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protection channels matter?**

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Abstract

In the current efforts towards harmonizing IPRs regimes in the African continent, this paper provides answers to four key questions relevant in the policy decision making processes. After empirically examining the questions, the following findings are established.

(1) In comparison to common law countries, civil law countries inherently have a significant autonomous rate of piracy; consistent with the ‘law and property rights’ theory. (2) But for IPRs laws, the other IP protection channels (WIPO treaties, Main IP law and Multilateral treaties) reduce the incidence of piracy. (3) In both short-run and long-term, IPRs protection channels in civil law countries appear to mitigate piracy more than in common law countries. (4) Formal institutions are instrumental in the fight against piracy through IPRs protection channels.

JEL Classification: F42; K42; O34; O38; O57

Keywords: Software piracy; Intellectual property rights; Panel data; Africa

1. Introduction

It has become crystal clear that, for any country, region or continent to be actively involved in the global economy, it must be competitive. Competition derives from intellectual property (IP), which is protected by intellectual property laws. In recent history, there has been a wide consensus on the key role that intellectual property rights (IPRs) protection and strength of IPRs regimes play in promoting innovation processes and economic growth. Hence, the debate has centered around IPRs protection, with some scholars postulating that increased protection of IPRs stimulates economic growth and development through the appealing impact on factor productivity (Gould & Gruben, 1996; Falvey et al., 2006). On the other hand, skeptics are of the stance that, IPRs protection and adherence to international treaties (laws) may seriously infringe the growth prospects of developing countries (Yang & Maskus, 2001). This strand supports its thesis by purporting that, less tight IPRs regimes are necessary (at least in the short-term) for developing countries, to enable knowledge spillovers, imperative for growth and development. In their perspective, the existing technology in developing countries is more imitative and/or adaptive in nature and not suitable for the creation of new innovations¹.

In the light of above debate, while theoretical literature has addressed the concern to some degree, little scholarly attention has been paid to empirical literature. The focus of the existing empirical studies has been on socio-economic determinants of piracy in several copyright industries (Bezmen & Depken, 2004; Banerjee et al., 2005; Peitz & Waelbroeck, 2006; Andrés, 2006; Bezmen & Depken, 2006; Goel & Nelson, 2009; Andrés & Goel, 2012). However, the debate has recently shifted towards measures needed to curb the proliferation of technology used to copy or pirate commodities. The recent trend of globalization, strengthened by increasingly sophisticated information and communication technologies

¹This school of thought has gained prominence in the debate over if 'permission' should be granted to permit 'copying' of life-saving pharmaceuticals, especially those used in the management of HIV/AIDS in developing countries most affected and least likely to afford such treatments.

(ICTs) has motivated efforts towards increasing and harmonizing the standards (and enforcement) of IPRs protection worldwide. Europe and North America have mastered the dynamics of IP and inexorably driving developments in the global and international arena. Other regions like Asia and South America are reacting in calculated steps that underscores the role of IP in the current pursuit of national, regional and international initiatives. In Africa, IPRs issues are also assuming central stage in discussions on development in the continent.

To the best of our knowledge, current efforts towards harmonizing IPRs regimes in the continent will be eased if policy makers have answers to the following four questions. (1) *Which* IPRs regimes matter in the fight against piracy? (2) *How* do legal origins matter in the effectiveness of IPRs regimes? (3) *Are* formal institutions instrumental in the enforcements of IPRs regimes? (4) *If so, for which* IPRs protection channels are they instrumental? Answers to the questions will provide the much needed policy guidance, as blanket IPRs regimes may not be effective without due considerations of legal origins in the policy making process. The intuition behind this hypothesis is that, legal origins differ in the emphasis they place on private property rights vis-à-vis those of the state. Hence, then need for standardization of IPRs regimes to be contingent on existing trends in their effectiveness and tailored differently across countries with diverse legal origins.

The rest of the paper is organized as follows. Section 2 examines existing literature. Data and methodology are discussed and outlined respectively in Section 3. Section 4 covers empirical analysis. We conclude with Section 5.

2. Literature review

2.1 Theoretical framework: legal origins and IPRs

This section describes the ‘law and property rights theory’. We devote space to spell-out the difference in how legal heritage continue to shape private property rights protection, investor protection laws and development today. In this section, we also describe two

mechanisms via which legal-origin may affect the contracting environment: the political and adaptability mechanisms.

2.1.1 Law, enforcement and private property rights

The first strand of the ‘law and property rights’ theory emphasizes that, legal institutions influence property rights and development (La Porta et al., 1998). The ‘law and property rights theory’ stresses that, cross-country differences in: (i) contract, company, bankruptcy and security laws; (ii) the legal system’ emphasis on private property rights, and; (iii) the efficiency of enforcement, influence the degree of expropriation and hence the confidence by which people are motivated to take part in innovation and invention processes. As sustained by La Porta et al. (2000) and backed by Beck & Levine (2005), the ‘law and property rights’ view follows naturally from the evolution of corporate laws handed down to colonies during the past half century. A country’s contract, company, security, bankruptcy and IPRs laws, as well as the enforcement of these laws fundamentally determine the rights of IP holders and the level of innovation.

Concerning how legal establishments should influence IP and the strength of IPRs, within a broad vision there are differing opinions regarding the degree to which legal systems should support the private contractual arrangements and the degree to which the legal system should have specific laws concerning property rights. According to Coasians (Coase, 1960), the legal system should simply enforce private contracts. Hence, effective legal establishments allow knowledgeable and experienced market participants to design a vast array of sophisticated private contracts in a bid to ameliorate complex agency problems (Coase, 1960; Stigler, 1964; Easterbrook & Fischel, 1991). The ‘law and private property’ theory three-point view has been highlighted in the introduction of this strand. Whether assuming a Coasian dependence on enforcing complex private contracts or an approach that augments the support of private contracts with company, bankruptcy, securities, IPR

laws...etc, the 'law and property rights' theory argues that the degree of protection of private property is a paramount determinant of incentives to innovation and invention that ultimately lead to development.

2.1.2 From legal-origin to piracy: political and adaptability mechanisms

In the second strand, we extend theories by Beck et al. (2003) in presenting a case as to 'why' legal origin matters in IPRs, innovation and development. They have examined two channels by which legal origins may influence development: the political and adaptability channels.

The political mechanism is based on two standpoints. Firstly, legal traditions differ in the emphasis they attribute to protecting the rights of private investors (in innovation for example) relative to those of the state. Secondly, private property rights protection forms the foundation for innovation and development. Hence, historical based differences in legal origin can help explain existing disparities in development with respect to this component of law and 'investor right' (La Porta et al., 1998). A great many scholars argue that the Civil law has tended to support the rights of the State, vis-à-vis private property rights, which is quite the opposite in Common law. Hence, Civil law countries have provided for legal systems that have unhealthy implications for innovation and development. A powerful State with a responsive civil law at its disposal, will tend to divert the flows of society's resources towards favored ends, which is not conducive to competition. More so, a powerful State will have difficulty credibly committing to not interfere in the innovation process, that will also obstruct financial development. Thus, the 'law and property rights' theory emphasizes that Civil law countries will have feebler property rights protection and lower levels of innovation (and development) than countries with other legal traditions. In contrast, Common law has historically tended to side with private property owners against the State. Instead of becoming a tool of the state, Common law has acted as a powerful tool in the upholding of private

property rights. Rajan & Zingales (2003) note that governments in Civil law countries were more effective than governments in Common law countries in stretching the role of government at the cost of market growth during the Interwar period 1919-1939. They attribute this difference to the heavy task of the judiciary vis-à-vis the legislature. Thus, ‘the law and property rights’ theory postulates that the British Common law supports innovation development to a greater extent than Civil law systems.

The second mechanism linking legal origin to development is the adaptability channel, that is also built on two premises. On a first note, legal systems differ in their ability to adjust to changing and evolving circumstances. Secondly, if a country’s legal system adapts only slowly to changing circumstance (especially economic), large gaps will open between the innovation needs of an economy and the ability of the legal system to support and fulfill those needs. An influential, albeit by no means unanimous position of inquiry holds that legal systems that espouse case and judicial discretion tend to adhere more efficiently to changing conditions than legal systems that adapt rigidly to formalistic procedures and that rely more strictly on judgments narrowly based on statutory law (Coase, 1960). Posner (1973) disputes that although legislators consider the incidence on particular individuals and interest groups when writing statutes, judges are forbidden from considering the deservedness of specific litigants and thus more likely to render decisions founded on objective efficiency criteria (Rubin, 1982, 205). It follows that, Common law systems are much more efficient than statutory-based systems because inefficient laws are routinely litigated and re-litigated pushing the law toward more efficient outcomes (Rubin, 1977; Priest, 1977), especially in the rapidly evolving context of ICTs and IPRs protection. From another perspective, some authors argue that statutory law evolves slowly and is subject to a greater degree of inefficient political pressures than Common law (Posner, 1973; Bailey & Rubin, 1994).

2. 2 Intellectual property rights (IPRs) and development

There are two principal avenues along which intellectual property (IP) and the strength of IPRs regimes are thought to affect the level of economic growth and development (Bezmen & Depken, 2004). The first strand provides analysis of the extent to which IPRs influence the creation of novel knowledge and information within nations, as well as the diffusion of existing knowledge across countries. The second strand is focused on the indirect effects of a nation's IPRs regime on international transactions that provide factors crucial for the growth process.

In the first strand which is tilted towards 'creation and dissemination of information', IPRs protection could be traced to the foundation of endogenous theories of economic growth whereby, investment in research and development (R&D) rewards individual investors with profit (returns) and also augments society's stock of knowledge. Lowering the cost of future innovation and invention, improves the accumulation of knowledge for economic growth (Romer, 1990; Grossman & Helpman, 1991). The underlying wisdom of tighter and restrictive IPRs regimes is based on the notion that, protection of IPRs serves as a catalyst to growth by encouraging inventions and innovations. In recent history, many newly industrialized countries have campaigned for stronger IPRs through bilateral, multilateral and regional arrangements. This difference in approach derives from the desire of developing countries to specialize in labor intensive production in agricultural industries. Until much recently, these industries have greatly benefited from shared knowledge spillovers and public expenditures have largely supported them in research and technology.

In the second strand, IPRs may also influence a nation's growth and development process through their influence on the nation's ability to engage in international transactions such as technology transfers, trade and, Foreign Direct Investment (FDI) flows (Bezmen & Depken, 2004). The endogenous growth theories have presented international trade as an

important stimulus to economic prosperity, since access to world markets could spur greater utilization of human resources (Todaro & Smith, 2003), and ease the transmission of technology by providing contact with foreign counterparts and direction of domestic resources towards more research focused and intensive sectors. Nevertheless, these models do not necessarily predict that openness brings economic growth for all countries and under all circumstances; principally because theoretical prediction depends on country-specific conditions. There is substantial documentation to support the view that, a stronger IPRs regime is a crucial factor in attracting the inflows of FDI and technological transfers (Lee & Mansfield, 1996), stimulating exports (Maskus & Penubarti, 1995) and increasing the possibility of investment undertaken by multinational enterprises (Mansfield, 1994; Seyoum, 1996). From the other side of the coin, stronger IPRs protection could mitigate the need for FDI (Yang & Maskus, 2001).

3. Methodology

3.1 Data

3.1.1 Measuring piracy

The measure of piracy is the software piracy rate, which is defined as “the unauthorized copying of computer software which constitutes copyright infringement for either commercial or personal use” (SIIA, 2000). Software piracy is multidimensional, complex and could potentially take many avenues – e.g., organized copiers, piracy by individuals and commercial or business piracy. Hence, obtaining an accurate measure of the prevalence of software piracy remains quite a challenge in the literature. Borrowing from the Business Software Alliance (BSA), there are many types of piracy and we can distinguish among: 1) end user copying; 2) downloading; and 3) counterfeiting. Piracy level is computed as the difference in demand for new software applications (computed from PC shipments) and

the legal supply of software. In the present paper, the measure of piracy employed is the percentage of software (primarily business software) in a country that is illegally installed (without a license) on a yearly basis and is taken to capture the level of piracy in software. This proxy is reported in percentages, varying from 0 % (or no piracy) to 100 % (i.e., all software installed is of pirated origin). Piracy data is gathered from the Business Software Alliance (BSA, 2007). Additional discussion on measurement could be obtained from BSA (2009)². BSA is an industry group; nonetheless its data on software piracy is the best cross-country measure currently used in the literature, subject to some inherent upward bias³. From a broad view, the data on software piracy could be perceived as proxying for the extent of digital piracy.

3.1.2 Intellectual Property Rights (IPRs) variables

IPRs variables are collected from the World Intellectual Property Organization (WIPO). The four endogenous explaining variables gathered include: *IPRs laws*, *Main IP laws*, *WIPO Treaties*, and *Multilateral Treaties*. *IPRs laws* and *Main IP laws* are IP laws that are enacted by the legislature and enforced by institutions. WIPO administered treaties are defined from the day they enter into force for the contracting party (country). IP relevant Multilateral Treaties data is also gathered with respect to the date they are enforced by contracting parties.

3.1.3 Instrumental and control variables

In this section, we devote space to providing justification for the empirical validity of the instruments. This justification is essential for the relevance of the empirical analysis since a theoretical basis for the instrumental variables is crucial for sound and consistent

² Data from the BSA primarily provide measurement for the piracy of commercial software. More discussion on the reliability of piracy data could be obtained from Traphagan & Griffith (1998) and Png (2008).

³This data has been widely used in the literature on piracy (Marron & Steel, 2000; Banerjee et al., 2005; Andrés, 2006; Goel & Nelson, 2009).

interpretation of estimated coefficients. In other words, whereas the object of this article is to assess the effect of IPRs laws (treaties) on piracy, it also indirectly seeks to examine how government institutions are instrumental in the incidence of IPRs protection channels on piracy. The instrumental variable approach in the empirical section requires that the instruments be correlated with the main endogenous explaining variable (piracy rate). Logic and common-sense have it that, government institutions and IPRs laws move hand in glove. Save in utopia, we cannot discuss one while ruling-out the other. Hence, only formal institutions set-up by the government in place can uphold and enforce IPRs laws (treaties). Measures indicating the quality of formal institutions include: *the rule of law, regulation quality, government effectiveness, corruption-control, political stability (no violence) and voice & accountability*. We argue that, these good governance indicators are natural instruments for the upholding and enforcement of IPRs laws (treaties).

Due to constraints in the degrees of freedom required for the test on validity of the instruments, we are unable to use more than one control variable at a time⁴. We employ two control variables: internet penetration and literacy rates. From common sense and intuition, these rates should have a positive relationship with the level of piracy.

Owing to constraints in piracy data availability, the data include annual observations for 11 African countries for the years 2000-2010. The data is made-up of six common law countries and five civil law countries. Details about the variable definitions (and data sources), summary statistics (with presentation of countries) and correlation analysis (showing the basic correlations between key variables used in this paper) are reported in the appendices. The summary statistics (Appendix 1) of the variables used in the panel regressions show that, there is quite a degree of variation in the data used so that one should be confident that

⁴ An OIR test is employable only in the presence of over-identification. That is, the instruments should be higher than the endogenous explaining variables by at least one degree of freedom. In cases of exact-identification (instruments equal to endogenous explaining variables) and under-identifications (instruments less than endogenous explaining variables), an OIR test is by definition not possible.

reasonable estimated relationships should emerge. The purpose of the correlation matrix (Appendix 2) is to attenuate issues resulting from overparametization and multicollinearity. Based on the correlation coefficients, there do not appear to be any serious concerns in terms of the relationships to be estimated.

3.2 Methodology

This paper adopts a Two-Stage Least Squares (2SLS) Instrumental Variable (IV) estimation technique, in accordance with recent piracy literature (Andrés & Goel, 2012). 2SLS estimation solves the puzzle of endogeneity and hence avoids the inconsistency of estimated coefficients by OLS when the exogenous variables are correlated with the error term in the main equation. More so, the IV approach is consistent with the questions in the introduction of this paper. The 2SLS estimation will entail the following steps:

First-stage regression:

$$IP_{it} = \gamma_0 + \gamma_1(\text{Instruments})_{it} + v_{it} \quad (1)$$

Second-stage regression:

$$\text{Piracy}_{it} = \gamma_0 + \gamma_1(IP)_{it} + \mu_{it} \quad (2)$$

In the first and second equations, v_{it} and μ_{it} respectively denote the error terms. Instrumental variables are: *regulation quality, control of corruption, government effectiveness, voice & accountability, rule of law and political stability*. *IP* represents IPRs laws (treaties): *Main Intellectual Property Law, Intellectual Property Rights Law, WIPO Treaties and Multilateral Treaties*. *Piracy* is the software piracy rate.

We adopt the following steps in the 2SLS analysis: (1) justify the choice of an IV over an OLS estimation technique with the Hausman-test for endogeneity; (2) verify the instruments are exogenous to the endogenous components of the explaining variables (IPRs channels) and; (3) ensure the instruments are valid and not correlated with the error-term in

the main equation with an Over-identifying Restrictions (OIR) test. Beside the control for endogeneity, further robustness of our models is ensured by the following: (1) use of both ‘full data’ and ‘average data’ with non-overlapping intervals to capture the long-run and short-term tendencies of estimated coefficients respectively; (2) employment of robust Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors; (3) restricted and unrestricted modeling to control for the ‘legal origin and property rights’ theory.

4. Empirical analysis

4.1 Presentation of results

This section examines the four main questions outlined in the introduction. (1) Which IPRs regimes matter in the fight against piracy? (2) How do legal origins matter in the effectiveness of IPRs regimes? (3) Are formal institutions instrumental in the enforcements of IPRs regimes?. (4) If so, for which IPRs protection channels are they instrumental? To examine these issues, we use the 2SLS approach with government quality instrumental variables.

Table 1 below reports results for the IV regressions. ‘Full data’ reflects long-run estimate whereas two-year NOI estimates are short-term. We have employed restricted and unrestricted (with a constant) modeling approaches to control for the ‘law-property rights theory’. For optimal specification of our models, two main tests are performed: the Hausman and the Sargan-OIR tests. The null hypothesis of the Hausman test is the position that, OLS estimates are consistent and efficient. Hence, a rejection of the null hypothesis points to the issue of endogeneity and lends credit the choice of the IV estimation technique. The null hypothesis of the Sargan test is the stance that, the instruments do not explain piracy beyond IPRs laws (treaties) channels. In other words, the null hypothesis is the position that, the IPRs laws (treaties) are strictly exogenous and do not suffer from endogeneity when instrumented with government quality indicators. Hence, failure to reject the null hypothesis will indicate

the instruments are valid. Based on the findings in Table 1: the null hypotheses of the Hausman tests are overwhelmingly rejected for all the models; but for Model 2 at a 10% significance level, the null hypotheses of the Sargan tests are not rejected. Therefore, results of both tests respectively justify the IV estimation approach and validate the government quality instrumental variables. We could not control for more than one variable at a time because of constraints in the Sargan-OIR test for instrument validity. We have six government quality instrumental variables and hence, must use less than six endogenous explaining variables to guarantee at least one degree of freedom: imperative for the OIR test. Both control variables are significant with the right signs.

Table 1 : 2SLS Regressions (with HAC standard errors)

	Dependent variable: Piracy rate							
	Common-law				Civil-law			
	Full Data		Two Year NOI		Full Data		Two Year NOI	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	---	0.440 (1.403)	---	0.179 (0.535)	---	2.555*** (5.576)	---	3.061*** (2.654)
Main IP law	-0.194*** (-10.24)	-0.180*** (-8.117)	-0.189*** (-8.326)	-0.184*** (-8.301)	-0.41*** (-5.649)	-0.37*** (-4.429)	-0.471** (-2.080)	-0.451** (-2.182)
IPRs law	0.142*** (3.607)	0.074 (1.324)	0.127** (2.542)	0.103*** (2.654)	0.203*** (4.110)	0.175*** (2.726)	0.256 (1.587)	0.241 (1.564)
WIPO Treaties	-0.155*** (-2.672)	-0.137*** (-3.508)	-0.117* (-1.931)	-0.116** (-2.310)	-0.063 (-0.911)	-0.15*** (-4.860)	-0.103 (-1.170)	-0.219** (-2.215)
Multilat. Treaties	-0.077*** (-4.421)	-0.095*** (-8.052)	-0.069*** (-3.088)	-0.076*** (-3.835)	-0.12*** (-4.323)	-0.12*** (-3.127)	-0.142* (-1.723)	-0.154* (-1.807)
Internet Penetration	0.690*** (7.555)	0.572*** (4.210)	0.629*** (6.074)	0.588*** (4.533)	---	---	---	---
Literacy rate	---	---	---	---	1.285*** (6.773)	---	1.453** (2.457)	---
Hausman test	151.77***	134.71***	132.14***	95.140***	114.76***	148.27***	62.223***	123.02***
Sargan OIR test	3.231 [0.198]	2.753* [0.097]	1.617 [0.445]	1.768 [0.183]	2.520 [0.283]	0.840 [0.656]	2.482 [0.289]	1.094 [0.578]
Adjusted R ²	0.863	0.885	0.864	0.875	0.439	0.484	0.120	0.170
Fisher	4122.4***	314.86***	3408.6***	18.627***	52.977***	130.60***	1.55e+15***	297.55***
Countries	6	6	6	6	5	5	5	5
Observations	46	46	26	26	44	44	44	44
Instruments	Constant; Control of Corruption; Government Effectiveness; Rule of Law; Regulation Quality; Political Stability; Voice & Accountability							

*,**,***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. []:P-values. Initial piracy: estimated lagged endogenous variable (piracy rate). Dif: Difference. Sys: System. GMM: Generalized Methods of Moments. HAC: Heteroscedasticity and Autocorrelation Consistent. SE: Standard Errors. NOI: Non overlapping intervals. Main IP: Main Intellectual Property. IPRs: Intellectual Property Rights. WIPO: World Intellectual Property Organization. Multilat: Multilateral. OIR: Overidentifying restrictions.

4.2 Discussion of results and policy implications

4.2.1 Law and property rights theory

From the results in Table 1, we notice a very significant constant term for civil law countries. This confirms the ‘law and property right theory’ we discussed in Section 2.1. Autonomous piracy in civil law countries is significant because, inherently, contrary to their common law counterparts, civil law countries were handed down a legal heritage that continue to shape private property rights protection in a negative way. While common law champions private property rights vis-à-vis the powers to the state, civil law inherently does the contrary. Hence, the significant autonomous piracy. Our position in this interpretation is supported by a substantial bulk of literature (Coase, 1960; Stigler, 1964; Posner, 1973; Rubin, 1977; Priest, 1977; Rubin, 1982; Easterbrook & Fischel, 1991; Bailey & Rubin, 1994; La Porta et al., 1998; Porta et al., 2000; Beck et al., 2003; Rajan & Zingales, 2003; Beck & Levine, 2005)

4.2.2 Which IPRs regimes matter in the fight against piracy?

But for IPRs laws, the other IP laws (WIPO treaties, Main IP law and Multilateral treaties) reduce the incidence of piracy. This finding is consistent across legal origins and time-static (stable across short-run and long-term estimates). The fact that IPRs laws channel reflects a positive incidence on piracy in both common and civil law countries, means other issues common to both types of legal systems significantly affect the enforcement of the IPRs laws enacted by the legislature. Investigating this concern could be an interesting future research direction.

4.2.3 How do legal origins matter in the effectiveness of IPRs laws (regimes)?

In both short-run and long-term, IPRs protection channels in civil law countries appear to mitigate piracy more than in common law countries. There are two possible explanations to

this. (1) IPRs protection channels in civil law countries have a higher impact on the piracy rate because of the inherent absence of a ‘property rights’ legal culture; as confirmed by the significant constant. This explanation is logical in the perspective that, where the prevalence of piracy is already high (constant significant term), the effects of introducing IPRs laws will be greater on the rate of piracy than in regions with traditionally low prevalence piracy rates. The inherent higher prevalence of piracy in civil law countries could further be observed from the summary statistics (Appendix 1) with the mean piracy rate in civil law countries 0.462 as opposed to 0.368 in their common law counterparts. (2) The higher incidence of IPRs laws (treaties) in civil countries could originate from the government quality instruments. Where more government resources are devoted to the fight against piracy through IPRs protection channels, it is only natural that the effect could be greater.

4.2.4 Are formal institutions instrumental in the enforcement of IPRs laws (treaties)? If so, for which IPRs laws (channels)?

The answer is a simple *yes*. The null hypotheses of the Sargan OIR tests are overwhelmingly rejected. Implying formal institutions are instrumental in the fight against piracy through IPRs laws (treaties) channels. But for one channel, government quality dynamics are instrumental in all the IPRs mechanisms investigated.

5. Conclusion

The recent trend of globalization, strengthened by increasingly sophisticated information and communication technologies (ICTs) has motivated efforts towards increasing and harmonizing the standards (and enforcement) of IPRs protection worldwide. Europe and North America have mastered the dynamics IP and inexorably driving developments in the global and international arena. Other regions like Asia and South America are reacting in calculated steps that underscores the role of IP in the current pursuit of national, regional and

international initiatives. In Africa, IPRs issues are also assuming central stage in discussions on development in the continent. To ease current efforts towards harmonizing IPRs regimes in the continent, this paper has provided answers to four key questions for which policy makers could be seeking answers.

The following findings have been established. (1) In comparison to common law countries, civil law countries inherently have a significant autonomous rate of piracy; consistent with the 'law and property rights' theory. (2) But for IPRs laws, the other IP protection channels (WIPO treaties, Main IP law and Multilateral treaties) reduce the incidence of piracy. (3) In both short-run and long-term, IPRs protection channels in civil law countries appear to mitigate piracy more than in common law countries. (4) Formal institutions are instrumental in the fight against piracy through IPRs protection channels.

Appendices

Appendix 1: Summary statistics and presentation of countries

		Panel A: Summary Statistics				
		Mean	S.D	Min	Max	Obser.
Dependent Variable	Piracy rate	2.745	1.857	0.000	5.250	121
	Piracy rate (Common law)	0.368	0.349	-0.288	0.720	60
	Piracy rate (Civil law)	0.462	0.234	0.034	0.720	46
Independent Variables	Main IP law	2.256	2.835	0.000	11.000	121
	IPRs law	1.438	1.944	0.000	7.000	121
	WIPO Treaties	2.735	0.793	2.000	4.000	121
	Multilateral Treaties	9.628	3.304	4.000	17.00	121
Control Variables	Internet Penetration	2.888	0.799	1.301	4.727	121
	Literacy	1.826	0.097	1.572	1.956	110
Instrumental Variables	Control of Corruption	-0.309	0.641	-1.236	1.086	110
	Rule of Law	-0.302	0.687	-1.657	1.053	110
	Regulation Quality	-0.180	0.547	-1.305	0.905	110
	Government Effectiveness	-0.164	0.583	-1.038	0.807	100
	Voice & Accountability	-0.277	0.69	-1.256	1.047	110
	Political Stability (No violence)	-0.393	0.842	-2.094	0.996	110

Panel B: Presentation of Countries

Algeria (F), Botswana (E), Cameroon (F), Egypt (F), Kenya (E), Mauritius (E), Morocco (F), Nigeria (E), Senegal (F), South Africa (E), Zambia(E).

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obser: Observations.

Appendix 2: Correlation matrix

Piracy rate	IP Independent variables				Government Quality Instrumental variables						Control variables		
	MIPL	IPRL	WIPO	Multi	CC	RL	RQ	GE	VA	PolS	Internet	Literacy	
1.00	-0.71	-0.01	0.32	0.02	-0.43	-0.50	-0.60	-0.60	-0.42	-0.29	-0.18	-0.34	Piracy
	1.00	0.10	-0.27	-0.22	0.23	0.10	0.29	0.43	0.29	0.01	0.43	0.35	MIPL
		1.00	0.30	0.44	0.19	0.12	0.08	0.28	-0.02	0.01	0.25	-0.39	IPRL
			1.00	0.31	-0.09	-0.12	-0.09	-0.10	-0.09	-0.22	0.20	-0.53	WIPO
				1.00	-0.26	-0.06	-0.15	-0.12	-0.20	-0.14	0.35	-0.61	Multi
					1.00	0.90	0.86	0.94	0.79	0.77	-0.30	0.41	CC
						1.00	0.87	0.88	0.72	0.82	-0.26	0.37	RL
							1.00	0.93	0.84	0.76	-0.25	0.46	RQ
								1.00	0.83	0.71	-0.12	0.40	GE
									1.00	0.72	-0.35	0.40	VA
										1.00	-0.49	0.41	PolS
											1.00	-0.10	Internet
												1.00	Literacy

MIPL: Main Intellectual Property Rights. IPRL: Intellectual Property Rights Law. WIPO: WIPO Treaties. Multi: Multilateral Treaties. CC: Control of Corruption. RL: Rule of Law. RQ: Regulation Quality. GE: Government Effectiveness. VA: Voice & Accountability. PolS: Political Stability.

Appendix 3: Variable definitions

Variables	Signs	Variable definitions	Sources
Piracy	Piracy	Logarithm Piracy rate (annual %)	BSA
Main IP law	MIPL	Main Intellectual Property Law	WIPO
IPRs law	IPRL	Intellectual Property Rights Law	WIPO
WIPO Treaties	WIPO	World Intellectual Property Organization Treaties	WIPO
Multilateral Treaties	Multi	Multilateral IP Treaties	WIPO
Internet Penetration	Internet	Logarithm of Internet Users	WDI (World Bank)
Literacy	Literacy	Logarithm of literacy	WDI (World Bank)
Control of Corruption	CC	Control of Corruption(estimate):Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.	WDI (World Bank)
Rule of Law	RL	Rule of Law(estimate): Captures perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence.	WDI (World Bank)
Regulation Quality	RQ	Regulation Quality (estimate): Measured as the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	WDI (World Bank)
Government Effectiveness	GE	Government Effectiveness(estimate): Measures the quality of public services, the quality and degree of independence from political pressures of the civil service, the quality of policy formulation and implementation, and the credibility of governments commitments to such policies	WDI (World Bank)
Voice & Accountability	VA	Voice and Accountability (estimate): Measures the extent to which a country's citizens are able to participate in selecting their government and to enjoy freedom of expression, freedom of association, and a free media.	WDI (World Bank)
Political Stability	PoIS	Political Stability/ No Violence (estimate): Measured as the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional and violent means, including domestic violence and terrorism.	WDI (World Bank)

WDI: World Bank Development Indicators. BSA: Business Software Alliance. Log: Logarithm. WIPO: World Intellectual Property Organization. IP: Intellectual Property.

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