

**THE COPYRIGHT DILEMMA: COPYRIGHT
SYSTEMS, INNOVATION AND ECONOMIC
DEVELOPMENT**

Walter G. Park

This paper discusses the potential role of copyright laws in technological and economic development. Although it is more common to think of the patent system as a source of economic and technological development, copyright laws and regulations affect cultural industries such as art, films, music and literature. These industries comprise an important part of gross domestic product and are a source of employment and income opportunities. Copyright regimes also affect education and scientific research through their impacts on the diffusion of knowledge embodied in copyright media, such as print and Internet publications, software and databases, among others. The copyright system can thus have an important influence on human capital accumulation. This paper surveys some of the theoretical and empirical work to date, assesses the implications of the findings for developing economies and identifies some areas where further research is needed.

Intellectual property rights are among the most important factors affecting technological progress and economic development. Thus far, most intellectual property rights research has focused on the role of patent protection rather than on other kinds of intellectual property rights, such as copyright protection. This is not surprising, since industrial inventors often look to patent rights for the protection of their innovations. However, the creation of copyright industries can also influence technological and economic change. This paper discusses the potential economic impacts of copyright laws and surveys existing theoretical and empirical work. The objective is to draw implications for economic development and to identify some issues in need of more research. The survey and discussion of issues will focus on the impacts of copyrights on innovation and creativity, since these are key determinants of economic development, but will not treat issues related to the operation and administration of copyright systems.¹

Copyrights can have both positive and negative influences on creative activity.

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As a result, debates about copyright policies should focus not so much on the desirability of strict or lax copyright protection, but on the appropriate design of copyright systems. For example, the standards of copyright protection in developing economies should be appropriate for their level of economic development in order to account for the different weighting of the costs and benefits of copyright protection. Furthermore, the copyright system influences not only commercial activities, but also non-commercial ones. Researchers investigating only the commercial impacts of copyright laws—for example, on production, sales and employment—will likely under-value the overall social impacts. Copyright policies, for example, can have effects on basic education and fundamental research, both of which are important inputs into commercial activity.² Moreover, while copyright systems can influence economic development, they are also a function of economic development; that is, the value of copyright protection is greater in more advanced markets. Consequently, in less developed markets, the incentives for policy-makers and stakeholders to invest in the copyright regime are generally weaker. The problem in this situation is that copyright protection and enforcement may be too weak to stimulate creativity in copyrightable works. Copyright industries would then remain

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too underdeveloped to have an impact on economic and technological development. These points suggest directions for further research, namely to assess the significance of copyright laws for non-commercial activities such as basic research and human capital accumulation, and to analyze the interdependence between the copyright regime and the level of economic development.

WHAT ARE THE COPYRIGHT INDUSTRIES?

In 2003, the World Intellectual Property Organization (WIPO) issued standardized guidelines that provide a formal definition of copyright industries. Using these guidelines, numerous country studies have measured the value of production of these industries, among other aspects.³ The copyright industries consist of four main categories, which include the core copyright industries and three related industries. First, the core copyright industries are those industries that essentially owe their existence to copyrights and neighboring rights.⁴ These industries create, manufacture and distribute copyrighted (or copyrightable) works. Some examples include software and databases, press and literature, music and theatrical produc-

tions, visual and graphic arts, motion pictures and video, radio and television, photography, advertising services and copyright collecting societies (i.e., organizations that manage copyrights on behalf of rights holders). Second, interdependent copyright industries are those that facilitate the manufacture, performance, communication and/or distribution of the copyrighted works. These include computers, photographic and cinematographic equipment, photocopiers, musical instruments and blank recording material. Third, partial copyright industries are only partially associated with copyrighted goods. Examples of partial copyright industries includes toys and games; apparel, jewelry and other crafts; furniture and household goods; architecture and interior design; and museums. Lastly, non-dedicated support industries are those in which only a portion of activities involve broadcasting, communication, sales and distribution—but not wholly, so they are not counted in the core copyright group. This group includes wholesale and retail trade, Internet companies and general transportation.

Table 1 provides an idea of the importance of these industries in the national economy. Two indicators are of interest: the share of their value-added, i.e., net sales of intermediate purchases in GDP, and their share of national employment. These indicators are shown for the core copyright industries and for the copyright industries as a whole, and for both developed and developing countries. The estimates were based on comprehensive data collection following the WIPO 2003 guidelines. Cross-country figures are not completely comparable since the data were collected at different time periods, during which countries experienced different phases of the business cycle and other economic events. Nonetheless, it appears that a worthy share of the workforce is employed in these industries, and the value-added of copyright industries is not to be overlooked. For example, in the United States, almost 9 percent of employment is in the copyright industries, with about 4 percent in the core copyright industries. The value-added of copyright industries equals about 11 percent of U.S. GDP, with that of the core copyright industries reaching almost 7 percent.

Interestingly, copyright industries have an important presence in developing countries. For example, about 11 percent of employment in Mexico and the Philippines are in the copyright industries. In South Korea, the value-added of total copyright industries is nearly 9 percent of GDP. However, at present, the core copyright industries in developing countries are fairly nascent and their value-added and employment levels are small in both relative and absolute terms. The other copyright-related industries—i.e., the interdependent, partial and support industries—are relatively stronger and account for a more significant share of output and employment. That is, the ratio of the value-added of the core copyright industries to that of the other copyright industries is smaller in developing coun-

tries than it is in the developed countries. This suggests that the core copyright industries in developing nations are actually lagging.

Table 1: Share of Copyright Industries in the Economy⁵

		<i>Value-Added Percent of GDP</i>		<i>Percent of National Employment</i>	
Developed Countries	Year of Study	Core Copyright Industries	Total Copyright Industries	Core Copyright Industries	Total Copyright Industries
Australia	2007	7.30%	10.30%	4.97%	8.00%
Canada	2004	3.50%	4.70%	4.00%	5.40%
EU-15	2002	3.90%	n/a	3.10%	n/a
Netherlands	2005	4.00%	5.90%	6.20%	8.80%
U.S.A.	2004	6.50%	11.10%	4.10%	8.50%
Developing Countries					
Bulgaria	2005	1.57%	2.81%	2.29%	4.30%
Colombia	2005	1.90%	3.30%	1.70%	5.80%
Croatia	2004	2.99%	4.27%	3.22%	4.64%
Hungary	2002	3.96%	6.66%	4.15%	7.10%
Jamaica	2005	1.70%	4.81%	1.79%	3.03%
Latvia	2000	2.90%	5.05%	3.70%	5.59%
Lebanon	2005	2.53%	4.75%	2.11%	4.49%
Mexico	2003	1.55%	4.77%	3.41%	11.00%
Philippines	1999	3.50%	4.82%	8.81%	11.10%
Romania	2005	3.55%	5.55%	2.36%	4.19%
Russia	2004	2.39%	6.06%	4.29%	7.30%
Singapore	2001	2.85%	5.67%	3.64%	5.80%
South Korea	2004	n/a	8.67%	n/a	4.31%
Ukraine	2005	1.54%	2.85%	1.16%	1.90%

Source: WIPO (2006, 2008, 2010).

Despite the copious information they provide, these country studies have at least three limitations as far as aiding the understanding of how copyright laws and regulations stimulate creativity, technological change and economic development. First, these national measurement studies are entitled “Economic Contribution of Copyright-Based Industries in [Country X].” The term contribution is somewhat problematic because it connotes a sense of causality. These studies are not what economists would call growth accounting exercises, which seek to estimate the contribution of specific factors to national economic performance, such as the contribution of copyrighted works and enterprises to productivity. Instead, these

studies measure the share of copyright and related industries in GDP, but do not show how the latter is a function of copyright activities.⁶

Second, these studies do not show how the strength or design of copyright laws affects national, regional or industrial economic performance.⁷ The impact of the copyright system is a subject of much debate.⁸ The system can generate both social benefits and costs and can, theoretically, stimulate creativity or hinder it, depending on the circumstances. These studies focus on the outcomes of copyright activity, but not on the determinants; that is, the extent to which copyright laws provide incentives for innovation and commercialization. Ultimately, it is important to know how the levers of copyright policy affect outcomes in the copyright-based industries.

Third, the studies focus on the commercial side of copyright activities. Technological and economic development may also benefit from the non-commercial side, such as education activities. The education sector itself is a source of copyrightable works and other subject matter. Moreover, copyright laws affect the distribution of books, journals, videos, software and other material for learning and scholarship, and influence the operation of libraries and laboratories. Basic research in the inventive industries also depends on the availability of educational resources, such as scientific journals, databases and presentations. Thus, the way copyright systems affect education and training should ultimately affect the value-added of the commercial copyright sectors and beyond.

During the duration of copyright protection, the work will be more expensive and less accessible than under a system of no copyright protection.

LINKAGES BETWEEN THE COPYRIGHT SYSTEM AND THE ECONOMY

Copyrights generate both costs and benefits to society. They give the rights holder the exclusive right to reproduce, adapt, perform or distribute an expression of an original artistic, literary or musical work for a limited period of time.⁹ Without the exclusive right, creators may have limited incentives to engage in creative activity due to the ease with which intellectual outputs can be copied and distributed, and to the resulting difficulty of recouping their investments and receiving recognition for their works.¹⁰ During the duration of copyright protection, however, the supply of the copyrighted work is not competitively provided. The work will be more expensive and less accessible than under a system of no copyright protection. The limited period of time could actually be decades, lasting the life of the author plus fifty years or more. The high cost of copyrighted goods

during this time may adversely affect learning, innovation and economic development. Furthermore, creators do not often work in isolation but build upon, or require access to, the intellectual creations of others, including those that are copyright protected. Through licensing and royalty arrangements, the various copyright owners could work out a scheme to allow one another to access and use copyrighted works. However, in some cases, such schemes may not work due to a large number of parties, strategic behavior or overlapping rights. In this event,

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the transaction costs of negotiating and managing rights—and the costs of potential litigation—will hinder creative activity.

Thus, a copyright system must balance the interests of creators and users of copyrighted works. In many cases, a party is both a creator and a user. From a policy perspective, the rationale for a copyright system should ultimately be that the overall benefits outweigh the costs. For example, copyright laws and regulations should, on balance, promote technological and economic development. Before surveying the theoretical and empirical work to date, it is useful to summarize some of the potential linkages between the copyright system and the economy.

Copyright industries and their products matter to technological and economic development in several ways. First, the industries are a source of employment, generating wage income for workers in the creative industries, as well as royalty, licensing and sales incomes for the copyright owners. The market for cultural goods, arts and entertainment, like sports, may not be directly involved in the production of high-technology goods, but a vibrant market for these goods generates a demand for the goods and services of other sectors of the economy, creating further production and income through a multiplier process. For example, a strong market in the arts may foster tourism. Furthermore, a large market in cultural and creative goods should stimulate technological innovators to target this market, and in particular, to invent technologies that improve the consumption of these goods, such as 3D films, surround sound, better computer accessories, specialized paints and electronic books, to name a few. Capital investment also occurs in copyright industries to build and maintain the necessary infrastructure, such as Internet servers, broadcast satellites, performance stages, studios, retail outlets and so forth, necessary for the delivery of creative goods and services.

Rather importantly, copyright works contribute to the pool of human knowledge and to technological research and human capital development; that is, to the development of literacy in artistic and scientific works, skills in symbolic language

and computer programming. The scientific and engineering community depends for its research on copyrighted works such as software, books, journals, educational films and databases, all of which are affected by copyright regulations. For high-technology companies traditionally dependent on patents, copyrights can protect material that patents cannot, such as content on company websites and manuals. Hence, copyright activities can affect technological change and economic development directly and indirectly.

A critical question is the role that copyright laws and enforcement play in stimulating incentives to engage in creative activity and to commercialize the outputs of that activity. Figure 1 provides a simple schema of the linkages between copyright policies and the national economy. The legal framework establishes property rights to creative activity. Here, copyright laws—including those on fair use or fair dealing—can stimulate creativity by providing incentives to invest in creative endeavors and hinder creativity by increasing the cost of access to copyrighted materials.¹¹ The economic impacts of creative activity are realized as the creations are commercialized, that is, put into practice for the marketplace. The economic impacts include production, employment and investment, and have implications for trade and knowledge accumulation. These impacts, as well as the size of the market, influence the incentives and opportunities for creative activity.

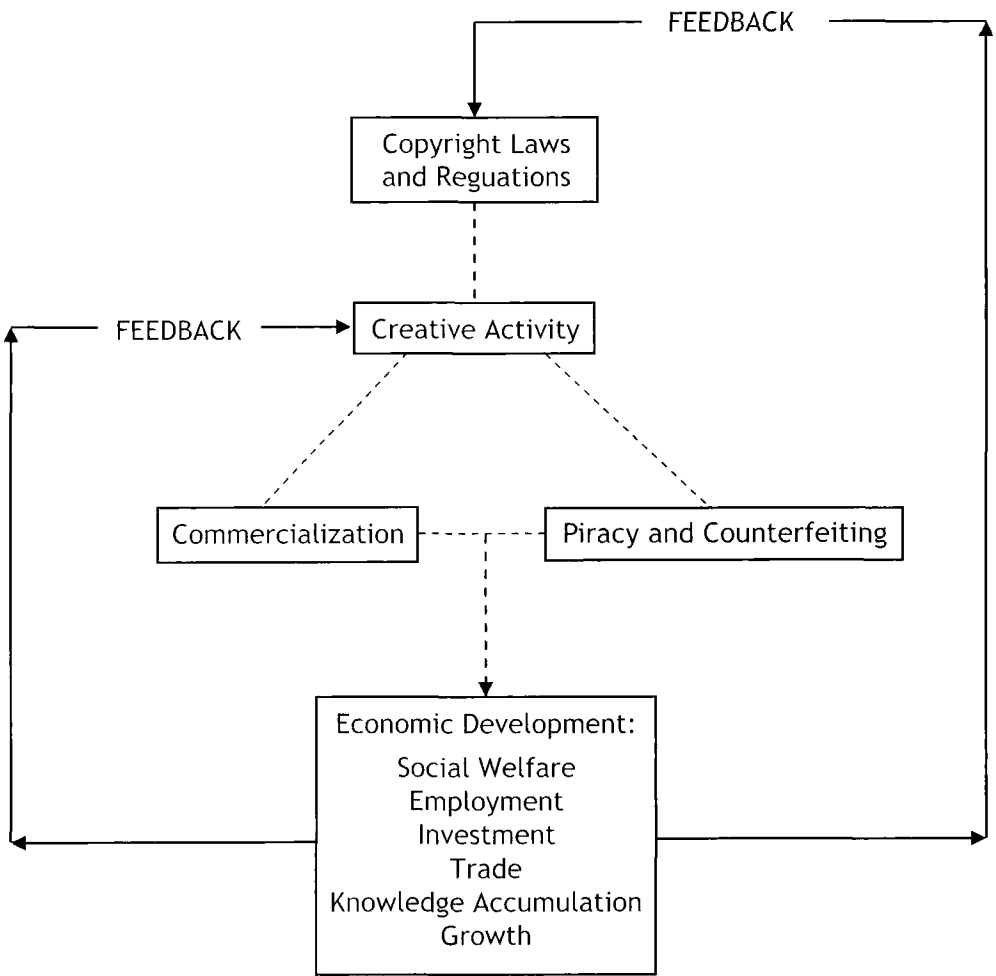
A chief risk of creative investments is piracy and counterfeiting. These activities divert sales and profits from commercial channels and reduce the returns to copyright holders and creativity. However, the impacts on social welfare of piracy and counterfeiting are more complex, since these activities help increase the supply of copyrighted goods at a lower cost.

Lastly, an important link is the feedback from economic activity to copyright laws and regulations, as policymakers adjust their policies to changing circumstances based on the level of copyright activity and outcomes in the economy. This helps explain why developing economies have weaker copyright protections relative to industrialized countries: They have fewer intellectual assets to protect and/or their economies are less dependent on copyright industries. However, levels of creative activity and commercialization may be low precisely because copyright protection and enforcement are inadequate. These mutual feedback effects need to be explored in order to determine if creativity traps exist.

COPYRIGHT STRENGTH AND THE INCENTIVES FOR CREATIVITY

What do we know so far about the strength of the linkages between the copyright regime and the economy? The theory and evidence are not all definitive, but they provide important insights into how copyright laws affect technological change and how they could potentially affect economic development.

Figure 1: Copyright Linkages to the Economy



Theoretically, strengthening copyright protection increases the incentives for creativity by reducing the share of the population that reproduces copies instead of purchasing a legitimate good, thereby raising the revenue of copyright producers. Consequently, producers have a greater incentive to develop higher quality products that require greater investments, the costs of which would not be recouped if the market of buyers were too small.¹² Furthermore, a producer may not develop a creative product unless copyright strength is above a critical level. The reason is that a producer has to incur the cost of development before the consumer chooses whether to purchase the original or make a copy. The producer faces the risk that future earnings will be less than the development cost. Thus, the incentive to develop arises if copyrights are sufficiently strong to compensate for that risk.¹³

As discussed earlier, the strength of copyright may adversely affect creativity

by raising the cost of expression.¹⁴ The intuition is that every author is both an earlier author and a later author; each author builds upon previous creative work or may be constrained by previous copyrights. An author may not express a particular idea in a certain way because it might infringe upon an existing copyright, or the transaction costs of obtaining permissions and paying royalties or licensing fees may be prohibitive. Thus, copyrights that are too strong make it difficult for creators to build upon material from earlier works and will likely offset the stimulus to creativity.

Copyright protection is therefore subject to certain exceptions, such as the fair use rights of users. It is important not to assume that a more liberal fair use policy would be associated with a decline in the sales of copyrighted works. Fair use allows sampling by consumers and may eventually promote greater future sales.¹⁵

While theoretical analyses can identify the channels by which copyrights affect creativity, ultimately the strength of the linkages between copyright systems and creativity is an empirical issue. The key challenges for empirical work are to obtain measures of copyright policy and creativity. In the case of industrial inventions, statistics on patenting are available, which is a way to measure inventive output. Furthermore, firms account for their expenditures on innovation through spending on research and development (R&D). Empirical research on copyrights has a more limited choice of criteria to measure creative activity. First, the counterpart to R&D is not readily available for artistic, literary or other creative activity. Second, copyright registrations can be used as a measure of creativity, but due to the automatic protection afforded copyrightable works, registration is not a prerequisite to receiving copyright protection. The number of registrations may therefore underestimate the true extent of creativity. However, since there are advantages to registration, especially in connection with enforcement, a significant percentage of creative works should be registered. Other measures of copyright creativity include copyright output—for example, new book titles, musical recordings, films and software—or the sales or revenues associated with those outputs—e.g., box office revenues.

How shifts in copyright strength are measured seems rather crucial to assessing the effects of copyright on creativity. For a study of the movie industry, Png and Wang use a rather simple measure; namely a yes/no variable as to whether a country extended the term of copyright protection. They find that an extension was not significantly associated with an increased supply of movies, and thus conclude that the case for copyright law is weak.¹⁶ But this measure of copyright

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reform does not take into account the magnitude of the changes in copyright duration (as a percentage of the previous duration of copyright protection) and does not incorporate other aspects of copyright law, such as the scope of protection and provisions on compulsory licensing.

Ku et al. likewise use a simple measure of copyright reform.¹⁷ They examine the effects of individual U.S. Supreme Court decisions or enactments of copyright legislation that expand copyright protection, finding that these decisions or legislation insignificantly affect copyright registration activity in the United States. A criticism of their methodology is that each of their different legal episodes may not be effectively picking up the effects of copyright strength. Each episode may have faint effects, but the sum of the changes or the cumulative effects over time may better capture a copyright owner's overall sense of protection.

The approach in Baker and Cunningham is designed to pick up the cumulative and marginal changes in copyright strength over time.¹⁸ Using U.S. data, Baker and Cunningham study the effect of copyright law changes on the stock market returns of firms in the copyright industries.¹⁹ To the extent that stronger copyright laws raise the profitability of firms by strengthening their ability to appropriate the returns to their copyright works, the impacts of copyright laws on profitability should be reflected in stock prices—i.e., the traded value of firms. Overall, they find a significant, positive effect of copyright strength on firm profitability. Their focus on profits does raise the issue of whether stronger copyrights actually increase creativity or strengthen the market power of existing copyrights. This issue is relevant for developing nations, where laws may simply increase market power and not the variety or availability of new creations. For example, are firms more valuable—i.e., their stock prices higher—because stronger copyright laws make their existing assets more valuable (due to enhanced market power), or because these laws give firms a greater opportunity to create new and improved quality of work?

In Baker and Cunningham, the numbers of copyright registrations are used to measure the quantity of new creative works.²⁰ This helps to assess whether copyright reforms increase creativity rather than simply enhance market power. Using U.S. and Canadian data, Baker and Cunningham find a significantly positive influence of copyright strength on registrations, but some limitations still remain. Variations in copyright registrations may either represent shifts in creativity or merely reflect changes in the propensity to register copyrights.

Park develops an index of copyright protection at the national level and studies the effects of copyright laws on economic growth and productivity for a sample of forty-one countries.²¹ The results show that intellectual property rights stimulate productivity growth indirectly rather than directly by stimulating investments in innovative activity. However, this study finds that copyright protection is not as

influential on productivity growth as patent rights are. When patent protection is controlled for, the influence of copyright protection is weak. Without controls for patent protection, copyright protection does appear to have a significant relationship with productivity in manufacturing, but this is because copyright strength and patent strength are correlated so that, in the empirical analysis, the copyright variable acts as proxies for the effects of patent rights. This suggests that copyright laws may actually have marginal effects on productivity growth in manufacturing beyond the effects of patent protection, but this does not preclude copyright protection from influencing manufacturing at another, more basic level, such as the training and education of scientists, engineers and managers. Recall that copyright materials (e.g., books and journals) are important inputs into human capital accumulation.

Smith et al. also seek to measure the effects of copyright protection on productivity (per capita GDP) using international data. The copyright regime can affect production activities directly or indirectly by affecting the inputs into production, such as human capital and the stock of copyright-related capital (for example, personal computers, internet bandwidth and servers). Their essential findings are that copyright-related capital has a statistically significant association with productivity, and that copyright policies work more to improve the productivity of copyright-related capital than to affect production activity directly.²² One limitation of the Park and Smith et al. studies is that the sample of industries is too broad. The effects of copyright laws on productivity may be better detected if the focus were on the core copyright industries.

Another way to gauge the effects of copyright law on creativity is to examine the effects of piracy on creative and commercial activity. Piracy tends to reflect weak copyright enforcement, but piracy depends on other factors as well, such as cultural and technological factors.²³ Both Hui and Png and De Vany and Walls find that piracy leads to a significant loss in revenue for the recorded music and motion picture industries, respectively.²⁴ These studies point out, however, that the impact of piracy on revenue is complex. On the one hand, pirated goods crowd out legitimate sales; on the other hand, piracy can increase legitimate sales through sampling effects. More people might be induced eventually to purchase legitimate versions (e.g., DVD) in order to get related material, such as a user manual, or documentation, such as song lyrics or interviews with the artists.²⁵

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IMPLICATIONS FOR DEVELOPING COUNTRIES

Little, if any, research on the economic impacts of copyrights has been explicitly conducted for developing economies. The cross-country empirical studies pool developed and developing country data together.²⁶ Future empirical studies are especially needed in the developing country context. Thus, the implications of copyright systems for developing economies must be extrapolated from the studies

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that are available to date. An important lesson for developing economies is that copyright protection can have both positive and negative effects on creativity. For economic development, copyright policy must be structured so that creators have sufficient protection against copyright infringement, the anticipation of which would tend to discourage creators from investing in their work. But economic development also rests on ongoing creativity, so that copyright protection must not be too strong as to shelter copyright owners from competition and the need to stay innovative in the marketplace.

Copyright protection and enforcement require the granting of permission to access works and the payment of licensing fees and royalties, and tend to raise the price of copyrighted works by increasing the cost of provision. The technological development of

developing countries will be hampered if access to the knowledge base of society is more costly. At the same time, the copyright system may enable a greater variety of creative works than would otherwise be available without copyright laws. In other words, the increased flow of new knowledge could offset the higher cost of accessing existing knowledge. For copyright laws to be conducive to economic development, copyrighted creations must diffuse widely and their economic potential utilized without adversely slowing down the rate of creation.

The protection of copyrighted works serves not only the interests of copyright owners in industrialized countries, but also those in developing countries. Nonetheless, the cost of copyright protection is likely to be higher in developing countries. Their levels of income and wealth are lower, so royalties and licensing payments are more burdensome to creators in developing countries. Industrialized countries own a larger stock of copyrighted works than developing countries do. From a balance of payments perspective, therefore, creators in developing countries are likely to be net users of copyrighted work—or net payers of royalties and licensing fees—since they are more likely to seek permissions to access copyrighted

works than others seeking to obtain access to their works. Further, the value of their copyrighted works is lower on average than that of industrialized countries, so that copyright owners in developing countries have lower bargaining power. These and other considerations suggest that standards of copyright strength should be lower for developing countries in order to take into account the fact that the relative costs of copyright protection are higher for developing countries.²⁷ For example, fair use policy could be more liberal, the duration of protection shorter and the standards of infringement more relaxed in developing countries.

Copyright content users in poorer countries are more apt to seek low-cost means of accessing copyrighted works, whether through copying, file sharing or trading in non-legitimate products. As a result, piracy and counterfeiting tend to reflect the level of economic development. Simply seeing piracy and counterfeiting as a result of inadequate copyright laws and enforcement misses other root causes. Certainly, the levels of piracy tend to be higher in regions where copyright laws are inadequate or where enforcement is ineffective, but rates of piracy are especially high, and inversely, correlated with the level of economic development.²⁸

Empirical work has also established that piracy is a function of the market for the copyrighted good.²⁹ Violators are more likely to target works that are in high demand, such as blockbuster films. Accordingly, piracy and sales have a simultaneous influence upon each other: piracy diverts sales from copyright owners, but sales determine the desirability of piracy. If the market is weak, piracy will be limited. Thus piracy, while undesirable for copyright owners and users who depend on new creative goods, is in part a reaction to the market.

The point, based on above considerations, is that developing countries would generally have lower standards of copyright protection and greater rates of piracy, and that the standards of protection and levels of piracy will evolve with economic development. As Figure 1 indicates, economic development depends on the copyright regime through the influence of copyright policies on creativity and commercialization, but the copyright regime depends on the level of economic development. Economies that are more developed have more resources to allocate to the legal provision of copyright protection, more valuable copyright assets to protect and a greater capacity to absorb the costs of copyright protection. Furthermore, cultural goods are not necessities, like food and medicine. They are income-elastic, in that the market demand for them grows more than proportionately to the growth in incomes. Hence, the share of cultural and creative goods in national consumption will increase with economic development, along with a demand for


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However, the two-way feedback between the copyright regime and economic development may be a barrier to technological development. The copyright industries in developing countries cannot be an important source of employment and income if the copyright sector remains small. If standards of copyright protection are too low, the copyright industries will remain marginal and underdeveloped. As long as these industries comprise a small share of the national economy, policymakers have less incentive to prioritize copyright reforms in their agendas. This would perpetuate weak levels of copyright protection and creative activity.

CONCLUSION

A dilemma for developing countries is that, if standards of copyright protection are too strong, the copyright regime is inappropriate for their economic development, in the sense that the costs of protection outweigh the benefits; that is, the system harms users of copyright and potential future creators more than it benefits current creators and copyright owners. In that case, the copyright system would not, on balance, be conducive to creativity. But if standards of copyright protection are too weak, the copyright regime and copyright industries may not evolve fully. The solution to this dilemma may lie outside the copyright framework. For example, subsidies to the creative industries may help them reach a critical size so that the public has a stake in the copyright regime. Trade policies that expand the copyright exports of developing countries are another way for copyright industries in developing countries to reach a critical mass. Trade liberalization measures that make internal markets more competitive can reduce the costs of copyright protection by helping to contain the market power of copyright holders.

Lastly, empirical research tends not to find a strong, direct influence of copyright protection on national productivity, particularly if patent rights are controlled for. This reflects the fact that manufacturing production and innovation depend on property rights over inventions. But focusing on commercial activities provides a narrow view of the impact of copyrights on technological and economic development. Non-commercial sectors such as education make important but indirect contributions to national productivity by affecting human capital development, which in turn affects innovation and production. More research is needed on how the copyright system affects basic education and fundamental research. How does the copyright system affect the cost and quality of education? How does it affect knowledge creation and transfer in public and private research institutes? Copyright law deals with the various media by which knowledge is stored and conveyed, such as books, canvases, disks and so forth. Just as copyrights have varied effects on creativity, they are likely to affect human capital in complex ways. 

NOTES

¹ For other surveys on the relationship between copyright laws and economic performance, see William Landes and Richard Posner, *Economic Structure of Intellectual Property Law* (Cambridge, Mass.: Harvard University Press, 2003); Ruth Towse, Christian Handke and Paul Stepan, "The Economics of Copyright Law: A Stocktake of the Literature," *Review of Economic Research on Copyright Issues* 5, no. 1 (June 2008), 1–22; Ivan Png, "Copyright: A Plea for Empirical Research," *Review of Economic Research on Copyright Issues* 3, no. 2 (December 2006), 3–13; Richard Watt, "An Empirical Analysis of the Economics of Copyright: How Valid are the Results of Studies in Developed Countries for Developing Countries?" in *Economics of Intellectual Property: Suggestions for Further Research in Developing Countries and Countries with Economics in Transition*, World Intellectual Property Organization (Geneva, Switzerland: WIPO, 2009), 65–99.

² That is, research on basic scientific principles rather than applied research.

³ WIPO, "Guide on Surveying the Economic Contribution of the Copyright-Based Industries" (Publication no. 893, Geneva: 2003); WIPO, "National Studies on Assessing the Economic Contribution of the Copyright-Based Industries" (Creative Industries Series No. 1, Geneva: 2006); WIPO, "National Studies on Assessing the Economic Contribution of the Copyright-Based Industries" (Creative Industries Series No. 2, Geneva: 2008); WIPO, "National Studies on Assessing the Economic Contribution of the Copyright-Based Industries" (Creative Industries Series No. 3, Geneva: 2010).

⁴ Neighboring rights are granted to parties who are not the authors of the copyrighted works but are closely connected to the work in some fashion, for example, performers and broadcasters. These parties are entitled to protection if they add original artistic value to the expression of works or contribute to the distribution of these works.

⁵ Core copyright industries are those industries that as a category would not exist without copyright in works. Other copyright industries are those that are interdependent with the core industries, are partially copyright industries, or are supportive industries. EU-15 refers to the original fifteen European Union countries.

⁶ For example, health care spending in the United States may be about 17 percent of GDP, but this does not indicate how health care spending contributes to GDP. Note that, for the United States, Stephen Siwek does provide an accounting of how the growth in GDP can be attributed to the growth in copyright industries in Stephen Siwek, "Copyright Industries in the U.S. Economy" (Washington, DC: Economists Incorporated, 2006).

⁷ The strength of copyrights is from the perspective of the copyright owner and reflects the ability of the owner to prevail over other parties in a copyright legal action (e.g., infringers), due to the nature of the statutes, procedures and enforcement actions.

⁸ See Michele Boldrin and David Levine, *Against Intellectual Monopoly* (New York: Cambridge University Press, 2008).

⁹ A key operative word is "expression," as opposed to "idea." Two works may have the same idea (e.g., a novel plot), but express it differently.

¹⁰ Of course, examples exist where creative activity occurs without formal copyrights, such as open source software programming, user innovation and certain online postings of videos and writings.

¹¹ Fair use and fair dealing doctrines give some limited use of copyrighted material without obtaining permission from rights holders, for, say, purposes of education, news reporting and criticism.

¹² Ian Novos and Michael Waldman, "Effects of Increased Copyright Protection: An Analytic Approach," *Journal of Political Economy* 92, no. 2 (April 1984), 236–46.

¹³ Kiho Yoon, "The Optimal Level of Copyright Protection," *Information Economics and Policy* 14, no. 3 (September 2002), 327–48.

¹⁴ William Landes and Richard Posner, *Economic Structure of Intellectual Property Law* (Cambridge, Mass.: Harvard University Press, 2003), 213–22; Sami Valkonen and Lawrence White, "An Economic Model for the Incentive/Access Paradigm of Copyright Propertization" (working paper no. 06-15, New York University Center for Law and Economics: 2006), 29–45.

¹⁵ Timothy Brennan, "Fair Use as a Policy Instrument," in *Developments in the Economics of Copyright*, ed. Lisa Takeyama, Wendy Gordon and Ruth Towse (Cheltenham, UK: Edward Elgar, 2005), 80–102; Ben Depoorter and Francesco Parisi, "Fair Use and Copyright Protection: A Price Theory Explanation," *International Review of Law and Economics* 21, no. 4 (May 2002), 452–73.

¹⁶ Ivan Png and Qiu-hong Wang, "Copyright Duration and the Supply of Creative Work: Evidence from the Movies" (working paper, National University of Singapore, Singapore: 2009).

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¹⁸ Matthew Baker and Brendan Cunningham, "Court Decisions and Equity Markets: Estimating the Value of Copyright Protection," *Journal of Law and Economics* 49 (2006), 567–596; Matthew Baker and Brendan Cunningham, "Law and Innovation in Copyright Industries," *Review of Economic Research on Copyright Issues* 6, no. 1 (2009), 61–82.

¹⁹ Baker and Cunningham, 2006.

²⁰ *Ibid.*, 2009.

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²² Pamela Smith, Omar Dafar, Kevin Menroe, Fabricio Nunez and Charlotte Tuttle, "How Do Copyrights Affect Economic Development and International Trade," *Journal of World Intellectual Property* 12, no. 3 (May 2009), 198–218.

²³ See Donald Marron and David Steel, "Which Countries Protect Intellectual Property? The Case of Software Piracy," *Economic Inquiry* 38, no. 2 (2000), 159–74; and Rajeev Goel and Michael Nelson, "Determinants of Software Piracy: Economics, Institutions, and Technology," *Journal of Technology Transfer* 34, no. 6 (December 2009), 637–58.

²⁴ Kai-Lung Hui and Ivan Png, "Piracy and the Legitimate Demand for Recorded Music," *Contributions to Economic Analysis & Policy* 2, no. 1, article 11 (2003); Arthur S. De Vany and David W. Walls, "Estimating the Effects of Movie Piracy on Box-office Revenue," *Review of Industrial Organization* 30, no. 4 (June 2007), 291–301.

²⁵ This may be why file sharing on the Internet (via Peer-to-Peer (P2P)) is not always found to have an adverse effect on record sales (see Felix Oberholzer-Gee and Koleman Strumpf, "The Effect of File Sharing on Record Sales: An Empirical Analysis," *Journal of Political Economy* 115, no. 1 (February 2007), 1–42).

²⁶ See Park, 9:1–9:51 and Smith *et al.*, 199, 218.

²⁷ More technically speaking, the balancing of the marginal costs and marginal benefits of copyright protection would occur at lower levels of copyright strength in developing countries.

²⁸ International Intellectual Property Alliance, "Special 301 Report on Copyright Protection and Enforcement" (Washington, DC: IIPA, 2009), Appendix A.

²⁹ See Hui and Png, 2003, and De Vany and Walls, 2007.

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