

Heitger, Bernhard

**Working Paper**

## Property rights and their impact on the wealth of nations: a cross-country study

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**Kiel Institute for World Economics**  
Duesternbrooker Weg 120  
24105 Kiel (Germany)

**Kiel Working Paper No. 1163**

**Property Rights and their Impact  
on the Wealth of Nations —  
A Cross-Country Study**

by

**Bernhard Heitger**

May 2003

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# **Property Rights and their Impact on the Wealth of Nations — A Cross-Country Study**

## **Abstract:**

This paper investigates the quality of property rights and long-term economic growth in an international cross-section of countries in 1975–1995. The empirical tests indicate that the impact of private property rights on growth is positive and simultaneously determined. Correcting for the simultaneity bias reveals a regression coefficient which is quite remarkable: A doubling in the index of the quality of property rights leads to a more than doubling in per capita incomes. In addition, private property rights also impact the ‘traditional’ determinants of economic growth. Thus it seems appropriate to class private property rights with the ultimate sources of economic growth.

**Keywords:** Economic Growth, Property Rights, Institutions

**JEL classification:** O40

**Dr. Bernhard Heitger**

Kiel Institute for World Economics

24100 Kiel, Germany

Telephone: +49/431/8814-249

Fax: +49/431/8814-500

E-mail: [heitger@ifw.uni-kiel.de](mailto:heitger@ifw.uni-kiel.de)

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## 1. Introduction

Many studies on economic development and growth suggest the accumulation of physical and human capital as well as technological improvements to be the key determinants of economic development. Traditional neo-classical growth theory (e.g. Solow 1957) emphasises physical capital accumulation whereas endogenous growth theory (e.g. Romer 1986) presumes human capital enlargements and technological improvements to be the main sources of economic growth and development. In augmented neo-classical models (e.g. Mankiw, Romer and Weil 1992) which also include human capital it has been demonstrated that physical as well as human capital are important determinants.

Nevertheless, it still remains an open question whether these factors are the real sources of economic development. There is reason to believe that if physical or human capital enlargements or technological improvements are taking place, the real growth factors must already have been unbound.<sup>1</sup> Accordingly, physical and human capital and technology should – at best – be seen as only *proximate* causes of growth.<sup>2</sup> The still open questions are: What speeds up their accumulation and what is conditional for technological improvements? What are the *ultimate* causes of economic growth, i.e. what is (are) the real *external lever(s)* of economic development?

The present paper hypothesizes that the missing ingredient in the theory of economic growth is incentives which in turn strongly depend on corresponding private property rights. Property rights are at the heart of any economic activity, i.e. an economic activity is and can only be undertaken efficiently if secure private property rights are given. Put differently, nobody will become economically active if he can be cheated out of the fruits of his efforts. In addition, only in a system of well-defined secure private property rights can prices be meaningful and ensure economic efficiency.

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<sup>1</sup> North and Thomas (1973: 2) argue that these “almost universally cited” determinants of growth (innovation, education, capital accumulation etc.) “... are not the causes of growth; they *are* growth.”

<sup>2</sup> This distinction between *proximate* and *ultimate* causes was emphasised by Maddison (1988).

Traditional growth theory makes no mention of incentives and private property rights. The above referred two lines of thought in the traditional theory of economic growth seem to implicitly assume that private property rights are well established. The present paper argues that in reality this is not the case. Obviously, many countries of the Third World lack secure and well-established private property rights and there are many gradations between secure and insecure property rights, so that in fact there are diverging incentives to work, to invest and to innovate. And even industrial countries show distinct variations with respect to property rights; e.g. taxation makes the freedom to keep what one earns differ widely.

The aim of the present paper is to explicitly analyse the impact of private property rights in the framework of an investigation into the causes of economic growth in an international context. The analysis is based on a modified, human capital augmented neoclassical model of economic growth.<sup>3</sup> It is assumed that private property rights have a strong impact on economic efficiency. In addition, it is hypothesised that there may be positive feedbacks from increased efficiency to further improvements of the property rights system. The reason is that gains in economic efficiency may also improve the prospects for additional institutional improvements. In light of this, it seems reasonable to explicitly investigate endogeneity issues, i.e. to test empirically whether the assumed influence of private property rights on economic prosperity is only in one direction (i.e. purely exogenous) or whether there is also a positive feedback from improved economic development to the establishment of more efficient private property rights (i.e. simultaneous determination). In addition, it will be analysed whether the quality of private property rights (also) impacts the traditional determinants of economic growth, i.e. physical and human capital accumulation as well as population growth. If this is also the case, private property rights should be classed with the “ultimate sources” of economic growth.

The paper is organised as follows. The next chapter reviews past and present hypotheses with respect to the importance of private property rights as a prerequisite for economic development. Chapter III briefly describes the results

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<sup>3</sup> This theoretical framework serves as an auxiliary tool to demonstrate the overall importance of property rights in explaining economic growth.

of previous empirical studies, outlines the empirical growth model and presents the empirical evidence. In this section, descriptive data on private property rights give an impression of the international variation in this variable. Ordinary least squares regression techniques are used to evaluate the direct impact of property rights on the pattern of economic growth, i.e. economic efficiency. Instrumental variables and two stage least squares (TSLS) methods are employed to examine possible feedbacks. Imposing restrictions on coefficients reveal possible changes in factor shares. The impact of the quality of property rights on the traditional determinants of economic growth, i.e. factor accumulation, is examined and finally, a “reduced form” equation of an adapted model of economic growth is estimated. Chapter IV concludes.

## 2. Thoughts on Private Property

Just like many researchers of empirical growth analysis today the classical writers in economics at a first sight seem to have neglected the importance of well established private property rights as a prerequisite for economic development. This seems to be particularly true for the English classical writers since in many of their writings there is little directly about property. This is not to say that the classical writers were indifferent to private property but it seems that many took it for granted. The reason may be that the legal situation in England in the 18<sup>th</sup> and 19<sup>th</sup> century — where even the tenant enjoyed legal security — was completely different from that on the European continent.

Adam Smith ([1776] 1976) in “Wealth of Nations” said (compared with the other topics he addressed) relatively little about the importance of private property. But some deeper investigation reveals that he obviously took the importance of property rights for economic development for granted.<sup>4</sup> E.g. only in the end of his comprehensive work (Book V, Chapter III) he stated that “commerce and manufactures can seldom flourish long in any state which does not enjoy a regular administration of justice, in which the people do not feel themselves secure in the possession of their property, in which the faith of contracts is not

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<sup>4</sup> For an overview of the thought of the classical writers on private property see Bethell (1998, esp. Chapters 7 and 8).

supported by law ...”.<sup>5</sup> In his “Lectures on Jurisprudence” he was much more explicit on the importance of property rights since he placed the issue on top. He began his lectures in Glasgow (1762-3) with a statement on the “first and chief design of every system of government” which “... is to give each one the secure and peaceable possession of his own property”.<sup>6</sup>

Malthus ([1820] 1986) regarded the security of private property as “among the most important causes which influence the wealth of nations”<sup>7</sup> but in his further research he concentrated on “the more proximate and immediate causes” of wealth: labour, capital and land. Ricardo (1817) rarely mentioned private property. But investigating taxes on property he stated that: “For the general prosperity, there cannot be too much facility given to the conveyance and exchange of all kinds of property, as it is by such means that capital of every species is likely to find its way into the hands of those, who will best employ it increasing the productions of the country”<sup>8</sup>. Mill ([1848] 1988) applied two chapters (but only in Book II – which was on “Distribution” not “Production”) to the full discussion of property.

In France, where institutional things were much different at that time, Say ([1803] 1834) devoted a whole chapter on “the right of property”. For him the need of security of property was “so completely self-evident that demonstration is quite superfluous”<sup>9</sup>. Only if property is secure, “... can the sources of production, namely land, capital and industry, attain their utmost degree of fecundity”<sup>10</sup>. But he also mentioned that if the “sovereign power” or government “practises robbery itself” property becomes a pure “mockery”. But without the protection of property “...it is impossible to conceive any considerable

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<sup>5</sup> Adam Smith ([1776] 1976: 445).

<sup>6</sup> Adam Smith (1978: 5). These lectures from the 1760s were not published before 1978.

<sup>7</sup> Malthus ([1820] 1986: 249).

<sup>8</sup> Ricardo (1819: 175).

<sup>9</sup> Say ([1803] 1834: 132).

<sup>10</sup> Ibid.: 131.

development of the productive power of man, of land, and of capital; or even to conceive the existence of capital at all ...”<sup>11</sup>

In the mid 1800s private property was viewed with growing suspicion. But with Marx and Engels ([1848] 1963) private property came under direct open attack since “the Communists can summarize their theory in the single sentence: Abolition of private property”<sup>12</sup>. Marx almost always qualified ‘property’ with an adjective, usually disparaging: bourgeois, individual, personal, private, communal and thought private property to be an alienating force, dividing people when they should be united.<sup>13</sup> For him, property was more an effect (of the stage through which ‘history’ was passing) than a cause (of economic development).<sup>14</sup> “From the standpoint of a higher economic form of society private ownership of the globe by single individuals will appear quite as absurd as private ownership of one man by another.”<sup>15</sup> Marx and Engels were not very explicit about the form of property that they believed would prevail in the classless future, but they took it for granted that the immediate successor of (bourgeois) private property would be state ownership, centrally controlled.<sup>16</sup>

Although the 19<sup>th</sup> century can be assumed to have been the heydays of private property in England (and the United States), the acceptance of secure private property rights as an indispensable requirement for economic development in the second half of the century began to fade away. One reason was obviously the Marxian attack, the other reason seems to have been the increasing believe in progress — technological advancements as well as the rise of human nature. In Marshall’s “Principles of Economics” ([1890] 1990) property as an indispensable precondition for economic development was dropped. Instead he concentrated on the distinction between ‘short-run’ and ‘long-run’ analysis. But Marshall seemed to know — as did Marx — , that if private property was to be

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<sup>11</sup> Ibid.: 135.

<sup>12</sup> Cf. Marx and Engels ([1848] 1963: 59).

<sup>13</sup> Bethell (1998: 114).

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Cf. Marx and Engels ([1848] 1963: 66-67)

dismissed, human nature would have to change — in fact they seem to have believed, that it had already changed to higher moral value and to a more public spirit.<sup>17</sup>

After World War I, a large-scale experiment on economic development without private property was conducted in the Soviet Union. This test turned out to be extraordinary costly in terms of life, personal liberty and economic prosperity. It lasted until the 1990s and for quite a long time observers from the West believed it could be even successful.<sup>18</sup> Meanwhile the Western World was hit by the Great Depression. Although the depression was produced by a failure of government and not of private enterprise, “the depression convinced the public that capitalism was defective”.<sup>19</sup> Roosevelt’s New Deal and the following economic recovery lent further support to this general assessment as did World War II. “At the end of the war it looked like as if central economic planning was the wave of the future”.<sup>20</sup> In Europe recovery in the wake of the Marshall Plan further encouraged the believe in government spending and in the Third World central planning was increasingly used as a tool to promote development. Keynesian policies to “manage” the economy were adopted widely and are still in use today.

In Keynesian theory elements of private property and respectively related incentives are completely missing. It seems to be “... a theory about economic activity that depends for its fulfilment upon ... economic activity itself”.<sup>21</sup> It needs no external lever to move the world since supply is simply a function of demand and the multiplicity of exchanges can be imagined as a system of hydraulic circulation where the income stream drives the economy.<sup>22</sup> In this

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<sup>17</sup> Cf. Bethell (1998: 121).

<sup>18</sup> Samuelson and Nordhaus (1989: 841) in the 13<sup>th</sup> edition of their textbook on “Economics” — published in 1989 (!) when the Berlin wall came down — still wrote: “Measured Soviet real GNP has grown more rapidly over the long run than have most of the major market economies.” Cf. Bethell (1998: 28).

<sup>19</sup> Cf. Friedman and Friedman (1980: 94).

<sup>20</sup> Ibid.: 95.

<sup>21</sup> Bethell (1998: 30).

<sup>22</sup> Ibid.

system government expenditures conveniently add power to the income stream and the economy can be controlled from the center (i.e. government), where a few economists only need to fine-tune the power of the system.

In such a world there seems to be no need to refer to small units of production nor their economic incentives. Nevertheless in the 1960s some economists started to examine the property rights issue in more detail and economic theory began to rediscover its real foundations. This revival was closely linked with the names of Alchian (1958, 1965), Coase (1960) and Demsetz (1967) and within a few decades a wide body of research from different scholars has emerged demonstrating the importance of property rights<sup>23</sup>:

Property rights create incentives and transaction costs affecting economic performance, and in turn, the economic conditions of life are a factor influencing changes in property rights.<sup>24</sup> Secure private property rights (again) turned out to be the key to economic prosperity. The reasons became well understood: Private property rights offer individuals unique incentives to weigh up short and long term costs and benefits and thus enable the owner to bring them in accordance with his own preferences. Secure private property rights allow the property owner to pursue his personal goals and if successful to also enjoy the fruits of his labor without having to share them with others. Thus, private property rights give him a much greater incentive to create wealth and to preserve the value of his assets than would do any other form of ownership, above all than would do state ownership or government determination.

If exclusive property rights do not exist, society is wasting resources<sup>25</sup> — attributable to the increase in the cost of transacting. Individuals will substitute free inputs for inputs for which one has to pay. In addition, they will try to maximise their own benefits with little or no regard to the long term value of

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<sup>23</sup> To be sure, "... the true purpose of property rights is not to benefit the individuals or entities holding these rights, but to give them the incentive to increase the value of their assets by investing, innovating, or combining them advantageously with other resources, something which would have beneficial results for society" (DeSoto 1989: 159-60).

<sup>24</sup> Cf. Pejovich (2001: xiv).

<sup>25</sup> Cf. Moran and Nahan (2000: 2).

their assets. If instead property rights are exclusive, individuals will economise on inputs for which they have to pay and owners will attempt to maximise the present value of their resources taking into account future alternative uses. If necessary, they will also make appropriate modifications/improvements to maintain the value of their assets.

Secure property rights are reflected in the rule of law, where according to Hayek (1973: 108) “the aim of the rules of law is merely to prevent, as much as possible, by drawing boundaries, the actions of different individuals from interfering with each other.” Only boundary drawing — as well as redefining them in case of changing circumstances — has made it possible to assign meaningful values (prices) to different inputs and thus allowed efficient trade to take place; and, the drawing of boundaries has also allowed normal legal recourse to adjudicate rights that are in collusion.<sup>26</sup>

In addition, if *transferable (exchangeable)* property rights exist, there is the possibility that one party can resolve a conflict by buying out the property of another (Coase Theorem).<sup>27</sup> Where the interests of parties are in conflict, one option is for one party to buy the opposing interests. E.g. in the case of land, the purchaser may either retain the adjacent property or re-sell it with a caveat on its use.

The main hypothesis that can be drawn from this section is that *secure* and *transferable (exchangeable)* property rights are the key to economic efficiency and wealth. Legal definitions of rights and responsibilities based on firmly understood private property rights are the major instrument for economic progress while at the same time ensuring the sustainability of production. In contrast, as history has shown, ill-defined property rights — as in the case of state-owned property like under communist rule or ruler-owned property like in feudal times — lead to inefficient use of resources and distorted incentives and thus result in less economic well-being if not economic decline. In the following section these hypotheses are empirically tested in a broad international cross-section of today’s countries.

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<sup>26</sup> Ibid.

<sup>27</sup> Ronald Coase (1960).

### 3. Empirical Evidence

Several economic historians have presented evidence that the rise of the Western world was based on gradual but fundamental changes in property rights (cf. e.g. North and Thomas (1973), North (1981) and Rosenberg and Birdzell (1986)). North and Thomas demonstrated that strong population pressure and accompanying distinct changes in relative prices — above all in wage-rental ratios — since the sixteenth century induced strong incentives for restructuring institutional arrangements and property rights and that after that the two most innovative countries, namely Holland and England, could achieve much better standards of living than those European countries lagging institutionally behind. In this context, Rosenberg and Birdzell (1986) emphasized the substitution of taxation for confiscation as a major step toward allowing those in the economic sphere to develop their own ways of creating and accumulating wealth — in contrast to e.g. Asian and Islamic empires which never adopted it (Ibid.: 120). Bethell (1998) presented plenty of evidence in historical puzzles as well as in issues of the day or at home in favour of private property rights as a means to promote economic development.

Econometric evidence on the relationship between private property rights and economic development is relative small, especially if compared with the copious body of empirical literature on the more “traditional” determinants on economic growth. Only very few studies provide a formal empirical analysis of the direct relationship between property rights and economic development.<sup>28</sup> In the first attempts researchers resorted to relatively easy available proxies to capture the quality of private property rights. E.g. Barro (1991) used measures of political stability such as coups and revolutions and political assassinations whereas others — e.g. Kormendi and McGuire (1985), Grier and Tullock (1989) or Scully (1988) — referred to measures of political freedom and civil liberties taken from e.g. Gastil (1983, 1986). But since these variables seem to be quite imprecise to capture the quality of property rights and in addition raise many questions, these first results although statistically significant do not seem to have been overly convincing.

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<sup>28</sup> Although with respect to institutions and economic growth there is a considerable and rapidly growing body of empirical research (Cf. Aron 2000).

Subsequent empirical research provided more direct tests on the quality of property rights. Torstensen (1994) employed two proxies of private property rights from Scully and Slottje (1991). The first was intended to record the degree to which property is state-owned. The other attempted to capture whether individuals are safe from arbitrary seizure of their property. His empirical results indicate that the degree of state ownership do not seem to affect growth rates whereas arbitrary seizure significantly affects growth in a negative way.

Knack and Kiefer (1995) introduced new data sets to measure the quality of property rights, namely indicators compiled by private international investment risk services such as International Country Risk Guide (ICRG) and Business Environment Risk Intelligence (BERI). This seems to have been a marked improvement in the data base. The empirical tests — with and without included rates of factor accumulation — revealed a significant positive relationship between the quality of property rights and economic growth. In addition, property rights also seem to positively impact physical capital accumulation. As a result, there is empirical evidence that institutions that protect private property rights are conducive to economic growth and investment.

Nevertheless, important questions have been left unanswered. The first one refers to causality. There is still the (empirical) possibility that higher growth rates or higher levels of economic development simply lead to improved property rights. Without additional econometrics it is difficult if not impossible to assess whether the estimated relationship is really causal.<sup>29</sup> Another problem is that of simultaneity. Previous studies on property rights only investigated one likely arrow of causality, namely from property rights to economic growth. As has been argued above, there is reason to suggest that improvements in private property rights promote economic growth and that this makes more likely the introduction of additional improvements in the quality of property rights which again will promote economic performance. Thus, according to these additional

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<sup>29</sup> Two more recent and broader studies on social infrastructure and on institutions provided such tests. Hall and Jones (1999) revealed that — after controlling for endogeneity — differences in social infrastructure still account for much of the variation in long-run economic performance around the world. Acemoglu et al. (2001) tried to solve the problem of causality by introducing additional sources of exogenous variation in institutions (i.e. potential settler mortality rates and European settlements).

feedback effects the positive overall impact from property rights on economic development may be higher than previously estimated. A third problem is related to factor accumulation. Previous studies only investigated the impact of property rights on physical capital formation. But there are good reasons to also assume significant impacts on human capital formation and on the growth rate of the population. Improved property rights make investments in human capital more profitable. And they reduce the need to heavily rely on family and kinship ties and on a large number of family members as is the case when private property rights are insecure and/or poorly established. The purpose of this study is to extend the existing empirical analyses by using an econometric approach that avoids the deficiencies mentioned above. We accomplish this through the use of instrumental variables analysis and two-stage least squares estimates.

### ***The Model***

This study focuses on levels of economic development instead of rates of economic growth. The reason is that international differences in growth rates may, in part, be transitory whereas levels of gross domestic product seem to better capture the wealth of nations.<sup>30</sup> The empirical tests refer to the 1975–95 period and will include all countries of the world for which reliable data, especially on property rights, are available.

The theoretical basis is given by the neoclassical approach to economic growth. The starting point is the neoclassical model of economic growth by Solow (1956) as specified by Mankiw et al. (1992), i.e. a human-capital augmented approach. This model is characterized by a neoclassical production function with decreasing returns to all forms of capital. From this general assumption it follows that countries reach different *steady state* levels of per capita income. According to the model these levels depend on the accumulation of physical and human capital and the growth rate of the labor force. This also means that the

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<sup>30</sup> E.g. Hall and Jones (1999: 85) argue that an analysis of economic growth in terms of income levels is preferable because levels capture the differences in long-run economic performance that are most relevant to welfare as measured by the consumption of goods and services.

rate of growth of per capita income during the transition period is also dependent on these determinants (but not in the final *steady state*).

The brief specification of the neoclassical growth model follows Mankiw et al. (1992: 416-18). The production function is given by:

$$[1] \quad Y(t) = K(t)^\alpha H(t)^\beta (A(t)L(t))^{1-\alpha-\beta}.$$

The notation is standard.  $Y$  is output,  $K$  physical capital,  $H$  human capital,  $L$  labor, and  $A$  the level of technology.  $L$  and  $A$  are assumed to grow at rates  $n$  and  $g$ , respectively. The number of effective units of labor,  $A(t)L(t)$ , then grows at  $n+g$ . It is also assumed that the same production function applies to physical capital, human capital and consumption, i.e. one unit of consumption can costlessly be transformed into either one unit of physical capital or one unit of human capital. In addition physical and human capital depreciate at the same rate  $\delta$ . Finally it is assumed that  $\alpha$  and  $\beta$ , the factor shares of physical and human capital respectively, sum up to less than unity. This implies that there are decreasing returns to all kinds of capital. After some reformulations and substitution into the production function as well as taking logs the following equation for the level of income per capita in the *steady state* emerges:

$$[2] \quad \ln \left[ \frac{Y(t)}{L(t)} \right] = A(0) + gt - \frac{\alpha + \beta}{1 - \alpha - \beta} \ln(n + g + \delta) \\ + \frac{\alpha}{1 - \alpha - \beta} \ln(s_k) + \frac{\beta}{1 - \alpha - \beta} \ln(s_h).$$

The equation shows how income per capita depends on the growth rate of the labor force and on the accumulation of physical and human capital. The coefficients of the factors of production are functions of the factor shares.

According to Mankiw et al. (1992: 410-11) the term  $A(0)$  reflects not only technology but also resource endowments, climate, institutions, and so on and may thus differ between countries. They assume that

$$[3] \quad \ln A(0) = a + \varepsilon,$$

where  $a$  is a constant and  $\varepsilon$  is a country specific shock. In their estimation equation these factors are neglected and are — if present — reflected in the constant term and in the error term.

In the present study the impact of property rights on economic development is of primary interest. To estimate this effect, a property rights variable explicitly enters the estimation equation as an additional variable – similar to  $A(0)$  as in Mankiw et al. (see above). The coefficient of this variable will indicate changes in economic efficiency due to changes in the quality of property rights.

### ***Estimation***

The estimation procedure is as follows. In a first step the equation for gross domestic per capita income as specified by Mankiw et al. (see above) — i.e. without property rights — is estimated. This equation serves as a reference point in the further analysis. Next, the equation is re-estimated taking explicitly into account the differences in private property rights. Changes in the estimated coefficients as well as in the coefficient of determination are then assumed to be due to the presence of a property rights variable.

The international data sample covers the 20 years between 1975 and 1995. The main data source is Penn World Tables (Heston and Summers 2000). These data are from real national accounts statistics and include among other things real income, investment and the working age population for almost all countries of the world. The data are annual and cover the period 1960–92. The data for 1992–95 are extrapolated according to IMF statistics. Variable  $n$  is measured as the average rate of change of the working age population. Savings  $s$  are proxied

by the average shares of real investment (including government investment) in real gross domestic product.  $Y(t)/L(t)$  is “productivity”, i.e. real gross domestic product per capita of the working age population in 1995. The data source for human capital accumulation  $h$  is Barro and Lee (2000). This variable is measured as the average number of years of secondary schooling of the working age population in 1985. As in Mankiw et al. (1992: 413-14) it is assumed that  $g$  — the rate of technical progress is 2 percent — and  $\delta$  — the rate of depreciation of physical capital — is 3 percent. Thus  $g + \delta$  is 5 percent per year.

The international data set on property rights is from Fraser Institute (Gwartney and Lawson 1990) and is based on various reports from PRS Group (International Country Risk Guide) and from Business Environment Risk Intelligence (BERI). The index is intended to capture the legal security of property rights and the enforcement of contracts. It has three components. The first component is the legal security of private ownership rights (risk of confiscation) with a weight of 34.5 percent.<sup>31</sup> The second component refers to the viability of contracts (risk of contract repudiation by the government) weighted 33.9 percent. The third component (31.7 percent) is the rule of law, i.e. legal institutions supportive of this principle including access to a non-discriminatory judiciary. The index is defined between 0 and 10. A rating close to 10 indicates that property rights are well established and that the quality of the supportive legal system is high.

Some illustrative descriptive statistics of the variables used are depicted in Table 1. Gross domestic product per capita in 1995 ranged from 369 \$ in Niger to 18855 \$ in the United States. The average share of investment in gross domestic product was 17.8 percent. The average growth rate of the working age population varied from 0.16 percent in Denmark to 4 percent in Kenya. Human capital, proxied by the average number of years of secondary schooling of the working age population, on average was 1.5 years. The index of the quality of property rights had a mean of 5.48. Luxembourg, the Netherlands, Switzerland and the United States ranked highest (10) whereas the index of property rights in Bolivia ranked lowest (0.72).

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<sup>31</sup> The weights have been adopted from Gwartney and Lawson (1990).

Table 1 — Some Descriptive Statistics of the Variables Used, 1975–95

Variable <sup>a</sup>	Mean	Maximum	Minimum	Std. Deviation
RGDP	6 178	18 855	369	5 525
INV	17.82	35.12	1.28	7.65
POP	1.89	4.00	0.16	1.08
HUM	1.51	4.77	0.05	1.01
PROP	5.48	10.00	0.72	2.59
PHER	2.40	5.00	1.00	1.08

<sup>a</sup>Statistics based on common sample (N=84). RGDP, real gross domestic product per capita (worker) in 1995 (purchasing power parities). INV, average share of investment in gross domestic product in 1976–95. POP, growth rate of working age population in 1975–95. HUM, human capital proxied by average years of secondary schooling of working age population in 1985. PROP, property rights index (Fraser) in 1985. PHER, property rights index (Heritage) in 1995.

*Source:* Barro and Lee (2000). Gwartney and Lawson (2000). Heston and Summers (2000). International Monetary Fund (var. iss.). Johnson and Sheehy (1995). Republic of China (2000). — Own calculations.

A two-step procedure is applied estimating equation (2). The first set of regressions consists of several unrestricted estimations, i.e. restrictions to estimate factor shares are not imposed. The first regression also ignores international differences in the quality of property rights and serves as a benchmark in the further analysis. In the next regression the property-rights index is included as an additional exogenous variable. Significance or insignificance of the coefficients as well as changes in the coefficients of determination can give a first indication of the importance of property rights. If the coefficient of the property rights variable turns out to be statistically significant, additional empirical tests will be applied to detect possible problems of causality and to correct for them, if necessary. In a second set of regressions, restrictions on all previous equations are imposed to get estimates of the underlying factor shares.

The results of the first set of regressions are presented in Table 2. In the first equation (Column 1) all determinants show the expected signs and are statistically significant at the 99 percent level. The regression predicts that

Table 2 — Regressions to Explain Levels of Gross Domestic Product in 1995 (97 Countries), 1975–95

Equation <sup>a</sup>	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) TOLS
Endogenous Variable <sup>b</sup>	RGDP	RGDP	PROP	RGDP	RGDP
Exogenous Variable <sup>c</sup>					
C	9.613 (9.77**)	8.535 (8.27**)	2.951 (3.39**)	6.233 (5.72**)	6.233 (4.31**)
INV	0.740 (6.06**)	0.590 (4.95**)	0.152 (1.36)	0.354 (2.70**)	0.354 (2.04*)
POP	-1.837 (-4.04**)	-1.404 (-2.97**)	-0.698 (-1.68 <sup>+</sup> )	-0.437 (-0.90)	-0.437 (-0.68)
HUM	0.517 (6.06**)	0.501 (5.89**)	-0.102 (-1.26)	0.511 (6.28**)	0.511 (4.73**)
PROP	.	0.438 (3.96**)	.	1.155 (5.24**)	1.155 (3.95**)
PHER	.	.	-0.606 (-4.66**)	.	.
RES	.	.	.	-0.905 (-3.64**)	.
Adjusted R <sup>2</sup>	0.74	0.78	0.40	0.82	0.67
S.E. Regression	0.58	0.53	0.46	0.47	0.62
N(Countries)	97	88	84	84	84
F-Test	93.63**	79.43**	15.02**	74.27**	52.01**

<sup>a</sup>Estimation using a cross-section of countries. T-test statistics in parentheses. <sup>+</sup>significant at 90 percent, \*at 95 percent and \*\*at 99 percent. OLS, ordinary least squares. TOLS, two stage least squares. — <sup>b</sup>RGDP, real gross domestic product per capita (worker) in 1995 (purchasing power parities). PROP, property rights index (Fraser) in 1985. All variables in logs. — <sup>c</sup>INV, average share of investment in gross domestic product in 1976–1995. POP, growth rate of working age population in 1975–1995 plus 5 percent (on account of technological progress and capital depreciation). HUM, human capital proxied by average years of secondary schooling of working age population in 1985. PROP, property rights index (Fraser) in 1985. PHER, property rights index (Heritage) in 1995. All variables in logs. RES, residual.

Source: Table 1. — Own calculations.

countries converge to different *steady state* levels of gross domestic product. These levels are positively related to physical capital accumulation and negatively related to population growth. This implies, that if the growth rate of the

working age population is high physical capital has to be spread more thinly per worker and the achievable level of gross domestic product is lower. As in the case of physical capital, human capital formation is also positively related to gross domestic product. The investigated determinants “explain” about three quarters of the variation of per capita gross domestic products in 1995. The estimation thus confirms the results of Mankiw et al. (1992: 420) for a different sample period.

If the quality of property rights is included as an additional variable (Column 2), the coefficients of some of these determinants change. Controlling for property rights, the positive impact of physical capital accumulation is reduced and the negative impact of the growth rate of the labor force is also lower. The coefficient of the human capital variable nearly stays the same. The coefficient of the property rights variable turns out to be positive as expected and to be statistically highly significant at the 99 percent level. Thus, the steady state level of per capita gross domestic product which countries can achieve also strongly depends on secure and well-defined property rights. Gains in economic efficiency and wealth seem to be much stronger if the quality of property is high so that economic incentives can unfold their strength.

### *Are Property Rights Exogenous?*

Nevertheless, the impact of property rights on economic development may be ambiguous. As was argued above, the arrow of causality can in fact run from economic development to property rights (“reverse causation”) or additional feedback effects may be at work (“simultaneity”). To account for these possibilities it seems reasonable to carry out some additional econometric tests. An appropriate tool is the Hausman specification test (Hausman 1991).

The first step in this test is to run an auxiliary regression in which the property rights index is regressed on the above hypothesized exogenous variables (the constant, physical and human capital accumulation and the growth rate of working age population) and an instrumental variable. As an instrumental vari-

able we chose the property rights index from a different data source.<sup>32</sup> The residuals of this additional regression in Table 2 (Column 3) are saved in a variable called RES.

The next step is to re-estimate equation (2) including the residuals (RES). The results are presented in Column 4. Under the null hypothesis that property rights are exogenous the variable RES should not be significant. As can be seen RES is statistically significant at the 99 percent level. Thus the null hypothesis has to be rejected. Per capita gross domestic income and the quality of property rights seem to be simultaneously determined. This simultaneity causes ordinary least squares — as in Column 2 — to be biased and inconsistent.<sup>33</sup>

The equation in Column 4 already contains the simultaneity-corrected coefficients for the exogenous variables. However, their standard errors are not correct. To also obtain correct standard errors and t-statistics a two-stage least squares regression can be run (Column 5).<sup>34</sup> In this final equation physical and human capital as well as property rights are still significant at the 99 percent level. The growth rate of the working population is not. Compared with the original ordinary least square estimates (Column 2) the coefficient of physical capital accumulation is considerably reduced. The coefficient of human capital is about the same. The coefficient of property rights turns out to be more than twice as high as in the original ordinary least squares regression. Thus, correcting for the simultaneity bias reveals that the impact of property rights on the wealth of nations turns out to be much higher.

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<sup>32</sup> This variable seems to be well suited to be used as an instrument: At the 99 percent significance level, this variable is significantly correlated with the property-rights index (from Fraser Institute) but not with the errors of the regression in Column 2. Note that the measurement concept of this variable is different: A low value, e.g. 1, indicates well established property rights whereas a high value, e.g. 5, means seriously distorted property rights. The data source is Heritage Foundation (Johnson and Sheehy 1995). The data refer to 1995.

<sup>33</sup> Pindyck and Rubinfeld (1998: 353).

<sup>34</sup> The regressors in Column (4) and (5) are identical.

### *Imposing Restrictions*

To complete the analysis and to get estimates of the factor shares of this modified neoclassical growth model, one may follow Mankiw et al. (1992: 420) and re-estimate all equations with parameter restrictions imposed.. The estimates are presented in Table 3. The benchmark regression — without property rights as an exogenous variable — in Column 1 reveal factor shares of  $\alpha = 0.24$  and  $\beta = 0.30$ . The magnitude of  $\alpha$  is somewhat lower than in Mankiw et al. (0.31) whereas  $\beta$  is slightly higher (0.28). Inclusion of property rights (Column 2) into the growth model yields slightly lower values (0.22 and 0.27 respectively). The correction for the simultaneity bias leads to a further decline to 0.18 and 0.26 respectively. Thus the inclusion of property rights as a determinant of economic development reduces the relative importance of physical and human capital as factors of production whereas the regression coefficients of the property rights variable remain about the same.

Taken as a whole, the above results clearly indicate that property rights and the rule of law promote economic efficiency and that positive feedback effects seem to play an important role. Countries which improve the quality of their property rights can thus reach higher levels of per capita income in the steady state.

Table 3 — Restricted Regressions to Explain Levels of Gross Domestic Product in 1995 (97 Countries), 1975–95

Equation <sup>a</sup>	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) TOLS
Endogenous Variable <sup>b</sup>	RGDP	RGDP	PROP	RGDP	RGDP
Exogenous Variable <sup>c</sup>					
C	8.548 (37.94**)	7.951 (29.88**)	1.786 (8.24**)	7.028 (20.41**)	7.028 (15.46**)
(INV-POP)	0.782 (6.72**)	0.601 (5.26**)	0.189 (1.73 <sup>+</sup> )	0.332 (2.52*)	0.332 (1.91 <sup>+</sup> )
(HUM-POP)	0.560 (7.37**)	0.526 (7.18**)	-0.047 (-0.67)	0.474 (6.79**)	0.474 (5.14**)
PROP	.	0.448 (4.13**)	.	1.139 (5.34**)	1.139 (4.05**)
PHER	.	.	-0.621 (-4.77**)	.	.
RES	.	.	.	-0.884 (-3.66**)	.
Adjusted R <sup>2</sup>	0.74	0.78	0.40	0.82	0.68
S.E. Regression	0.58	0.52	0.46	0.47	0.61
N(Countries)	97	88	84	84	84
F-Test	135.49**	106.63**	19.17**	93.87**	70.84**
Implied I	0.24	0.22	.	0.18	0.18
Implied $\vartheta$	0.30	0.27	.	0.26	0.26
<sup>a</sup> Estimation using a cross-section of countries. T-test statistics in parentheses. <sup>+</sup> significant at 90 percent, *at 95 percent and **at 99 percent. OLS, ordinary least squares. TOLS, two stage least squares. — <sup>b</sup> RGDP, real gross domestic product per capita (worker) in 1995 (purchasing power parities). PROP, property rights index (Fraser) in 1985. All variables in logs. — <sup>c</sup> INV, average share of investment in gross domestic product in 1976–1995. POP, growth rate of working age population in 1975–1995 plus 5 percent (on account of technological progress and capital depreciation). HUM, human capital proxied by average years of secondary schooling of working age population in 1985. PROP, property rights index (Fraser) in 1985. PHER, property rights index (Heritage) in 1995. All variables in logs. RES, residual. — I, factor share of physical capital. $\vartheta$ , factor share of human capital.					

Source: Table 1. — Own calculations.

### *Factor Accumulation*

Do property rights also have an impact on physical and human capital accumulation and on population growth? As had been argued above, there should be strong causal links between the quality of property rights and the rule of law on the one side and the accumulation of physical and human capital and population growth on the other. With respect to physical capital accumulation the impact seems to be obvious. Physical capital is “shy” and therefore hides if the risk of confiscation is high due to a lack of private property rights. International capital inflows to an insecure country will also be small and perhaps negligible, whereas capital flight out of such a country may be considerable. There are also reasons to suggest that personal savings will be held in forms which can easily be hidden, i.e. in cash, gold, jewelry etc. But capital held in these forms is also “dead capital” (DeSoto 2000: 6). It does not bear interest and it cannot be used as a security for raising a mortgage. In addition, if a low quality of private property rights also means that there is a distinct lack of access to formal business – as is the case in many developing countries (DeSoto 1989) — a large part of business activities can only be done informally. In such a country the amount invested in machinery and equipment will thus be smaller than it otherwise would be and it will also be in other forms, preferably in only light and flexible machinery and equipment which can easily be removed and hidden from the authorities.

Human capital accumulation will also suffer from insecure private property rights. If access to formal business is seriously restricted, the returns to education will be lower as will be the demand for formal education. Education will then eventually take place in family-run enterprises and be more in the form of learning-by-doing rather than in formal schooling. Lack of formal housing due to inadequate access to private property will further strengthen such tendencies. The reason is that in areas of illegal housing the supply of formal education — above all higher education — is also often totally missing.

In addition, insecure property rights and a bad rule of law are incentives to raise children which will foster population growth.<sup>35</sup> The reason is that in an insecure

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<sup>35</sup> Cf. Norton (2002).

environment the traditional family ties become more and more important because they are at least in part a substitute for good property rights. Family-run enterprises as well as family- or clan-related business lines will thus form a large part of the formal and informal economy.

Thus, there are unambiguous causal links between the quality of property rights and the accumulation of physical and human capital and population growth. Such links are also suggested by the empirical results in Table 2: The inclusion of property rights as an exogenous variable in the regressions made the coefficients of physical capital accumulation and population growth decline and lose statistical strength. But obviously the relationship was not strong enough to lead to insignificant coefficients, i.e. did not cause severe problems of multicollinearity.

Another indication of the strength of the relationship between property rights and the other exogenous variables of the growth equation is given by the correlations of Table A1. As can be seen all coefficients exhibit the expected sign and are statistically significant at the 99 percent level. Additional regression analyses confirm these findings (Table 4). In these equations the investment share, the growth rate of the working age population and human capital accumulation respectively are the endogenous variables. In each equation the only exogenous variable is property rights which in all cases exhibits the expected sign and is statistically significant at the 99 percent level. The coefficient of determination varies between 0.13 and 0.16. This is quite remarkable since in all equations the quality of property rights is the only regressor and the number of total observations is quite high. Since all variables are in logs the coefficients represent elasticities. Thus it is easy to assess the underlying magnitudes of the relationships: A 10 percent improvement in the index of property rights would lead to an increase in the average investment share of about 4.5 percent. Whereas the magnitudes involved with long-term population growth and human capital accumulation are  $-5.9$  percent and  $5.8$  percent respectively.

Table 4 — Regressions to Explain Factor Accumulation, 1975–95  
(103 Countries)

Equation <sup>a</sup>	(1)	(2)	(3)
Endogenous Variable <sup>b</sup>	INV	POP	HUM
Exogenous Variables <sup>c</sup>			
C	1.978 (11.06**)	1.362 (6.25*)	-0.818 (-3.28**)
PROP	0.447 (4.10**)	-0.589 (-4.47**)	0.580 (3.87**)
Adjusted R <sup>2</sup>	0.14	0.16	0.13
S.E. Regression	0.63	0.77	0.84
N(Countries)	100	103	91
F-Test	16.83**	19.98**	14.97**

<sup>a</sup>Estimation using a cross-section of countries. T-test statistics in parentheses. \*significant at 95 percent and \*\* at 99 percent. — <sup>b</sup>INV, average share of investment in gross domestic product in 1976–1995. POP, growth rate of working age population in 1975–1995. HUM, human capital proxied by average years of secondary schooling of working age population in 1985. All variables in logs. — <sup>c</sup>PROP, property rights index (Fraser) in 1985 in logs.

Source: Table 1. — Own calculations.

### ***Reduced Form***

The estimates in Tables 2 and 3 reveal that the quality of private property rights exerts a statistically highly significant impact on the level of economic development. In addition, empirical evidence in Table 4 indicates that the quality of property rights has an influence on the accumulation of the factors of production, i.e. that additional “channels” with respect to investment in physical and human capital as well as with respect to population growth are also important. It is therefore reasonable to assume a model of economic growth which focuses on the direct relationship between the quality of property rights — as the only exogenous variable — and economic development. In such a model the equations of Tables 2 – 4 can be interpreted to be only the “structural equations” of the model whereas the equation of the “direct” relationship between property rights and the level of economic development can be viewed as the “reduced form”.

Estimating this “reduced form” yields<sup>36</sup>:

$$[4] \quad \ln \text{RGDP95} = 6.324 + 1.161 \ln \text{PROP} \quad \text{adjR}^2 = 0.32; \text{ S.E.} = 0.97$$

$$\quad \quad \quad (23.03^{**}) \quad (6.99^{**}) \quad \quad \quad \text{N} = 104; \quad \text{F} = 48.93^{**}$$

The regression shows a highly significant relationship at the 99 percent level. The coefficient has a value of 1.161 with a standard error of 0.166. The magnitude of the parameter of the property rights variable is nearly the same as the one obtained in Tables 3 and 4 after correcting for the simultaneity bias. The regression’s coefficient of determination is — given the large number of observations (N = 104) and the fact that there is only one exogenous variable — remarkably high. The estimated coefficient again indicates that a doubling of the index of property rights — as could be done relatively easily in the case of a poor developing country, e.g. say from 2 to 4 — would more than double the level of per capita gross domestic product in the *steady state*.

In addition, it should be noted that this magnitude seems to be on the low side. Given the above empirical results when correcting the simultaneity problems within the neoclassical model there is reason to believe that such simultaneity problems may also be present with respect to the reduced form estimation: Due to feedback effects the overall impact could be even stronger. But to arrive at satisfying simultaneity-corrected estimates seems to be hard, mainly because of only low degrees of freedom and problems of under-identification. Further research with respect to additional exogenous sources of variation in private property rights is needed to solve these problems.

Taken together, well established property rights seem to be one of the most important if not *the* most important precondition and the most promising recipe for economic well-being and development — as foreseen by the classical economists. And, one might add, compared with other economic cures a relatively inexpensive one.

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<sup>36</sup> Notation as in Tables 2 and 3.

## 4. Conclusions

The central hypothesis of this study was that secure and well-established property rights and the rule of law are a powerful tool to promote economic growth. The hypothesis was tested in an international cross-section of countries in 1975–1995. Empirical tests using a modified human capital augmented neo-classical growth model revealed that property rights have a significant positive impact on economic efficiency and the wealth of nations in 1975-1995. Compared with the more traditional determinants of economic growth such as physical and human capital accumulation and the growth rate of the working-age population the impact of property rights is quite remarkable.

As could be demonstrated, rising income levels lead to further improvements in the quality of property rights. This implies that property rights and economic development are determined simultaneously. Hausman specification tests significantly support this relationship. The overall impact of property rights on economic development is considerable: A doubling of the property rights index more than doubles per capita income.

In addition it could be shown that property rights also impact the accumulation of the factors of production. Improved property rights significantly raise the accumulation of physical and human capital whereas the growth rate of the working-age population is significantly decreased. Thus the economic effects of property rights on factor endowments are as expected.

Given this additional area of influence it seems reasonable to class property rights among the *ultimate* sources of economic growth. In contrast, the more traditional determinants (physical and human capital accumulation as well as population growth) should be classified to only be *proximate* sources. Obviously, in such a model of economic growth the relationship between property rights and economic growth is of central importance and would represent the *reduced form* of the model — whereas the other equations estimated in this paper could be thought of as *structural equations*. Estimating the direct relationship between property rights and end-of-period per capita incomes yields a highly significant regressor and again indicates that a doubling in the index of property rights improves living standards more than twice. Thus, the present property rights approach seems to lend strong support to Mancour

Olson's view that in the area of institutions there are to gain "big bills left on the side-walk" whose magnitude amounts to trillions of dollars (Olson 1996).

Given these results, mainstream development economics since WWII seems to have been off the track. One misleading track was thinking in purely materialistic terms, i.e. to assume that just mixing inputs like some labor with plenty of human and physical capital would create economic growth and to believe that money alone could promote economic development. Another (related) misleading scent was the resort to planning, which was also thought to be scientific (Bauer 1972: 72). But planning too did not yield the expected results. On the contrary, the disparity in levels of per capita incomes till the end of the century has tended to rise.

One of the most important reasons for this outcome seems to have been neglected incentives because of ignoring the importance of secure private property rights. But only if institutions are working as they should could market forces unfold their strength. Within these secure and well-defined property rights seem to be not only the "missing ingredient" (DeSoto 1993) but an indispensable prerequisite for economic development as the classical economists have believed a long time ago.

## Appendix

Table A1 — Correlation Matrix of the Variables Used, 1975–95

Variable <sup>a</sup>	RGDP	INV	POP	HUM	PROP
INV	0.69**	.	.	.	.
POP	-0.66**	-0.48**	.	.	.
HUM	0.83**	0.57**	-0.64**	.	.
PROP	0.81**	0.59**	-0.52**	0.59**	.
PHER	-0.77**	-0.63**	0.49**	-0.63**	-0.70**

<sup>a</sup>Statistics based on common sample N=(84). \*\*significant at 99 percent. RGDP, real gross domestic product per capita (worker) in 1995 (purchasing power parities). INV, average share of investment in gross domestic product in 1976–95. POP, growth rate of working age population in 1975–95. HUM, human capital proxied by average years of secondary schooling of working age population in 1985. PROP, property rights index (Fraser) in 1985. PHER, property rights index (Heritage) in 1995.

Source: Table 1. — Own calculations.

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