"An Economic Perspective on Intellectual Property Rights and Education in Developing Countries"

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ABSTRACT

This chapter examines the relationship between copyright regimes and educational attainment across countries. Access to schooling and education is crucial for achieving social and economic progress. Copyright and learning have been linked since the seventeenth century as a means of promoting equality and economic growth, and contributed to the process that transformed the United States from a colonial settlement to a global leader in industry and cultural exports. A sample of over 140 countries is used to assess contemporary issues in copyright and education in developing countries today. The statistical analyses of these data indicate that a significant relationship exists between intellectual property regimes and educational outcomes. However, strong copyright protection is not inevitably appropriate for all levels of educational attainment and socioeconomic development, and is most effective when adopted as part of an endogenous process. The goals and outcomes of copyright in furthering development need to evaluated within a broader institutional context. That is, copyright policies have to be assessed as part of a bundle of such related institutions as antitrust laws and tariffs on books, that likewise impinge upon the potential for improvements in education and the promotion of the development agenda.

INTRODUCTION

The twenty-first century is a period of rapid technological progress and high standards of living for a fortunate few in the world economy. At the same time, claims on global resources are significantly skewed, and the distribution of income both within and across countries has diverged over time. In particular, a significant fraction of the population in developing countries lack access to goods and services that satisfy basic needs. Explanations for such patterns include a lack of initial endowments, inefficient institutions, corruption and poor governance. Moreover, endogenous growth models highlight the role of knowledge and ideas in generating increasing returns and externalities that have the potential to radically shift production possibilities (Romer, 1990; Grossman and Helpman, 1990; Klenow, 1998). Empirical research confirms that the quality of education exerts a strong influence on the prospect for individual and national progress, and this is especially true of primary education and schooling for girls (Hanuschek and Kimko, 2000; Heyneman, 1997.) Similarly, the World Bank has characterized development in terms of the "four pillars of the knowledge economy," comprising incentives for the creation, diffusion and application of knowledge, trained workers, effective innovation systems, and information technologies.

Although these features are often viewed as inherent to the ability to succeed in modern societies, education, knowledge, and incentives for creativity have long been recognized as crucial inputs into economic and social progress. Engerman and Sokoloff (2011) find that education, suffrage and land policies comprised the most important explanations for the divergence over time in the growth paths of the Caribbean and Latin America. These regions were initially far wealthier than the colonies in the North American continent in the period before the nineteenth century, but the extreme inequality in access to resources in Latin American and the Caribbean and their underinvestment in human capital ultimately resulted in stagnation and a decline in their long-run growth prospects. Certainly, appropriate institutions are integral to explaining the course of U.S. economic history and its exceptional achievements. Goldin and Katz (2008) characterize economic advance in the United States over the past two centuries as "a race

between technology and education." From the very inception of the new Republic, access to education for all members of society and to intellectual property rights comprised a significant element of the blueprint for social mobility and economic development.

For today's developing economies, situation is both more complicated and less well-understood. In such countries the trade-offs between broad development goals and the narrow private interests of providers of cultural goods are difficult to determine and resolve. Such trade-offs are especially evident in the realm of copyright, which has the potential to infringe on learning and the dissemination of knowledge and information in ways that affect the degree of inequality and socioeconomic progress. Nevertheless, as the U.S. example illustrates, within these constraints, viable strategies are still available that might ensure access to education and also maintain incentives for creativity. Few would dispute these claims, but effective policies have to further resolve the dilemma of being sufficiently detailed to be readily implemented, while also garnering broad approval. A further level of complexity is added because the ability to propose and implement independent policies is restricted by harmonization and global integration.

In any event, effective strategies require relevant data and analysis, but relevant studies are scarce even in the developed countries. This chapter therefore offers an empirical investigation into the relationship between intellectual property and education in developing economies. The subject is complex and quantitative analysis is unlikely to fully capture the subtleties that need to be taken into account, so the data offer a basis for further deliberations, rather than a dictate for policy. The first section discusses the historical interaction between intellectual property and education in socioeconomic development during the era of industrialization. The second and third sections examine contemporary issues in copyright and education, based on an assessment of summary statistics and multivariate analysis for a sample of 140 representative countries. These results inform a discussion of the influence of intellectual property as well as other policies such as tariffs that also have an impact on educational attainment. The fourth section briefly examines the burgeoning publishing industry which, in many

developing economies, have been launched in response to government subsidies for educational publishing. The final part of the paper offers a brief conclusion.

I. COPYRIGHT AND EDUCATION IN HISTORICAL PERSPECTIVE

An historical perspectives offers useful insights into the factors that promote economic and social progress. From the time of its founding, the United States highlighted policies that allows it to lay claim to the title of the world's first "knowledge economy." The American colonies wished to ensure the creation and dissemination of ideas, information, innovation and education, and were prescient in linking socioeconomic growth to widespread opportunities for education and incentives for authors and inventors. Most of these colonies recognized, designed, and implemented specific policies to facilitate learning and the diffusion of "useful knowledge." Schooling and provisions for intellectual property rights were often legislated in the same clause, reflecting the notion that universal access to education and incentives for innovation achieved similar ends. For example, Pennsylvania's Frame of Government in April 1683 authorized the colony to "erect and order all public schools, and encourage and reward the authors of useful sciences and laudable inventions in the said province."[1]

After the Revolution, all of the original states, with the exception of Delaware, enacted statutes to protect authorship.[2] Their objectives were decidedly utilitarian, and the legislatures declared that copyright was necessary to encourage learning and education.[3] Pennsylvania's statute was intended "for the encouragement and promotion of learning" and directed toward "useful books." The copyright declaration of the state of New York also included plans to fund an educational academy in Kings County. North Carolina echoed the common theme that "it is proper that men should be encouraged to

[1] United States, Report of the Commissioner of Education, 1892-3, vol. 2, p. 1263, Washington, D.C., 1895.
[2] See Khan, Founding Choices. The Preamble to the Massachusetts Constitution of 1780, Ch. 5, Sec. 2 proclaimed: "Wisdom and knowledge, as well as virtue, diffused generally among the body of the people, being necessary for the preservation of their rights and liberties; and as these depend on spreading the opportunities and advantages of education in the various parts of the country, and among the different orders of the people, it shall be the duty of legislatures and magistrates, in all future periods of this commonwealth, to cherish the interests of literature and the sciences;… to encourage private societies and public institutions, rewards and immunities, for the promotion of agriculture, arts, sciences, commerce, trades, manufactures…."
[3] The English Statute of Anne of 1709 was entitled "An Act for the encouragement of learning," but this was ultimately merely a style of phrasing, rather than an explicit policy linking education and intellectual property.

pursue useful knowledge by the hope of reward; and … the security of literary property must greatly tend to encourage genius, to promote useful discoveries, and to the general extension of arts and commerce." In keeping with these social objectives, and to ameliorate any monopolistic consequences, many of the clauses included restrictions on the rights of the copyright holder. Copyrighted books had to be sold at a reasonable price, or else a compulsory license could be issued; for, as Georgia's law noted, "it is equally necessary for the encouragement of learning, that the inhabitants of this State be furnished with useful books, &c., at reasonable prices."

The United States and Canada were also exceptional in devoting significant resources to providing free public schooling for the majority of their citizens (Mariscal and Sokoloff, 2000). By 1800 all of the New England states had approved laws to establish primary or grammar schools in towns once they reached a certain population size. The "common school movement" was funded by general taxes at the local level, and both private and public expenditures contributed to widespread access to education even among the poor. These patterns contributed to high literacy rates among the free population, as well as offering opportunities for socioeconomic mobility and greater equality. The rest of the world lagged behind the United States in spending and attainment: while U.S. schooling over the twentieth century expanded at both the secondary and tertiary level, in Europe during that period educational investments were generally still being directed at the primary and lower secondary level (Denison, 1967). In marked contrast, the wealthier Latin American colonies would take more than seventy five years to achieve the same levels of literacy and education as in the nineteenth century U.S., and even today a number of countries in Africa have yet to match that record.

Although the historical evidence on schooling is limited, and the direction of causality is complex, empirical studies uniformly support the view that such variation in educational investments explain a significant part of differential rates of long term economic growth across countries (Mariscal and Sokoloff , 2000).[4] Higher expenditures on educational inputs also contributed to greater

[4] Mariscal and Sokoloff (2000) argue that suffrage institutions and the degree of political inequality partially determined educational decisions and outcomes, which in turn influenced socioeconomic mobility and the distribution of income.

convergence among European countries toward the end of the nineteenth century (O'Rourke and Williamson, 1997). Spending on primary and high schools played a significant role in enhancing economic productivity, through the acquisition of human capital, and as inputs into technological innovation. Informal institutions that facilitated learning and the acquisition of skills, such as apprenticeship systems, were likewise crucial in adding to the productivity of workers. Some scholars point to less direct, spillover benefits of educational attainment including better health and reduced fertility, lower poverty and crime, higher labour force participation, social capital, and overall political stability. Education was a primary factor in reducing inequality and encouraging social mobility.

This continued emphasis on the creation and dissemination of knowledge has comprised a keystone in the American model of economic development. In the first address to Congress in 1790, George Washington urged: "Nor am I less persuaded, that you will agree with me in opinion, that there is nothing which can better deserve your patronage, than the promotion of science and literature. Knowledge is, in every country, the surest basis of public happiness."[5] Policy makers agreed that, like education, copyright protection would serve secure the democratization of knowledge. Ideally, incentives for creativity would increase the flow of learning and information. Moreover, facilitating reading and publication would contribute to free speech. The diffusion of knowledge would also ensure broad-based, democratic access to the benefits of social and economic development. Accordingly, the earliest federal statute to protect the product of authors was approved on May 31 1790, "for the encouragement of learning, by securing the copies of maps, charts, and books to the authors and proprietors of such copies, during the times therein mentioned." John Barry obtained the first federal copyright when he registered his spelling book in the District Court of Pennsylvania and early grants reflected the same utilitarian character. In the first decade of copyright, between 1790 and 1800, the vast majority of works registered were of a practical nature: music, poetry and fiction accounted for less than 14 percent, whereas textbooks, scientific works, and dictionaries comprised fully one third of all filings (Khan, 2005).

[5] See First State of the Union Address, available at http://ahp.gatech.edu/first_state_union_1790.html .

In the case of patents, the rights of inventors, whether domestic or foreign, were held to be coincident with public welfare. At the same time, policymakers were ambivalent about copyright, which had the potential to inhibit free speech and restrict access to educational materials. As such, from the very beginning, the laws were designed and calibrated to moderate the trade-offs between the rights of authors (or publishers) and social welfare. The protections provided to authors under American copyright laws were as a result much more limited than those most European countries offered. Of relevance here are stipulations regarding compulsory licenses, fair use, and loss of rights after the first sale or in the case of employees creating "work for hire." In the American system, if the welfare of the copyright holder conflicted with that of society, these individualized concerns could be addressed and enforced through contract law or unfair competition rulings, rather than through a generic federal statutory clause that would affect all property holders. Thus, the default was the benefit of the public domain, and the rights of authors comprised a limited exemption to this realm.

The difficult quest for balance between private and public good is most evident in the copyright doctrine of "fair use" that allowed users to have unauthorized access to copyrighted works under certain conditions. The fair use doctrine was initially applied in English legal decisions, but found its most distinct articulation in the American system as a way of minimizing the monopoly costs of an exclusive right in expression. Fair use allowed wide latitude for educational purposes, and reduced the costs of learning by permitting unauthorized access to copyright materials. The unique interpretation of the fair use doctrine illustrates the extent to which U.S. policy makers weighed the costs and benefits of private property rights against the rights of the public and the needs of a democratic society. If copyrights were as strictly construed as patents, it would serve to hinder scholarship, prevent public access to key information, heighten transactions costs for potential users, and inhibit learning which the statutes were primarily intended to foster and facilitate.

The 1790 Copyright Act also applied the principles of fair use in a novel manner across international borders (Khan, 2005). The U.S. was long a net importer of literary and artistic works, especially from England, which implied that recognition of foreign copyrights would have led to a net

deficit in international royalty payments. The legislators openly acknowledged the imbalance in the cultural ledger, and explicitly authorized Americans to take free advantage of the cultural output of other countries.[6] Protective tariffs on imported books that ranged as high as 25 percent added to the incentive to reprint foreign works. The United States stood out in marked contrast to countries such as France which prohibited counterfeiting of both foreign and domestic works. It was not until 1891, after the United States became more competitive in the international market for cultural goods, that international copyrights were recognized. However, the statutes still included significant concessions to domestic printers' unions and printing establishments. These clauses resulted in U.S. failure to qualify for admission to the Berne Convention until 1988, more than one hundred years after the first agreement to harmonize international copyright laws.

The American copyright regime during the period of piracy reminds us that, in the absence of state-enforced rights of exclusion, private markets have an incentive to develop alternative methods of appropriating benefits. The size of the market expanded when prices fell, leading to much greater U.S. readership for some foreign authors, and this market expansion fuelled further network externalities that were associated with bestselling works. A number of foreign writers were able to exploit such externalities by providing complementary goods and services, such as lectures and speeches, that could be as profitable as the direct income from sales of copyrighted products. Publishers practiced market segmentation and price discrimination, which allowed them to increase revenues relative to a single pricing strategy. Moreover, the "reputable firms" in the book trade adhered to cartels, which allowed them to create synthetic copyrights or private methods of exclusion. In other instances, authors and publishers drew up bilateral contracts, and some entered into work for hire agreements. Moreover, there were natural barriers to whole-scale copying, such as the need for material that was appropriate to local

[6] Senator John Ruggles was one of the leading authorities in Congress on the patent system and a strong proponent of the 1836 changes in the patent law. He was also a key member of a committee to consider reforming international copyrights, and argued that "American ingenuity in the arts and practical sciences would derive at least as much benefit from international patent laws, as that of foreigners. Not so with authorship and book-making. The difference is too obvious to admit of controversy" (Barnes, 1974, p. 71).

circumstances. This was especially true of the textbook industry, which required specialized knowledge of American geology, geography and history.[7]

In sum, the United States emphasized the importance of mass literacy and universal public education from the beginning of its colonial era, and this approach was associated with a relatively equal distribution of income, innovation and a balanced growth path. While it acknowledged the importance of incentives for authorship and innovation, policymakers did not hesitate to abridge copyrights when there was a possibility that conflicts might exist between learning and copyright. Thus, the United States lagged behind the rest of the world in terms of both domestic and foreign copyright protection during the period when it was a developing country. It is very likely that such American "copyright piracy" provided net benefits initially when the United States was a debtor in flows of cultural goods in the global economy. But, once the balance of trade in cultural exchange moved in its favour, the United States had an incentive to adopt stronger laws to protect its authors and artists internationally.

II. EDUCATION IN DEVELOPING COUNTRIES

Education is a fundamental human right, as well as a key input in generating economic productivity and growth. Additions to human capital are positively related to per capita income and economic development in a cumulative and self-sustaining process (Figure 1). On average, nations across the globe devote close to 5 percent of their gross domestic output to education, but the allocation of resources varies within and across countries. Higher-income countries have devoted significant resources to primary, secondary, and tertiary education, and their policy debates tend to focus on such issues as the role of technology in the classroom. At the same time, more than seventy five percent of the world's potential students live in developing regions and, although improvements have been achieved in resources and outcomes, the results fall short of the standards necessary to fulfill the development agenda.

[7] According to one publisher of textbooks, "The question of international copyright law is one which we have not considered very much, as it does not materially affect the schoolbook business. It has almost wholly to do with general literature. Each country has its own methods of teaching, and the school books of one country can not be pirated in another to advantage." See Khan (2005).

Table 1 provides summary statistics for educational indicators between 2000 and 2009 across the world. These data highlight the significant regional variation that exists in such metrics as spending on education and pupil-teacher ratios. In some areas, substantial progress has been achieved, whereas in others students still lack basic items such as electricity, water, teachers, and textbooks, and minimal standards have yet to be exceeded in the vital area of schooling for girls. Over the course of this period, for instance, South Asian primary school completion rates for females increased from 60.4 percent to 83.8 percent. A similar pattern holds in most areas, and primary school enrollments converged across countries, for both boys and girls, toward the levels set by the higher-income economies. However, secondary school attendance was still well below capacity in many developing regions, especially for girls, and in 2009 the global average secondary schooling rate comprised no more than 59.8 percent. Over a longer period of time, the trends are even more striking, since the rate of growth in primary and secondary school enrollments has slowed in more recent years (Glewwe and Kremer, 2005).

The outliers deviate markedly from the global average, and illustrate that solutions need to be customized to individual circumstances. Most evidently, the Latin American countries, whose schooling record was quite similar to those in other regions in the middle of the twentieth century, made dramatic gains in terms of most indicators, and even the educational gender gap was eliminated. By way of contrast, Sub-Saharan Africa (SSA), despite allocating 18.9 percent of its government expenditures to education, and achieving gains in a number of key indicators, lagged significantly in almost all measures behind the rest of the world, and behind peer economies. Nine countries with the lowest adult literacy rates in the world are in Sub-Saharan Africa, where almost a half of the adult population had never been formally educated, and a third of them could neither read nor write. In Congo, Togo, Côte d'Ivoire, Madagascar, Equatorial Guinea, Chad and Niger, over fifty percent of schools lacked basic sanitation facilities.[8] Approximately 32 million children in Sub-Saharan Africa have never been given any primary

[8] Over 80 percent of schools did not have electricity in a number of African countries, including Burkina Faso, Burundi, Cameroon, the Democratic Republic of the Congo, Gambia, Guinea, Malawi, Niger and Togo (Unesco, 2011).

schooling, classrooms are overcrowded and supervised by poorly-trained teachers, and the quality of education leads many to question the efficiency with which resources are being deployed.[9]

Another important issue, that might explain the paradox of relatively high spending in relation to deficient outcomes, is the distribution of expenditures. As is the norm in most countries, Sub-Saharan governments subsidize tertiary education disproportionately relative to other levels of schooling (Unesco 2011). Low low-income countries spend 34 times more on a student in tertiary education relative to the expenditures per primary school student (Glewwe and Kremer). Families pay for a third of primary education costs, and almost a half of secondary education, whereas public funding accounts for close to eighty percent of expenditures at the tertiary level. At the same time, less than one percent of the population in SSA hold university degrees, and graduates are likely to be the source of a brain drain to richer countries. As a result of such regressive budgeting, the educational sector is less effective as a means of changing social status for poor families in these countries.

An additional source of inequity relates to the allocation of funding and expenditures. SSA countries typically finance large-scale capital projects such as construction, whereas recurring expenses like textbooks and other educational materials have been underfunded or ignored. As Table 2 indicates, textbooks are often shared, and are especially scarce in Cameroon, with an average 13.1 pupils per mathematics textbook, and 11.2 per reading textbook. Moreover, the higher the grade of the class, schoolbooks become even less available for students (Table 3). At the university level, where textbooks are typically not provided by the government, students may resort to photocopying recommended books, at times with the encouragement of instructors. However, even when adequate numbers of books and materials are available, they tend to be outdated, worn, or irrelevant for the needs of the particular society. Students are less apt at learning from books adopted from overseas or expressed in a second or (or even third) language that differ from the local dialect. Although some observers are optimistic that high technology such as solar-powered computer devices might allow students to leapfrog the current gap in

[9] For instance, in 6 out of 10 countries in sub-Saharan Africa there were more than 50 pupils in the average first grade class, and in Chad the average class comprised an astonishing 85 pupils (Unesco, 2011).

educational resources, such solutions seem somewhat esoteric for the circumstances faced by the majority of children in lower income regions.[10]

In short, impressive advances in schooling have occurred since the middle of the twentieth century, but large gaps still exist in access to education, especially among the population of lower-income countries. These patterns are partly explained by supply-side factors, since enrollments and attendance tend to increase significantly after obstacles to educational access are reduced or removed. Numerous aspects of supply shortfalls might explain these lags in schooling and learning, including insufficient financial resources and inadequate numbers of trained personnel, or inefficiency and corruption. To some extent, it is encouraging to note that the families in these circumstances typically recognize the importance of schooling, and that supply shortfalls may be resolved by greater spending. However true this might be, suggested solutions are unlikely to succeed if the educational sector is considered sui generis. Educational policies have to be assessed within a larger institutional context, since there are spillover effects from the rules and standards toward tariffs and imports, publishing, employment, health, taxation, transportation and infrastructure, as well as intellectual property enforcement. In short, institutions are closely interlinked, and this implies that other facets of development also impinge upon the efficacy of schooling, and the acquisition of knowledge more broadly.

III. COPYRIGHT AND EDUCATION IN ECONOMIC DEVELOPMENT

The global divide in education and the use and dissemination of knowledge extends to the realm of intellectual property rights. Ideally, as articulated in the objectives of the TRIPs agreement, "the protection and enforcement of intellectual property rights should contribute to … the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare."[11] These objectives, however desirable, are not entirely in accordance with the realities of the

[10] Angrist and Lavy (2002) found that computer-assisted learning methods did not improve students' performance in mathematics and reading, and indeed, may have had a negative influence on outcomes.

[11] http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm. Article 13 allows for limitations and exceptions, provided that "Members shall confine limitations or exceptions to exclusive rights to certain special cases which do

relationship between copyright and learning, as discussed in the examination of the historical experience. Copyright and educational considerations at times involve conflicts between users and producers, and protection of such property rights may not always be consistent with maximizing social and economic welfare. These tradeoffs and paradoxes of intellectual property rights become most evident when the enforcement of exclusive rights in copyrighted materials serves to constrain access to knowledge and information in the educational sector. This section therefore considers the relationship between intellectual property and related rights, and the publishing and education industries.

The traditional approach to intellectual property rights focuses on the incentives that are offered when authors (broadly defined) have the legal ability to exclude nonpayers from using their original expression. In the absence of rights of exclusion, public goods are nonrival (one person's consumption does not reduce the total available) and nonexclusive (it is difficult to prevent free-riding). Thus, this approach is based on the premise that cultural output, including educational materials, would not be produced or disseminated without copyright protection. As such, it is argued, the interests of the author and publisher are aligned with the interests of society in obtaining access to the inputs that facilitate educational attainment. At the same time, the majority of cultural goods that are traded internationally originate in the developed countries, and if publishers' earnings in these markets cover their fixed costs, it could be argued that competitive pricing in other countries (setting price equal to marginal or incremental costs) would not lead to negative consequences in terms of incentives to create.

Copyright rules and standards influence a wide range of activities that affect teachers, students, and other users and producers in academia that illustrate the ways in which private and social interests might not be aligned. These include performances or displays of cultural goods, and copying or distributing works, for educational purposes. Assignments might require students to integrate copyrighted materials (such as a lesson in digital media that uses software and existing video and music clips), while teachers might engage in the copying of works for students to use in the class or for homework, and distribute materials without attribution or payment to the rights owner because the time

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not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right holder."

and monetary costs would be too burdensome. Professors make extensive use of copyrighted inputs in their own research, but they also contribute significantly to the public domain. Libraries must also often sacrifice access in deference to intellectual property rights. Since academic practices necessarily involve the widespread integration and transformation of knowledge and information, the transactions costs of attaching remuneration to each application would ultimately prove to be prohibitive. Under such circumstances, copyright enforcement would function as a significant barrier to access to knowledge (Kapczynski 2008).[12]

The historical experience of the United States suggested that intellectual property rights policies prove to be most effective when they are adopted in accordance with the needs and level of development of the individual jurisdiction. Not surprisingly, this is likewise true of developing countries in general in today's global economy. Table 4 presents simple correlation statistics between measures of intellectual property rights and variables that reflect knowledge and educational issues, for up to 214 countries. The intellectual property index and the copyright index synthesize central elements of legislation and enforcement characteristics in each country, and higher values reflect stronger property rights. Inclusion on the International Intellectual Property Alliance (IIPA) watchlist or high scores on measures of software piracy characterize poor intellectual property regimes. Such indices are not perfect indicators, especially in terms of capturing how the law on the books is interpreted and enforced in practice, but confidence in the results are bolstered by the significant correlations between each of the indices. An exception is the IIPA watchlist, a roster which arguably reflects questions of political economy and private business interests as much as the intellectual property rules of particular jurisdictions.

The results suggest that countries where all property rights are respected also tend to protect intellectual property and to refrain from piracy. Measures of knowledge, communications technology, and information at the national level are positively and significantly correlated with stronger intellectual property rights. One might expect that greater urbanization and internet access would likely facilitate software piracy; instead, unauthorized use of software is more prevalent in countries with lower urban

[12] For an application of this approach, see C Armstrong et al. (eds), Access to knowledge in Africa: The role of copyright (2010).

populations, and where internet usage is lower. Such variables are also proxies for levels of economic development, and this is consistent with the strong positive relationship between gross domestic product per capita and indices of intellectual property. It is interesting that overall intellectual property rights are positively correlated with the Gini index (stronger intellectual property rights are associated with greater income inequality), whereas copyright is negatively correlated (stronger copyrights are associated with lower income inequality).

As discussed above, schooling and education are influenced by copyrights in ways that are difficult to quantitatively assess. As might be expected, literacy is more strongly related to copyrights than to patents and other intellectual property rights. The patterns of bivariate correlations are supported by the multivariate regressions in Table 5, which consider the determinants of primary schooling and educational attainment. Educational attainment and university enrollment are positively associated with greater security in general property rights and with stronger intellectual property systems, although copyright does not have a statistically significant relationship to expenditures on education. A striking finding is that primary schooling is negatively and significantly linked to all indices of intellectual property, and to copyright in particular. One explanation could be that copyright laws are easier to evade at the college level, where students have greater discretion in choice of readings and in means of illegal duplication, whereas primary school students might face greater constraints because fewer substitutes are available for required readers or educational materials.

The results in Tables 4 and 5 also highlight the fact that areas with poor educational attainment generally impose higher barriers to learning, in the form of tariffs on books and educational materials. Access to educational materials depends critically on the prices that users have to pay. Since the majority of lower-income countries are net importers of such items, access is heavily influenced by tariffs on books, music, films and other resources. The Florence Agreement of 1950 ("an international agreement facilitating the free flow of books, publications and educational, scientific and cultural materials") was

designed to reduce customs duties in this arena.[13] In accordance with the Florence Agreement, the European Union and North America does not impose tariffs on books and related items, but Figure 1 illustrates the high barriers that many developing countries have placed on educational materials, amounting to more than 35 percent in Latin America. Since many of these countries do not have domestic publishing industries to protect, it may be assumed that the tariff barriers are levied in order to raise revenues for the government, by means of taxes on imports. These policies result in higher prices for students and for consumers in general, which are likely to be especially restrictive in instances where pupils and their families do not obtain public subsidies or tax credits for investments in education. Tariffs highlight the extent to which policy initiatives towards education and intellectual property rights cannot be undertaken sui generis. Rather, copyright policies must be considered as part of a general portfolio of coherent rules and strategies to promote educational attainment.

IV. COPYRIGHT AND EDUCATIONAL PUBLISHING

The question of copyright protection becomes most straightforward when it is evident that producers are making a good in order to gain income, as in the textbook industry. Positive correlations exist between stronger copyright regimes and the size of the publishing industry for books and educational materials. Copyright furthers the goal of education in areas where enforcement provides incentives for greater output in the textbook industry and in the creation of other materials that are used as inputs into education. Profit-maximizing strategies and differences in demand elasticities benefit both producers (in the form of greater net income) and price-sensitive consumers (in the form of two-part pricing). The United States is one of the world's largest exporters of textbooks, and publishers employ a model of price discrimination, selling books at significantly lower prices in developing countries relative to the price in

[13] Signatories include Afghanistan, Belgium, Bolivia, China, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, France, Greece, Guatemala, Haiti, Honduras, Iran, Israel, Luxembourg, Netherlands, New Zealand, Pakistan, Peru, Philippines, Syria, Sweden, Switzerland, Thailand, United Kingdom, the United States (1959) and Uruguay. These countries, according to Article IV of the Agreement, intended to "promote by every means the free circulation of educational, scientific or cultural materials, and abolish or reduce any restrictions to that free circulation which are not referred to in this agreement."

the markets of the richer economies.[14] Publishers are aware that demand curves slope downwards, and that higher prices might create an incentive for users with low opportunity cost to resort to imperfect substitutes such as photocopying or loans from libraries. In some instances, it might even be cost-effective for publishing companies to distribute books for free to developing countries, as part of a long-term strategy to improve markets through promoting literacy.[15]

Even so, imported books may be too costly for the budgets of families in poor countries, and this has created a market for cheaper local goods. Product differentiation may at times be counter-productive if duplication of existing materials (such as mathematics or physics) is more cost-effective. Nevertheless, in many instances indigenous textbooks are likely to be more appropriate for education than imports, especially in the case of local history, sociology, and the study of individualized circumstances, especially if languages and dialects are specific to a region. Accordingly, within the past two decades, domestic publishing and the provision of textbooks by resident writers has rapidly increased throughout the world, even in Sub-Saharan Africa. For instance, in 2009 Malaysian publishers produced 15,767 titles, a quarter of which were textbooks. In Vietnam, 29.7 percent of titles were schoolbooks, but the total number of volumes in education comprised 77.3 percent of all books published in the country.[16] In Nigeria, about 90 percent of the publishing industry is devoted to the production of textbooks.

Government subsidies are often directed towards aiding these "infant industries" to overcome the high initial fixed costs. Brazil offers a good illustration of the advantages and disadvantages of state sponsorship. In that country, government involvement led to enormous growth in the size of local cartels in educational publishing. The global publishing industry is heavily concentrated, and the largest market shares are accounted for by corporations from the developed world, but two of the top 50 firms in the

[14] A survey of publishers GAO (2005) notes that prices are set according to "income levels, the cost of living, the role of the textbook in the classroom, intellectual property protections, the strength of the local currency, and the prices of competing textbooks sold in that marketplace. In some cases, international prices may be substantially lower than prices at which the textbook is sold in the United States… in many developing countries, incomes are generally too low for students to buy textbooks at U.S. prices."

[15] See, for instance, Book Aid International, which has distributed over 30 million volumes, largely provided by publishers, to various countries in Africa.

[16] ASEAN Book Publishers Association, Annual Report: Bridge to Regional Understanding, 2010.

world are from Brazil.[17] Both of these companies, Saraiva and Editora, were part of the National Textbook Program, which offered government contracts for supplying textbooks.[18] Such cartels typically lead to higher prices and fewer substitutes for products, and may necessitate further intervention in the form of inefficient price controls and antitrust supervision. Government "patronage" can substitute for copyright protection, if publishers are compensated directly by the state, but this can raise issues of rent-seeking, corruption and the misallocation of resources. Government actions such as the direct provision of free textbooks can also lead to the undermining of the higher-priced copyrighted publishing industry.

Nevertheless, over the past decade one observes a retreat of the state from the publishing of textbooks, and greater decentralization, such as the marked changes occurring in the publishing industry in China. Other methods include a type of "work for hire" whereby writers of textbooks are paid a lump sum instead of copyright royalties. In Poland and Switzerland textbook authors are allowed to use compulsory licenses to compensate the producers of the works they cite or recreate. As private entities assume responsibility for the large initial investments that the publication of educational materials require, it might be expected that concerns about copyright enforcement will resurface or increase, this time to protect domestic enterprises. Thus, as the positive correlation between per capita income and copyright suggests, in this sector and elsewhere, over time an endogenous evolutionary process serves to link stronger intellectual property rights to educational systems and other pursuits in developing economies.

V. CONCLUSION

Copyright and other forms of intellectual property are offered to the creators of cultural goods to resolve the public good problem, whereby free-riders may reduce or eliminate the incentive for investments in knowledge and information. Once the item is created, however, rights of exclusion increase prices and transactions costs, and reduce social access. This tradeoff between incentives and access is compounded

[17] The ten largest publishing companies in the world are Pearson, Reed Elsevier, Thomson Reuters, Wolters Kluwer, Hachette Livre, Grupo Planeta, McGrall-Hill Education, Random House, Holtzbrinck, and Scholastic.
[18] See Publisher's Weekly 2012 survey of "Global Publishing Leaders" http://www.publishersweekly.com/pw/by-topic/industry-news/financial-reporting/article/52730-global-publishing-leaders-2012-saraiva.html

by the fact that intellectual property rights also facilitate markets in cultural goods, which benefit both producers and consumers. In the global economy the majority of trade in cultural goods originates in the developed world and, since the incremental cost of producing another unit is close to zero, it is not always the case that free access by consumers in developing countries might create disincentives for the producers. The dilemmas become more evident when goods are vital to basic needs such as health and education. Thus, when the further dimension of a division across countries is added to the calculus, economic questions are necessarily fused with unquantifiable considerations of political factors, and distributive and social justice.

The American experience indicates that, in the absence of strong international copyright enforcement, markets adjust, and private solutions tend to be substituted for legal rights of exclusion. Access can be reduced or eliminated through the enforcement of intellectual property rights, but also through technological barriers and digital rights management, contract, monopolization, taxation, transactions costs, tariffs, inefficiency and corruption. Similarly, rights of access can be affected through market and nonmarket mechanisms. Market-oriented strategies include price discrimination, the use of complementary items to obtain returns from a freely-provided product, work for hire, subsidies, parallel importation, market segmentation, and the use of private contracting. Nonmarket means include compulsory licenses, working requirements, public provision, cartelization, fair use exceptions, and "piracy". As such, any assessment of the role of copyright needs to incorporate and gauge its consequences as part of a portfolio of related policies.

Gaps in copyright enforcement are universal, but there is significant variation in the means by which flexibility is attained. In the United States, a rich and expansive fair use tradition ensures that copyright is constrained in the realm of education, although one might further question whether the existing balance is optimal. In many developing countries, copyright piracy takes the place of legitimate fair use legislation, serving as a decentralized means of increasing access. The data indicate that countries at the low end of the income scale tend to use "piracy" as a means of gaining access to copyrighted goods in the international market. However, piracy is a short-term solution, since more-developed economies

have an endogenous tendency to adopt stronger domestic intellectual property systems. For instance, as educational publishing becomes more decentralized, local writers and publishers have a greater incentive to support the introduction of copyright enforcement. It is arguably in this transitional period that official limitations and exceptions become especially significant, both as a deterrent to "self-help" solutions, and as a stimulus for integration into the global economy. In short, international copyright laws and policies that allow for flexibility and legitimate gaps in enforcement seem most likely to encourage the progress of science and useful arts in developing societies.

TABLE 1
GLOBAL EDUCATION STATISTICS

Country	Indicator	2000	2009
East Asia & Pacific	Public spending on education, total (% of GDP)	3.6	3.4
	Public spending on education, total (% of govt expenditure)	15.4	16.4
	Pupil-teacher ratio, primary	21.7	18.6
	Pupil-teacher ratio, secondary	17.7	16.5
	School enrollment, primary (% net)	93.1	94.1
	School enrollment, secondary (% net)	58.7	68.6
	Primary completion rate, female (% of relevant age group)	96.1	98.2
Europe & Central Asia	Public spending on education, total (% of GDP)	4.5	5.1
	Public spending on education, total (% of govt expenditure)	11.9	12.4
	Pupil-teacher ratio, primary	16.6	15.6
	Pupil-teacher ratio, secondary	11.5	11.3
	School enrollment, primary (% net)	95.6	95.1
	School enrollment, secondary (% net)	83.2	86.7
	Primary completion rate, female (% of relevant age group)	95.7	96.6
Latin America & Caribbean	Public spending on education, total (% of GDP)	4.0	4.0
	Public spending on education, total (% of govt expenditure)	14.4	15.2
	Pupil-teacher ratio, primary	25.6	23.5
	Pupil-teacher ratio, secondary	19.2	18.0
	School enrollment, primary (% net)	92.8	94.2
	School enrollment, secondary (% net)	61.5	73.2
	Primary completion rate, female (% of relevant age group)	97.4	100.0
Middle East & North Africa	Public spending on education, total (% of GDP)	5.8	4.8
	Public spending on education, total (% of govt expenditure)	18.3	19.3
	Pupil-teacher ratio, primary	24.6	21.8
	Pupil-teacher ratio, secondary	.	.
	School enrollment, primary (% net)	84.9	90.1
	School enrollment, secondary (% net)	59.8	65.4
	Primary completion rate, female (% of relevant age group)	78.7	85.9

….. Continued …

Table Continued

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Country	Indicator	2000	2009
North America	Public spending on education, total (% of GDP)	5.6	5.1
	Public spending on education, total (% of govt expenditure)	14.8	13.8
	Pupil-teacher ratio, primary	15.2	13.9
	Pupil-teacher ratio, secondary	15.0	14.0
	School enrollment, primary (% net)	94.7	91.6
	School enrollment, secondary (% net)	86.4	87.9
	Primary completion rate, female (% of relevant age group)	97.4	93.7
South Asia	Public spending on education, total (% of GDP)	2.7	2.9
	Public spending on education, total (% of govt expenditure)	13.2	14.9
	Pupil-teacher ratio, primary	39.2	39.5
	Pupil-teacher ratio, secondary	34.1	33.0
	School enrollment, primary (% net)	75.4	86.4
	School enrollment, secondary (% net)	.	.
	Primary completion rate, female (% of relevant age group)	60.4	83.8
Sub-Saharan Africa	Public spending on education, total (% of GDP)	3.6	3.8
	Public spending on education, total (% of govt expenditure)	.	18.9
	Pupil-teacher ratio, primary	48.0	46.2
	Pupil-teacher ratio, secondary	.	27.3
	School enrollment, primary (% net)	59.2	75.1
	School enrollment, secondary (% net)	19.5	27.0
	Primary completion rate, female (% of relevant age group)	46.4	63.1
World	Public spending on education, total (% of GDP)	4.1	4.4
	Public spending on education, total (% of govt expenditure)	13.9	15.1
	Pupil-teacher ratio, primary	26.8	23.9
	Pupil-teacher ratio, secondary	21.8	22.2
	School enrollment, primary (% net)	82.6	87.8
	School enrollment, secondary (% net)	52.2	59.8
	Primary completion rate, female (% of relevant age group)	78.9	87.3

Source: World Bank EdStats, 2012. The data include extrapolations for missing years.

TABLE 2

Class size and school resources in Africa, 2010

Primary Education	**Average class size.**	**Pupil/ textbook**	**Pupil/ textbook**	**No Electricity**
		Reading	Mathematics	Percent
COUNTRY				
Angola	...	2.9	3.0	...
Benin	45.9	1.1	1.0	...
Burkina Faso	55.8	...	...	90.9
Burundi	55.5	3.7	...	97.7
Cameroon	...	11.2	13.1	81.0
Cape Verde	26.4	1.0	1.0	47.1
Central African Republic	...	8.0	7.9	...
Chad	66.9	3.2	3.2	...
Congo	62.1	1.8	2.1	...
Democratic Republic of the Congo	...	1.8	1.9	92.1
Equatorial Guinea	...	...	...	64.2
Eritrea	45.1	...	...	65.1
Ethiopia	...	1.5	1.5	...
Gambia	...	2.3	2.1	82.7
Guinea	43.9	1.0	1.1	97.6
Madagascar	49.3	0.8	1.4	...
Malawi	...	...	1.8	87.8
Mali	59.3	0.9	1.0	...
Mauritius	31.5	0.3	1.0	.
Mozambique	52.3	1.3	1.3	...
Niger	42.2	1.1	1.5	98.2
Rwanda	47.5	0.4	0.8	...
Togo	45.5	2.4	3.6	91.4
Uganda	...	2.4	3.2	...
Tanzania	...	2.0	3.9	93.7

Source: Unesco (http://stats.uis.unesco.org/unesco)

TABLE 3

TEXTBOOKS PER STUDENT IN SOUTHERN SUDAN, 2010

PRIMARY SCHOOL

	Students	Eng. Textbooks	Ratio	Math Texts	Ratio
P1	426,349	102,778	4.1	95,788	4.5
P2	295,554	76,919	3.8	72,750	4.1
P3	244,215	57,409	4.3	61,207	4.0
P4	185,885	46,059	4.0	46,073	4.0
P5	117,418	28,527	4.1	27,500	4.3
P6	67,921	17,292	3.9	17,556	3.9
P7	42,157	12,989	3.2	11,954	3.5
P8	22,375	7,012	3.2	7,538	3.0
Total	1,401,874	348,985	4.0	340,366	4.1

SECONDARY SCHOOL

	Students	English Textbooks	Ratio	Math Texts	Ratio
S1	14,821	2,922	5.1	2,851	5.2
S2	10,211	2,808	3.6	2,173	4.7
S3	7,800	2,344	3.3	1,917	4.1
S4	1,655	1,013	1.6	767	2.2
Total	34,487	9,087	3.8	7,708	4.5

Source: Government of Southern Sudan, Education Statistics, 2011.

TABLE 4
CORRELATION BETWEEN IPR MEASURES AND ECONOMIC INDICATORS, 2010

	IPR Index	IIPA Watchlist	Copyright Index	Software Piracy
IPR Index	1	0.02	0.50***	-0.9***
IIPA Watchlist	0.02	1	0.23***	-0.16**
Copyright Index	0.50***	0.23***	1	-0.57***
Software Piracy	-0.9***	-0.16**	-0.57***	1
Security of Property	0.79***	0.1	0.47***	-0.80***
Legal Enforcement	0.38***	0	0.33***	-0.34***
Tariffs on Books	-0.29***	-0.04	-0.24***	0.37***
Knowledge Index	0.73***	0.2**	0.66***	-0.86***
Innovation	0.8***	0.2**	0.64***	-0.89***
ICT	0.71***	0.18**	0.64***	-0.83***
Internet Usage	0.73***	0.14*	0.61***	-0.87***
Literacy	0.25**	0.36***	0.43***	-0.47***
Primary School Enrollment (%)	-0.48***	-0.29***	-0.59***	0.67***
University Enrollment (%)	0.5***	0.18**	0.57***	-0.6***
Education (% GDP)	0.31***	-0.13	0.07	-0.08
Education Index	0.61***	0.2**	0.63***	-0.74***
GDP per capita	0.82***	0.07	0.5***	-0.85***
Gini Index	0.53***	0.25***	-0.13	-0.48***
Rural Population (%)	-0.49***	-0.25***	-0.39***	0.63***
Population Density	0.22**	0.15*	-0.05	-0.18**

Notes: Pearson correlation coefficients across countries (N varies from 146 to 214). Asterisks indicate levels of significance at 1%, 5% and 10%.

TABLE 5
REGRESSIONS: COPYRIGHTS AND EDUCATION

	(1)	(2)
Dependent Variable	Education Index	Primary Schooling
Intercept	3.03***	11.34***
	(2.88)	(6.79)
Copyright Index	0.003**	-0.003*
	(2.17)	(1.72)
Middle Income Country	-1.64***	2.29**
	(4.00)	(2.45)
Low Income Country	-3.23***	2.88***
	(4.14)	(2.55)
Local Publishing	0.29***	0.30*
	(2.80)	(1.81)
Tariff on Books	-0.02**	0.009
	(2.37)	(0.92)
	N=69	N=26
	R^2=0.74	R^2=0.37
	F=36.13	F=2.34

Notes and Sources:
Data are from the World Bank, WIPO, Unesco and Unctad. Income levels are based on the categorization of countries in the World Bank Development Indicators for 2010. The dependent variables comprise an index of educational attainment included in the composite World Bank Knowledge Index http://go.worldbank.org/E7ISX99P10, and the log of primary school enrollments. The excluded regional variable is North America.

TABLE 6
REGRESSIONS: BOOK PUBLISHING AND IP-RELATED POLICIES

	(1)	(2)	(3)
Intercept	7.39***	-3.96**	3.12***
	(4.10)	(2.26)	(3.67)
Intellectual Property Index	0.05***	0.06***	
	(4.37)	(4.75)	
Copyright Laws			0.01***
			(3.33)
Tariffs on Books		-0.001	-0.01
		(0.21)	(1.36)
Regional Fixed Effects			
Latin America and Caribbean	-1.41	-1.07	2.53***
	(0.86)	(0.97)	(3.78)
Europe and Central Asia	-0.34	0,50	3.45***
	(0.22)	(0.48)	(4.36)
Middle East and North Africa	-2.86*	-2.14**	2.03***
	(1.76)	(1.97)	(2.65)
East Asia and Pacific	-1.44	-1.36	4.01***
	(0.87)	(1.26)	(4.95)
South Asia	0.32	-0.77	4.64***
	(0.17)	(0.61)	(3.73)
Sub-Saharan Africa	-5.05***	-3.98***	
	(3.08)	(3.45)	
Middle Income Nation		0.31	
		(0.71)	
Low Income Nation		-1.41	
		(1.91)*	
Log of Population		0.63***	
		(7.33)	
	N=84	N=78	N=73
	R^2=0.66	R^2=0.87	R^2=0.66
	F=21.21	F=38.85	F=18.30

Notes and Sources:
Data are from the World Bank, Unesco and Unctad. Income levels are based on the categorization of countries in the World Bank Development Indicators for 2010. The dependent variable is percentage of the college-aged population who are enrolled in tertiary educational institutions. Tariffs on books were obtained from UNCTAD, whereas the data on books published were provided by UNESCO. Software Piracy data are from the Business Software Alliance www.BSA.org. The excluded regional variable is North America.

FIGURE 1
Education and Economic Development

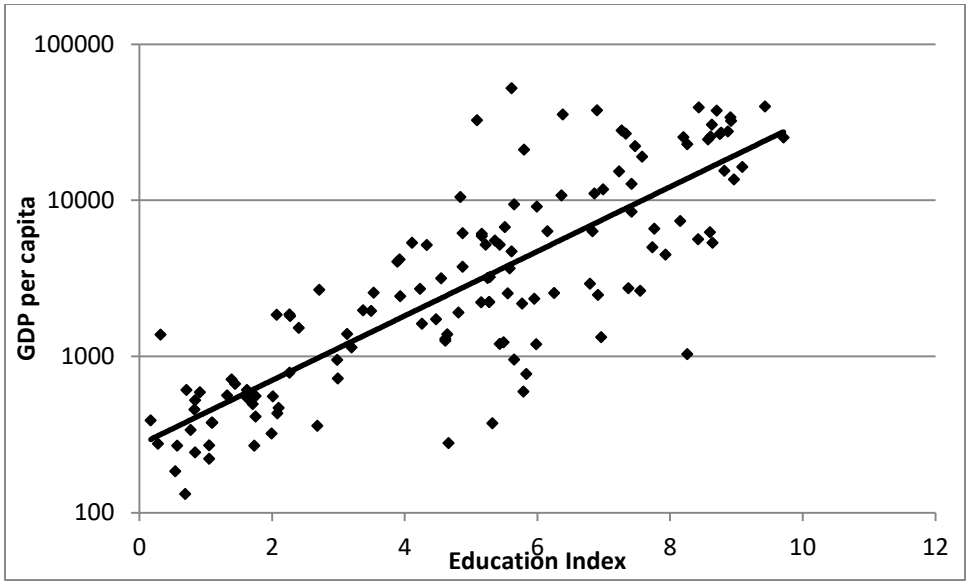
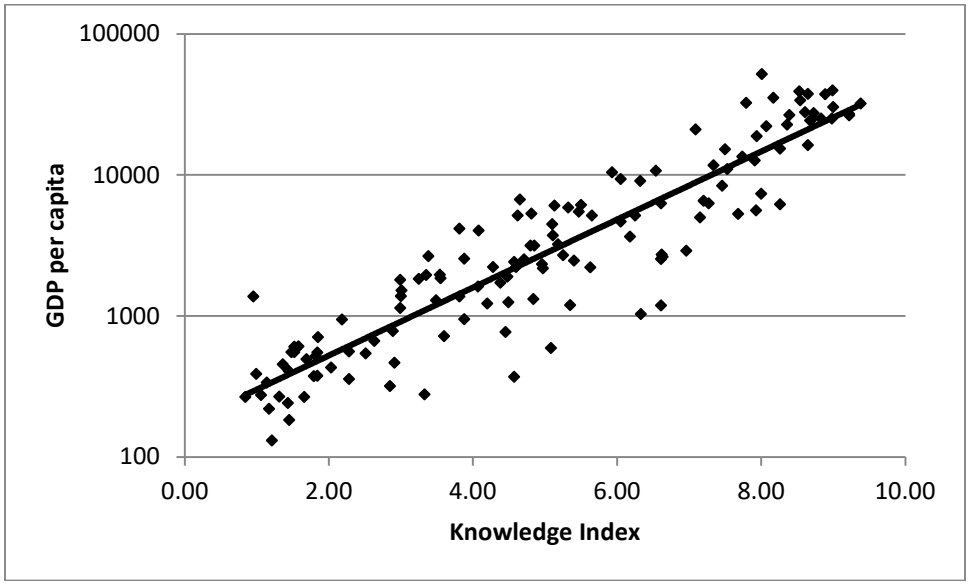


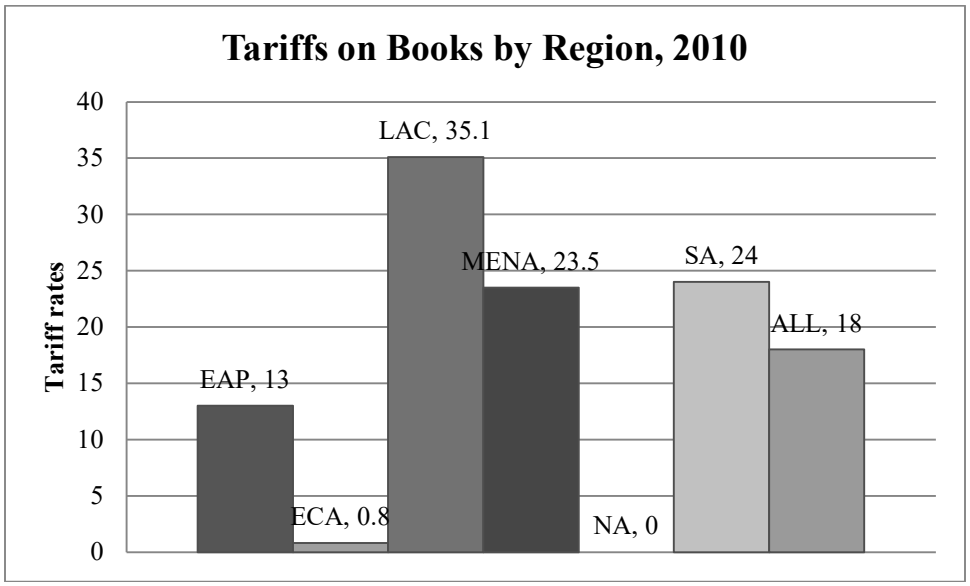
FIGURE 2

Knowledge and Economic Development



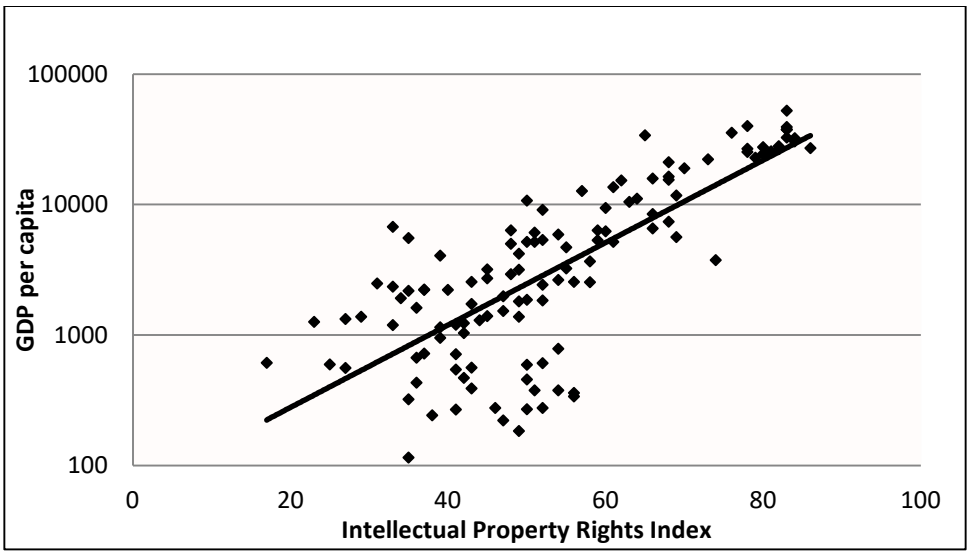
Notes and Source: Economic development is measured by GDP per capita. The data for educational attainment and the knowledge index are from the World Bank (2012).

FIGURE 3
Regional Distribution of Tariffs on Books and Printed Material



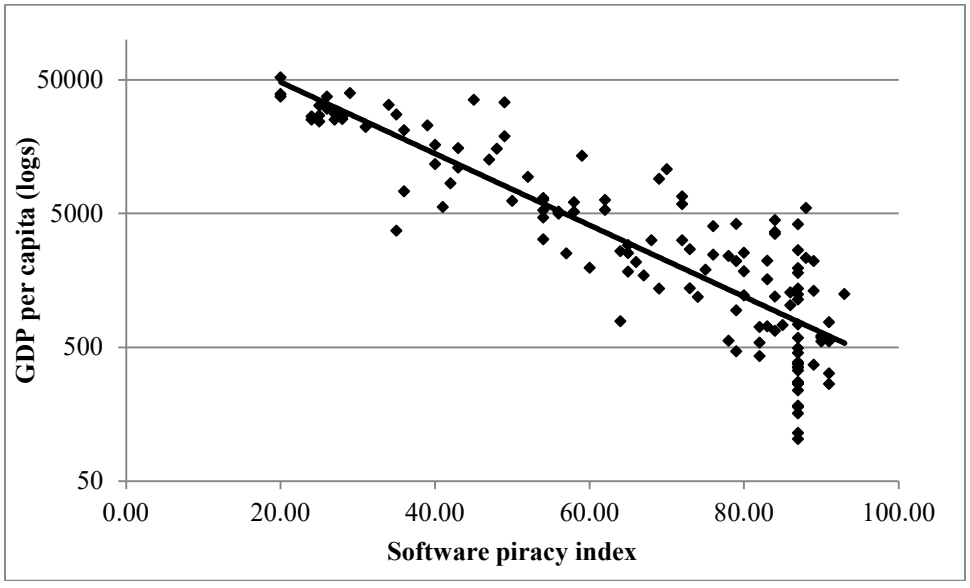
Notes and Sources: World Trade Organization/UNCTAD (2012). The data show the average percentage tariff rates on books and printed matter, for each region: East Asia and the Pacific; Europe & Central Asia; Latin America and the Caribbean; Middle East and North Africa; North America; South Asia; and the world average (ALL).

FIGURE 4
Intellectual Property Rights and Economic Development



Notes and Sources: Economic development is measure by GDP per capita (logs). The intellectual property rights index is from the World Bank (2012). The trend line was generated by linear regression.

FIGURE 5
Software Piracy and Economic Development



Notes and Sources: Economic development is measure by GDP per capita (logs). The software piracy information is from the BSA Global Software Piracy Study (2011). The trend line was generated by linear regression.

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