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Global Software Piracy: Searching for Further Explanations

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ABSTRACT. This paper identifies that Information and Communication Technology (ICT) has a negative effect on software piracy rates in addition to consolidating prior research that economic development and the cultural dimension of individualism also negatively affect piracy rates. Using data for 59 countries from 2000 to 2005, the findings show that economic well-being, individualism and technology development as measured by ICT expenditures explain between 70% and 82% of the variation in software piracy rates during this period. The research results provide important implications for policy makers and business practitioners to help reduce software piracy.

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KEY WORDS: culture, economic development, ICT, software piracy

Introduction

Software piracy has become a global phenomenon. It can be defined as the unauthorised utilisation or replication of intellectual property (IP) protected software. Such piracy may involve massive imitative manufacturing and sales for profit or give rise to collective benefit of cost-saving efforts, such as Internet peer to peer sharing on downloading and/or small-scale illegal efforts associated with individual use. Software piracy is more severe than piracy in most other industries because the nature of software products enables both massive reproductions for profit and individual and organisational copying at a click of the fingertip. As a result, software piracy has been a major global headache for policy makers, businesses and consumers alike due to the uncertainties involving cross-border conflicts, business losses and consumer victimisation of viruses (Yang, 2008). According to the Business Software Alliance (BSA), global piracy rates have decreased to 35% in 2006, but the piracy value has risen. "…[F]or every two dollars' worth of PC software purchased legitimately in 2006, one dollar's worth was obtained illegally" (BSA, 2007, p. 1). Out of the 102 countries BSA studied, half had a piracy rate of at least 60%, and 30% had more than 75%. Moreover, none of the 102 countries is able to enjoy a piracy-free zone, as the piracy rates range from 21 to 95% (*op cit*). Even developed countries like the U.S., Japan and EU countries have piracy rates ranging from 21 to 28% (*op cit*). This phenomenon will undoubtedly continue to affect the industry because BSA estimates that the piracy value of PC software may reach US$180 billion by 2010.

The prevalence of software piracy has attracted great attention towards searching for explanations to this ubiquitous phenomenon. Despite the large volume of work on the determinants of piracy, what appears to be missing from prior studies is the lack of immediate policy instruments to curb piracy. Accordingly, the purpose of this article is to demonstrate the influence of Information and Communication Technology (ICT) on alleviating software piracy in addition to revisiting some other widely accepted factors that are purported to impact global software piracy. As a result of this global study, we are able to provide policy implications against software piracy for policy makers and business practitioners.

The significance of this research is reflected in its theoretical, empirical and practical contributions. The theoretical contribution is two-fold. First, ICT is identified as an important factor to alleviate software piracy because the development of ICT infrastructure in a country will raise the demand for authentic software and for after-sale services. This study therefore extends prior research because ICT differs from other factors in curtailing piracy. The speedy development of ICT may serve to increase the demand for authentic products instead of fakes. This speedy development is also associated with governments' desire to curtail piracy and to invest in this high technology sector. Second, this research also revalidates prior research. We deem prior research important for this research because the determinants of software piracy are not mutually exclusive. That is to say, software piracy is not determined by one single factor. Except ICT, the factors – economic well-being and cultural differences – that we have included in our extended study have been tested and are generally accepted as being influential to piracy. These factors and ICT together demonstrate stronger explanatory power to piracy rates. The revalidation, extension and synthesis of early studies add knowledge to the study of political economy and piracy, and establish a theoretical argument of the importance for research and policy making.

Empirically, the contribution of this paper is reflected in its temporal and spatial terms. It brings relevant studies about piracy up to date by conducting a longitudinal study, as most previous research was highly focused on the piracy situation in the 1990s. Moreover, prior research focused extensively on the U.S. and European countries and their piracy grievances. Some piracy prevalent countries were often omitted from the studies. The authors have therefore, in this study, included such countries as China, Indonesia and Malaysia, arguing that the inclusion of these countries would provide a better sample representation.

This research also contributes to practice because it provides evidence of global studies about the importance of ICT on curtailing piracy and this would allow governments to have ground for new policy to alleviate their countries' piracy situation. The prevalence of global software piracy indicates that the awareness of the determinants of software piracy across the globe is a fundamental step towards promulgating appropriate government policies against software piracy. It will also provide business practitioners with insights as to the corporate decisions and actions to tackle counterfeiting, and improve corporate–consumer and corporate–government relations through helping government improve ICT environments.

The remainder of the paper is structured as follows. The 'Literature review' section critiques existing literature to examine the relationship of software piracy with a country's economic well-being, culture and the importance of ICT. The 'Methodology' section focuses on the data sources, sample and measures used to operationalise the model. The 'Findings and discussions' section reports our analytical results. Finally, the 'Conclusions' section discusses the implications of the research for practice, and sets research directions based on the limitations of our study.

Literature review

The ubiquitous piracy phenomenon is associated with country environments, supply and demand reciprocity, and corporate factors (Banerjee, 2003; Banerjee et al., 2005; Burke, 1996; Husted, 2000; Marron and Steel, 2000; Ronkainen and Guerrero-Cusumano, 2001; Shore et al., 2001; Traphagan and Griffith 1998; Yang and Sonmez, 2007; Yang, 2008;

Yang et al., 2008). Economic development, attitudes and understandings derived from cultural origins and legal environments affect people's intentions and behaviours related to piracy. The supply of pirated products responds to consumer demand levels which are generally increased by the growing price gaps between authentic and fake products. This situation is further exacerbated when international operations create distance difficulties for firms to control piracy and when products are easily duplicated.

In line with the above studies, we focus on the macro factors relevant to IP environments because we believe that people's ethical decisions and actions to pirate derive primarily from the influence of their macro environment. This differs from the existing ethical models on individual behaviour (Ajzen and Fishbein, 1969; Banerjee et al., 1996, 1998; Cronan et al., 2006; Glass and Wood, 1996; Leonard et al., 2004; Peace et al., 2003; Straub and Nance, 1990). As a result, we are better able to recommend policy implications aimed at curtailing piracy in addition to justifications for consumer purchasing behaviours of software piracy. Given the severity of software piracy, searching for explanations has been a constant task for practitioners and researchers. However, despite their efforts, it appears that only two factors are validated both theoretically and empirically – economic and cultural factors. Therefore, there is the need to search for further explanations so that the determinants of piracy rates can be understood more thoroughly. To meet this need, in this section, we use logical arguments and relevant theoretical and empirical evidence to explore the validity of ICT as a factor to explain software piracy in addition to assessing the importance of economic well-being and cultural dimensions to determine piracy rates.

Economically well-off people tend to pirate less

Consumers purchasing fakes tend to be categorised into three types (Yang and Fryxell, 2007) – deceived, non-deceived and mixed. Deceived consumers are those who unknowingly buy fake products that are often related to products in the areas of food, and health and safety such that counterfeiters make every effort to make the fakes' appearance identical with the authentic ones. On the other hand, 'non-deceived' consumers are fully aware of purchasing a fake such that suppliers tend to be relatively open about the non-authentic nature of their sales. Products in this category tend to be fake brands, such as branded handbags, and fashion clothing, when the brands are beyond most consumers' reach, or their prices are set too high to be worth paying. However, not all products are clearly categorised into these two archetypes creating a third "mixed" category. In this category, fakes are close in appearance to authentic ones and are sold at a higher price compared to the original, deceiving some but being relatively obvious to more sophisticated consumers.

As far as software is concerned, consumers dealing with fakes can be in the mixed categories. When the fake software is sold dearly, consumers unknowingly buy and install it into a computer. Meanwhile, consumers may also install authentic software at a low cost without a licence or knowingly purchase a fake due to financial means beyond their reach. They make a purchasing decision according to their subjective assessments of the risks, price and quality of a fake.

People's economic well-being is closely linked with their purchasing behaviour. As mentioned earlier, the supply of pirated software responds to consumer demands due to the price gaps between genuine and fake software and fake suppliers ease in overriding authentic product R&D, promotion and design (Bosworth and Yang, 2006; Yang, 2008). Consumers' allegiance driven by brands and technology sophistication create the desire for relevant products, but their financial means may hinder its realisation. Therefore, purchasing pirated products can overcome the barrier and achieve their materialistic desire through this compensation strategy for consumers with low income.

Prior research as detailed below has vigorously assessed the relationship between economic well-being and software piracy. It appears that the conclusions are consistent: the higher the income of a country, the lower the piracy rate. Gross National Income (GNI) per capita is often employed to assess a country's economic well-being. It is the total value of the goods and services per person produced by a country at home and abroad for a year (Pass and Lowes, 2001). When it comes to cross-country comparisons, purchasing power parity (PPP) – the products and services that a dollar, for example, can buy – tends to be taken into account to reflect different countries' varied standards of living so that more direct comparisons are possible.

Depken and Simmons (2004) studied 75 countries in 1994 and concluded that GDP per capita (differs from GNI because of exclusion of products and services produced abroad) was negatively correlated with piracy rate (at the 5% significance level). Burke (1996) tested the members of three copyright conventions – Bern, Rome and Phonographic Conventions – and concluded that GDP per capita determines piracy level because it influences the general public, police and judiciary to actively recognise the role of intellectual property protection (IPP). Ronkainen and Guerrero-Cusumano (2001), based on a study of 50 countries in 1997, concluded that GNI per capita (adjusted for PPP) accounted for 73% of the variation in software piracy. The findings are in line with those by Husted (2000), Marron and Steel (2000) and Traphagan and Griffith (1998). Bloch et al. (1993) using data from 200 American shoppers further confirmed that the purchasers of pirated products tend to consider themselves financially deficient. The findings align with the results by Shore et al. (2001), based on a survey of 627 university students from Hong Kong, New Zealand, Pakistan and the U.S., that the extent of affordability of software determines the level of piracy. Economic well-being appears to be a key reason that developing countries differ from developed countries in their levels of piracy (Alford, 1995; Yang, 2005).

On the basis of the above discussion, we can hypothesise that

H1: Economic well-being is inversely correlated with software piracy, i.e. the higher the GNI per capita (PPP), the lower the level of software piracy.

Individualistic societies tend to pirate less

Several theories explain the diversity of world culture. Culture here is defined as the collective beliefs, norms and attitudes of people derived from their traditions and macro environment, which distinguishes one group from another (Hofstede, 2001). The diversity of culture is determined by their way of communication in either low or high context culture – where 'context' is 'one of many ways of looking at things' (Hall, 1976, p. 113). People from a low context society tend to be direct, expressive and speak their minds when problems strike. In contrast, people in a high context culture tend to be explicit to insiders (family, relatives and friends) and implicit to outsiders (colleagues). These differences of culture are derived primarily from individualism and communitarianism (Hampden-Turner and Trompenaars, 2000). Countries with individualist traits are prone to self-interests, self-reliance, self-achievement and competition. In contrast, countries with communitarianism tend to emphasise altruism, cooperation, social responsibility and social harmony.

Hofstede (2001) asserts that people's values and attitudes are derived from their cultural origins and the divergence and convergence of culture across the world as reflected more specifically in four dimensions. 'Power distance' is the extent of equality or inequality that reflects the degree of hierarchy within organisations and in a society. For example, high power distance indicates the unequal distribution of power and wealth. 'Masculinity' indicates the degree of masculine dominance in a society over feminine power. This means that the higher the masculinity, the higher the differentiation between genders that can have a direct impact on employment, promotion and other activities. 'Uncertainty avoidance' indicates the different degrees to which a society handles uncertainty. That is, the higher the uncertainty avoidance, the more likely it is that people in a society will try to avoid risky situations. As a result, they may be more obedient to rules and regulations. Finally, 'individualism' denotes different degrees of emphasis on individual rights and freedom over collective interests. In other words, the higher the individualism in a society, the more incentive the people have to reinforce their individual identity and achievement.

Previous research has linked these four dimensions with the degree of piracy, but the findings are largely inconclusive except for the relationship between piracy and individualism. Cohen et al. (1996) confirm that high power distance countries perceive software piracy to be more tolerable than people from lower power distance countries. However, Shore et al. (2001) found that power distance is only marginally correlated with software piracy. This was confirmed by Depken and Simmons (2004), based on a study of 65 countries where two of the four models tested yield insignificant results. This result is further demonstrated by Husted (2000) who confirmed that power distance–software piracy relationship is insignificant. Likewise, uncertainty avoidance has little impact on piracy. While people in a low uncertainty society tend to be less tolerant of unethical issues (Vitell et al., 1993), people from a higher uncertainty culture are prone to confront the absence or ambiguity of laws. The findings by Husted (2000) rejected any significant connections between software piracy and uncertainty avoidance although Shore et al. (2001) supported a positive significant correlation (at the 0.05 significance level), based on a survey of students from four countries. In addition, 'masculinity' also has a weak association with piracy. Vitell et al. (1993) argue that people from a high masculinity culture tend to be more tolerant of unethical issues and practices due to the inherent culture. In another study, a survey of U.S. students (Sims et al., 1996) appears to support the argument that male students tend to pirate software more than female students. However, Shore et al. (2001) subsequently challenged this finding based on a larger survey. Husted also pointed out that the link is insignificant despite the logical construction of a positive hypothesis between software piracy and masculinity.

Different from the above inconclusive findings, the studies about the individualism–software piracy relationship have been more uniformly supported. Individualistic societies perceive software piracy as an input-based exchange while collective societies may not need such an input due to the essential cultural rooting of sharing (Swinyard et al., 1990). This is derived from the fact that when people are bound by collectively biased decisions and actions, they are more willing to share. Marron and Steel (2000) used the 1994–1997 data of 53 countries and confirmed that individualistic societies tend to have a low piracy rate due to higher level of respect towards individual achievements and research and development. This conclusion is confirmed by some other previous researchers (Depken and Simmons, 2004; Gopal and Sanders, 1998; Husted, 2000; Moores, 2003; Shore et al., 2001). For example, based on a study of 371 students from the U.S.A. and Singapore, Swinyard et al. (1990) concluded that Singaporeans' willingness to copy, compared with Americans, is probably because they are more bound by group norms, as opposed to Americans that base on law and the nature of the decision itself. For example, in most Asian countries, public sharing of a creative work is often perceived as bestowing honour on the creator due to fame and prestige. Such thinking would need time to evolve in the direction of private ownership of protection. Therefore, this paper hypothesises that

H2: The individualistic culture is inversely correlated with software piracy, i.e. the higher the individualism index, the lower the propensity for software piracy.

Technologically advanced countries tend to pirate less

There seems to be little doubt that technologically advanced countries have stronger IP protection (Ginarte and Park, 1997), but the studies so far about the relationship between technological advancement and piracy appears to be inconclusive. First, prior research uses some direct technological measurements to examine the relationships with software piracy. Based on the data of 37 countries (1996, 2001 and 2003), Bagchi et al. (2006) show partially a significant inverse relationship between piracy and technology infrastructure in 1996. The conclusion is based on the assumption that low information technology infrastructure (older editions of software) attracts people to use pirated software for work and other functions. In addition, piracy has become more prevalent due to the convenience of Internet access (Moores and Dhillon, 2000) because free and cheaper software are accessible on the web sometimes through illegal loading (Shin et al., 2004). However, there is no significant relationship between growth in Internet use and software piracy (Moores and Dhillon, 2000). Piquero and Piquero (2006) examine the interrelationships between software piracy and the number of PCs per 1000 population and the number of persons per 1000 inhabitants that have access to the Internet. They argue that high-piracy countries are economically poor and that the citizens of poor countries have fewer computers and more economic incentives to pirate software. Moreover, several studies suggest a correlation between research and development (R&D) and piracy, but the conclusion is also indefinite. For example, Shadlen et al. (2005) concluded that scientific infrastructure as proxied by the number of full-time R&D workers per 1000 inhabitants has a strong impact on the degree of software piracy. But Marron and Steel (2000) and Andrés (2006) found no evidence of R&D independently affecting piracy. Such mixed results about the technology–piracy relationships warrant the need to search for new variables that can represent the construct of technology advancement.

The authors propose ICT as a new representation of technology advancement. ICT as a concept, just like the sector itself, is still at its development stage. This means that despite the wide acceptance of this term, its scope appears to have never been standardised. In its statistics, the World Bank has categorised ICT as an indicator of science and technology development, and ICT, as a broad term, encompasses software and computing development. The broad usage is partly due to the interrelated nature of information, computing, software and communications.

We argue that ICT is an important representation of technology advancement because of its important role in a country's development. The role of ICT, including software development, in a country's economy is widely accepted. Software as a part of ICT has gained in importance over the years to generate economic revenue and create world class companies. For example, software has been a major source of exports for countries like Ireland (US$8 billion), Israel (US$3 billion) and India (US$7.5 billion), and strength in software development can have direct bearing on foreign direct investment (Tessler et al., 2003). Software is essential to enhance government administrative effectiveness and a symbol of industrial and commercial infrastructure and international competitiveness across all industries (*op cit*). Therefore, the software industry, and ICT sector as a whole, has been an integral part of a country's economy (Hanna, 1991).

We also argue that ICT and software piracy are closely linked. The advances in the ICT sector have made software copying an unsophisticated task and pose a serious threat to software producers, as they provide opportunities and help encourage individuals to engage in piracy. The world has seen a surging number of people owning personal computers at home, workplace and schools as well as a steady increase in the number of people having access to the Internet. Kushairi (2002) argues that software piracy is the main cause of loss because the perpetrators are normally well organised and well networked that makes them ever so elusive and difficult to be caught by the authorities. But efforts to clamp down on these illegal activities are more difficult, as consumers, who are easily enticed by the cheaper prices, continue to provide support (Kushairi, 2002, p. 1). The nature of software makes it more vulnerable for both intentional and inadvertent infringements. One difference between software and other patentable technologies is that it does not wear out; instead it builds up on other software. This means that software may involve millions of lines of code and hundreds of patents. This makes the originality (a patent requires novelty, inventiveness and utility for grant) blurred and, consequently, unintended infringements often occur.

At the global level, software protection is not as harmonised as other forms of IP protection, which further exacerbates the piracy problem because countries have more diverse protection policy in this industry. Countries like the U.S., Japan and some European countries protect software by both copyright and patent rights, while the rest of the world are generally staunch supporters of copyright protection of software on the grounds of quick protection, less fear of infringements, and a cheaper and simpler commercialising process with fair competition (Garfinkel et al., 1991; Heckel, 1992; Irlam and Williams, 1994; Kahin, 1990; Morgan, 1999; Samuelson, 1990). For example, the EU does not protect software under patent laws, but does not prevent individual countries from granting software patents. This means that there is a degree of policy inconsistency between EU members with respect to software protection. Thus, uncertainty will continue to exist, producing further confusion about protection levels and anxieties about litigation.

Given the prevalence of software piracy, it is important to have effective ICT policies to tackle the piracy situation at both the business and private user levels (Kasim, 2002). However, in spite of the above discussions involving ICT as an important factor to drive technology development, little research has been done to assess the relationship between ICT and piracy; thereby the aim of the rest of the section is to formulate our hypotheses based on logical arguments and a few indirectly related studies.

The development of ICT creates a hindrance for software piracy. Although pirates can easily break through the technological advances due to their incremental nature, the barriers created by these technological advances can at least hinder or delay piracy acts. This is because pirates need to acquire relevant knowledge, experience and technicalities before committing a particular piracy act. Constant improvement of existing software and introduction of new software driven by competition in the ICT sector create imitation barriers and disadvantage copying (Hopkins et al., 2004). Furthermore, introducing new versions would force pirates to upgrade the old versions to attract buyers of fake software. As a result, this act increases the costs to the pirates – organisations, individuals and counterfeiters – (Yang et al., 2004). This is based on the fact that product innovations are time-consuming, and costly, and pirates tend to be less advanced in technology and less financially well off, and if production is involved, they tend to have less manpower (Yang and Fryxell, 2007).

In addition, a less developed ICT country tends to have low level of availability of original software, thereby creating an environment where people have a tendency to use pirated software more frequently to compensate for the low supply of authentic software (Bagchi et al., 2006). Relevant to this factor, the present research extends the argument based on economic theory that the low supply of original software may, under a market economy, drive the price up, and create a vicious circle of higher demand for pirated software. On the other hand, when a country has advanced ICT development, users of software tend to buy authentic software so as to avoid computer virus attacks and benefit from after-sale services and upgrades. Further, in an advanced ICT environment, people tend to have higher demand for IPP and higher protection results in lower piracy. In addition, when there is a low ICT environment there is low protection of IP, which results in high software piracy.

On the basis of the above logical discussions, we hypothesise that

H3: Technology advancement is inversely correlated with software piracy, i.e. the higher the ICT development, the lower the propensity for software piracy.

Methodology

Data sources and sample representation

We have used data from 2000 to 2005 to conduct our analysis. The piracy rates were compiled from raw data published by the International Planning and Research Corporation (IPRC) and commissioned by BSA. They compile piracy data based on 26 different types of business application software. GNI per capita was collected from the World Development Indicators (WDI). The World Bank compiles data following the 'aggregation rules', in other words, data are aggregated 'based on the World Bank's regional and income classifications of economies' (World Bank, 2007). Data on the cultural dimension of individualism were first compiled in 1973, but were updated in the 1990s (Hofstede, 2001). The data comprise an index of individualism for 67 countries; higher values of the index are associated with a higher degree of individualism and lower values are associated with a more collective trait. While the ICT data were also sourced from the WDI, the International Telecommunication Union (ITU) is the original source.

Our final analysis included 59 countries that possess a complete set of data for all the variables (Table I). We are unable to use the whole population because many countries do not have the data either for individualism or for the ICT. Our careful examination of the data indicates that there is a balanced representation of countries from the six main continents of the world although there is somewhat more coverage of the northern than the southern hemisphere. The sample still covers over 30% of the countries across the world.

Measurements and justification

The study unit is the national software piracy rate in a given year. The piracy rate was measured as the percentage difference between software installation and legal shipment of software before 2002. From 2003 onwards, the IPRC and BSA changed their methodology and subsequently the piracy rate is calculated as "the total number of units of pirated software put into use … divided by the total units of

TABLE I

Countries studied (2000–2005)

No.	Country	No.	Country
1	Argentina	31	Mexico
2	Australia	32	Morocco
3	Austria	33	Netherlands
4	Brazil	34	New Zealand
5	Bulgaria	35	Nigeria[a]
6	Canada	36	Norway
7	China	37	Pakistan
8	Colombia	38	Panama
9	Costa Rica	39	Peru
10	Czech Rep.	40	Philippines
11	Denmark	41	Poland
12	Ecuador	42	Portugal
13	Egypt	43	Romania
14	Finland	44	Russia
15	France	45	Saudi Arabia
16	Germany	46	Singapore
17	Greece	47	Slovakia
18	Honduras	48	Slovenia[a]
19	Hong Kong	49	South Africa
20	Hungary	50	South Korea
21	India	51	Spain
22	Indonesia	52	Sweden
23	Ireland	53	Switzerland
24	Israel	54	Thailand
25	Italy	55	Turkey
26	Japan	56	United Kingdom
27	Jordan	57	United States
28	Kenya	58	Uruguay
29	Kuwait	59	Venezuela
30	Malaysia		

[a]Refers to countries that are not included in the 2000 model due to missing data.

software installed'' (BSA, 2007, p. 16). We believe that the current method is more appropriate because it ensures a consideration of purchases on the Internet.

Our rationale for choosing software piracy rates as the study unit is twofold. First, piracy in the software industry has been most prevalent and widespread with consumer piracy and counterfeiting co-existing, as in the movie and music industries (Yang et al., 2004). Second the data on software piracy are relatively systematic and complete (Husted, 2000; Traphagan and Griffith, 1998). The IPRC and BSA have been compiling software piracy data since 1994. The time series data is available on a yearly basis. This makes the study of this industry advantageous over alternatives, such as the movie and music industries, because we are able to conduct a longitudinal data analysis to assess software piracy trends. Husted (2000) and Traphagan and Griffith (1998) argue that software piracy may be underestimated because many software applications are sold without the computer hardware. Moreover, the data providers are not in a neutral position, which may create an upward bias in the measure. However, this database is probably the most systematic and complete for conducting global piracy studies. It also has been widely employed for empirical research on piracy (e.g. Banerjee et al., 2005; van Kranenburg and Hogenbirk, 2005).

There are three independent variables. GNI per capita (PPP current international $) reflects the economic well-being of a country. Higher GNI per capita indicates a better standard of living in a particular country, and more individuals will be willing to buy authentic software. The individualism index is used to reflect a country's cultural characteristics. A high individualism ranking indicates that individuality and individual rights are paramount within the society (Hofstede, 2001). Individualist societies tend to have established legal systems to enforce IP. A low individualism ranking typifies societies of a more collectivist nature with close ties between individuals; such a society is likely to share and to copy more (*op cit*). The indices are still largely valid (Husted, 2000) because culture is a relatively 'static' or 'durable' factor and it evolves instead of changing dramatically (Shin et al., 2004). They are in metric format and provide researchers with a useful measurement to analyse cultural associations with other phenomena.

ICT expenditure as a percentage of GNI (ICT/GNI) is a reflection of a country's scientific and technological advancement. In particular, it is closely relevant to the level of software development because it reflects government spending on computer hardware, software, computer services, communication services and wired and wireless communications equipment. Where ICT is more developed, it is likely that the services linked to the authentic software, such as technical support and up-grades, will be more important and readily available to users. When a country is developed in ICT, companies and government would be more active to defend their IP interests.

Analytical method

Our analysis uses the model as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

where Y_{it} denotes the piracy rate in country i at time t and α_i denotes the intercept for year t representing unobserved individual country effect. β represents unknown parameters to be estimated. X_{it} is a vector of explanatory variables – GNI per capita, individualism and ICT. ε_{it} is the error estimates that can differ across countries and over time.

We have followed a procedure comprising a three-step analysis. In the first step, a descriptive data analysis allows us to understand the characteristics of all the variables, the consistency of the data, the variable correlations and potential multicollinearity. The second step is to conduct a regression analysis. For simplicity, only the best model will be shown for each year. The last step is to conduct a robustness analysis to establish the degree of confidence in assuming the model can be generalised to study the software piracy phenomena for all countries.

Findings and discussions

Table II shows the characteristics of the data. The mean values and standard deviations across the 6 years show that the data are evenly distributed representing the diversity of the world population. The sample is represented by countries across the spectrum from low to high piracy rates. It is worth noting that 2000 country data are slightly different from the 2001 to 2005 data, because in 2000, Nigeria and Slovenia were not included in the analysis due to missing data. The Pearson correlation coefficients show that all the variables are highly inversely correlated with piracy in at least the 0.05 significance level.

We have tested a number of assumptions before estimating the regressions. The box-plots show that Vietnam is an outlier because it has much higher

TABLE II

Descriptive characteristics of the data

Year	2000	2001	2002	2003	2004	2005
Mean						
Piracy	54.16	53.56	52.02	54.56	54.53	54.17
GNI (000$)	14.741	15.004	15.398	16.055	17.027	18.094
IDV	43.70	43.19	43.19	43.19	43.19	43.19
ICT	5.80	5.52	5.76	5.79	5.88	5.87
Standard deviation						
Piracy	17.53	17.48	17.29	19.51	20.19	20.13
GNI (000$)	10.268	10.541	10.786	11.177	11.701	12.271
IDV	23.91	23.66	23.66	23.66	23.66	23.66
ICT	2.22	2.08	2.07	2.09	2.11	2.12
N						
Piracy	57	59	59	59	59	59
GNI	57	59	59	59	59	59
IDV	57	59	59	59	59	59
ICT	57	59	59	59	59	59
Pearson correlation[a]						
Piracy						
GNI	−0.77	−0.79	−0.77	−0.86	−0.86	−0.86
IDV	−0.78	−0.76	−0.74	−0.76	−0.76	−0.77
ICT	−0.53	−0.57	−0.49	−0.45	−0.41	−0.39

[a]Significance at least at the 0.05 level.

ICT expenditure while having high piracy rates during the period 2001–2005 (there is no ICT data for Vietnam in 2000); thereby this country was excluded from the study. The scatter-plots reveal no nonlinear relationships between the independent and dependent variables. Further tests also demonstrate that there are no violations of heteroscedasticity. Field (2005, p. 174) argues that multicollinearity is virtually unavoidable. The tests show that the tolerance and variable inflation factor (VIF) for our data are in the range of 0.454 and 0.932, and 1.073 and 2.205 respectively. The correlations among the independent variables are <0.733. These mean that they do not cross the thresholds of elimination or forming composites, *viz.*, a tolerance smaller than 0.1, VIF >10, or correlation >0.80 (Bowerman and O'Connell, 1990; Hair et al., 2006).

Table III presents the six best models for the stepwise regression analysis and demonstrates remarkably consistent and significant results. All the independent variables are closely and significantly correlated with the piracy rate. This means that economic well-being, individualism and ICT advancement all appear to significantly influence the rate of piracy. Their inverse relationships with piracy rates indicate that the increase of these three can bring down piracy. This result confirms all the hypotheses formulated in the literature review section – the higher the standard of living, the higher the individualism, and the higher the level of ICT expenditure in an economy, the lower the piracy rate. Take the 2005 model, for example, in which for every one percentage rise in ICT expenditure per unit of GNI, there will be a 1.734 percentage point decrease in piracy rates. Meanwhile, a one unit rise in the individualism index produces a 0.237 percentage point fall in the rate of piracy. Finally, a one thousand dollar increase in GNI per capita gives rise to a 1.011 percentage point fall in the rate of piracy. All the adjusted R^2 are in excess of 70% indicating that these three variables can explain a large amount of variations in the rate of software piracy. In addition, the changes of adjusted R^2 show how the ICT entry strengthened the explanatory power, confirming that ICT is significantly related with piracy rates. This provides evidence for the argument that increases in ICT have a powerful effect to reducing a country's piracy rate.

Table III also shows the robustness of the findings, as the results are significant and consistent across the six years of the survey. Hair et al. (2006) assert that validity can be tested by comparing the values of R^2 and adjusted R^2. These comparisons would demonstrate whether the data are 'overfitting' the sample. The results in Table III show a good fit of R^2, adjusted R^2 and standard errors across the 6-year best models. The consistent and significant results demonstrate that the results are generalisable. This test allows us to state that ICT has strong explanatory power to alleviate piracy.

This paper has demonstrated the influential power of economic well-being, individualism culture, and information and communication expenditure (ICT) to reduce the piracy rate in a country. The significance of this research is reflected in identifying and demonstrating the strong effect of a rise in ICT on the reduction in software piracy. An increase in ICT expenditures raises the standard of the ICT infrastructure, which increases the demand for higher quality software, as a result, buyers can access after-sale services and other benefits derived from using authentic software. In addition, the present results also consolidate prior research and emphasises the additive effect of economic well-being, culture and ICT on alleviating piracy. This longitudinal study updates prior research and provides governments and business practitioners with hard evidence to stipulating appropriate policies and taking effective actions against software piracy. Using data of 59 countries (2000–2005) from the World Bank, International Telecommunication Union, BSA, and Hofstede (2001), we have obtained remarkably consistent results of piracy relationships with economic well-being, culture and ICT for the 6 years.

This research confirms prior research that income per capita is the most influential factor on software piracy (significant at the 0.001 level). In other words, a one thousand dollar increase in GNI per capita leads to the decrease in the piracy rate from between 0.6 and 1.01 percentage points. In addition, this variable alone explains between 59% and 74% of the variations in the rate of piracy across countries.

The finding that individualism has a significant negative impact on piracy at least at the 0.01 significance level is broadly consistent with its role in reducing the incidence of piracy in previous studies. The inclusion of individualism alongside GNI per

TABLE III

The determinants of software piracy

Year		2000			2001			2002			2003			2004			2005		
Best model		β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Intercept		87.654	3.622	0.000	87.857	3.485	0.000	85.974	3.895	0.000	93.258	3.473	0.000	93.570	3.690	0.000	92.853	3.711	0.000
GNI (000$)		−0.637	0.177	0.001	−0.721	0.165	0.000	−0.712	0.171	0.000	−1.098	0.145	0.000	−1.109	0.143	0.000	−1.011	0.137	0.000
IDV		−0.313	0.075	0.000	−0.252	0.073	0.001	−0.247	0.078	0.003	−0.194	0.069	0.007	−0.207	0.071	0.005	−0.237	0.072	0.002
ICT		−1.801	0.603	0.004	−2.287	0.616	0.000	−2.141	0.632	0.001	−2.191	0.551	0.000	−1.906	0.571	0.002	−1.734	0.576	0.004
R^2	M1	0.595			0.619			0.587			0.736			0.743			0.732		
	M2		0.697			0.693			0.656			0.773			0.781			0.781	
	M3			0.741			0.754			0.715			0.824			0.818			0.812
Adjusted R^2	M1	0.587			0.612			0.580			0.731			0.739			0.727		
	M2		0.686			0.682			0.644			0.765			0.774			0.773	
	M3			0.726			0.741			0.700			0.814			0.808			0.802
SE		9.173			8.902			9.472			8.407			8.841			8.960		
Degree of freedom		(3,53)			(3, 55)			(3, 55)			(3, 55)			(3, 55)			(3, 55)		
Significant F		0.000			0.000			0.000			0.000			0.000			0.000		

Notes: (1) β: Unstandardised coefficient; SE: Standard Error; (2) The best model across the 6 years is model 3; (3) M1: Model 1 – includes Intercept and predictor GNI; M2: Model 2 – includes Intercept, and predictors GNI and IDV; and M3: Model 3 – includes Intercept and predictors GNI, IDV, and ICT; (4) Unless otherwise indicated (e.g. R^2 and adjusted R^2 figures), the table shows the best model results.

capita increased the explanatory power of the model by between 4 and 10%. In other words, a one unit rise in IDV index results in at least 0.194 percentage point fall in the piracy rate. This confirms the finding by Shin et al. (2004) that culture is a complementary factor that impacts software piracy, but is perhaps a secondary factor compared to GNI.

Finally, the present study reports a new finding, i.e., the ICT expenditure has a strong effect on software piracy. The coefficient for this variable is significant at least at the 0.01 significance level. A one percentage rise in ICT/GNI reduces the incidence of piracy by at least a 1.734 percentage point. The addition of this variable raises the explanatory power of the model by between 4% and 6%.

Conclusions

Policy and corporate implications

The research results provide four implications for policy makers and for business managers. The first is that economic improvement is important for bringing down the level of piracy. Improvements to the standard of living tend to reduce the rate of purchase of pirated products. Thus, economic development amongst the less developed countries will be an important factor in decreasing the demand for pirated goods, and as the demand diminishes, the incentive to supply pirated products will be reduced.

The second policy implication is related to culture. Previous studies and the present research both confirm that culture is a matter of importance in handling piracy. Although culture is relatively inherent and deep-rooted in each country, governments can create a culture that recognises the importance of IP through IP-related training and publicity. This will create an environment of public respect for intellectual creations, thereby increasing the willingness of creators of new ideas to seek appropriate protection, as well as consumers' willingness to buy authentic products.

The third policy implication is that increases in ICT expenditures result in improvements to the quality of the ICT infrastructure, raising the demand for legitimate software because of the need for other services that are supplied with them (e.g. technical support and subsequent free or low-cost upgrades). The growth in ICT also reflects the move towards greater emphasis on the value of IP. This also leads to a greater policing of various forms of infringement of IP and societies' enforcement of the associated IP. Given the durability of culture in a country and the time lag in economic development, ICT investment is probably a more effective a policy strategy against software piracy in the short and medium term.

Finally, although an authentic product can never compete with a fake on the basis of price due to the need for the authentic producer to undertake R&D, authentic firms can at least narrow the gap to attract certain groups of consumers through promotional activities and tying their IP with other products and services, such as after-sale services. It is not only important for firms to educate consumers about the importance of IP, but also to liase with government to increase public awareness about the importance of using authentic software.

Research limitations and future research directions

Several limitations of this research can be overcome in future studies. First, although we have identified the importance of ICT in reducing software piracy, further studies should explore the detailed reasons why this factor has a most powerful effect on piracy. Second, GNI, individualism and ICT capture between 70% and nearly 82% of the variations in piracy rates. This indicates that the rest of the 30 to 18% variation is the result of currently unidentified variables, which also play a role in influencing software piracy. The unidentified variables may be associated with companies and individuals. For example, the price of a software product and the consumers' attitudes towards buying fakes might have a role to play. Therefore, exploring the explanations of software piracy has become an unending process. Third, although our data have captured representative samples to conclude our findings, further testing using more countries and richer ICT data would help consolidate our findings. This is possible because, in the future, ICT data will be established for more and more countries. Finally, our deductive approach to drawing conclusions can be complemented by future research adopting an inductive method. As a result, future research can complement our findings through enriched case study analysis of specific countries.

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References

Ajzen, I. and M. Fishbein: 1969, 'The Prediction of Behavioural Intentions in a Choice Situation', *Journal of Experimental Social Psychology* **5**(4), 400–416. doi:10.1016/0022-1031(69)90033-X.

Alford, W. P.: 1995, *To Steal a Book is an Elegant Offence: Intellectual Property Law in Chinese Civilization* (Stanford University Press, Stanford).

Andrés, A. R.: 2006, 'Software Piracy and Income Inequality', *Applied Economics Letters* **13**(2), 101–105. doi:10.1080/13504850500390374.

Bagchi, K., P. Kirs and R. Cerveny: 2006, 'Global Software Piracy: Can Economic Factors Alone Explain the Trend?', *Communications of the ACM* **49**(6), 70–76. doi:10.1145/1132469.1132470.

Banerjee, D.: 2003, 'Software Piracy: A Strategic Analysis and Policy Instruments', *International Journal of Industrial Organization* **21**(1), 97–127. doi:10.1016/S0167-7187(01)00090-X.

Banerjee, D., T. P. Cronan and T. W. Jones: 1998, 'Modeling IT Ethics: A Study in Situational Ethics', *MIS Quarterly* **22**(1), 31–60. doi:10.2307/249677.

Banerjee, D., T. W. Jones and T. P. Cronan: 1996, 'The Association of Demographic Variables and Ethical Behaviour of Information System Personnel', *Industrial Management & Data Systems* **96**(3), 3–10. doi:10.1108/02635579610114893.

Banerjee, D., A. M. Khalid and J. Sturm: 2005, 'Social-Economic Development and Software Piracy: An Empirical Assessment', *Applied Economics* **37**(18), 2091–2097. doi:10.1080/00036840500293276.

Bloch, P. H., R. F. Bush and L. Campbell: 1993, 'Consumer "Accomplices" in Product Counterfeiting: a Demand Side Investigation', *Journal of Consumer Marketing* **10**(4), 27–36. doi:10.1108/07363769310047374.

Bosworth, D. and D. Yang: 2006, 'Conceptual Issues of Global Counterfeiting on Products and Services', *Journal of Intellectual Property Rights* **11**(1), 15–21.

Bowerman, B. L. and R. T. O'connell: 1990, *Linear Statistical Models: An Applied Approach*, 2nd Edition (Belmont, Duxbury).

BSA: 2007, 'Fourth Annual BSA and IDC Global Software Piracy Study (Business Software Alliance/International Data Corporation)', Online: http://www.bsa.org/globalstudy/.

Burke, A. E.: 1996, 'How Effective are International Copyright Conventions in the Music Industry?', *Journal of Cultural Economics* **20**(1), 51–66.

Cohen, J. R., L. W. Pant and D. J. Sharp: 1996, 'A Methodological Note on Cross-Cultural Accounting Ethics Research', *The International Journal of Accounting* **31**(1), 55–66. doi:10.1016/S0020-7063(96)90013-8.

Cronan, T. P., C. B. Foltz and T. W. Jones: 2006, 'Piracy, Computer Crime, and IS Misuse at the University', *Communications of the ACM* **49**(6), 84–90. doi:10.1145/1132469.1132472.

Depken, C. A. and L. C. Simmons: 2004, 'Social Construct and the Propensity for Software Piracy', *Applied Economics Letters* **11**(2), 97–100. doi:10.1080/1350485042000200187.

Field, A.: 2005, *Discovering Statistics Using SPSS*, 2nd Edition (Sage, London).

Garfinkel, S., R. Stallman and M. Kapor: 1991, 'Why Patents are Bad for Software?', *Issues in Science and Technology* (Fall), 50–55.

Ginarte, J. C. and W. G. Park: 1997, 'Determinant of Patent Rights: A Cross National Study', *Research Policy* **26**(3), 283–301.

Glass, R. S. and W. A. Wood: 1996, 'Situational Determinants of Software Piracy: An Equity Theory Perspective', *Journal of Business Ethics* **15**(11), 1189–1198. doi:10.1007/BF00412817.

Gopal, R. D. and G. L. Sanders: 1998, 'International Software Piracy: Analysis of Key Issues and Impacts', *Information Systems Research* **9**(4), 380–397.

Hair, J. F. J., W. C. Black, B. J. Babin, R. E. Anderson and R. L. Tatham: 2006, *Multivariate Data Analysis*, 6th Edition (Pearson-Prentice Hall, Upper Saddle River).

Hall, E. T.: 1976, *Beyond Culture* (Anchor Press/Doubleday, New York).

Hampden-Turner, C. and F. Trompenaars: 2000, *Building Cross-Cultural Competence* (John Wiley & Sons, New York).

Hanna, N.: 1991, *The Information Technology Revolution and Economic Development* (World Bank, New York).

Heckel, P.: 1992, 'Debunking the Software Patent Myths', *Communications of the ACM* **35**(6), 121–140.

Hofstede, G.: 2001, *Culture's Consequences* (Sage, Beverly Hills).

Hopkins, D. M., L. T. Kontnik and M. T. Turnage: 2004, *Counterfeiting Exposed: Protecting Your Brand and Customers* (John Wiley & Sons, Hoboken).

Husted, B. W.: 2000, 'The Impact of National Culture on Software Piracy', *Journal of Business Ethics* **26**(3), 197–211. doi:10.1023/A:1006250203828.

Irlam, G. and R. Williams: 1994, 'Software Patents: An INDUSTRY at Risk', http://lpf.ai.mit.edu/Patents/industry-at-risk.html. Accessed 20 April 2006.

Kahin, B.: 1990, 'The Software Patent Crisis', *Technology Review* **93**(52), 543–558.

Kasim, S.: 2002, 'Software Piracy Still Rife', *Computimes Malaysia* 1.

van Kranenburg, H. and A. Hogenbirk: 2005, 'Multimedia, Entertainment, and Business Software Copyright Piracy: A Cross-National Study', *Journal of Media Economics* **18**(2), 109–129. doi:10.1207/s15327736me1802_3.

Kushairi, A.: 2002, 'PC Black Market Gaining Unwanted Foothold', *Computimes Malaysia* 1.

Leonard, L. N. K., T. P. Cronan and J. Kreie: 2004, 'What Influences IT Ethical Behaviour Intentions – Planned Behaviour, Reasoned Action, Perceived Importance, or Individual Characteristics?', *Information & Management* **42**(1), 143–158.

Marron, D. B. and D. G. Steel: 2000, 'Which Countries Protect Intellectual Property? The Case of Software Piracy', *Economic Inquiry* **38**(2), 159–174. doi:10.1093/ei/38.2.159.

Moores, T. T.: 2003, 'The Effect of National Culture and Economic Wealth on Global Software Piracy Rates', *Communications of the ACM* **46**(9), 207–215. doi:10.1145/903893.903939.

Moores, T. and G. Dhillon: 2000, 'Software Piracy: A View from Hong Kong', *Communications of the ACM* **43**(12), 88–93. doi:10.1145/355112.355129.

Morgan, J.: 1999, 'Chaining Opening Source Software: The Case against Software Patents', http://lpf.ai.mit.edu/Patents/chaining-oss.html. Accessed 2 July 2006.

Pass, C. and B. Lowes: 2001, *Dictionary of Economics*, 3rd Edition (Collins, London).

Peace, A. G., D. F. Galletta and J. Y. L. Thong: 2003, 'Software Piracy in the Workplace: A Model and Empirical Test', *Journal of Management Information Systems* **20**(1), 153–177.

Piquero, N. and A. Piquero: 2006, 'Democracy and Intellectual Property: Examining Trajectories of Software Piracy', *The Annals of the American Academy of Political and Social Science* **605**(1), 104–127. doi:10.1177/0002716206287015.

Ronkainen, I. A. and J.-L. Guerrero-Cusumano: 2001, 'Correlates of Intellectual Property Violation', *Multinational Business Review* **9**(1), 59–65.

Samuelson, P.: 1990, 'Legally Speaking: Should Program Algorithms be Patented', *Communications of the ACM* **33**(8), 23–27. doi:10.1145/79173.79175.

Shadlen, K. C., A. Schrank and M. J. Kurtz: 2005, 'The Political Economy of Intellectual Property Protection: The Case of Software', *International Studies Quarterly* **49**(1), 45–71. doi:10.1111/j.0020-8833.200500334.x.

Shin, S. K., R. D. Gopal, G. L. Sanders and A. B. Whinston: 2004, 'Global Software Piracy Revisited', *Communications of the ACM* **47**(1), 103–107. doi:10.1145/962081.962088.

Shore, B., A. R. Venkatachalam, E. Solorzano, J. M. Burn, S. Z. Hassan and L. J. Janczewski: 2001, 'Softlifting and Piracy: Behaviour Across Cultures', *Technology in Society* **23**(4), 563–581. doi:10.1016/S0160-791X(01)00037-9.

Sims, R. R., H. K. Cheng and H. Teegen: 1996, 'Toward a Profile of Student Software Piraters', *Journal of Business Ethics* **15**(8), 839–849. doi:10.1007/BF00381852.

Straub, D. W. and W. D. Nance: 1990, 'Discovering and Disciplining Computer Abuse in Organizations: A Field Study', *MIS Quarterly* **14**(1), 45–60. doi:10.2307/249307.

Swinyard, W. R., H. Rinne and A. K. Kau: 1990, 'The Morality of Software Piracy: A Cross-Cultural Analysis', *Journal of Business Ethics* **9**(8), 655–664. doi:10.1007/BF00383392.

Tessler, S., A. Barr and N. Hanna: 2003, 'National Software Industry Development: Considerations for Government Planners', *The Electronic Journal on Information Systems in Developing Countries* **13**, 1–17.

Traphagan, M. and A. Griffith: 1998, 'Software Piracy and Global Competitiveness: Report on Global Software Piracy', *International Review of Law Computers & Technology* **12**(3), 431–447. doi:10.1080/13600869855298.

Vitell, S. J., S. L. Nwachukwu and J. H. Barnes: 1993, 'The Effects of Culture on Ethical Decision-Making: An Application of Hofstede's Typology', *Journal of Business Ethics* **12**(10), 753–760. doi:10.1007/BF00881307.

World Bank: 2007, *World Development Indicators (WDI) Online* (World Bank, Washington, DC).

Yang, D.: 2005, 'Culture Matters to Multinationals' Intellectual Property Businesses', *Journal of World Business* **40**(3), 281–301. doi:10.1016/j.jwb.2005.05.005.

Yang, D.: 2008, *Understanding and Profiting from Intellectual Property* (Palgrave, London).

Yang, D. and G. Fryxell: 2007, 'Anti-Counterfeiting Success, Brand Positioning and Consumer Discrimination of Fakes', AOM Annual Meeting 3–8 August 2007: Doing Well by Doing Good, Academy of Management, Philadelphia.

Yang, D., G. Fryxell and A. K. Y. Sie: 2008, 'Anti-Piracy Effectiveness and Managerial Confidence: Insights from Multinationals in China', *Journal of World Business* **43**(3), 321–339. doi:10.1016/j.jwb.2007.11.010.

Yang, D. and M. Sonmez: 2007, 'Economic and Cultural Impact on Intellectual Property Violations: A Study of Software Piracy', *Journal of World Trade* **41**(4), 731–750.

Yang, D., M. Sonmez and D. Bosworth: 2004, 'Intellectual Property Abuses: How Should Multinationals Respond?', *Long Range Planning* **37**(5), 459–475. doi:10.1016/j.lrp.2004.07.008.

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