

Do Legal Institutions Matter for Growth: Evidence from Africa*

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“It is difficult to make our material condition better by the best law, but it is easy enough to ruin it by bad ones.”

Theodore Roosevelt (1858-1919)

The literature on the importance of institutions is straight forward: they matter. Whether a country wishes to have more growth or more equality it is the institutional structure that will determine how effectively the goals are reached. Douglas North (1981) observed that “institutions frame all human behavior...” through organizations, formal and informal groups, laws and social norms to name a few. La Porta et al (1999), in a study on the quality of government, evaluated what aspects of a government are good for growth. They used measures of government intervention, public sector efficiency, public good provision, size of government and political freedom and found that countries with certain attributes did more poorly than others without those attributes. For example, countries that are poor, close to the equator, ethnolinguistically heterogeneous, use French civil law or have high proportions of Muslims and Catholics all exhibit mediocre government output.

Easterly and Levine (1997) offer evidence that supports the claim that ethnic heterogeneity in Africa is the cause of poor government performance. That is, when there are large numbers of differing ethnic backgrounds the group that has control will put policies in place to keep themselves in power. There is an abundance of examples to back up that claim. Iraq under Saddam Hussein is a perfect example. His “religious” affiliation was the minority so he sought “policies” that would allow him to keep power.¹ Those policies were obviously not good for growth or the development of the country.² Seeing that the institutions of a country can hinder growth it is important to understand which ones matter and how they effectively change

¹ The terms “religious” and “policy” are used rather loosely here, as those were probably justifications for his sadistic approach to dealing with his opponents.

² The author is not arguing that the current state of Iraq is good for growth either.

people's behavior. This study seeks to uncover a small part of a huge body of literature on growth: which legal institution is better for growth—British common law or French civil law—and whether the argument that law has no influence on growth is true.

I look to Africa as a natural experiment in that there are common and civil law countries side by side (in some situations), and the legal structures were inherited, for the most part, through the same mechanism—colonization. There are several approaches taken in this paper to determine the importance of legal structure. First, some simple descriptive statistics are examined followed by a simple cross sectional regression. A simple matching technique will be used to group countries together by their predicted growth rates. A more sophisticated technique will be used to pair countries based on law and predicted growth and take the difference between all pairs.

The analysis showed that legal institutions matter for growth and civil law countries tend to have worse performance than common law nations, which is what the law and finance theory proffers. Also, the idea that law is not an important variable gained no ground in this study. The matched regression based on law improved the estimates and the significance of the variables suggesting that law accounts for many unobservable variables or unquantifiable indicators; hence, not accounting for any legal institution could bias the results. The remainder of the paper is structured into two parts. Part one deals with legal issues and part two deals with econometric issues. Section one looks at the historical development of civil and common law nations, and section two looks at why law should be important for growth. Section three looks at why one legal institution is better than another and especially looks at the law and finance theory, while section four outlines some alternative theories for the link between law and growth. Section five is the start of part two and looks at the literature for different types of matching that have been

used in different areas of study. Section six describes the data used; the econometric approach employed and then presents the results. A conclusion is offered in section seven which also points out areas where this study could be improved, areas of further study and some possible policy implications.

Part I

I. Historical Background

It is often argued that common law is better for growth than civil law (Hayek, 1960), (Posner, 1973), but others argue civil law is better (Tullock, 1997) or that law should not be viewed in terms of efficiency at all (Rizzo, 1980; Aranson, 1992; Hadfield, 1992). Mahoney (2000) found that common law countries grew at a faster rate than civil law countries during the period 1960-92. He proposes that common law is investor friendly and civil law is more interventionist. How each legal system got to this point offers interesting insights into the differing views on how and who the law should protect.

Common law.

Beck, Demirgüç-Kunt and Levine (2001), in a very cogent manner, spell out just how common and civil law got their start and it follows from the reasoning of North's (1990) path dependence in that past historical processes helped shape and still are influencing the current path of things. Beck et al. (2001) point out that in 1086 C.E. William the Conqueror ordered the writing of the Domesday Book³ which compiled all claims on property—land, livestock, ponds, farming equipment and manpower. By defining property rights William the Conqueror forever changed the relationship between King and Baron. Property was no longer for the taking by the Crown; there were now clearly defined rules. Overtime laws were put in place that treated large land owners as property right holders and not as “tenants to the King” (Beck & Levine, 2003).

By the 1600's, English law had established itself as one that enforced private property rights. The conflict between parliament and the crown during the 15th and 16th centuries saw English kings trying to sell property to deal with budget issues. The parliament and courts

³ It took this name because it was supposed to be forever.

asserted the court was above the king while King James I averred that the King was above all. In 1688, the Stuarts were dethroned and common law won the right to reduce the crown's authority to expropriate private property for personal gain.

Civil Law.

Across the English Channel a much different legal structure took shape. In 534 C.E., the Byzantine Emperor Justinian had Roman law compiled into a single text often referred to as the Justinian texts (Beck et al., 2001). Until that moment Roman law was above all individuals and the state, but after the assemblage of the Justinian texts the emperor was placed above the law (Hayek, 1960). Also, emperor Justinian had effectively granted himself a monopoly over the interpretation of the law (Dawson, 1968). Regardless of the fact that the Justinian texts never took hold, when they were rediscovered at the end of the 11th century they were pored over by scholars which led to a compilation of literature that influenced all of European law-especially French civil law (Beck et al., 2001).

French law at the end of the dark ages was an amalgamation of customary laws that were based on case law and the Justinian texts (Dawson, 1968). This left the law fragmented with the deliberations over the appropriate interpretation of the law being done in private, whereas English law was deliberated in an open forum. By the end of the 1700's the judiciary was a position that could be bought and was oft granted to associates of the crown. This led to rich elites being in a position to promote laws that help the rich elite (Dawson, 1968). When the French revolution hit there was a sense that judges would always promote their interests at the expense of the majority. Jurisprudence was vehemently snuffed out, the state was propped up above the court and the introduction of the Code Napoleon rendered judges miniscule bureaucrats.

Perhaps the American journalist, satirist and social critic Henry Louis Mencken (1880-1956) summed it up best when he stated “A judge is a law student who grades his own papers.” Though speaking from a different time and situation it is still fitting: if judges are the final say on the law then the state is at the mercy of the courts.⁴ Understanding the origins of the two legal systems allows one to see how they have developed into their current forms and how they have led to their respective outcomes.

II. Importance of Law

Hayek (1960) and Posner (1973) both lauded common law for its superiority over civil law but for different reasons. Hayek based his view on the fact that governments have less power in common law countries whereas Posner believed that common law was just more efficient. It is Posner’s idea of efficiency that has become the mantra of the law and economics movement. Regardless of which avenue it takes, the idea that a legal system is important for a country is intuitive. If claims on property are not secure then internal and external investors will not allocate their resources to a country.⁵ Even at the most micro of levels property rights surely matter.

Tom Bethell (1990), in a well documented book, outlined the importance of property rights and very convincingly shows that the Irish flight into the new world was not because of a potato famine, but rather due to a lack of secure property rights.⁶ This led to unwillingness to invest in the betterment of one’s lot, as there was no “system of residual claimancy.”⁷ A whole nation suffered because individuals knew that any improvement made to their station would be taken away by the gentry. He gives several examples how at the smallest levels secure property

⁴ It really becomes a question of which is worse an all powerful state or a fragmented and somewhat powerful court.

⁵ The term “property” refers to any form it may come in: land, capital, intellectual et cetera.

⁶ The late blight only exacerbated the problem of food scarcity.

⁷ This is a phrase that Dr. Davis used in his econ development class.

rights can determine if a system functions properly.⁸ There is a bevy of literature that stresses the importance of property rights and the protection of them.

Grossman and Kim (1995) develop a general equilibrium model for the allocation of resources between two activities: appropriative and productive. They find that as long as property rights are highly secure the cost of appropriative activities will be high. That is to say if property rights are indeed secured—through laws—then the cost of trying to steal those rights will be rather large. In their model increased security essentially increases the transaction cost of trying to steal one's private property. The reverse can also be said: low security for property rights decreases the transaction cost of illegally obtaining the property, and if Coase (1960) is right then the illegal acquisition of such rights may happen.

North (1990) believes that if a judicial system is ineffective in enforcing contracts then a critical part of economic growth is missing, and Mauro (1995) backs this claim up when he finds evidence that suggests a negative relationship between corruption and investment, as well as growth: as corruption increases investment and growth decrease significantly in both economic and statistical terms.

La Porta et al. (1999) found evidence that countries with socialist law origins tend to have worse protection of property rights and a more intrusive government which in turn lowered the economic output of a country. In an earlier study, La Porta et al. (1997) found that countries with poorer protection of investor rights tend to have smaller and less dynamic capital markets, and Barro (1998) finds that an increase by one point in the rule of law index increases growth by a 0.5 percentage point.⁹ He suggests that greater maintenance of the rule of law is conducive for

⁸ He also suggests that Jamestown and Plymouth suffered from the tragedy of the commons and was only fixed once individuals were allowed to keep a portion of what they made as opposed to giving it to the commune.

⁹ He uses the rule of law index compiled by Knack and Keefer (1995), which are subjective measures but have been found to be rather reliable.

growth. Easterly and Levine (1997) looked at the connection between the legal environment and financial development and found three important correlations: countries with high creditor priority, and are receiving the full present value of claims on corporations; enforcing contracts effectively; and promoting accurate financial reporting have more developed financial intermediaries.

The point is clear that if the law does not respect individual property rights or investors do not feel like they can receive a return on investment, due to poor investor rights, then growth will be stymied. The ability of a legal system to influence investment can come from different avenues, and it has been argued that the link between law and growth maybe a proxy for some other correlation.

III. Law & Finance Theory

The law and finance theory, as conceived by LaPorta et al. (1997, 1998, 1999 & 2008), contend that financial development is influenced by the relationship between the rights of individual investors and the state, and that this relationship shaped the political environments of the three major legal traditions – British common law, French civil law and German civil law.¹⁰ The dynamic view of the law and finance theory argues that there are two channels by which the law can shape institutions.

Political Channel.

As outlined earlier, the English common law evolved to protect private property – in any form – from the crown, whereas the French system evolved into one that gives the state power over all (Beck et al., 2001). This dichotomy led to differing confidence levels for investors.

Under the common law system property owners had a confidence that their dealings were safe

¹⁰ The current study only looks at British and French law, as German law is quite frequently cited as being a hybrid between the two.

from illegal confiscation (North & Weingast, 1989), and when juxtaposed with civil law the distinction is clear. As Mahoney (2000) stresses, the states power over the court, under civil law, led to less rights being granted to investors. The theory then states that through conquest and colonization the spread of legal systems took place, and thus can be traced back to these original influences. The “political” aspect of the law and finance theory differs from the “adaptability” channel by the way in which the law is formed, but they both influence financial institutions.

Adaptability Channel.

The “adaptability” process looks at how the differing legal systems deal with changing investment climate and stresses that those countries that are better able to rid themselves of inefficient laws end up with more mellifluous capital markets (Beck et al., 2002). This was Posner’s (1973) argument in favor of common law: as inefficient laws were challenged by efficient ones the inefficient laws should be replaced. The political and adaptability channels are not exclusive and may work simultaneously, but there is still a distinction: one looks to the rights of property owners and the other to the ability of the courts to deal with changing investment climate (Beck et al., 2002).¹¹

Through anecdotal evidence it may be hard for one to see that one legal group is better for growth than another. For example, if one looks to England and France’s economy one sees two very robust economies. If an investor were deciding which to invest in they may be indifferent between the two; however, Merryman (1985) suggests that the French have been able to deal with the inefficiencies in civil law by way of Article 1382 of the Code Napoleon. Article 1382 is a body of tort law literature that deals with damages brought on by ones negligence.

¹¹ Up to this point in history the political channel and the adaptability are probably very close in importance; however with markets going global and theft of intellectual property on the rise, overseas, the most important channel to understand may become the adaptability channel. That is, can foreign countries promise investors that their courts will mimic some semblance of common law in that rights supersede the state?

This led to the use of case law to decide “just compensation.” This is an obvious example of how the French have dealt with some of the problems, but that is not to say that all civil law nations took such proactive steps to mitigate these inefficiencies. When France exported its’ legal system to colonies it did not allow such interpretations even when the law itself was so foreign as to render it useless (Merryman, 1996). When England exported its’ legal system it allowed native customs and traditions to guide many of the laws, and thus it was more readily accepted and allowed for changing attitudes. There are other theories for the differing financial developments of former colonies.

IV. Alternative Theories

Politics & Finance Theory.

Many scholars believe that legality is of lesser importance than the political atmosphere in terms of shaping financial institutions. The politics and finance theory believes that once a group has power it will use politics and institutions to shape the world around them in such a way as to protect them from competition (North, 1990b). There is both historical and empirical evidence to support those claims. When elites are threatened by competition they try to block it. When the government is more centralized it is much easier to stop personal transactions than when competition reigns and the government is small and dispersed (Beck & Levine, 2001). However this theory only adds to—does not replace—the law and finance theory. For elites to stop competition they must use compulsion; compulsion from a government nearly always comes in the form of laws. It then becomes a question of which legal system allows the government to quickly act with intervention. The reverse could also be said: the legal system was structured by influences from elites and has led to the government halting competition over time. The two theories are almost impossible to separate and they both show that legal institutions matter.

Endowment Theory.

Another view that has been put forward is the endowment theory. It states that geography and disease form the political and legal institutions of a country (Beck et al. 2003). Some areas were prone to disease and had poor land; therefore surpluses of agricultural never arose to the point needed for development. This by itself does not explain why a poorly functioning system would have arisen. It only shows that some areas lived crop to plate more often than others. In point of fact, from 1970 through 1990 economies with a high ratio of natural resource exports to GDP grew at a slower pace than non-resource abundant countries (Sachs & Warner, 1997). Some researchers have offered a more dynamic view of the endowment theory. Acemoglu et al. (2000) suggest that hard to settle areas of conquest led Europeans to extract from some areas while setting up institutions in amiable ones. This could explain a few of the reasons why some areas have better institutions, but it cannot explain it all.

Transplant Plant Theory.

Berkowitz et al. (2000) argue (and offer evidence) that regardless of the particular legal family it is the way in which it is “transplanted” that matters. If a country already had developed internal legal systems then the importing of a foreign legal institution was more successful than when a country was unfamiliar or had no such institutional legal system. This theory maybe a corollary to the law and finance theory, and it offers an important insight. The institutional structure prior to the introduction of a legal system may determine the successfulness of such an import. This finding could have major policy implications. To control for such problems as the endowment issue and prior institutional structure a matching technique will be used in hopes of accounting for preexisting conditions.

Part II

V. Literature Review of Matching

The former colonies of France and England are relatively large in number and differ in historical, cultural and endowment backgrounds; hence it would be folly to assume that all former colonies of France and England are the same. This study tries to distinguish itself from former studies by determining the importance of law while controlling for preexisting conditions, and then assessing how not accounting for legal institution may reduce a growth models ability to produce accurate results. Before demarcating the exact approach taken in this study a review of other approaches and the theoretical backing for matching should be outlined.

Theory Behind Matching.

Most studies of growth use either times series data or just group countries or states into large cross sections and compare them. This is the paradigm in regression analysis for the study of a large number of observations. Goff et al. (2008) suggest that this practice offers coefficients that are based on disparate units of observation. In any regression analysis there are several observable control variables, but that is not to say that one can control for un-observables. In fact, there may be several distinct differences between observational units that are unquantifiable. There are ways that statisticians have tried to control for these differences.

Matching is attractive to researchers because of its intuitive aspects. If two series participants are – theoretically – exactly the same in every way except for a treatment then the difference between the treated and non-treated units can be attributed to the series (Heckman et al. 1998). This has been done with birth twins as a way to reduce genetic differences in the units of measure (Goff et al., 2008). Ashenfelter and Krugman (1992) did a study on twins looking at the returns to education. But the capacity of the economics community, as a whole, to use twins

is very limited. The ability to find identical states or countries is rather difficult if not impossible, so to deal with the lack of “twins” researchers have devised ways to match based on many different criteria.

Propensity Scoring.

One way to match is based on a propensity score. When large observational studies have differences between treatment and non-treatment groups a selection bias may occur; therefore it must be corrected so as to not bias the outcome (Parsons, 2000). To correct for selection bias one can match based on a number of characteristics of the treated and non-treated group or one can create a single “score” that relates a number of characteristics of treated and non-treated units (Parsons, 2000; Dehejia & Wahba, 2002). That is, the propensity score is the probability of being within a certain treatment group based on some observed vector of attributes (Rosenbaum & Rubin, 1983). Some research has shown that the bias due to selection is statically not as important as other components (Heckman et al., 1998). Moreover, some even argue that the use of propensity score does not reduce variance as much as is thought (Heckman et al., 1997).

The use of propensity score in economics has been mainly used when trying to look at a particular programs effect on the participants (Smith & Todd, 2001; Jalen & Ravllion, 2003; Hansen, 2004). An assumption that is implicitly made is that all participants were randomly selected into the program, which may not be the case. For example, if a researcher were to find a correlation between on the job training and success at work then the program may be thought of as successful; however the researcher would need to keep in mind that educated individuals may be the same ones who would self select into on the job training—which is indeed the case (Weiss, 1995). Propensity scoring has been taken up in many fields of study other than economics and

statistics. The medical profession uses propensity scoring to look at the success rates of certain treatment groups (Hume et al. 2004).

Matching based on covariates is another way to match based on a score. This method comes in a variety of forms: exact matching, sub-classification, nearest neighbor, optimal, full, genetic and coarsened exact matching.¹² The idea is the same as with the propensity score; one is looking to the underlying process to determine the correct way to match individuals. There is not much evidence in the way of which form produces better matches. Another way to match groups is to reduce the sample down in hopes of lessening the variance.

Subsample Matching.

Chow type tests are a way to determine if using smaller groups improves estimates. It uses the f-statistic to determine whether restricting the sample size to some smaller subgroup improves the outcome.¹³ Basically, it looks at whether the parameters are improved through two different sets of regressions (Chow, 1960). Many researchers have looked to reduced subsampling to help deal with dissimilar units of observation.

Barro and Sala-i-Martin (1991) find that while convergence (as predicted by the neoclassical growth model) in a large cross section does not hold, it does when the observational units are broken down into subsamples or regions. The thought is that in the cross section one is comparing states like California and Maine, but when broken down into smaller groups the bias caused by comparing such units may reduce. Some global research has focused on OECD member countries as opposed to the world as a whole due to the aforementioned issues (Barro, Mankiw & Sala-i-Martin, 1995).

¹² For examples of these see Gary King's website at Harvard.

¹³ Dr. Goff needs to be credited here for helping to understand Chows reasoning.

Goff et al. (2008) matched states based on historical factors such as the date statehood was acquired and land area. Once again the thought is that the omitted variable bias will be “purged” because of the matching. They found that the coefficients were improved. Their method matched several states based on criteria, but some studies have looked at just two similar states (Campbell, 1994). The problem with matching based on just two similar units is it essentially becomes anecdotal evidence. The exact method of matching that is used in this study is outlined in the following section.

VI. Econometric Analysis & Results

The first analysis used to determine the importance of law is a normal cross sectional regression analysis with one accounting of legal type and the other disregarding it. By doing this a determination can be made about the importance of law itself by comparing adjusted r-square values from the two regressions. The next step is going to look at a simple matched regression based on predicted values of growth. More specifically, countries are grouped into high and low growth nations based upon their predicted growth rates which is a function of preexisting conditions—arable land, farm equipment per capita, population density and urban density. That is, the countries predicted growth rates were dependent upon the preexisting infrastructure and endowments, and then they were grouped together if their respective growth rates were within some threshold. The final, “sophisticated,” matched regressions are based on legal origin and predicted growth and countries are grouped together with the differences being taken for all matched pairs in the regression. By doing this the hope is that one is matching nations with similar omitted variables and thus lowering the bias caused by omitted variables. If the coefficients are improved then this would suggest that not including the legal structure of a country may bias the estimates. The author is not suggesting that the bias is no longer present

but rather it has diminished when compared to a normal regression analysis (Goff et al., 2008). Before beginning with the regression analysis the data and how it was coded will be discussed, which is followed by some descriptive statistics.

Data & Variables .

The data used in this study were retrieved from the World Development Indicators 2007 database and the CIA World fact book (CIA, 2008).¹⁴ Percentage change from 1997 to 2003 is the dependent variable with the initial, 1997, level of GDP inserted on the right hand side of the regression to test for convergence (Goff et al., 2008). All other variables were chosen based upon previous studies that deemed certain variables more important than others, and they fall into the following groups: demographics; capital-human and physical; infrastructure; and social (cultural).¹⁵

The first place to look for relevant variables is Levine and Renelt (1992) who did a sensitivity analysis of variables that are often quoted as important for growth. They found that most variables were fragile and therefore depended upon the specification of the model, but they did find that the ratio of trade to GDP and the ratio of investment to GDP were both robust to all permutations. Bauer et al. (2006) in a paper on the long run determinants of state income growth finds that knowledge stock—human capital—was the most important variable for determining growth rates. Barro (1998) finds that while most policy variables matter for growth the importance of some variables such as inflation will hinge on the magnitude of the value and the behavior of fluctuations.¹⁶ The infrastructure and demographic variables just make intuitive sense. Population, population density and the like must be controlled for and the same for

¹⁴ All development indicators came from the WDI while cultural data came from the CIA, such as the legal system, neighboring countries, etc...

¹⁵ Taxes are an extremely important variable when considering growth but there was no data on taxes for almost all African countries.

¹⁶ It is probably a safe assumption to think that some African countries have inflation such that it influences growth.

infrastructure. Both by themselves may not explain growth of a particular country but across sections of countries there may be disparate levels of both.

The social or cultural variable is the legal system and as cited earlier has been seen as an important variable for growth. The legal systems of Africa fall into two categories: civil and common. When coding this variable a judgment call had to be made in certain instances. For example, if a country's legal system was described as a mix of the two or just traditional the choice was determined by the last occupier of the country. If the span of occupation was not very long then the author looked to the percent of the country that spoke a certain language. That is to say, if a country was occupied by both England and France and both legal systems were cited then whichever country's language was spoken by a higher percentage of the total population was the respective legal system that was chosen. The assumption is that whichever language took hold is the culture that was more accepted, and therefore had more influence. If at this point there could be no judgment made then the author referred to La Porta et al. (2008) who in a study on the importance of legal structure grouped the world into civil or common law categories. Their study found that common law countries tend to have larger capital markets and a better investment climate. This paper delves into the issue of which legal system is better for growth with some simple statistics.

Descriptive Statistics.

Looking at simple statistics can offer some insight into how the opposing legal systems have fared recently. Tables one and two offer the averages of common law countries and civil law countries respectively.¹⁷ As one can see there are no glaringly obvious differences between the two systems. The levels of education enrollment are roughly the same and offer no real

¹⁷ All tables can be found at the end of the study but before the reference list.

insight into any differences between the two. One area of difference is in the amount of farming capital per capita. Common law nations average 19 per person while civil law average 43 per person and if one looks to the amount of arable land ones sees that they are about the same so one would think that the amount of farming capital should be close to the same. This could be due to common law countries being more developed and having more “hi-tech” farming equipment and thus lower per capita levels.

Civil law countries receive less aid on average than common law. Why this is the case is a little confusing unless common law nations on average give more in aid to other common law nations than they do to civil law countries. The reason this may be the case is that civil law nations tend to be more socialist in nature and aid often comes with stipulations for market oriented functions such as the “Washington Consensus.” Electricity consumption per capita is much higher in common law nations with 841 as compared to 455 for civil law countries. This might signal that common law nations have more access to electric power, or it might also mean that areas that are highly populated use high rates of electricity and regions outside of the developed areas have little access. Common law countries do have higher population density rates on average thus it is hard to ascertain the true relationship.

Higher rates of population density might suggest that there are more developed areas in that if there is a high concentration of people in an area then there must be jobs to accommodate more people. However, if one looks at urban population it is almost the same for the two systems. Urban population might also proxy for developed areas. The rest of the variables are about the same save for inflation. Civil law nations exhibit much higher rates of variation in inflation than common law nations. As mentioned earlier Barro (1998) found evidence that high rates of variation in inflation can be more troublesome than just a high rate of inflation. Upon

first glance the two systems seem to be about the same, but due to the specious nature of descriptive statistics some further investigation is needed.

Regression Results.

Table 3 presents the results from the two cross sectional regressions and the first matched regression. The first regression is a normal OLS regression that does not account for law, which takes the form of equation one:

$$(1) \quad Y_i = \beta_0 + \beta_1 X_i + e_i.$$

Where X is some group of explanatory variables for country i. Equation two represents the cross section plus the law variable:

$$(2) \quad Y_i = \beta_0 + \beta_1 X_i + \beta_2 \text{law}_i + e_i.$$

Where law is indicated with a dummy variable for country i and the same set of x variables are used. This will allow a comparison of the models fit and determine the importance of law. By looking at the adjusted r-squared value one can see that adding the law variable increases it from 77 to 81. This suggests that adding law increases the fit of the model; thus there is evidence that law type is important for explaining growth. It is also significant. There is no difference in significance levels of the other variables from the regression with law and the regression without law, and the parameters did not change.¹⁸

The second regression that includes law is the relevant one for discussion. The first issue to note is that the initial level of GDP does not have a negative coefficient as the neo classical growth model would suggest. This is a common finding in normal cross sectional analysis. Inflation was not significant and had the opposite sign that would be expected. This finding is

¹⁸ Some variables sign changed which is very curious.

not unique as Barro (1998) suggests, and there are those who believe that moderate amounts of inflation may actually be beneficial for growth in that real wages are better able to adjust to the market clearing wages.

Trade, which is defined as exports plus imports relative to GDP, was significant; however the sign is negative suggesting that an increase in trade will decrease growth. This might be due to African countries not really having any goods that the rest of the world wants except for diamonds. The way in which diamonds have been extracted—war lords fighting for them—may cause a negative relationship. One would think that a single sector would not drive this result but diamonds are a huge commodity especially in poor nations.

Capital formation is significant and positive which suggests that increases in capital increases growth. This seems to be correct especially in countries of Africa because there is an abundance of labor and when capital is added production should go up. The terms of trade are also significant and negative (once law was added) and this is opposite of what the international trade theory would envision. If a country's terms of trade increase they now have to give up fewer exports in return for imports which should increase output. The finding in this paper suggests that an increase in a nation's terms of trade will decrease growth. The terms of trade are influenced by several factors like the price of local currency and the interest rate so the interpretation of what is really going on here is very convoluted. Aid is significant and positive which is somewhat of a surprise especially in terms of African nations. There is a huge body of literature that offers evidence that the efficacy of international aid should be seriously reconsidered. While aid is statistically significant, the economic significance is rather minute, and given the large amounts of money given in the form of aid this makes it rather ineffective.

The educational variables were significant except for tertiary; however primary education

had a negative parameter while secondary education had a positive sign. This may be a perverse proxy for regulation in that children in countries such as those in Africa are often considered able bodied at that age and an increase in primary enrollment ostensibly means a decrease in labor force, which could decrease output. Those who go on to secondary education were the ones who made it through primary without having to work and so they are more productive upon leaving school and output may go up.

The variable for law is a dummy variable that is in reference to common law. It is significant and negative which is exactly what the law and finance theory would suggest (La Porta et al., 1997, 1998). That is to say, civil law nations grow slower than common law countries. The argument that law should not be considered as a relevant variable for growth gains no credence from these results. The adding of law increased the adjusted r-square value suggesting a better fit due to its inclusion and it was found to be significant and negative which is what the law and finance theory would recommend. The theory behind matching would suggest that these findings may be biased if there are omitted variables or variables that are unquantifiable. Grouping the nations into high and low growth may account for some of the omitted variables.

Grouping the nations in such a way leads to an equation that looks like equation three:

$$(3) \quad Y_i = \beta_0 + \beta_1 X_i + \beta_2 \text{law}_i + \beta_3 \text{match} + e_i$$

The same explanatory variables are used but now the countries are now grouped via the match variable into high and low growth nations.¹⁹ This approach only improved the estimates mildly but increased the parameter of the law variable from 0.07 to 0.11 and increased its significance.

¹⁹ A simple dummy variable was inserted to indicate high and low growth nations and thus its importance as a variable in and of itself is null so it was not reported.

The fit of the model increased but interpreting this as a true improvement to the model is erroneous. By grouping the nations by their predicted growth rates one has effectively entered a very important dummy variable on the right hand side, which will increase the r-square value. Again there is no evidence in favor of the neo classical idea of convergence. The only other variable significantly influenced was that of primary education which jumped up a statistical significance level. While the simple matching technique did not improve the estimates in a large way it did, however, improve them in some instances and especially for law. This is by no means extraordinary, but it showed improvement nonetheless. The next technique employed is the sophisticated matching approach which will allow one to flesh out the true importance of law. To be exact, nations were matched by law with the differences between all pairs being taken; however when matching based on both law and predicted growth rates nations were grouped together by legal structure and their grow rates if it was within the threshold considered to be close.²⁰ This matching technique takes the form of equation four:

$$(4) \quad Y_i - Y_j = \beta_1(X_i - X_j) + (u_i - u_j).$$

Where X is the same set of independent variables but it now includes countries i and j in the regression with the differences being taken. Matching based on legal type increased the significance levels of most of the variables, and these results can be found in table 4. Table 4 also presents the results of the matched regression based on law and predicted growth (which actually offered worse results).²¹ Comparing the cross sectional regression (with law) to the matched regression based on law one can see that all the variables are now significant except for inflation, which at no point was it significant. Inflation may be so high that individuals price in a

²⁰ The author assumed that .05 percentage points was a close enough threshold.

²¹ This equation would look just like equation 4 except that it would include the matching variable which indicates whether a particular countries grow rate was within some threshold.

cosmically high rate of inflation when they invest thus its effects would not be felt unless a low rate were to be excepted and then an astronomically high rate were present. The matched regression based on law (and to a lesser extent law and growth) offered interesting insights to newly significant variables.

Electric consumption has not been significant in any other regression until matched by law which may suggest that matching by law “soaked up” some of the omitted variables. Electric consumption has a negative coefficient which provides evidence that an increase in electric consumption per capita will decrease growth. This may be due to some kind of transition from rural to urban style living which in the short run will decrease output, but in the long run more electricity should increase production. Secondary educational enrollment moved up a significance level but stayed negative which may imply a “brain drain” effect. To be precise, once one is educated enough for global movement they flow to the most productive outlet, which will most likely not be in Africa.²²

Trade and the terms of trade increased a significance level and remained negative. Aid also gained a significance level and stayed positive. The test for convergence was once again negative. At no point during this study was convergence proved. This is not evidence that the neo classical model is wrong, but evidence that it may only be pertinent for some percentage of the world. The assumption of “rational agents” may not hold in a nation where one does not know if what they own will still be theirs in the morning. As a matter of fact this type of environment may breed “irrational” behavior such as burying ones valuables or even actively

²² That is not to say that Africa has no educated positions to fill only that other countries have more of them.

trying to live as close to bare sustenance as possible so as to decrease the likelihood of encountering appropriative behavior.²³

As far as the comparison between the matching techniques the more sophisticated matching regression that grouped nations by law only was better. The matching based on both law and growth rates actually decreased some parameters and their significance levels, and offered no further insights. The matching techniques did not give way to astonishing improvements in the outcomes of the variables; however, matching did improve the significance levels of several variables. The regression that matched based on law offers evidence that not including law type in a growth equation may bias the results. When nations were matched based on law the estimates improved—mildly—thus suggesting that matching by law helped match up omitted variables. The significance of law and the increase in the adjusted r-square value may be evidence that law should be considered for growth models and that the specific type of legal institution may help predict growth.

The simple fact that the regression parameters did not change much would seem to suggest that while law is important it is, however, uncorrelated with any of the other explanatory variables. That is, as the other variables change, the direction of that move is completely independent of a particular legal structure. This offers interesting insight into how exactly law may be affecting output. It is not correlated with any of the explanatory variables used to determine growth in this study, but if it were to be found to be correlated with capital markets or financial institutions this would lend serious evidence in favor of the law and finance theory.

²³ Some economists might argue that the term irrational here is relative—not absolute. That is, it is actually rational to act irrational in this state of being. However according to the neo classical definition it is irrational.

VII. Concluding Remarks

The institutions of a nation are important to understand since they shape the interactions between people. The legal institution has often been cited as very important for the growth of a country. Without law and order property rights are not secure and a system of “residual claimancy” cannot be established. The law and finance theory states that common law nations are better at protecting the rights of investors and property holders than civil law nations; however some have argued that law is secondary and the correlation between growth and legal structure is only a proxy for something else.

Many studies that look at the determinants of growth use time series analysis or group nations together that may not have the same natural resources or preexisting infrastructure. This study tries to account for such omitted variables as endowments and like by matching similar nations together. First, they are matched based on predicted growth rates which is a function of preexisting characteristics. Then nations were matched based upon law and growth rates with the differences being taken between all matched pairs.

The results of this study suggest that the inclusion of law increases the fit of the model and that civil law nations tend to do worse—in terms of growth—than common law nations. The importance of law is also established by the increased significance and parameters of the variables in the matched regression. Although only modest improvements were obtained from matching, a relationship was still present and would suggest that law should be considered when looking for the determinants of growth. Another important outcome was the absence of evidence in favor of the neo classical idea of convergence. Though this does not mean that the model is wrong it does however put forward the idea that the neo classical model does not account for all of the growth process.

As far as political implications of these findings are concerned the policies aimed at increasing the growth/development of a nation should look at the relationship between the state (legal system) and investors and property holders and realize that certain systems will be better able to conform to a “non-ergodic” world. Understanding the inefficiencies of institutions can help donor nations put the right kind of incentive structures in place that would allow the country to bypass those inefficiencies. There are several areas where this study could be improved upon. The first is the most glaringly obvious one: find tax data! The lack of information about taxes from the African countries is very bothersome. Taxes are often cited as being very important for growth regardless of the direction of the influence. A suitable proxy would have even benefitted this study, but one has to accept the data that is available.

Due to the lack of reporting information actually proffers a unique situation to match countries based on their reporting behavior. That is, one could look to the percentage of reported indicators as a variable to match upon. The same countries that are not reporting may be the same ones who have a lack of infrastructure, education et cetera. This may match better than predicted growth and law. Running a robust/fragile analysis like that of Levin and Renelt (1992) would vastly improve the results as the true effects could be discerned and the parameters would not be determined by the model specifications.

Understanding how the law specifically influences growth would be very interesting. For example, one could look to whether it is the relationship between the state and private property holders or whether it is the legal systems ability to adjust to a changing world that is the explanations for the link between growth and law. The quote that began this paper asserted that good laws will not make a nation rich but poor laws can hinder a countries ability to grow. In today’s world it is important to understand this, as the world is going global new laws will need

to be in place to protect new types of issues. The evidence provided in this study suggest that common law nations are in a better position to make this change while civil law countries are doomed to past ideas of what a legal institution should be.

Table 1—Common law descriptive statistics for variables of interest

Variable	Mean	Std Dev	Median
pc_growth	0.124	0.137	0.098
Growth	0.250	0.172	0.209
Primary	88.825	21.425	88.870
Secondary	36.975	24.989	31.056
Tertiary	5.301	4.382	6.133
Arable	0.252	0.156	0.183
Capital	19.141	18.114	11.023
Current acct	-3.668	3.161	-4.845
Aid	81.630	158.752	25.739
Electric	841.001	1565.700	202.088
Pop den	88.834	143.341	43.588
Interest rate spread	11.239	3.638	10.626
Risk premium	9.779	5.081	9.079
Capital formation	17.035	6.059	16.919
Trade	65.394	33.860	58.433
Inflation	13.329	16.555	8.106
LFPR	72.907	10.927	75.055
Pop growth	2.745	1.726	2.413
Pop tot	22166674.430	28548874.070	14308131.000
Urban pop	35.629	12.290	35.540
Terms of trade	103.228	31.390	102.232

Table 2—Civil law countries' descriptive statistics for variables of interest

Variable	Mean	Std Dev	Median
pc_growth	0.037	0.183	0.035
Growth	0.158	0.183	0.175
Primary	81.188	26.696	80.440
Secondary	27.417	20.553	19.109
Tertiary	6.622	11.420	2.892
Arable	0.294	0.226	0.235
Capital	43.664	71.713	9.231
Current acct	-3.069	7.402	-2.778
Aid	58.032	53.792	51.261
Electric	455.939	493.842	173.737
Pop den	44.297	57.193	31.498
Interest rate spread	11.337	5.809	13.474
Risk premium	6.257	2.489	5.833
Capital formation	21.191	11.948	19.485
Trade	73.136	44.740	60.691
Inflation	16.683	36.577	4.965
LFPR	73.088	11.606	74.277
Pop growth	2.557	1.274	2.544
Pop tot	12940277.610	15790844.750	7925410.000
Urban pop	36.139	18.072	34.620
Terms of trade	99.130	23.754	100.000

Table 3—Cross sectional results and matched regression results

Variable	Coefficients	Coefficients (law)	Coefficients (matched)
Intercept	0.24196 (0.14360)	0.23537* (0.12800)	0.16872 (0.10208)
log_pc_gdp97	0.02054** (0.00890)	0.01876** (0.00799)	0.01334* (0.00651)
Inflation	0.00107 (0.00122)	0.00095 (0.00109)	0.00071 (0.00084)
Trade	-0.00246** (0.0010)	-0.00222** (0.00090)	-0.00272** (0.00072)
Capital formation	0.02540*** (0.00535)	0.02640*** (0.00480)	0.02931*** (0.00387)
Terms of trade	0.00417** (0.00102)	-0.00396** (0.00092)	-0.00328** (0.00076)
Primary	0.00593** (0.00138)	-0.00581** (0.00123)	-0.00611*** (0.00096)
Secondary	0.00510** (0.00230)	0.00564** (0.00207)	0.00572** (0.00159)
Tertiary	0.00049 (0.00380)	0.00044 (0.00338)	-0.00090 (0.00266)
Electric	0.00001 (0.00003)	-0.00003 (0.00003)	-0.00004 (0.00002)
Aid	0.00161** (0.00067)	0.00180** (0.00060)	0.00233** (0.00051)
Law		-0.07322* (0.04008)	-0.11354** (0.03473)
R-Sq	0.89	0.92	0.96
Adj R-Sq	0.77	0.81	0.89
N	20	20	20

Note: * denotes significance at the 10% level, ** denotes significance at the 5% level and *** significance at the 0.1% level. The standard errors are in parenthesis. The adjusted r-sq value is only relevant for the move from without law to law. The first column is a normal cross sectional regression without accounts for law. The second column is the same except law is now accounted for in the regression, and the third is the same but the countries are grouped by high and low growth via a dummy variable which indicates high and low growth nations.

Table 4—Matched regressions based on law and predicted GDP growth

Variable	Coefficient (law only)	Coefficient (law and growth)
Intercept	0.05493*** (0.01275)	0.04635** (0.01845)
log_pc_gdp97	0.01577*** (0.00418)	0.01773** (0.00651)
Inflation	0.00051 (0.00051)	0.00081 (0.00080)
Trade	-0.00220*** (0.00031)	-0.00252*** (0.00052)
Capital formation	0.02589*** (0.00238)	0.02455*** (0.00439)
Terms of trade	-0.00367*** (0.00038)	-0.00364*** (0.00071)
Primary	-0.00608*** (0.00052)	-0.00604*** (0.00102)
Secondary	0.00554*** (0.00087)	0.00475** (0.00188)
Tertiary	-0.00061 (0.00130)	-0.00057 (0.00294)
Electric	-0.00003* (0.00001)	-0.00003 (0.00002)
Aid	0.00162*** (0.00024)	0.00160** (0.00047)
R-Sq		94 93
N		47 28

Note: these two matched regressions match by law only then by law and predicted growth and then takes the difference between all match pairs. First column is the results for matching by law only and the second column is matched by law and growth. Significance is denoted the same as table 3. Standard errors are in parenthesis.

References

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2002). Reversal of fortunes: geography and institutions in the making of the modern world income distribution. *Quarterly Journal of Economics*, 117.
- Aranson, P. (1992) The common law as central economic planning. *Constitutional Political Economy*, 3, 289-317.
- Ashenfelter, O. & Krueger, A. (1992). Estimate of the economic return to schooling from a new sample of twins. Working paper.
- Barro, R.J. (1997). *Determinants of economic growth: A cross country study*. Cambridge MA: MIT Press.
- Barro, R.J. (1998). *Determinants of economic growth: a cross country empirical study*. Cambridge: MIT Press.
- Barro, R.J., & Sala-i-Martin, X. (1991). Convergence across U.S. states and regions. *Brookings Papers on Economic Activity*, 1, 107-82.
- Barro, R.J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100, 223-51.
- Barro, R.J., Mankiw, N.G., & Sala-i-Martin, X. (1995). Capital mobility in neoclassical models of growth. *American Economic Review*, 85, 103-15.
- Bauer, P.W., Schweitzer, M.E., & Shane, S. (2006). State growth empirics: the long-run determinants of state income growth. Working Paper, 06-06, Federal Reserve Bank
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2001a). Law, politics, and finance. World Bank Policy Working paper, 2585.
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2003b). Law, endowments, and finance. *Journal of Financial Economics*, 70, 137-81.
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2003c). Law and finance. Why does legal origin matter? *Journal of Comparative Economics*, 31, 653-75.
- Beck, T., & Levine, R. (2003d). Legal institutions and financial development. World Bank Policy Working Paper, 3136, (forthcoming in the handbook of New Institutional Economics).
- Berkowitz, D., Pistor, K., & Richard, J.F. (1999). Economic development, legality, and the transplant effect. University of Pittsburgh working paper, 308.

- Bethell, T. (1998). *The noblest triumph: property and prosperity through the ages*. New York: St. Martin's Press.
- Campbell, C.D. (1994). New Hampshire's tax-base limits: an example of the leviathan model. *Public Choice*, 78, 129-44.
- Central Intelligence Agency. (2008). *The world fact book*. Washington, D.C.: U.S. government printing office.
- Chow, G.C. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica*, 28, 591-605.
- Coase, R. (1960). The problem of social cost. *Journal of Law and Economics*, 3, 1-44.
- Dawson, J. (1968). *The oracles of the law*. Ann Arbor, MI: University of Michigan Law School.
- Dehejia, R.H., & Wahba, S. (2002). Propensity score matching methods for nonexperimental causal studies. *Review of Economics and Statistics*, 84, 151-61.
- Easterly, W., & Levine, R. (1997). Africa's growth tragedy: policies and ethnic divisions. *The Quarterly Journal of Economics*, 112, 1203-50.
- Goff, B., Lebedinsky, A., & Lile, S. (2008). A matched pairs analysis of state growth differences. Forthcoming.
- Grossman, H.I., & Kim, M. (1995). Swords or plowshares? A theory of the security of claims to property. *The Journal of Political Economy*, 103, 1275-1288.
- Hadfield, G. (1992). Biases in the evolution of legal rules. *Georgetown Law Journal*, 80, 583-616.
- Hansen, B.B. (2004). Full matching in an observational study of coaching for the SAT. *Journal of the American Statistical Association*, 99, 609-18.
- Hayek, F. (1960). *The constitution of liberty*. Chicago: The University of Chicago Press.
- Heckman, J.J., Ichimura, H., & Todd, P.E. (1997a). Matching as an econometric evaluation estimator: evidence from evaluation a job training programme. *Review of Economic Studies*, 64, 605-54.
- Heckman, J.J., Ichimura, H., & Todd, P.E. (1998b). Matching as an econometric valuation estimator. *Review of Economic Studies*, 65, 261-94.
- Hume, A.L., Lapane, K.L., Mor, V., Toledano, A.Y., & Weitzen, S. (2004). Principles for

- modeling propensity scores in medical research: systematic literature review. *Pharmacoepidemiology and Drug Safety*, 13, 841-53.
- Jalan, J. & Ravllion, M. (2003). Estimating the benefit incidence of an antipoverty program by propensity-scoring. *Journal of Business & Economics Statistics*, 1, 19-30.
- Knack, S., & Keefer, P. (1995). Institutions and economic performance: cross-country tests using alternative institutional measures. *Economics and Politics*, 7, 207-27.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1997). Legal determinants of external finance. *The Journal of Finance*, 52, 1131-50.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, 106, 1113-55.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1999). The quality of government. *The Journal of Law, Economics & Organization*, 15, 222-83.
- La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The economic consequences of legal origins. *Journal of Economic Literature*, 46, 285-332.
- Levine, R., & Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *American Economic Review*, LXXXII, 942-63.
- Mahoney, P. (2000). The common law and economic growth: Hayek might be right. Working Paper, University of Virginia School of Law.
- Mauro, P. (1995). Corruption and growth. *Quarterly Journal of Economics*, 110, 681- 712.
- Merryman, J.H. (1985a). The civil law tradition: an introduction to the legal systems of western Europe and Latin America. Stanford, CA: Stanford University Press.
- Merryman, J.H. (1996b). The French deviation. *The American Journal of Comparative Law*, 44, 109-19.
- North, D. (1981a). *Growth and structural change*. New York: W.W. Norton.
- North, D. (1990b). *Institutions, institutional change, and economic performance*. Cambridge: Cambridge University Press.
- North, D., & Weingast, B. (1989). Constitutions and commitment: the evolution of institutional governing public choice in seventeenth-century England. *The Journal of Economic History*, 49, 803-32.
- Parsons, L.S. (2000). Using SAS® software to perform a case-control match on propensity score in an observational study. *Working paper*, 225-25, Ovation Research Group, Seattle.

- Posner, R.A. (1973). *Economic analysis of the law*. Boston: Little-Brown.
- Rizzo, M. (1980). The mirage of efficiency. *Hofstra Law Review*, 8, 641-58.
- Rosenbaum, P. & Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41-55.
- Sachs, J.D., & Warner, A. (1995). Natural resource abundance and economic growth. National Bureau of Economic Research, 5398, 1-50.
- Smith, J.A., & Todd, P.E. (2001). Source reconciling conflicting evidence on the performance of propensity-score matching methods. *The American Economic Review*, 91, 112-118.
- Tullock, G. (1997). *The case against the common law*. Durham, NC: Carolina Academic Press.
- Weiss, A. (1995). Human capital vs. signalling explanations of wages. *The Journal of Economic Perspectives*, 9, 133-154.

