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RESEARCH ARTICLE

Exploring Influential Factors on Music Piracy Across Countries

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This study explored various determinant variables influencing music piracy rates across countries. Seven variables, including income level, income inequality, individualism–collectivism, level of education, intellectual property protection, music CD price, and music market size, were adopted for this study. This study found that income level, income inequality, and market size directly impact music piracy, whereas income level, level of education, music CD price, and market size influenced music piracy through intellectual property protection.

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Music piracy is pervasive in every corner of the globe and is a key threat the music industry is facing today. Music piracy has created a significant drain on revenues and has retarded continued growth of the music industry. For example, in 2002, an estimated 40%[1] of all music CDs and cassettes sold around the globe were pirated, and the estimated value of the pirated market for 2002 was $4.6 billion[2] (International Federation of Phonographic Industry [IFPI], 2003). Music piracy rates have continued to increase. In 2001, an estimated 28% of all CDs sold were pirated, which was up from 20% in 2000 (IFPI, 2003). Additionally, the development of new technology such as the Internet, CD-ROMs, and CD-Rs has accelerated music piracy rates.

In response to the global music piracy issue, a variety of international (e.g., IFPI, Interpol Intellectual Property Crime Action Group) and domestic (e.g., Recording Industry Association of America) organizations, including music industry representatives and music artists (e.g., American Society of Composers, Authors and Publishers), have made an effort to prevent people from illegally copying music without explicit permission from, and compensation to, the copyright holder. However, some people support music piracy as a beneficial distribution tool and a new marketing opportunity. They argue that music piracy, especially music file

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sharing, is helpful for "new" artists to market and distribute their products at a modest price (Bhattacharjee, Gopal, Lertwachara, & Marsden, 2003). In support of this position, one study showed that more than half of consumers who listened to music from illegitimate sources purchased legitimate copies of the same material (Matthews, 2000).

While these contradictory views on music piracy have been discussed, scholars have attempted to find the predictors of music piracy on an individual level (e.g., Bhattacharjee, Gopal, & Sanders, 2003; Chiou, Huang, & Lee, 2005), although few scholars have taken an international perspective in studying factors that potentially impact music piracy across countries. In fact, a majority of variables and literature related to the study of music piracy have been conscripted from software piracy research because both software and music share similar characteristics such as information goods, having high initial production costs and low reproduction costs (Shapiro & Varian, 1999), and public goods, in which multiple consumer consumption does not reduce utility for the product (Samuelson & Nordhaus, 1995). Although the IFPI's annual reports provide statistical data for music piracy rates in each country, there has been no systematic and practical study of factors affecting levels of music piracy across the countries.

Recognizing the paucity of existing studies, the researchers intend to explore the seven variables—income level, income inequality, individualism–collectivism, level of education, intellectual property protection, music CD price, size of music market—influencing music piracy rates. The purpose of this study is to present alternative ways of looking at music piracy by analyzing variables as they are found across countries. Thus, this study intends to provide a theoretical basis and outline for a systematic background and explanation of the relationship between music piracy and the effects of the factors. Additionally, the results of this study can lead the music industry to create country-specific strategies to protect its copyrights and intellectual property.

Literature review

Several studies have been conducted regarding music piracy. Bhattacharjee, Gopal, Lertwachara, et al. (2003) analyzed a model to enhance revenues from digital music sales in the presence of online music piracy. Their study provided that analytical models of different selling strategies incorporate consumer valuation for music, search cost of music, consumer surplus, and the economics of seller revenue, and found that it is not necessary to eliminate online music piracy in order to achieve revenue maximization strategies for the seller. In another study, Bhattacharjee, Gopal, and Sanders (2003) analyzed influential factors, including demographics, economic factors, and technology, on online digital music–sharing behaviors. In comparing segments of the general population, they found that age (older), gender (female), and income (higher) were factors that tended toward less piracy. They suggested that rate of music piracy increases with price and amount of bandwidth.

Chiou et al. (2005) examined the antecedents of music piracy attitudes and intentions and provided that attributive satisfaction, perceived prosecution risk, magnitude of consequence, and social consensus significantly influenced both attitude and behavioral intention toward music piracy. However, these studies utilized the individual as the unit of analysis and are not useful in explaining cross-national differences in music piracy rates. Although nation as a unit of analysis is not common, there are reasons for its use in this study: (a) the variables adopted for this study pertain to country-level analysis (e.g., income inequality, culture, level of education) and (b) country as a unit of analysis has long been commonly used in sociology, economics, and other social sciences.[3]

None of the previous studies compared or contrasted music piracy with the intention of unveiling common patterns and highlighting differences at the country level. Because of the lack of studies on music piracy at the country level, the current body of literature on music piracy adopted various factors discussed in the studies of software piracy across countries. Software and music share similar characteristics in terms of information goods and public goods. They are both information goods with high initial production costs and almost zero or insignificant reproduction costs (Shapiro & Varian, 1999). Similar to software, music is vulnerable to illegal copying and counterfeiting, given the facility with which copies may be made at a negligible cost. They also have the similar characteristics of providing a public good, in that sharing with others does not reduce consumer utility for the product (Samuelson & Nordhaus, 1995). Thus, in reviewing the previous studies, the researchers identified seven variables; economic development, income inequality, individualism–collectivism, level of education, intellectual property protection, music CD price, and market size of music.

Economic development

The economic variable is among the most commonly accepted influential factors for piracy. At the individual level, piracy is closely related to economic status since the rich have no need to obtain pirated copies, whereas the poor may (Husted, 2000; Rapp & Rozek, 1990). For example, Cheng, Sims, and Teegen (1997) found that household income is significantly related to "can't afford software" as a reason for illegally copying software. Preceding software piracy studies have applied economic factor to country level and found that economic differences at country level differentiate rates of software piracy across the globe. Rapp and Rozek examined the relationship between economic development and protection of patents. They found that patent protection strongly correlates with economic development and high-income countries that have stronger patent laws. Husted studied the relationship between the level of economic development and the rate of software piracy and suggested the existence of a significant relationship. Thus, the researchers hypothesize that

H1: The higher the level of economic development, the lower the music piracy rate.

Income inequality

In developing countries, income may affect music piracy differently since income inequality is more pronounced and music consumption is greater among higher income groups, rather than among lower income groups. These groups are more likely to have access to technical devices such as CD-RWs, which can be used to pirate music (Business Software Alliance, 2003). Therefore, one would expect that music piracy would be more prevalent in countries with a large middle class. The software literature provides evidence supporting this proposition. For instance, Sims, Cheng, and Teegen (1996) found that software piracy is particularly common among university students, representing a privileged middle class. Husted (2000) examined the impact of income inequality on rates of software piracy at the country level and found that piracy is significantly related to income inequality. Thus, the second hypothesis was drawn as follows:

> H2: The higher the level of income inequality (the smaller the middle class), the greater the rate of music piracy.

Individualism–collectivism

Despite the reasonable explanation for piracy prevalence in predominantly less developed countries, a significant number of anomalies continuously occur in the global piracy phenomenon. For instance, in 1999, the rates of software piracy among average per capita annual income countries such as Hong Kong ($22,185) and Singapore ($26,460) were 56% and 51%, whereas the rates of relatively lower income countries, such as New Zealand ($17,210) and Israel ($16,438), were 31% and 44%. This phenomenon, therefore, cannot simply be explained by economic variables. To wholly understand the underlying mechanics, it is necessary to extend economic rationale to include the role of cultures.

It can be assumed that certain cultural norms may either encourage or discourage piracy behavior because they can possibly influence the perception of copyright protection. A majority of Western countries hold that individual creative works should retain individual ownership. Steidlmeier (1993) argued that intellectual property protection is deeply rooted in Western culture. In the Western view, individual freedoms and benefits are emphasized over societal benefits. On the contrary, Eastern cultures have traditionally emphasized sharing individual creative works because Asian culture emphasizes social harmony and cooperation (Donaldson, 1996; Swinyard, Rinne, & Kau, 1990). One Chinese proverb reflects this view: "He that shares is to be rewarded; he that does not, condemned." East Asian nations traditionally believe "copyrighting is a Western concept created to maintain a monopoly over the distribution and production of knowledge and knowledge-based products" (Altbach, 1988, p. 62).

Software piracy studies have suggested that cultural influences on piracy vary across countries. Swinyard et al. (1990) studied cultural differences in morality and behavior toward software piracy between Singapore and the United States. They

claimed that Singaporeans held attitudes and intentions less congruent with copyright laws than did Americans because their culture tended toward less support for copyright legislation and more in support of the human benefits that resulted from piracy. Whitman, Townsend, Hendrickson, and Rensvold (1998) observed an interaction between culture and computer-use ethics and found that U.S. students had less permissive attitudes toward computer-use ethics than did students from Hong Kong and Singapore because of their cultural differences.

In spite of several methodological limitations,[4] Hofstede's (1983, 2001) five dimensions of sociocultural variability—individualism–collectivism, uncertainty avoidance, power distance, masculinity–femininity, and long-term versus short-term orientation —were widely used in prior studies of culture. This study, however, employs individualism–collectivism to measure cultural perspective related to ethical sensitivity on piracy. Hofstede defined individualism as "a preference for a loosely knit social framework … in which individuals are supposed to take care of themselves and their immediate family only" (1983, p. 336). Conversely, collectivism is referred to as "a preference for a tightly knit social framework in which individuals can expect their relatives, clan, or other in-group to look after them, in exchange for unquestioning loyalty" (Hofstede, 1983, p. 336).

Within individualistic culture, individual goals are emphasized, whereas group goals take precedence over individual goals in collectivistic cultures. Individualistic countries tend to use social institutions or laws to protect individual rights, including ownership. Glass and Wood (1996) suggested that equity theory helped explain decisions made by individuals to share pirated software. That is, piracy is considered as an exchange associated with an evaluation of the outcomes compared with the inputs of the exchange. This kind of calculation would be predominant in the individualistic society. On the contrary, in a collectivistic culture, greater emphasis on sharing exists within a group (Hofstede, 1997; Swinyard et al., 1990). Studies also supported the concept as finding that software piracy rates are significantly higher in collectivistic countries than in individualistic countries (Husted, 2000; Marron & Steel, 2000; Shore et al., 2001).

The authors drew the following hypothesis based on the assumption that countries' cultural belief systems, whether individualistic or collectivistic, influence decision-making processes or ethical standards regarding music piracy behavior.

H3: The more individualistic a country, the lower the rate of music piracy.

Education level

Level of education can be another important predictor of piracy because ethical and moral developments are highly and positively related to education (Kolberg, 1969). At the individual level, more educated people are more likely to view piracy as an unethical behavior. In a similar vein, countries with a well-educated population would have stricter ethical standards against piracy or even better developed intellectual property rights.

Ginarte and Park (1997) suggested that education is positively correlated with several dimensions of patent protection, including duration, availability in different industrial sectors, and membership in international patent agreements, circumstances under which protection lapses, and enforcement. Scalise (1997) found a U-shaped relationship between education and patents; as education levels increase, patent protection first decreases and then increases. Furthermore, Marron and Steel (2000) found a strong negative relationship between education and software piracy rates across countries; countries with higher education levels have lower software piracy rates. Accordingly, the following hypothesis is drawn

H4: The higher the educational level, the lower the music piracy rate.

Intellectual property protection

Laws protecting intellectual property could be an effective mechanism used to hinder piracy. Although there is no internationally uniform standard of protection for intellectual property, it is controlled by several international conventions—the Berne Convention for the Protection of Literary and Artistic Works, the UNESCO Universal Copyright Convention, the Geneva Convention for the Protection of Producers of Phonograms, the World Intellectual Property Organization (WIPO) Copyright Treaty, and the WIPO Phonograms and Performances Treaty (United Nations Conference on Trade and Development, 2004). Despite these international conventions regarding intellectual property, the nature of protection policies in terms of intellectual property differs from country to country, and differences occasionally cause international disputes. For instance, during the summer of 1996, the United States and China threatened trade sanctions against each other. According to *The Economist* ("Retribution for reproduction," 1996), the United States claimed that China did not live up to a prior agreement to police counterfeiting of products protected by U.S. copyrights, whereas China denied the charge (Wei, 1996).

Many countries try to protect copyrighted products through intellectual property rights. For example, in the United States, new regulations have been adopted against piracy, including the 1997 No Internet Theft (NET) Act, the 1998 Digital Millennium Copyright Act, the 1999 Digital Theft Deterrence, and the Copyright Damages Improvement Act, which applies a maximum fine of up to $150,000 for each instance of copyright infringement (Moores, 2003).

Existing studies have acknowledged the importance of intellectual property protection laws in discouraging piracy (Harvey, 1996) and have identified a negative relationship between software piracy and intellectual property protection across countries (Marron & Steel, 2000). Thus, the fifth hypothesis is drawn as follows

H5: The stricter a country's intellectual property protection enforcement, the lower the music piracy rate.

Music CD prices

Compared with the average price of software programs, music CDs are significantly cheaper. Despite the relatively low expense of CDs, people are still more likely to buy pirated CDs because of lower prices for quality similar to that of legitimate CDs. In software piracy studies, price consistently has been considered an important indicator for piracy (Gopal & Sanders, 1997, 1998, 2000; Moores, 2003; Moores & Dhillon, 2000). Several studies have suggested that increasing the price of software increases software piracy (Cheng et al., 1997; Gopal & Sanders, 1997, 2000). One study found that, as with software piracy, price significantly relates to music piracy in that piracy increases as price increases (Bhattacharjee, Gopal, and Sanders, 2003). In countries where CDs are relatively expensive goods and price limits availability to the general population, piracy rates are expected to be higher than in countries where CDs can be purchased for relatively modest prices. Therefore, the following hypothesis is formed

H6: The higher the price of music CDs, the higher music piracy rates.

Market size of music industry

This study adopted the market size of the music industry as another predictor of music piracy. In one empirical software piracy study, Gopal and Sanders (1998) suggested that the size of the domestic software industry is closely related to software piracy rates. The authors assumed that in countries with a big music market, people might recognize music as a social value and might provide an environment of increased copyright enforcement to protect against music piracy. Accordingly, we form the following hypothesis

H7: The bigger the music market, the lower the music piracy rate.

Income level and intellectual property protection

As noted earlier, the authors hypothesized that those countries with lower income levels may have higher music piracy rates. The previous studies on software piracy consistently found a positive relationship between economic development and intellectual property protection; countries with high economic development have stricter intellectual property protections (e.g., Rapp & Rozek, 1990). Most high-income countries, developed countries, tend to have stricter enforcement, longer in duration and more comprehensive intellectual property protection. In other words, developing countries are less likely to punish the commercial counterfeiting of products (Schultz & Saporito, 1996). Based on this observation, the researchers added another hypothesis that

H8: The higher a country's income level, the stricter its intellectual property protection enforcement.

Based on the literature review and hypotheses proposed, Figure 1 shows the conceptual model for this study.

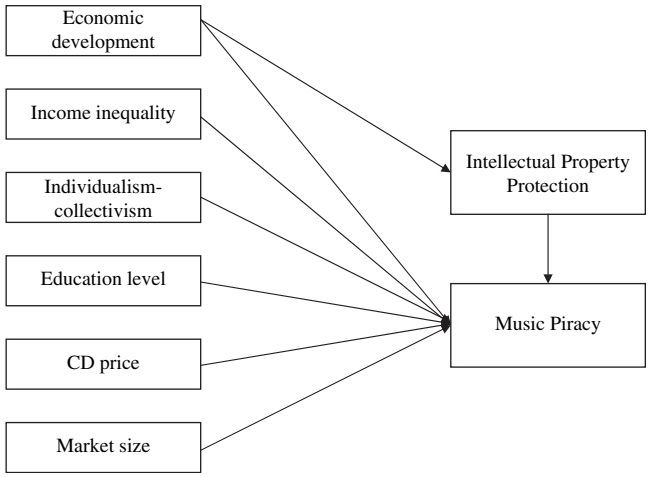

Figure 1 Conceptual model.

Methodology

Data sources

The data pertaining to music piracy rates across countries used in this study were provided by the IFPI, and based on a three-step procedure of calculation. First, based on local surveys, individual research, and seizure statistics by affiliate national groups, music piracy estimates were compared with other sources such as historical estimates, economic indicators, and data from the optical disc and magnetic media industries (IFPI, 2002). Employing its own model of these sources, IFPI approximates piracy units by individual country. Second, piracy values were estimated according to local prices for pirated materials. Finally, considering both the piracy values and the total music sales in a national market, IFPI determines music piracy rates (percentage of pirated music values among total copies, including both legal and illegal sales) for each country.

This study used purchase power parity (PPP) gross domestic product (GDP) per capita for the measurement of economic development, and Gini index for the measurement of income inequality, as reported by the World Bank (2002). Individualism index scores for countries were adopted from Hofstede's (2001) findings, and education index scores were obtained from United Nations Development Programme reports (UNDP, 2002). The intellectual property protection data were adopted from the annual reports of Economic Freedom of the World (Gwartney & Lawson, 2001). In addition, annual reports of music CD prices and total music sales were provided by IFPI (2002). Excluding the Gini and individualism indices, which were surveyed for 1 year, data for the variables were gathered during the period from 1999 through 2002.

Measurement of variables

Music piracy rate was examined as a dependent variable with seven independent variables. The independent variables are economic development (PPP GDP per capita), income inequality (Gini index), individualism–collectivism, educational level, intellectual property protection, music CD price, and music market size.

Dependent variable

Music piracy rates, the percentage of the value of the pirated music copies compared with the value of total copies for each country, were used as the dependent variable in this study. For statistical use, this study conducted a logistic transformation of music piracy rates to meet the normality assumption.

Economic development and income inequality

To measure consumer demand, this study utilized PPP GDP per capita measured in 1995 constant U.S. dollars, and the Gini index as reported by the World Bank (2002). GDP represents the averaged income effect of consumers, whereas Gini index measures the unequal distribution of income among consumers. Therefore, GDP is assumed to negatively affect music piracy, whereas Gini is expected to have a positively correlated impact on the piracy. According to the World Bank (2002), Gini index measures the extent to which the distribution of income (consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentage of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line (World Bank, 2002). A Gini index of zero represents perfect equality, whereas an index of 100 implies perfect inequality. That is, the higher the Gini index, the more income inequality in a country.

Individualism–collectivism

Individualism index (Hofstede, 2001) is a variable to examine the effects of individualism on music piracy rates. Based on the scores from surveys among IBM subsidiary employees across countries, individualism index ranged between 0 and 100 and indicated that countries with higher scores were likely to be more individualistic than collectivistic.[5]

Level of education

Education index (UNDP, 2002) is a variable used in the study to examine the effects of education level on music piracy rates. The education index ranged from 0 to 1, with education level increasing as scores approach 1 (UNDP, 2002).

Intellectual property protection

Annual reports from the Economics of Freedom of the World index contain the subcategory of protection of intellectual property. Based on surveys of business

people conducted by the World Economic Forum, intellectual property protection represents the degree of effort by countries to protect intellectual property and range from 0 to 10, with 0 being the lowest level of protection and 10 the highest. The authors believe this is one of the most appropriate indices for directly measuring the degree of intellectual property protection at the country level.[6]

Music CD price and music market size

The average price of music CDs by country is divided by GDP per capita, and the market size of the music industry is measured by dividing the total legal music sales by country GDP. Both data fields were derived from the IFPI. In the case of CD price, some data were not used in this analysis because the authors determined them to be outliers that could significantly alter the study results. For instance, the data from Zimbabwe in whole years, 1999–2002 ($193, $17, $15, $39, and $58), were excluded. Those prices were significantly inflated when compared with the GDP per capita.

Statistical analysis

In order to test the suggested eight hypotheses, this study uses two types of statistical analyses: regression analysis and path analysis. In the case of regression analysis, Hypotheses 1 through 7 are tested, whereas in the case of path analysis, Hypothesis 8, as well as Hypotheses 1 through 7, is tested.

Specifically, in the case of regression analysis, the effects of GDP, Gini index, individualism, education level, intellectual property protection, CD price, and market size on music piracy are tested simultaneously. Therefore, the regression model is defined as follows:

$$\text{PIRACY} = \alpha + \beta_1\text{GDP} + \beta_2\text{GINI} + \beta_3\text{INDI} + \beta_4\text{EDU} + \beta_5\text{PROTECT} + \beta_6\text{PRICE} + \beta_7\text{SIZE}.$$

Although regression analysis has been frequently used in previous piracy studies and can produce easily understandable results, it has some drawbacks. First, regression analysis cannot test the endogeneity of mediating variables. In other words, the relationships among independent variables cannot be considered in regression analysis. Therefore, path analysis, an extension of the regression model that is used to test the fit of the correlation matrix against two or more causal models (Hair, Anderson, Tatham, & Black, 1998), is required for Hypothesis 8, which tests the endogeneity of intellectual property protection. Second, in regression analysis, it is not easy to deal with the multicollinearity problem, which has been present in previous piracy studies. Path analysis can be a viable way to ease the problem because it allows interdependent relationships among independent variables.[7] Path analysis, thus, employs simple bivariate correlations by specifying the relationships in a series of regression-like equations that can then be estimated by determining the amount of correlation attributable to each effect in each equation simultaneously (Hair et al., 1998). To test the model with all its paths, the study uses a goodness-of-fit test from a structural equation modeling program. The goodness of fit of this study, thus, was calculated by entering the path

model and its data into a structural equation modeling software package, LISREL 8.7, which computed a variety of alternative goodness-of-fit coefficients.

In order to test the suggested hypothesis, a saturated path model is used in this study. Specifically, the other six independent variables are assumed to affect intellectual property protection, and all of the seven independent variables, including protection, are assumed to affect piracy in the path model. In brief, the use of multiple statistical analyses is expected to increase the robustness of results for this study.

Results

Descriptive statistics

A total of 58 countries were included for final analysis. For each of the countries, 4-year (1999–2002) data were collected. The descriptive statistics in Table 1 provide an interesting insight into the variation of the data and show the mean of the respective variables. As expected, there was great variation among countries. The average percentage of worldwide music piracy rates, as a dependent variable among sampled countries, has increased continuously from 1999 through 2002 (M = 29.56% in 1999, M = 32.30% in 2000, M = 35.32% in 2001, and M = 36.30% in 2002), but the standard deviation showed great differences from country to country (SD = 25.52 in 1999, SD = 28.86 in 2000, SD = 28.44 in 2001, and SD = 27.77 in 2002).

The means of the PPP GDP per capita have also increased continuously from 1999 through 2002 (M = \$13,331 in 1999, M = \$13,803 in 2000, M = \$13,954 in 2001, and M = \$14,377 in 2002). The standard deviations show the disparity of GDP among the sampled countries (SD = \$8,509 in 1999, SD = \$8,812 in 2000, SD = \$8,907 in 2001, SD = \$9,012 in 2002). The average value of Gini is 37.77. The average index score regarding individualism among the 58 countries is 46.00, indicating slightly collectivistic tendencies for the countries sampled. As for education factor, most countries had higher levels of education, with an average of .88 in 1999 and 2000 and .89 in 2001 and 2002.

Regarding intellectual property protection, the average of the mean values has decreased slightly from 1999 through 2002 (M = 6.09, M = 5.72, M = 5.43, and M = 5.50, respectively). The mean values of music CD price, one of the industry factors, do not exhibit any consistent pattern, with the values having decreased from 1999 to 2000 (M = 1.25 and M = 1.11, 1999 and 2000, respectively), increased from 2000 to 2001 (M = 1.11, and M = 1.77, 2000 and 2001, respectively), and decreased from 2001 to 2002 (M = 1.77 and M = .65, 2001 and 2002, respectively). The average size of the music market has continuously decreased from 1999 through 2002 (M = .95, M = .89, M = .82, and M = .72, respectively).

Regression analysis

Prior to regression analysis, several underlying statistical assumptions were tested. Normality was checked for each of seven marginal distributions, using

Table 1 Descriptive Statistics

Variable	Year	*M*	*SD*	*N* (Number of Countries)
Music piracy	1999	29.56	25.52	54
	2000	32.30	28.86	50
	2001	35.32	28.44	57
	2002	36.30	27.77	58
	Total	33.47	27.61	219
Economic development (gross domestic product)	1999	13,330.92	8509.19	58
	2000	13,803.27	8812.20	58
	2001	13,953.67	8907.33	58
	2002	14,376.94	9,012.02	57
	Total	13,863.99	8,761.62	231
Income inequality (Gini)	Total	37.77	10.12	232
Individualism–collectivism	Total	46.00	23.43	232
Education level	1999	.88	.11	58
	2000	.88	.11	58
	2001	.89	.11	58
	2002	.89	.11	58
	Total	.89	.11	232
Intellectual property protection	1999	6.09	1.78	52
	2000	5.72	2.10	56
	2001	5.43	2.17	58
	2002	5.50	2.05	58
	Total	5.68	2.04	224
CD price	1999	1.25	1.11	58
	2000	1.11	.99	58
	2001	1.77	5.32	58
	2002	.65	.59	56
	Total	1.20	2.80	230
Market size	1999	.95	.50	58
	2000	.89	.46	58
	2001	.82	.53	57
	2002	.72	.44	54
	Total	.85	.49	227

Shapiro–Wilks test statistics ($n < 2000$) for normality and visual normal QQ plot inspection (Johnson & Wichern, 1992).

Using a partial regression plot, which showed the relationship between a single independent variable and the dependent variable, the linearity was also checked. The variable to sample ratio was 1:25.9 and satisfied the sample size criterion suggested by Hair et al. (1998).

Before conducting the regression analysis, a correlation analysis was examined. As shown in Table 2, all the suggested independent variables are significantly

Table 2 Correlation Matrix

	PIRACY	GDP	GINI	INDI	EDU	PROTECT	PRICE	SIZE
PIRACY	—							
GDP	−.75**	—						
GINI	.39*	−.42**	—					
INDI	−.65**	.74**	−.43**	—				
EDU	−.52**	.63**	−.21**	.57**	—			
PROTECT	−.77**	.87**	−.37*	.71**	.51**	—		
PRICE	.18**	−.27**	.15*	−.25**	−.17*	−.27**	—	
SIZE	−.68**	.50**	−.06	.56**	.49**	.56**	−.05	—

Note: N = 207, PIRACY = music piracy, GDP = economic development, GINI = income inequality, INDI = individualism/collectivism index, EDU = education level, PROTECT = intellectual property protection, PRICE = CD price, SIZE = market size.
* $p < .05$. ** $p < .01$.

associated with the dependent variable (piracy). GDP ($r = -.75$), individualism ($r = -.65$), intellectual property protection ($r = -.77$), and market size ($r = -.68$), in particular, have highly significant associations with music piracy. In addition, all of the directions have the same signs as predicted by the hypotheses. Compared with the other independent variables, price has a relatively lower level of association ($r = .18$) with piracy. The correlation analysis shows that the suggested independent variables are significantly associated with piracy, as the hypotheses predicted. Therefore, it can be stated that all of the suggested independent variables passed the first criterion and should be included in the regression model for final analysis.

Table 3 shows the results of regression analyses. A total of five regression analyses were conducted for each of the 4 years and the total data. The total variances accounted for in the five regression models were 69–76%, and the models were highly significant in terms of F values ($F = 74.71$ in total, 20.10 in 2002, 21.05 in 2001, 13.04 in 2000, and 13.50 in 1999). The model fit for the regression models increased as the recent data were analyzed. This indicates that the suggested model became increasingly more useful. This usefulness is also found in terms of significant independent variables. In the 1999 and 2000 models, only one variable (size) was found to be significant. However, the number of significant independent variables increased to two (Gini and size) in the 2001 model and three (GDP, intellectual property protection, and size) in the 2002 model.

Hypothesis testing is conducted based on the regression results of the total model. In the total model, a total of four independent variables such as GDP, Gini, intellectual property protection, and market size were found to be significant. Each of these variables was found to be significant in at least one of the previous four regression analyses. This result indicates that the use of merged data may increase the statistical power and reduce the effect of multicollinearity. However, the effects of

Table 3 Regression Analysis

	Year (Beta)				
Independent Variable	Total	2002	2001	2000	1999
GDP	−.274**	−.347*	−.303	−.313	−.180
GINI	.162**	.101	.170*	.190	.204
INDI	.040	−.020	.052	.071	.032
EDU	.014	.069	−.008	.033	−.046
PROTECT	−.263**	−.310*	−.280	−.187	−.168
PRICE	.042	.008	.065	.031	.039
SIZE	−.415**	−.269*	−.405**	−.438**	−.522**
R^2	.724	.758	.754	.690	.697
Adjusted R^2	.715	.720	.718	.637	.646
F	74.707	20.097	21.050	13.038	13.500
Prob. $> F$	.000	.000	.000	.000	.000

Note: GDP = economic development, GINI = income inequality, INDI = individualism/collectivism index, EDU = education level, PROTECT = intellectual property protection, PRICE = CD price, SIZE = market size.
* $p < .05$. ** $p < .01$.

individualism, education, and price were not found in this regression analysis. Therefore, the results of the regression supported Hypothesis 1, the higher the level of economic development, the lower the music piracy rate; Hypothesis 2, the higher the level of income inequality (the smaller the middle class), the greater the rate of music piracy; Hypothesis 5, the stricter a country's intellectual property protection enforcement, the lower the music piracy rate; and Hypothesis 7, the bigger the music market, the lower the music piracy rate.

Whereas Hypotheses 3, the more individualistic a country, the lower the rate of music piracy; Hypothesis 4, the higher the educational level, the lower the music piracy rate; and Hypothesis 6, the higher the price of music CDs, the higher music piracy rates, were rejected in the regression analysis.

Path analysis

As explained earlier, hypothesis testing is conducted by path analysis as well as regression analysis. In this path model, GDP, Gini, individualism, education, CD price, and market size are assumed to affect music piracy directly and indirectly via the mediation of intellectual property protection. By using this saturated model, the effects of the independent variables on music piracy can be tested together with the interdependent relationship between GDP and intellectual property protection.

A path analysis with maximum likelihood estimation showed that GDP, Gini, intellectual property protection, and market size directly affected piracy, whereas individualism, education, and price had no significant direct relationship to music

piracy. This result has good fit with the result of the regression analysis in that the same independent variables were found to be significant in both analyses. Therefore, Hypothesis 1, 2, 5, and 7 were supported, whereas Hypothesis 3, 4, and 6 were rejected in the path analysis.

More importantly, the path analysis showed that GDP was significantly related to intellectual property protection. Therefore, Hypothesis 8, the higher a country's income level, the stricter its intellectual property protection enforcement, is supported in this study. In addition, education, price, and size were found to be significantly related to intellectual property protection. It is noted that price and size were significantly related to protection level, although they were not significantly related to piracy. That is, education and price can only affect piracy indirectly via intellectual property protection.

This study conducted an additional path analysis focusing on significant relationships. Figure 2 shows the results of the final path model. As explained earlier, GDP, Gini, intellectual property protection, and market size were found to have a direct effect on music piracy. In addition, GDP, education, price, and size were found to affect intellectual property protection. Therefore, GDP and size affected music piracy both directly and indirectly, Gini affected piracy only directly, and education and price only affected piracy indirectly. As expected by Hypothesis 8, intellectual property protection functioned as a mediating variable in the path model. Table 4 shows that, according to the given fit indices, the fit of the path model was generally satisfactory.

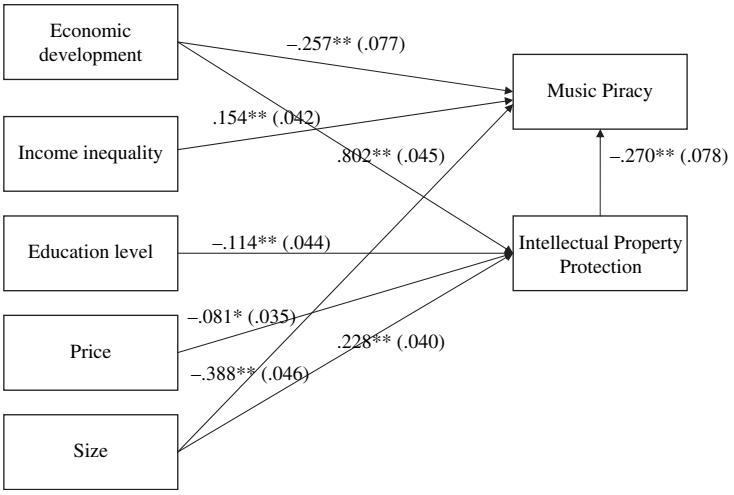

Figure 2 Path model.
* $p < .05$, ** $p < .01$, and the number in parenthesis indicates standardized error.

Table 4 Fit Measures for Path Model

Model Fit Index and Criteria	Fit Statistics
Chi-square > 0.05	1.778 ($p = .620$; $df = 3$)
Chi-square/degree of freedom < 3	.593
Goodness-of-fit Index (GFI) > 0.9	.998
Adjusted GFI (AGFI) > 0.9	.977
Normed fit index (NFI) > 0.9	.998
Non-NFI (NNFI) > 0.9	1.011
Comparative fit index (CFI) > 0.9	1.000
Root mean square residual (RMR) < 0.05	.008

Discussion and conclusion

This study provides an opportunity to gain better understanding of, and better insights into, what factors are significantly related to music piracy rates across countries through information obtained from the regression and path analyses. The results show that GDP per capita, income inequality, intellectual property protection, and music market size play a significant role in predicting music piracy rates across countries in both regression and path analyses. In addition, the path analysis shows that intellectual property protection is significantly associated with GDP, as well as education level, CD price, and music market size. This indicates that education level and the price of a music CD may have an indirect effect on music piracy rates via intellectual property.

As Husted (2000) determined the impact of the level of economic development of a country on the rate of software piracy, this study provides consistent evidence that music piracy rates decreased as the GDP per capita increased across countries. Levels of intellectual property protection of a country also have significantly affected music piracy rates, indicating that countries with more restrictive regulations against piracy, for the protection of intellectual property, have lower rates of music piracy. Thus, differences in individual countries' legal systems, as they pertain to intellectual property, including copyrights, patents, trade secrets, and trademarks, can have significant effects on music piracy rates among countries.

This study also shows that music market size is significantly and negatively associated with music piracy rates, suggesting that countries with bigger music markets have lower music piracy rates than those with smaller markets. The results support previous findings from software piracy studies that found that countries with larger domestic software industries had a lower incidence of piracy (Gopal & Sanders, 1998). In considering the impact of music market size on music piracy, the music industry should use a more proactive marketing strategy. Music companies can promote the advantages of buying an original music CD by investing more money in the music market. This may be employed as an initial strategy to encourage the market to maturate in a country where levels of music piracy are relatively high.

As the market grows, it will likely lead to the initiation of more effective educational and legal campaigns to educate users about music piracy as an unethical behavior and about the negative economic and social impacts. Thus, to reduce illegal copying, buying, and selling of music CDs in the long term, an expansion of the music market can be more effective than lawsuits against consumers or developing technology to prevent unauthorized duplication.

The path analysis shows that countries with higher income levels, lower education levels, less expensive CD prices, and smaller music markets tend to have stricter intellectual property protections. The finding supports previous findings that high-income countries have stronger patent laws (Rapp & Rozek, 1990). Beyond the direct effects of GDP and music market size on the music piracy rates, we can assume that education level and music CD price in a country may have an indirect effect on music piracy rates through intellectual property protections that directly impact music piracy rates. The finding showed that countries with higher education levels are relatively less strict on intellectual property protection. This may imply that people with higher education may have greater moral and ethical standards against music piracy. Thus, when creating strategies against music piracy in countries with higher levels of education, self-regulation may be more effective than law enforcement in reducing music piracy rates.

In the current study, unlike earlier research that suggested that individualism–collectivism was an influential factor on music piracy rates, such effect on music piracy was not supported. The result may have been caused by outdated data (e.g., Individualism index, Hofstede, 1997) or a drawback of sampling (e.g., convenience samples of IBM employees). We may assume that Hofstede's cultural dimensions might not provide information about entire national cultures as samples only comprising IBM employees can be questionable as being truly representative of a country. In addition, assuming that a country's young generation is likely to be more involved in pirating behaviors, the individualism–collectivism index derived from outdated data needs to be updated and compared against current trends in future research.

Although there will always be a demand for pirated music, appropriate application of the determined study factors can help assuage the music piracy issue by creating a viable and effective strategy against music piracy for the protection of music industry copyrights and other intellectual property. As Rothschild (1999) suggested, we may consider variables relevant to the selection of educational campaigns, marketing strategies, and intellectual property protection as sets of tools that can be brought to bear for control of music piracy. While individuals have differing motivations, opportunities, and abilities to cooperate, countries also have different levels of economic development, and differing cultural and political backgrounds. In dealing with music piracy across countries, therefore, the relative appropriateness of the use of various combinations of education, marketing, and laws can be a significant factor.

Some limitations should be noted when interpreting the findings of this study. First, the conception of piracy, which is limited to illegally produced CDs and

cassettes made for sale, for this study should be broadened in future studies. If the word piracy includes counterfeiting, pirating, bootlegging, home taping, online music file sharing, and music CD burning (Marshall, 2004), the influential factors on music piracy are likely to be different from the findings of this study, although there will be some difficulties in gathering statistical data for all these areas of piracy. Second, considering the fact that online music piracy has had a serious effect on the music industry in recent years, future research should consider technological variables as an important factor. Obviously, technological developments, such as CD-R/CD-RW recording and MP3 technology, accelerate music piracy via the Internet because copying requires little effort with minimal additional costs. Third, this study did not address individual copying behaviors and motivations for music piracy. Future research needs to explore music piracy behaviors of individuals, such as unauthorized duplication/download and pirated music product purchasing, and researchers should be encouraged to develop a behavioral model for music piracy activity. Such research could also provide valuable information about the relationship between individual copying behavior and music piracy across countries.

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Notes

1 Pirated music sales in this study only include illegally produced CDs and cassettes made for sale. Thus online music file sharing and music CD burning by individuals, or sharing for noncommercial purposes were excluded.
2 IFPI calculated the estimated pirate value based on the prices of pirate products sold, minus actual losses to the recording industry (IFPI, 2003).
3 This explanation has been added in response to the anonymous reviewer's comment.
4 The dimensions espoused by Hofstede have been criticized, especially his methodology. First, scholars pointed out that his survey group was limited to employees from only one corporation, IBM, and could not be generalized to provide information about entire national cultures. Second, although 117,000 questionnaires were administered in 66 countries (Hofstede, 1998), the large number of respondents would not likely provide representativeness because the survey group was not randomly selected and was in too close a relationship to the researcher (Bryman, 1988). Among the 66 countries, there was a significant degree of over- or underrepresentation dependant on the number of participants from each country. Additionally, the average number of participants from each country is relatively small, which leads to generalization issues (McSweeney, 2002). This explanation was added in response to the suggestion of the anonymous reviewer.
5 Although individualism data for Paraguay are not provided by Hofstede (2001), this study calculated an individualism index for Paraguay by averaging data for Argentina,

Chile, and Uruguay, which are considered to have a similar culture to that of Paraguay (The Southern Cone) (Lenartowicz & Johnson, 2003).

6 Because data for protection of intellectual property were not provided for the period between 1996 and 1999, only data for the year 1999 were used. In some countries, data for protection of intellectual property were not provided by the World Economic Forum. In such cases, a similar type of data, data for legal system and property rights, provided by the World Economic Forum, were used for the countries (e.g., Bahrain, Kuwait, Oman, and Pakistan), considering that the two variables have a high correlation with each other ($r = .898$ in 2002, $r = .923$ in 2001, $r = .931$ in 2000, and $r = .861$ in 1995).

7 The path analysis was conducted in response to the anonymous reviewer's suggestion. The authors thank the author for the valuable suggestion.

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