indicator are actually negatively correlated with changes in the World Economic Forum indicator*, and although the level is also very low, it is highly statistically significant. As Table 3 also notes, the correlation of improved ranking scores between each index is small and insignificant. These observations should throw up a major caution sign for the validity of these indicators.

[Table 3 about here]

To further elaborate on the level versus change analysis, Table 4 represents the results of 12 separate correlations. We see that in all three indicators, the level of property rights has a large negative association with poverty as represented by infant mortality rates and a large positive association with growth rates per capita. However, the change in the variables tells a different story. The Heritage Foundation indicator, used by de Soto himself (2000), has a large negative association with infant mortality rates. A unit change in property rights is associated with 25% higher infant mortality rates. The other two indicators had no significant effect on infant mortality.

Change in the Heritage Property Rights Index also shows a strong negative association with growth. The other two indicators show a much smaller, but still positive association with growth. These correlations, both in size and level of significance, are much smaller than the large negative association found with the

Heritage indicator. *If we assess the change as oppose to simply the level of property rights protection, our analysis suggest a weak causal relationship* between property rights and development. Property rights changes between 1995 and 2005 seem to have a minimal, if not a negative, impact on economic growth and development. This empirical finding is further assessed with our regression analysis.

[Table 4 about here]

### *Regression Results*

The coefficients for the regressions of GDP per capita growth on level and improvement of property rights and several additional explanatory variables are reported in Table 5 and 6, respectively. When using the Heritage Foundation index, we find that an increase in the protection of property rights by 1 percent results in countries experiencing 0.06 percent less growth in GDP per capita during the period from 1995 to 2005. With the Fraser Index, we find a positive increase of 0.70 percent of growth during the same time period but it is a less statistically significant finding in comparison to the Heritage index. The WEF index however, produces a similar finding as that of the Heritage indicator, estimating 0.70 percent less growth, yet less statistically significant and found in the random effects model.

[Table 5 about here]

An alternative approach to estimate the effect on growth when the protection of property rights increases is by creating a dummy variable representing cases where countries had an actual improvement in their protection of property rights ranking score. By substituting the property rights index with this dummy variable, we find that the significance found in the negative or positive associations between property rights and real GDP per capita growth in Table 5 completely disappear, with the exception

of the Fraser index as seen in Table 6. With the improved FRASER dummy variable, we find that improving the protection of property rights increases growth by 0.62 percent, a finding that is statistically significant at an alpha level of 10 percent.

[Table 6 about here]

By and large, the associations found between the protection of property rights and GDP per capita growth are found to be weak, inconsistent and often contradictory. If these property rights indices are considered valid measures, there is at least as much evidence that property rights protection leads to negative, minimal or no significant growth than the opposite. It all depends on which index one uses. Considering these indices are allegedly measuring the same metric, this is surprising and troubling.

## **5. Conclusion**

Our results clearly raise questions about studies showing the beneficial consequences of strong property rights that use the level of property rights in their empirical analyses. We show that a dynamic analysis could yield substantially different results. The change and improvement in property rights, not the overall value of property rights, must be the object of interest if we are evaluating policy. Indeed, why bother to construct a yearly data set if not to study the change in the variables?

While we would be surprised if there was nothing to which these codings correspond, we must keep in mind the lack of correlation, or even the negative correlation, that we observed in the dynamic versions of these indexes. As a result of the uncertainty of what policy changes or regulatory changes these scores actually refer to, we are especially in need of much more specific measures of property rights which are composed of objective data, as well as much more detailed quantitative



evaluations of country-level or sub-country level property rights programs to complement the growing number of qualitative case studies of these phenomena. These studies should attempt to *directly measure the purported mechanisms* that we are assuming are behind the correlations in the cross-national data. Finally, additional natural experiments should be identified and analyzed.

Overall, these results should be quite troubling for the pro-property rights advocates that rely on the analyses of these indices to bolster their positions. *Either there is no robust evidence that reforms of property rights has been beneficial, or these indices don't really capture the evolution of property rights protection.* We strongly suspect that these indices have unacceptably low validity. Given the lack of agreement in changes in property rights scores across these indices, it is ambiguous to use these metrics in policy analysis.

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## **Tables**

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## **Appendix**

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**Table 1**  
Description of Property Rights Indices.

Source	Index	Description	Number of Countries	Years of Data Availability	Ranking Scale	
					Low	High
Heritage Foundation/Wall Street Journal Index of Economic Freedom	Property Rights sub-index	The more guaranteed the legal protection of property, the higher a country's index score; likewise, the greater the probability of government expropriating property, the lower a country's score.	183	1995-2009	10%	100%
Fraser Institute Economic Freedom World Index	Legal Structure and Security of Property Rights sub-index	The index is intended to capture the security of property rights and the enforcement of contracts. A rating close to 10 indicates that property rights are well established and that the quality of the supportive legal system is high.	141	1970-2006	1	10
World Economic Forum Global Competitive Index	Property Rights sub-index	A high country score suggest that property rights are clearly defined and well protected by law. A low country score imply poorly defined property rights not protected by a proper legal system.	131	2000-2008	1	7

Note: The description of each property rights index is based on information derived from the website of each source. Heritage Foundation/Wall Street Journal Index of Economic Freedom: <http://www.heritage.org/Index/>; Fraser Institute Economic Freedom World Index: <http://www.freetheworld.com/>; World Economic Forum Global Competitive Index: <http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>.



**Table 2**  
Correlation in Level between each Property Rights Index.

	HERITAGE	FRASER	WEF
HERITAGE	1.0 (1635)		
FRASER	0.80*** (827)	1.0 (827)	
WEF	0.84*** (517)	0.88*** (508)	1.00 (517)

Note: The correlation matrix is based on observations between 1995 and 2005. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively. Finally, the number of correlated observations is in parentheses.

**Table 3**

Correlation in Change and Improvement between each Property Rights Index.

	HERITAGE		FRASER		WEF	
	Change	Improvement	Change	Improvement	Change	Improvement
HERITAGE	1.0 (1472)	1.0 (1635)				
FRASER	0.08* (602)	0.02 (827)	1.0 (602)	1.0 (827)		
WEF	0.04 (396)	-0.05 (517)	-0.13*** (391)	0.04 (508)	1.00 (396)	1.00 (517)

Note: The correlation matrix is based on observations between 1995 and 2005. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  indicate significance levels, respectively. The number of correlated observations is in parentheses.

**Table 4**

Associations between Property Rights, Infant Mortality and GDP per Capita, 1995 to 2005.

<i>Full Variation</i> <i>Property Rights Index</i>	Pearson Correlation Coefficients		
	HERITAGE	FRASER	WEF
Level of Infant Mortality Rates	-0.66***	-0.75***	-0.67***
Level of GDP per Capita	0.74***	0.77***	0.76***
<i>Dynamic Variation</i> <i>Property Rights Change</i>	Pearson Correlation Coefficients		
	HERITAGE	FRASER	WEF
Growth in Infant Mortality Rates	0.25***	-0.05	0.05
Growth in GDP per Capita	-0.14***	0.07†	0.08†

Note: The Pearson Correlation Coefficients are based on observations between 1995 and 2005. † $p < 0.10$  and \*\*\* $p < 0.001$  indicate significance levels, respectively.

**Table 5**  
Effect of the *Level* of Property Rights on Real GDP per Capita Growth.

Dependent Variable: <i>Real GDP per Capita Growth</i>						
Model Method	HERITAGE		FRASER		WEF	
	(1) REM	(2) FEM	(3) REM	(4) FEM	(5) REM	(6) FEM
Property Rights Index	-0.04*** (0.01)	-0.06*** (0.01)	0.14 (0.15)	0.70** (0.27)	-0.70* (0.36)	0.15 (0.57)
Openness	0.01** (0.00)	0.06*** (0.01)	0.00 (0.00)	0.05** (0.02)	0.01 (0.00)	0.08*** (0.03)
Inflation	-0.60*** (0.15)	-0.87*** (0.18)	-0.20 (0.18)	-0.48** (0.22)	-0.32 (0.21)	-0.67*** (0.25)
Foreign Direct Investment/GDP	0.03** (0.15)	0.01 (0.01)	0.03 (0.02)	0.01 (0.01)	0.02* (0.01)	0.01 (0.01)
Savings Rate	0.03 (0.02)	0.08 (0.06)	0.04* (0.03)	0.11 (0.07)	0.06* (0.03)	0.10 (0.14)
Initial GDP per Capita	0.00 (0.00)	—	-0.00 (0.00)	—	0.00 (0.00)	—
Constant	4.55*** (0.88)	1.61 (1.81)	1.23 (1.04)	-6.78** (3.12)	5.91*** (1.41)	-4.67 (5.62)
Observations	1240	1240	696	696	462	462
Number of Countries	139	139	123	123	105	105
R-squared	0.08	0.16	0.12	0.15	0.20	0.25

Note: These are cross-sectional time-series regressions run in random-effects (REM) and fixed-effects (FEM) models where standard errors are clustered by country to reflect non-independence of sampling and for robustness to serial correlation. The regression coefficients are based on observations between 1995 and 2005. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively. Robust standard errors are in parentheses. The dependent variable is the percentage growth in real GDP per capita. Property Rights Index is the level of one of the three measures of property rights protection (HERITAGE, FRASER, WEF). Openness is trade openness, measured as the sum of imports and exports as a percentage of GDP. Inflation is log inflation in the consumer price index. Foreign Direct Investment/GDP is Foreign Direct Investment as a percentage of GDP. Savings Rate is gross domestic savings as a percentage of GDP. Initial GDP per Capita is the level of GDP per capita in 1995.

**Table 6**  
Effect of *Improved Property Rights* on Real GDP per Capita Growth.

Dependent Variable: <i>Real GDP per Capita Growth</i>						
Model Method	HERITAGE		FRASER		WEF	
	(7) REM	(8) FEM	(9) REM	(10) FEM	(11) REM	(12) FEM
Improved Property Rights	-0.12 (0.53)	0.02 (0.48)	0.72* (0.37)	0.62* (0.37)	0.11 (0.22)	0.30 (0.22)
Openness	0.01* (0.00)	0.06*** (0.01)	0.01 (0.00)	0.05** (0.02)	0.01 (0.00)	0.08*** (0.03)
Inflation	-0.50*** (0.14)	-0.87*** (0.18)	-0.21 (0.18)	-0.48** (0.22)	-0.30 (0.21)	-0.68*** (0.25)
Foreign Direct Investment/GDP	0.03* (0.02)	0.01 (0.01)	0.03 (0.02)	0.01 (0.01)	0.02 (0.01)	0.01* (0.01)
Savings Rate	0.01 (0.02)	0.07 (0.06)	0.05* (0.02)	0.10 (0.07)	0.04 (0.03)	0.1 (0.14)
Initial GDP per Capita	-0.00 (0.00)	—	-0.00 (0.00)	—	-0.00 (0.00)	—
Constant	2.84*** (0.83)	-1.66 (1.73)	1.90** (0.79)	-2.27 (2.19)	3.36*** (0.89)	-4.03 (4.29)
Observations	1240	1240	696	696	462	462
Number of Countries	139	139	123	123	105	105
R-squared	0.07	0.14	0.13	0.14	0.14	0.25

Note: These are cross-sectional time-series regressions run in random-effects (REM) and fixed-effects (FEM) models where standard errors are clustered by country to reflect non-independence of sampling and for robustness to serial correlation. The regression coefficients are based on observations between 1995 and 2005. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively. Robust standard errors are in parentheses. The dependent variable is the percentage growth in real GDP per capita. Improved Property Rights is a dummy variable representing improved property rights scores in each respective property rights measure (HERITAGE, FRASER and WEF), which takes on the value of one if the country improved in protecting property rights in a specific year, and zero otherwise. Openness is trade openness, measured as the sum of imports and exports as a percentage of GDP. Inflation is log inflation in the consumer price index. Foreign Direct Investment/GDP is Foreign Direct Investment as a percentage of GDP. Savings Rate is gross domestic savings as a percentage of GDP. Initial GDP per Capita is the level of GDP per capita in 1995.

## Appendix 1. Descriptive Statistics of Variables

**Table 7**  
Descriptive Statistics

Summary Statistics		
Variables	Mean (SD)	Number of Observations
Heritage Property Rights Index	51.60 (23.75)	1635
Fraser Property Rights Index	5.63 (1.93)	827
WEF Property Rights Index	4.74 (1.15)	517
Log Infant Mortality	3.18 (1.11)	1456
Log GDP per capita	7.65 (1.60)	1567
% Growth in GDP per capita	2.71 (4.40)	1589
Openness	84.77 (48.74)	1560
Log Inflation	1.62 (1.32)	1412
FDI/GDP	2.68 (7.55)	1423
Savings Rate	17.77 (13.69)	1570
Initial GDP per Capita (1995)	5376.46 (7237.35)	1635

## Appendix 2. Summary of Heritage Foundation Property Rights Index

**Table 8**

Correlation Summary of Heritage Foundation Property Rights Index.

Correlation Matrix									
Property Rights Index	1								
Log Infant Mortality	-0.66***	1							
Log GDP per Capita	0.74***	-0.90***	1						
% Growth in real GDP per capita	-0.10***	-0.05**	0.04	1					
Openness	0.23***	-0.22***	0.24***	0.14***	1				
Log Inflation	-0.36***	0.39***	-0.41***	-0.10***	-0.11***	1			
FDI/GDP	-0.06**	0.07**	-0.09***	0.09***	0.16***	0.03	1		
Savings Rate	0.32***	-0.35***	0.51***	0.13***	0.26***	-0.19***	-0.10***	1	
Initial GDP per Capita (1995)	0.43***	-0.52***	0.51***	0.01	0.07***	-0.32***	-0.08***	0.11***	1

Note: The correlation matrix is based on observations between 1995 and 2005. Each variable is correlated with the Heritage Foundation Property Rights Index level. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively.

### Appendix 3. Summary of Fraser Institute Property Rights Index

**Table 9**  
Correlation Summary of Fraser Institute Property Rights Index.

Correlation Matrix									
Property Rights Index	1								
Log Infant Mortality	-0.75***	1							
Log GDP per Capita	0.77***	-0.90***	1						
% Growth in real GDP per capita	0.07**	-0.06**	0.04	1					
Openness	0.26***	-0.22***	0.24***	0.14***	1				
Log Inflation	-0.33***	0.39***	-0.41***	-0.10***	-0.11***	1			
FDI/GDP	-0.07*	0.07**	-0.09***	0.09***	0.16***	0.03	1		
Savings Rate	0.37***	-0.35***	0.51***	0.13***	0.26***	-0.19***	-0.10***	1	
Initial GDP per Capita (1995)	0.49***	-0.52***	0.51***	0.01	0.07***	-0.32***	-0.08***	0.11***	1

Note: The correlation matrix is based on observations between 1995 and 2005. Each variable is correlated with the Fraser Institute Property Rights Index level. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively.



## Appendix 4. Summary of WEF Property Rights Index

**Table 10**  
Correlation Summary of World Economic Forum Property Rights Index.

Correlation Matrix									
Property Rights Index	1								
Log Infant Mortality	-0.67***	1							
Log GDP per Capita	0.76***	-0.90***	1						
% Growth in real GDP per capita	-0.17***	-0.06**	0.04	1					
Openness	0.21***	-0.22***	0.24***	0.14***	1				
Log Inflation	-0.44***	0.39***	-0.41***	-0.10***	-0.11***	1			
FDI/GDP	-0.07	0.07**	-0.09***	0.09***	0.16***	0.03	1		
Savings Rate	0.36***	-0.35***	0.51***	0.13***	0.26***	-0.19***	-0.10***	1	
Initial GDP per Capita (1995)	0.52***	-0.52***	0.51***	0.01	0.07***	-0.32***	-0.08***	0.11***	1

Note: The correlation matrix is based on observations between 1995 and 2005. Each variable is correlated with the World Economic Forum Property Rights Index level. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$  indicate significance levels, respectively.