BY SEUNG KYOON SHIN, RAM D. GOPAL, G. LAWRENCE SANDERS, AND ANDREW B. WHINSTON

Global Software Piracy Revisited

Determining why the roots of the disparity in national piracy levels lie beyond economics.

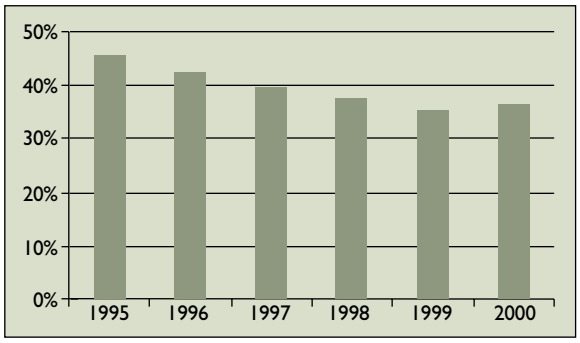
GLOBAL SOFTWARE PIRACY has become an increasing concern to businesses and software developers throughout the world during the past two decades. For the U.S., which is generally considered the world leader in the software industry, the problem of piracy diminishes revenues and lessens investment in R&D, threatening the long-term viability of this important industry. Assessed damage from global software pirates is considerable:

According to the Software and Information Industry Association (SIIA), the worldwide revenue of business-based PC applications was $21.6 billion in 1999, but global revenue losses due to piracy in the business application software market were calculated at $12 billion. These statistics drew attention not only because the losses attributed to piracy go beyond more than 50% of revenues, but also because the world piracy rates showed an increase for the first time since 1995.

Particularly troublesome is the concern that software pirates can single-handedly destroy the work of software developers, who invest millions dollars in software development projects. Although special coding, fingerprinting, and other methods and techniques can protect software programs, no technological protection system yet devised is completely effective. In addition, despite the clear specification of property rights, piracy still can exist due to the high cost of policing consumer behavior and enforcing the law. As such, is likely that software piracy will remain a prevalent and a serious problem into the foreseeable future.

The economics underlying the software markets have recently been identified as key

reasons for the disparity in software piracy levels across the globe. The contention is that income levels can influence the ability of consumers to purchase software, and consequently influence software piracy attitudes and behaviors. In essence, there is an income effect where a change in consumption results from changes in the level of a consumer's real income. The notion is that software piracy is a poor-man's-only avenue for participating in the new information economy. While this offers a reasonable first-order explanation for the prevalence of piracy in predominantly poorer countries, a significant number of anomalies persist in the global phenomenon of piracy. For instance, in 1999, the software piracy rates of some high-income countries such as Hong Kong ($22,185) and Singapore ($26,460) were 56% and 51%, while the rates of relatively lower income countries such as New Zealand ($17,210) and Israel ($16,438) were 31% and 44%. These observations are contrary to the attitude that global piracy is a poor-man's disease that is exclusively curable through economic elixirs. To gain a holistic understanding of the underlying mechanics, we must extend the economic rationale for software piracy to include the role of cultural mores and attitudes.



Data Source: *SIIA's Report on Global Software Piracy 2000.*

Figure 1. World software piracy rate.

The Cultural Imperative

National culture is the collective mindset that distinguishes members of one nation from another [7]. Culture is a construct that is inferable from verbal statements and other behaviors and is useful in predicting other verbal and nonverbal behaviors. The role of culture in human development is to transfer ideals and norms to new generations [10]. According to Ajzen and Fishbein's Theory of Reasoned Action, a person's specific behavior is determined by his or her behavioral intention to perform a behavior, and behavioral intention is jointly determined by a person's attitude and norm concerning the behavior in question. The notion of culture is considered one of the most influential factors contributing to the formation of individual and social norms in regions across the globe.

Scholars have proposed several typologies for classifying cultural dimensions, and Individualism-Collectivism, as one dipolar dimension, is one of the most important cultural dimensions emerging in many cross-cultural studies. An individualistic culture is one where ties between people are weak and their understanding of self is independently derived from what others think. In contrast, a collectivistic culture consists of strong cohesive groups and the concept of the self is related to the reactions of others around them [3]. Individualism and collectivism have been used to explain why groups in some countries are more willing to adhere to group norms than groups in other countries. Since group norms enable the majority to exercise normative influence on the minority during decision making, individualism/collectivism is considered a substantial factor in the development of the group gestalt.

Members of collectivist cultures tend to show great concern for the welfare of members of their own in-group but relative indifference to the needs of outsiders [12]. There are several subcategories of collectivism such as benevolence and conformity [11]. Benevolence focuses on the concern for the welfare of others in everyday interactions. People in a high-benevolence group, therefore, would share their resources (or software) in order to increase the welfare of overall group members. Conformity is derived from the requirement that individuals inhibit inclinations that might be socially disruptive.

Software Piracy: The Collateral Mischief of Collectivism?

Gopal and Sanders [6] define software piracy as a group activity, and argue the mechanism of piracy involves a group of individuals who purchase a copy of the software at the market price and make copies for all group members. In fact, the unauthorized copying of personal computer software for use in the office or at home and sharing the software with friends and co-workers is the most pervasive form of piracy encountered, and is estimated to be responsible for more than half the total revenues lost by the software industry.

In a collectivistic society where sharing resources with others is regarded as a virtue (or at least as a social norm), software is naturally considered as a resource that can be shared and in effect used to increase the overall welfare of the group. Moreover, software has the distinctive characteristic of all digital goods that make it easy to share—the first copy is very expensive to produce, but subsequent reproductions have low marginal cost and are easy to distribute. Therefore, it is natural that people in high-tech, high-collectivistic countries such as Hong Kong, Singapore, and Thailand are

extensively involved in piracy activity.

This pro-social aspect of collectivism is often equated to utilitarianism in which a utilitarian strives for the greatest good to the greatest number of people. The core of the utilitarianism philosophy is that an act or behavior is right if it provides an excess of benefits over harmful effects. Software piracy researchers also argue that people higher on the philosophy of utilitarianism are more involved in software piracy [5]. Consequently, it is not surprising to find that highly collectivistic countries in Asia and Africa are associated with a high amount of software piracy, while the piracy rates of low collectivism countries in Europe and North America have low piracy rates.

The Income Effect

It has been noted that income levels influence the ability of consumers to purchase software. In a prior study of global piracy using 1997 levels of national income and piracy rates, a strong negative correlation was found between per capita GDP and piracy rates for countries with GDPs less than $6,000 [4]. As a first step, we updated this analysis using 1999 data and confirmed the prior result. Data with respect to national software piracy and GDP was obtained respectively from the SIIA's *Report on Global Software Piracy* [1] and the World Bank Data Base. We found the following statistical regression relationship between piracy and the national income:

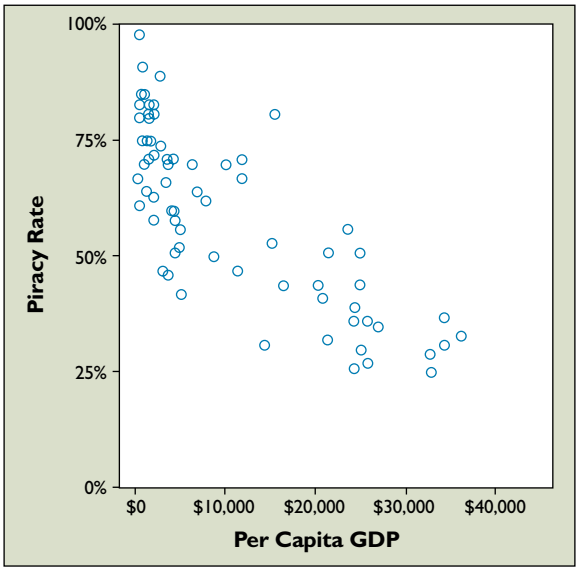
Piracy Rate (%) = 73.7 -0.0014 * GDP Per Capita

The regression analysis results are consistent with the previous study.

The Income Plus Cultural Effects

A regression analysis was performed with the international software piracy rates, per capita GDP, and national collectivism indices[1] for 49 countries (see Table 1). The collectivism indices were obtained from Hofstede's culture study. Culture is a very durable phenomenon and remains consistent over time, and, in a sense, is a collective mental programming. Hofstede's scales and cultural indices have been replicated in several cultural studies [9], and the results showed that the Individualism-Collectivism indices are still viable.

Figure 2. Per capita GDP and software piracy.



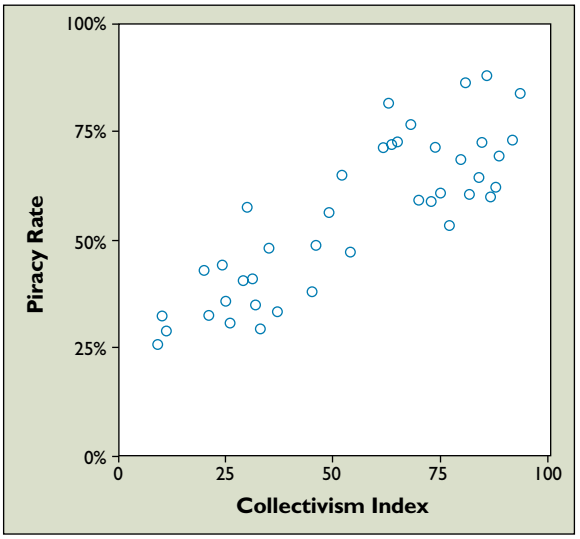


Figure 3. Collectivism index and software piracy.

The statistical regression relationship between software piracy rate and two piracy predictors, GDP per capita and collectivism indices is:

Piracy Rate(%) = 47.6 + 0.295 * Collectivism – 0.00075978 * GDP Per Capita

The empirical results offer evidence of a significant positive relationship between people's collectivism and the software piracy in a country (β_1 = 0.295, p < 000). In addition, there is a negative relationship between the national per capita GDP and the software piracy of the country (β_2 = -0.00075978, p < 0.000). The results imply not only that poor countries are more involved in software piracy, but also that high collectivistic countries are involved in piracy. The relationship between the national software piracy and the collectivism indices is presented in Figure 3. The software piracy rate indicates the percentage of software pirated in a country, and the national collectivism scale ranges from 0 to 100.

While the model with national income effect alone explains about 63.7% of variance in global piracy rate, the model with collectivism indicators improves the

[1]The original Hofstede's national index ranges between 0 and 100 and rank between 0 to 50 in terms of national individualism. As Hofstede defines Individualism-Collectivism as a bipolar dimension, the collectivism index has been obtained by the reversed individualism index.

explanation power to 73.9%.[2] Collectivism tenders additional information regarding the software piracy phenomenon.

In essence, collectivism offers a complementary explanation for software piracy. It also answers the question related to why some economically stronger, but highly collectivistic, countries become engaged in piracy rates, whereas some countries with lower GDPs but less collectivistic natures such as Israel are less involved with software piracy.

Countries With GDP Less than $6,000

A more detailed investigation of the data reveals an inflection point at approximately $6,000, where income levels below the inflection point exhibit a different relationship with the piracy rates. This inflection is approximately the midpoint of the income range, which is classified by World Bank as upper middle income. The statistical analysis with the two data segments provides the following:

Piracy Rate (%) = 48.6 + 0.349 * Collectivism - 0.0032 * GDP Per Capita (Less than $6,000)

Piracy Rate (%) = 49.6 + 0.288 * Collectivism - 0.0008 * GDP Per Capita ($6,000 or more)[3]

The effect of collectivism and GDP is quite strong with countries having GDP less than $6,000. For countries with per capita GDPs less than $6,000, each $1,000 increase in GDP is associated with a nearly 3.2% decrease in the piracy rate. On the other hand, for countries with GDP greater than $6,000, an increase in the per capita GDP of $1,000 will not even yield a 1% reduction in the piracy rate. Although the effects of two piracy indicators are strong predictors of piracy in countries with GDP less than $6,000, the regression formula gives more information with respect to piracy phenomenon in countries with GDP more than $6,000.

Complexity of Software Piracy

Software piracy is not a pure economic phenomenon—it also involves a multitude of cultural overtones. Similarly, it is not a purely cultural derivative as it is amenable to instruments of economics and governmental regulation.

Country	Piracy Rate	GDP per Capita	Collectivism	Country	Piracy Rate	GDP per Capita	Collectivism
Argentina	62%	$8,100	54	Korea	50%	$12,086	82
Australia	32%	$23,554	10	Malaysia	71%	$4,526	74
Austria	36%	$31,550	45	Mexico	56%	$3,613	70
Belgium	36%	$29,687	25	Netherlands	44%	$30,135	20
Brazil	58%	$4,479	62	New Zealand	31%	$17,210	21
Canada	41%	$21,754	20	Nigeria	67%	$250	80
Chile	51%	$5,121	77	Norway	37%	$37,142	31
Colombia	58%	$2,261	87	Pakistan	83%	$508	86
Costa Rica	71%	$3,994	85	Panama	66%	$3,246	89
Denmark	29%	$37,308	26	Peru	63%	$2,346	84
Ecuador	71%	$1,419	92	Philippines	70%	$1,138	68
El Salvador	83%	$1,752	81	Portugal	47%	$12,309	73
Finland	30%	$30,355	37	Saudi Arabia	64%	$6,718	62
France	39%	$28,959	29	Singapore	51%	$26,460	80
Germany	27%	$31,721	33	South Africa	47%	$3,904	35
Greece	71%	$12,652	65	Spain	53%	$16,989	49
Guatemala	80%	$1,545	94	Sweden	35%	$29,866	29
Hong Kong	56%	$22,185	75	Switzerland	33%	$45,496	32
India	61%	$450	52	Thailand	81%	$2,717	80
Indonesia	85%	$962	86	Turkey	74%	$2,965	63
Ireland	51%	$25,158	30	United Kingdom	26%	$21,069	11
Israel	44%	$16,438	46	United States	25%	$30,845	9
Italy	44%	$20,174	24	Uruguay	70%	$6,208	64
Japan	31%	$42,318	54	Venezuela	60%	$3,213	88
Kenya	67%	$337	73				

Software piracy, GDP per capita, and national collectivism (1999).

Clearly, parties with vested interests can engage in activities that alter the economic incentive structures of software piracy. For instance, effective pricing schemes such as pricing based on affordability can reduce the disparity in the piracy levels and improve the coffers of software companies around the world. Similarly, governments can bolster the laws and enforcement to make the practice of piracy more costly to the participants.

Software companies invest in technology to achieve a competitive advantage in the marketplace. The software industry is one area where local businesses can compete effectively with multinationals in both local and foreign markets. Yet, without appropriate protection in less-developed countries where piracy rates are relatively higher, software pirates can destroy the revenue streams of small companies that have managed to successfully establish particular niches in the industry. Without this revenue stream, these small companies lack the resources for delivering new software innovations, and thus decreasing their chances of making a profit. Furthermore, the development literature suggests that technology development must have the right

[2]Although there is a correlation between the national income level and the collectivism index, the variance inflation factor (VIF) provides evidence that two indicators are independently meaningful in the statistical setting. An analysis with VIF shows that the two independent variables are not involved in the multicollinearity problem (VIF = 2.274). In addition, three regression analyses were conducted with the data of years 1997, 1998, and 1999, and the results appear to be consistent for all three years.

[3]The R2 of the regression with countries with per capita GDPs less than $6,000 is 46.6%, while the R2 of the regression with countries with per capita GDPs greater than $6,000 is 63%. That is, both collectivism and income effects are powerful indicators of global software piracy, although they offer more information with better-off countries.

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environmental conditions such as basic infrastructure, business practices, and appropriate government policies [8]. As such, strong copyright protection may be more important for software industries in less-industrialized countries.

Electronic licensing has recently been given more attention as a distribution strategy. According to the International Data Corporation, all software revenues will be derived from electronic licensing by 2008. In general, the increased use of electronic software distribution may eventually reduce software theft, because the technology can facilitate prohibiting any illegitimate distribution. New business models including the application service provider (ASP) model, which harkens back to the centralized model of the past where program logic was initiated from a central repository, may reduce piracy through software hosting on the provider's server.

Providing differentiated benefits between legitimate and pirated software has also been discussed as an effective strategy [6]. One of the most important differences between legitimate software products and pirated software is the users' eligibility for technical support. Software companies have been increasing the availability of user support for their products outside of the U.S. This increased user support has promoted the purchase of legal software. According to the Business Software Alliance piracy study [2], increased user support to legitimate software users reduced the software piracy rate during period assessed in the study.

The cultural dimension poses a number of challenges. Various initiatives to counter piracy may encounter cultural roadblocks. Aggressive legal schemes may backfire if they interfere with the fundamental cultural identity of a nation. People with deep-rooted cultural norms built up over centuries may not easily adapt to the conflicting demands of the new global economy. It may be easier for the software industry to adapt to the cultural intricacies of nations rather than forcing tectonic cultural shifts among nations in order to legitimately engage in the software economy. Strategies such as schemes that reduce the "public" good nature of software may lessen the collectivistic tendencies to share. Pay-per-use and ASP models are a good starting point. Innovative business models that incorporate sharing might also prove effective and beneficial. C

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Seung Kyoon Shin (shin@uri.edu) is an assistant professor in the College of Business Administration at the University of Rhode Island. **Ram D. Gopal** (ram@sba.uconn.edu) is GE Professor of Business Associate Professor and CIBER Research Fellow in the Department of Operations and Information Management at the University of Connecticut.

G. Lawrence Sanders (mgtsand@acsu.buffalo.edu) is Professor and Chair of the Ph.D. program, in the Department of Management Science and Systems, State University of New York at Buffalo.

Andrew B. Whinston (abw@uts.cc.utexas.edu) is the Hugh Cullen Chair of Information Systems, Computer Science, and Economics at the University of Texas at Austin and the director of the Center for Research in Electronic Commerce.