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Comparative Empirical Analysis on Computer Software Piracy Behaviors between China and the United States: An Exploratory Study

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ABSTRACT

Using the data collected from several universities in China and the United States, which have drastically different piracy rates, economic development stages, income levels, and national cultures, this study aims to identify which demographic factors affect software piracy significantly. Totally, the dataset includes 600 valid responses. Multivariate data analysis, supported by Multivariate Analysis of Variance and Turkey's test, reveals that among various factors, country difference and gender most significantly influence software piracy. In addition, this study offers recommendations on how to curb software piracy effectively.

Keywords: China, United States, empirical analysis, intellectual property rights, software piracy

INTRODUCTION

Software piracy, defined as the unauthorized use or illegal copying/distribution of copyrighted software without explicit permission from the copyright holder (BSA, 2012; Hinduza, 2008), threatens the long-term viability of the software industry by both discouraging development efforts and, more seriously, triggering international political disputes (Bagchi, Kirs, & Cerveny, 2006; Moores & Chang, 2006; Rawlinson & Luption, 2007). Specifically, software piracy strains the ability of technology companies to invest in new jobs and new technologies, harms local resellers and services firms, lowers government tax revenues, and increases the risk of cybercrime and security problems. The 2011 BSA/IDC Global Software Piracy Study projected that lowering software piracy by just 10 percent over four years would create nearly 500,000 new jobs and pump $140 billion into ailing economies. The piracy rate denotes the amount of software pirated as a percentage of the total software installed in each country (BSA, 2012; Mishra, Akman, & Yazici, 2006).

Computer software is one of the most common examples of intellectual property and is granted an ownership right called Intellectual Property Right (IPR) as well as legal protection, including copyrights and patents. Copyrights protect forms of expression such as written material and artistic work; patents protect ideas used for industrial products or processes (Shim & Taylor,

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1989). Computer software piracy, a significant segment of the larger digital piracy phenomenon (Holsapple, Iyengar, & Rao, 2008), violates IPR and is considered a criminal act under copyright law in both China and the United States.

Software piracy sometimes occurs from a common misunderstanding about software purchases: When a person buys software, one does not purchase the actual software, but rather a license to use it. The license tells a purchaser how many times the software can be installed. If one makes more copies of the software than the license permits, then s/he commits piracy (BSA, 2012). The most commonly pirated types of software are operating systems and office, antivirus, and entertainment software (Hsu & Su, 2008).

Software piracy has been a major concern for many advanced countries, especially for the United States, where approximately 75% of the world's packaged software is currently produced (Schrank, 2003). A dramatic worldwide increase in computer usage, rapid advancements in computer and data compression techniques, and the ever-improving/expanding broadband accessibility to the Internet have contributed to software piracy on a global scale.

A recent study (BSA Global Software Piracy Study 2013) revealed that 43% of the software installed on PCs around the world was not properly licensed; the commercial value of those unlicensed installations (piracy) was $62.7 billion. The Asia-Pacific region showed the highest rate (62%) of unlicensed software use among all regions and accounted for $21 billion (over 33% of the worldwide commercial value loss) of financial loss. China's piracy rate was 74%, with the lost commercial value of $8.767 billion accounting for about 42% of the entire Asia-Pacific region's financial loss and 14% of the global loss.

There is an urgent need to investigate the contributing factors (independent variables) to software piracy in a country with a high piracy rate and major financial effect such as China. For the present study, the data collected from China were cross examined with that from the United States, where significant differences in piracy rates, economic situations, social environments, and cultures exist.

LITERATURE REVIEW

Software piracy behaviors have been studied for decades in various fields ranging from social science to business and information systems in attempts to both clarify its contributive elements and impact on business and economics, and suggest effective curving methods (Acilar, A., 2010; Andre´s & Asongu, 2013; Chan & Lai, 2011; Cronan, Foltz, & Jones, 2006, Goel & Nelson, 2009; Hamister & Braunscheidel, 2013; Kariithi, 2011; Mishra, Akman, & Yazici, 2006; Moores & Dhaliwal, 2004; Moores & Esichaikul, 2011; Nill, Schibrowsky, & Peltier, 2010; Siponen, Vance, & Willison, 2012). Those empirical research studies have included many dependent variables, such as economic factors (e.g. per capita GDP/GNP, income level and inequality, and high prices of software); demographic factors (e.g. age, education, and gender); cultural factors (e.g. collectivistic vs. individualistic society); and environmental factors (e.g., authority enforcement, availability of pirated software, degree of IT infrastructure, and government governance and laws).

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However, findings from the prior studies were not always consistent as they were conducted across different time frames and locations (Acilar, 2010; Nill and Shultz, 2009). In addition, researchers cannot guarantee that the findings from those studies can transcend different environments and national cultures, as many software piracy studies have been conducted within specific national cultures (Kariithi, 2011; Tan et. al., 1998). Additionally, a national culture changes over time (Mayers and Tan, 2002). Studies posit that national culture is closely related to national wealth (Hofstede 2001; Javidan et al., 2006). As an economy grows and national wealth accumulates, national culture may also change as a result. Due to the dynamism of national cultures and economic development speeds, previous empirical findings about software piracy could become less applicable. Other concerns regarding prior research include small sample size and outdated macroeconomic data. Table 1 summarizes selected empirical studies about software piracy since 2004.

Authors	Key findings	Sample/Country	Journal/Year
Andre´s & Asongu	Governance tools considered significantly decrease the incidence of piracy; corruption-control is the most effective tool.	Data from BSA,WDI, Freedom Data	*Journal of Business Ethics* 2013
Siponen, Vance, & Willison	Neutralization techniques and informal deterrents such as shame and moral beliefs effect software piracy intentions.	Graduate students in an European business school	*Information and Management* 2012
Moores & Esichaikul	Age, gender, and work experience tend to play different roles in affecting buying, sharing, and using pirated software.	Master student samples in Thailand	*Journal of CIS* 2011
Acilar A.	Demographic factors such as family income and duration of Internet usage affects software piracy negatively.	Undergraduate student samples in Turkey	*Issues in IS and IT* 2010
Goel & Nelson	Effects of economic, institutional, and technical factors on piracy examined, based on a large sample of countries.	Data from IRPC/BSA 2004	*Journal of Tech. Transfer* 2009
Robertson, et al.	Economic growth, foreign investment, Internet usage, and development assistance relate to software piracy rates in Latin America.	Data from Business Software Alliance and World Bank	*Journal of Business Research* 2008
Hsu & Su	Younger computer users with a limited budget are more likely to use pirated software. The most commonly used pirated software includes operating systems and office, antivirus, and games/entertainment software.	Professionals and practitioners in Taipei, Taiwan.	*Social Behavior and Personality* 2008
Rawlinson & Luption	Chinese students perceive higher level of piracy than U.S. students. Chinese students regard university instructors as having more power, persuasion, or control over the use of unlicensed software in the classroom than	Students samples in China and U.S. universities	*Journal of Education for Business* 2007

	do American students. Chinese students make little distinction between cheating in university and cheating to get ahead in career.		
Douglas, Cronan, & Behel	Reciprocal fairness and procedural fairness had significant effects on software piracy.	Students samples in U.S. universities	*Information and Management* 2007
Moores & Chang	Pirated use is determined by buying, buying is determined by intention, and intention is determined by judgment. Significant differences exist in ethical decision making processes based on age, but only limited difference exists based on gender.	University IS students in Hong Kong	*MIS Quarterly* 2006
Gan & Koh	Age was negatively related to piracy. No identifiable relationship between computer experience (use) and piracy rate.	Student samples in Singapore universities	*Information and Management* 2006
Mishra, Akman, & Yazici	Gender does not have any impact on software piracy. Age has reverse relationship on software piracy.Type of education has no impact on software piracy. Experience has no significant relationship with software piracy.	IT professionals in Turkey	*International Journal of Information and Management* 2006
Bagchi & Cerveny	Nations with less corruption and weak collectivism had less piracy. Strong economic growth, low trade regulations, high uncertainty avoidance, low Internet use, better IT laws, and strong IT infrastructure had partial influence on low piracy, within the time frame of study.	GDP per capita, number of ISPs, trade policy index, corruption index, individualism/ collectivism, Hofstede's index, etc.	*Communicat-ion of ACM* 2006
Wooley & Eining	Neither efforts of authority representatives nor students' knowledge of copyright laws have influenced software piracy rates.	Students registered in U.S. university accounting classes	*Journal of Information Systems* 2006
Moores & Dhaliwal	Culturally and economically similar countries show different attitudes toward software piracy, accordingly different approaches against piracy. Act of piracy is not a product of cultural difference in attitude between East and West toward the act of copying, but a rational, economic decision to acquire software out of one's	Students in Singapore compared to earlier study done with students in Hong Kong	*Information and Management* 2004

	financial reach.		
Shin, Gopal, Sanders, & Whinston	There was a significant positive relationship between people's collectivism and the software piracy. Research identified a significant negative relationship between national per capita GDP and the software piracy in a country.	GDP (World Bank) Piracy rates (SIIA's Report on global software piracy)	*Communication of ACM 2004*

Table 1: Selected Empirical Studies about Software Piracy (since 2004)

Software piracy studies have focused extensively on Asia, including Hong Kong (Moores, & Dhillon, 2000), Singapore (Moores & Dhaliwal, 2004), Turkey (Acilar, 2010; Mishra, Akman, & Yazici, 2006), China (Chan and Lai, 2011; Rawlinson & Luption, 2007), Taiwan (Hsu & Su, 2008), and Jordan (Aleassa, Pearson, & McClurg, 2011). It is worthwhile to note, however, that except research done in China, other Asian studies were conducted in developed part of Asian countries (Kariithi, 2011) with relatively lower piracy rates. The piracy rates of more developed Asian countries (43% in Hong Kong, 32% in Singapore, 38% in Taiwan, and 60% in Turkey) were relatively lower than less developed Asian countries (87% in Bangladesh, 83% in Sri Lanka, 81% in Vietnam, and 74% in China) based on the 2013 BSA/IDC Global Software Piracy Study.

In addition, the data from the aforementioned piracy studies (except the study done by Rawlinson & Luption in 2007) have not been comparatively analyzed against data from another country with a drastically different piracy rate and culture. China and the United States were selected for this study. Historically, United States' piracy rate has been one of the lowest in the world; in 2013, its piracy rate of 18% was the lowest in the world. Conversely, China's piracy rate has been historically high; its current rate 74% is higher than the average in the Asia-Pacific region (62%), and in the world (43%).

Although China's piracy rate is not the highest, the number of its potential software users (as the world's most populous country with over 1.35 billion) and its potential economic effect as the second largest economy of the world since 2012 give value to its inclusion in this analysis. Based on the above BSA/IDC study, China's illegal software market was worth $ 8.767 billion versus a legal market value of $3.080 billion.

In addition to the significantly different piracy rates, China and the United States show disparity in their respective industrialization/development, economic and political environments, and cultures, which may present interesting viewpoints for comparative analysis.

HYPOTHESES DEVELOPMENT

As shown in Table 1, researchers have made myriad attempts to find relationships between demographic factors and software piracy and piracy-related attitudes/perception issues since 2004. The impact of demographic factors on piracy was also investigated in earlier studies as well (Jaeger, 2003; Lau, 2003; Rahim, Rahaman, & Seyal, 2000). Generally, demographic factors and collectivism (a dimension of national culture) seem to affect software piracy,

although the findings are somewhat inconsistent and mixed (Acilar, 2010; Nill, Schibrowsky, & Peltier, 2010).

For the present study, demographic factors including country difference, gender, education, work experience, and computer experience are used as independent variables. As for the dependent variables, piracy behavior and piracy-related factors, such as attitudes and peer norms, are included. We also examine additional factors to explore their effects on software piracy: the effect of terms and agreement, concern and respect for property ownership, understanding of copyright and copyright exceptions, and licensing audit. Our literature review shows that the aforementioned factors have not before been extensively studied.

Country Factor Hypothesis

Country-based piracy studies have been actively conducted in recent years. Software piracy was found to significantly correlate to a country's economic factors, such as per capita GDP, income inequity, and also to Hofstede's cultural dimension of individualism (Acilar, 2010; Hsu & Su, 2008; Husted, 2000). Similar research found that countries with higher per capita GDP have lower piracy rates as compared to those with lower per capita GDP, and lack of price discrimination on the part of software vendors is one of the contributing factors in spreading piracy (Holsapple, Iyengar, Jin, & Rao, 2008; Gopal & Sanders, 2000). Furthermore, income inequality among nations appeared to inversely correlate with amounts of software piracy in those countries.

Some studies revealed that piracy rates were lower in countries that had strong institutions for enforcing property rights (Ander's & Asongu 2013; Marron & Steel, 2000). In addition, recent studies explored the roles of non-economic factors on piracy (Andre's & Asongu 2013; Bagchi & Cerveny, 2006) and found that countries with less corruption and weak collectivism were found to have less piracy.

However, an earlier study (Traphagan & Griffith, 1998) concluded that the more economically developed the nation, the larger its computer infrastructure and market for software. High personal incomes did not influence piracy rates, but legal protection, effective enforcement, and cultural norms seemed to result in low software piracy rates.

The cultural spectrum of a nation is described in various ways in prior studies (Calhoun, Teng, & Cheon, 2002; Hofstede, 1991; Javidan, Dofman, De Luque, & House, 2006). China is classified as a country in the Confucian country cluster; institutional collectivism, in-group collectivism, gender egalitarianism, and power distance are useful facets in describing its national culture. The United States promotes capitalism and tends to place less emphasis on in-group collectivism, while China implements socialism and communism where collectivism is very strongly pronounced. Diverse ideas and individuals are tolerated more in the United States and encouraged less in China.

Although China recently became the second largest economy in the world with the nominal GDP of $8.229 trillion (USD), the per capita GDP and income level, one of the important piracy factors, is still very low when compared to the United States. The United States has the largest

economy in the world with nominal GDP of $16.2 trillion (USD) and GNI per capita (Atlas method-current USD) of $52,350 (World Bank Data, 2013). Conversely, China has the GNI per capita (Atlas method-current USD) of $5,720 in 2013, merely 11% of the United State's GNI per capita (World Bank Data, 2013).

Considering the major differences of national culture, economic development, political system, and income levels between China and the United States, we hypothesize the following:

H1: Computer users in the United States have different piracy behaviors and commit less software piracy than those in China.

Education Factor Hypothesis

Some research has found that lower level of education lead to greater software piracy (Goel and Nelson, 2009). Other study indicated that education had little significant impact on software piracy (Mishra, Akman, & Yazici, 2006). The research in this area is still preliminary and ongoing. Considering the data subjects in university environments for the present study and the potential importance of education, we further investigate whether higher education may influence software piracy and piracy-related behaviors. We propose the following hypothesis for the present study:

H2: Computer users with higher education commit less software piracy than computer users with lower education.

Gender Factor Hypothesis

Based on one study conducted about parameters of software piracy, gender is one of the most widely studied factors in this context (Holsapple, Iyengar, Jin, & Rao, 2008). Although there have been extensive studies about the effect of gender, research results have been relatively inconsistent and inconclusive. Some studies suggest that males are more likely to purchase or use pirated software than females (Mishra, Akman, & Yazici, 2006; Moores & Esichaikul, 2011). Another posits that U.S. females pirate less software than males (Gopal & Sanders, 1997; Lau, 2003; Sims, Cheng, & Teegen, 1996; Solomon & O'Brien, 1991). Significant gender differences were also reported among Singapore students (Moores & Dhaliwal, 2004) and Thailand students (Moores & Esichaikul, 2011). However, only limited differences based on gender were found in the study of students in Hong Kong (Moores & Chang, 2006). Another study found that gender had no impact on the use of pirated software in general (Acilar, 2010). In addition, each of the studies used samples from one country, which limits the research's external validity. The present study proposes the following hypothesis to investigate the gender effect on samples of two countries with drastically different piracy rates. We propose the following hypothesis for the present study:

H3: Female computer users commit less software piracy than male computer users.

Age Factor Hypothesis

Age is the second most widely studied demographic factor in the context of piracy study (Holsapple, Iyengar, Jin, & Rao, 2008). However, recent studies' findings are not always consistent. Most of the studies found that age does significantly affect the ethical decision making process: younger people are more likely to engage in piracy than older people (Cronan, Foltz, & Jones, 2006; Hsu & Su, 2008; Gan & Koh, 2006; Mishra, Akman, & Yazici, 2006; Moores & Chang, 2006; Moores & Esichaikul, 2011). However, Acilar's 2010 study found that age does not impact software piracy. To further investigate the age factor on software piracy, the following hypothesis is developed:

H4: Younger computer users commit more software piracy than older computer users.

Work Experience Factor Hypothesis

Findings regarding the effects of work experience on software piracy are mixed. Some prior studies did not support a relationship between work experience and the attitude/ethical behavior regarding software piracy (Mishra, Akman, & Yazici, 2006; Schore, Venkatachalam, & Solorzano, 2001). However, one study found that people with more work experience are more likely to use pirated software (Moores & Esichaikul, 2011). Although the effect of work experience on software piracy was not substantially supported in prior research, we expect that lack of work experience may result in more software piracy because those computer users are less-educated about the illegality of piracy than computer users with more work experience. We would like to investigate this factor in a separate hypothesis:

H5: Computer users with less work experience commit more software piracy than computer users with more work experience.

Computer Experience Factor Hypotheses

Due to the nature of software piracy, computer experience had been investigated as a separate independent variable than work experience in previous studies, and appeared to relate to the use of pirated software (Rahim, Seyal, & Hahaman, 1999). Research shows that software piracy is committed by highly skilled, experienced computer users, since they need to know how and where to find software accessibility and use it (Craig & Burnett, 2005). Robertson et al. (2008) found that computer experience (e.g. experience of accessing Internet via computer) positively relates to software piracy. On the other hand, a contradictory study reported that weekly Internet usage inversely affects software piracy (Acilar, 2010). To further investigate computer experience related effects on software piracy, the following hypotheses are developed:

H6: Computer users with more computer software experience commit more software piracy than computer users with less experience.

H7: Computer users with more daily time spent using computer software commit more software piracy than computer users with less daily time spent using computer software.

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DATA AND METHODOLOGY

Empirical studies about software piracy have been generally conducted with students and academic subjects (Acilar, 2010; Cronan, Foltz, & Jones, 2006; Gan & Koh, 2006; Rahim, Rahaman, & Seyal, 2000; Rawlinson & Luption, 2007). In addition to the ease of data collection, several studies recognized that a greater piracy problem exists in the academic community than in the business community (Gan & Koh, 2006; Rawlinson & Luption, 2007; Shim & Taylor, 1989). For the present study, Chinese and U.S. college students simultaneously surveyed comprised the data samples.

The survey instrument was developed based on prior instruments and studies (Douglas, Cronan, & Behel, 2007; Gan & Koh, 2006; Mishra, Akman, & Yazici, 2006; Wooley & Eining, 2006). The survey (see Appendix) consists of 22 questions in two parts: a general demographical section with eight questions and a piracy-related section with 14 questions. (We added a country dummy variable as question 23 to analyze the effects of a country factor upon software piracy.) The questionnaire was pilot-tested by two groups of students and administered simultaneously to students in major universities in China and the United States. Survey participants comprised 643 students from both countries. A total of 600 valid responses were collected. Participation was voluntary.

Due to the need to assess multiple response variables simultaneously, a MANOVA (Multivariate Analysis of Variance) analysis was conducted to investigate statistically significant relationships between independent and dependent variables. In addition, Turkey's test was performed to compare the means of some of the dependent variables, corresponding to the independent variables that are found statistically significant. Comparing pairwise means, the Tukey's test tends to result in a narrower confidence limit. Scheffe's test can be wasteful of statistical power and likely to lead to Type II errors unless complex comparisons are being made.

Profiles of Respondents

Table 2 below presents the summaries of the data samples, collected from China and the United States, tallying gender, age, school years, work experience, computer software experience, and daily time using computer software.

Gender:	U.S. samples (364)	China samples (279)
Male (%)	45.88	58.78
Female (%)	54.12	41.22
Ages:		
Between 17 and 21 (%)	83.01	82.86
Between 22 and 25 (%)	14.79	13.57
School Years:		
Freshman (%)	72.63	56.02
Sophomores (%)	9.50	13.91
Juniors (%)	12.85	12.03
Seniors (%)	3.63	14.66

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Master (%)	1.40	3.38
Work Experience:		
Less than 1 year (%)	39.56	0.73
Between 1 and 3 years (%)	54.40	20.73
Between 4 and 6 years (%)	4.12	40.00
Between 7 and 9 years (%)	1.92	38.55
Computer Software Experience:		
Less Than 1 year (%)	92.58	26.81
Between 1 and 3 years (%)	4.67	43.48
Between 4 and 6 years (%)	1.37	25.00
Between 7 and 9 years	0.55	2.90
Over 9 years	0.82	1.81
Daily Time Using Computer:		
Less than 1 hour (%)	17.58	6.43
Between 1 and 3 hours (%)	33.24	9.64
Between 4 and 6 hours (%)	30.77	16.79
Between 7 and 9 hours (%)	11.54	32.50
More than 9 hours (%)	6.87	34.64

Table 2: Profiles of Respondents (United States vs. China)

RESULTS AND DISCUSSION

The MANOVA shows that some independent variables have significant main effects on software piracy (Table 3). Country, gender, software experience, and daily time using software are the four independent variables with statistically significant impacts on software piracy. Age, work experience, and education do not significantly affect software piracy statistically.

Due to their relatively smaller P values, country and gender are found to be more important than software experience and daily time using software, although all four variables significantly affect software piracy. Unlike the results reported from previous studies (Gan & Koh, 2006; Holsapple et al., 2008; Misha et al., 2006; Moores & Esichaikul, 2011; Nill and Shultz, 2009), our study did not find age to significantly affect software piracy.

	Wilks' Lambda	**F Value**	**P Value**
Country effect	**0.81**	**9.52**	**<0.0001*** **
Gender effect	**0.92**	**3.32**	**<0.0001*** **
Software experience effect	**0.84**	**1.47**	**0.007****
Daily time using software effect	**0.87**	**1.41**	**0.02***
Education effect	0.91	1.33	0.08 (Rejected)
Age effect	0.90	1.36	0.06 (Rejected)
Work experience effect	0.90	1.09	0.31 (Rejected)

*** means P <0.001; ** means P <0.01; * means P <0.05

Table 3: MANOVA Statistics Summary for Main Effects

After reviewing the MANOVA analysis results, we looked at the ANOVA output for each dependent variable. We found that country status (Q23) (see Table 4); gender (Q1) (see Table 5); software experience (Q7) (see Table 6); and daily time using software (Q7) (see Table 7) significantly affect some but not all of the dependent variables (see appendix for questionnaire).

	Q9	Q10	Q16	Q17	Q18	Q21
F Value	41.86	30.56	21.73	17.44	4.02	23.97
P Value	<0.0001***	<0.0001***	0.0001***	0.0001***	0.045*	<0.0001***

Table 4: Dependent Variables Significantly Affected by Country Status

	Q9	Q10	Q14	Q17	Q19
F Value	10.92	14.43	5.78	21.58	5.26
P Value	0.001*	0.0002**	0.017*	<0.0001***	0.026**

Table 5: Dependent Variables Significantly Affected by Gender

	Q11	Q12	Q15	Q16	Q18	Q21	Q22
F Value	3.65	2.40	3.21	3.47	5.14	2.87	2.48
P Value	0.006**	0.049*	0.013*	0.008**	0.001**	0.023*	0.043*

Table 6: Dependent Variables Significantly Affected by Software Experience

	Q21	Q22
F Value	6.52	2.83
P Value	<0.0001***	0.024*

Table 7: Dependent Variables Significantly Affected by Daily Time Using Software

Country Effects

Turkey's test, Alpha at 0.05 level, shows significant differences across countries regarding some of the dependent variables on software piracy. In particular, the country-specific means of those dependent variables are summarized in Table 8. (The questions from 9 to 22 used a five point Likert scale such as Complete Disagree (1) and Strongly Agree (5).)

	Q9	Q10	Q16	Q17	Q18	Q21
China	2.08	2.18	2.33	3.39	1.89	3.05
United States	3.15	3.30	1.52	2.14	2.79	2.27

Table 8: Means Significantly Different Across Countries

Piracy Behaviors: In the United States, the mean for Q9 ("Of all the software I use, 100 percent are LEGAL copies") was 3.15 while the mean for Chinese respondents was 2.08. The American respondents' mean for Q10 ("I always purchase legal software copies") was 3.30, whereas the mean for Chinese respondents was 2.18. This finding is consistent with that of the BSA Global Piracy Study 2013; the U.S. piracy rate is significantly lower than that of China.

Effect of Terms of License Agreement: Evaluating Q16 ("I always read the terms of the license agreement of the software I use"), the Chinese respondents had a higher mean (2.33) than the

American respondents (1.52). The aforementioned means being less than 3 indicates that respondents were not likely to read the terms of license agreement with software products, even though the American respondents had significantly more legal software copies than the Chinese respondents. Respondents' lack of interest in reading terms of license agreement included in software products and the benefits of the license agreement needs to be further investigated in future study.

Fear of Getting Caught: Corresponding to Q 17 ("I fear that I will get caught for making illegal software copy"), there are significantly different means between U.S. (2.14) and Chinese respondents (3.39). We, therefore, could infer that Chinese respondents have more fear than American respondents for making/using pirated copies. This fear might link to the fact that Chinese respondents possess more illegal software copies, but possibly also to not fully understanding the potential punishment for making illegal software copies.

Education about the Punishment: Comparing the means of Q 18 ("I have been educated about the punishment for making/using pirated copies"), we can find a significant difference between U.S. (2.79) and Chinese respondents (1.89). The difference may suggest that U.S. respondents are more aware of the potential punishment for making/using pirated copies than Chinese respondents.

Understanding Software Licensing Audit: Based on Q21 ("I fully understand the concept of a software licensing audit, where a software user is audited for license compliance"), Chinese respondents seemed better educated about software licensing audits than U.S. respondents. The gap between the U.S. (2.27) and Chinese respondents (3.05) averages regarding understanding software licensing audit is notable.

Although Chinese respondents appeared to better understand software licensing audits, their means of answers for Q9 and Q10 are still higher than those of U.S. respondents, suggesting Chinese respondents' higher software piracy rate. The above contradiction may imply that the penalty against software piracy in China is ineffective. A weak penalty may not discourage people from owning illegal software copies, even though these people claim that they understand software licensing audit.

Some of the values in Table 7 may not appear to differ substantially. However, due to the relatively large sample size, they are still significantly different based on Turkey's test.

Gender Effects

Unlike the prior research findings (Mishra, et al, 2006; Moores & Chang, 2006), the results based on Turkey's test (Alpha at 0.05 level) for dependent variables demonstrate significant cross-gender differences concerning some of the dependent variables about software piracy. The cross-gender means of those dependent variables are listed in Table 9. Statistically, some of the cross-gender numbers appear to be close, but because of the moderately big sample size, the cross-gender difference remains significant.

	Q14	**Q17**	**Q19**

Male	**2.55**	2.51	2.37
Female	2.32	3.25	2.57

Table 9: Means Significantly Different Across Gender

Male respondents were more likely than females to feel comfortable copying software without license. Relatively speaking, female respondents were more inclined to care about the interests of software publishers. Compared to males, female respondents also felt more fear that they would get caught for making illegal software copy. The aforementioned differences could be related to the nature of gender. Literatures suggest that aggressive and confrontational social behavior is perceived as masculine (Calhoun, Teng, & Cheon, 2002; Hofstede, 1991), while looking for a harmonious solution and being concerned with the impact of actions on others are considered more feminine traits.

Effect of Computer Software Experience

Experience Using Software	Q16	Q18	Q21
No more than six years	2.25	1.97	2.85
Seven or more years	1.60	2.72	2.54

Table 10: Means Significantly Different Across Various Software Experiences

Turkey's test (Alpha at 0.05 level) shows that the respondents with more software experience more frequently indicated that they have been educated about the punishment for making/using pirated copies. However, they read less about the terms of the software license agreement than those respondents with less computer software experience. It might be that more experienced respondents are so familiar with using software and do not feel the need to read license agreement terms thoroughly. Over time, respondents with more software experience might forget software licensing audit concepts when compared to less-experienced software users who better remember recently-learned concepts. The aforementioned findings remind us that the software users with more year experience still need to be retrained periodically to update their understanding about license agreement and licensing audit.

Effect of Daily Time Spent Using Software

Daily Time Spent Using Software	Q21	Q22
No more than six hours	2.69	2.80
Seven or more hours	3.42	3.27

Table 11: Means Significantly Different Across Daily Time Spent Using Software

Additionally, Turkey's test (Alpha at 0.05 level) indicated that respondents with heavy daily software usage tended to have significantly higher means for Q21 ("I fully understand the concept of a software licensing audit, where a software user is audited for license compliance") and Q22 ("I fully understand the consequences of software license violation"). The means from the respondents with relatively less daily software usage are obviously lower, regarding Q21 and

Q22. The above findings could help software manufacturers target certain software users in terms of disseminating information about software licensing audit and the consequence of software license violation.

LIMITATION AND FUTURE WORK

As an academic exploratory research project, this study is not without its limitations. As explained in the literature review section, data used in this study was collected based on a convenience sample of university students from two countries. Thus, the data sample is not representative of all computer software users in the United States and China; consequently, the study's findings should not be extrapolated due to its restricted external validity. The findings from this study should be limited to college student groups as these groups have their unique demographic characteristics and part-time working experience. The fact that some of the hypotheses in this study are not supported may be also attributed to the aforementioned distinctive data characteristics.

Future study could focus on collecting more comparable data samples across various countries in different continents. Future research should include participants with various work experiences, dissimilar annual incomes, diverse experiences, and varying daily time spent using computer software as a means to better understand the factors that affect software piracy.

CONCLUSION

The four variables of country factor, gender, computer software experience, and daily time spent using software have statistically significant impact on software piracy acts. Our research also revealed that country status and gender affect software piracy much more than one's computer software experience and daily time spent using software, which was not found in other studies.

Our investigation reveals that U.S. respondents commit less software piracy than Chinese respondents do. U.S. respondents are less exposed to a piracy-prone environment and more educated about IPR and property ownership than the Chinese students.

It is also found that males, regardless of country status, commit more software piracy acts than female respondents do. However, neither age nor education was significant in terms of affecting software piracy, which is not consistent with former studies (Gan & Koh, 2006; Holsapple et al., 2008; Misha et al., 2006; Moores & Esichaikul, 2011; Nill and Schultz, 2009) conducted in other countries and areas.

To develop an effective anti-piracy strategy, we recommend a country-specific remedial approach rather than a universal uniform solution. Specifically in China, software companies may consider offering financial and technical support to government and universities to help fight software piracy, with an emphasis on enforcing legal penalties against people who own illegal software copies. In addition, we recommend that computer software companies, in collaboration with local governments and universities, focus more on educating male computer software users about the legal consequences of software piracy. Users with greater software experience should also be required to update their understanding about license agreement and

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licensing audit. Education and propagation about licensing audit and punishment against license violation could focus more on the users with less daily software usage, who demonstrated significantly less understanding about these mentioned concepts.

REFERENCES

Acilar, Ali (2010). Demographic Factors Affecting Freshman Students' Attitudes toward Software Piracy: An Empirical Study. *Issues in Informing Science and Information Technology*, 7, 321-328.

Aleassa, H., Pearson, M. J., and McClurg, Scott. (2011). Investigating Software Piracy in Jordan: An Extension of the Theory of Reasoned Action. *Journal of Business Ethics*, 98, 663–676.

Andre´s, A. & Asongu A. S. (2013). Fighting Software Piracy: Which Governance Tools Matter in Africa? *Journal of Business Ethics*, 118, 667–682.

Bagchi, K. & Cerveny, R. (2006). Global Software Piracy: Can economic factors alone explain the trend? *Communications of the ACM*, 49(6), 70-75.

BSA Global Software Survey (2013). The Compliance Gap. http://globalstudy.bsa.org/2013.

BSA/IDC Global Software Piracy Study (2012 & 2011). http://www.bsa.org/country/research.

Calhoun, K. J., Teng, J. T., & Cheon, M. J. (2002). Impact of national culture on information technology usage behavior: an exploratory study of decision making in Korea and the USA. *Behavior and Information Technology*, 21(4), 293-302.

Chan, R. & Lai, J. (2011). Does ethical ideology affect software piracy attitude and behavior? An empirical investigation of computer users in China. *European Journal of Information Systems*, 20, 659–673.

Craig P. & Burnett M. (2005). Software Piracy Exposed. Syngress Publishing, Rockland, MA.

Cronan, T. P., Foltz, B., & Jones, T. W. (2006). Piracy, Computer Crime, and IS MISUSE at the University. *Communication of the ACM*, 49(6), 85-90.

Douglas, D. E., Cronan, T. P., & Behel, J. D. (2007). Equity perceptions as a deterrent to software piracy behavior. *Information and Management*, 44, 503-512.

Gan, L. L. & Koh, H. C. (2006). An empirical study of software piracy among tertiary institutions in Singapore. *Information and Management*, 43, 640-649.

Goel, K. R. & Nelson, M. A. (2009). Determinants of software piracy: economics, institutions, and technology. *Journal of Technology Transfer*, 35, 637-658.

Gopal, R. D. & Sanders, G. L. (1997). Preventive and deterrent controls for software piracy. *Journal of MIS*, 13(4), 29-47.

Gopal, R. D. & Sanders G. L. (2000). Global software piracy: you can't get blood out of a turnip. *Communications of the ACM*, 43(9), 82-89.

Hamister, J. & Braunscheidel, M. (2013). Software piracy and intellectual property rights protection. *Academy of Information and Management Sciences Journal*, 16(1).

Hinduza, S. (2008). Deindividualization and Internet Software Piracy. *CyberPsychology and Behavior*, 11(4).

Hofstede, G. (1991). Cultures and Organizations: Software of the Mind. McGraw-Hill Book Company, London, England.

Hofstede, G. (2001). Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. London: Sage.

Holsapple, C. W., Iyengar D., Jin H., & Rao S. (2008). Parameters for software piracy research. *The Information Society*, July.

Hsu, J. L. & Su, Y. (2008). Usage of Unauthorized Software in Taiwan. *Social Behavior and Personality*, 36(1), 1-8.

Husted, B. W. (2000). The impact of national culture on software piracy. *Journal of Business Ethics*, 26, 197-211.

Jaeger, P. T. (2003). The Endless Wire: E-Government as Global Phenomenon. *Government Information Quarterly*, 20, 323-331.

Javidan, M., Dofman, P. W., De Luque, M. S., & House, R. (2006). In the eye of the beholder: cross cultural lessons in leadership from project GLOBE. *Academy of Management Perspective*, 20(1), 67-90.

Javidan, M., House, R.J., Dorfman, P. W., Hanges, P. J., & De Luque, M. S. (2006). Conceptualizing and Measuring Cultures and Their Consequences: A Comparative Review of GLOBE's and Hofstede's Approaches. *Journal of International Business Studies*, 37(6), 897-914.

Kariithi, K. Nixon (2011). Is the Devil in the Data? A Literature Review of Piracy around the World. *The Journal of World Intellectual Property*, 14(2), 133-154.

Lau, E. KW. (2003). An Empirical Study of Software Piracy. *Business Ethics: An European Review*, 12(3), 233-245.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Marron, D. B. & Steel, D. G. (2000). Which countries protect intellectual property? The case of software piracy. *Economic Inquiry*, 38(2), 159-174.

Mayers, M. & Tan, F. (2002). Beyond models of national culture in information systems research. *Journal of Global Information Management*, Jan-Mar, 24-32.

Mishra, A., Akman, I., & Yazici, A. (2006). Software piracy among IT professionals in organizations. *International Journal of Information Management*, 26, 401-413.

Moores, T. & Chang, J. (2006). Ethical decision making in software piracy: Initial Development and Test of a four-component model. *MIS Quarterly*, 30(1), 167-180.

Moores, T. & Dhaliwal, J. (2004). A reversed context analysis of software piracy issues in Singapore. *Information and Management*, 1037-1041.

Moores, T. & Dhillon, G. (2000). Software piracy: A view from Hong Kong. *Communication of the ACM*, 43(12), 88-93.

Moores, T. & Esichaikul, V. (2011). Socialization and software piracy: a study, *Journal of Computer Information Systems*, Spring, 1-9.

Nill, A., Schibrowsky, J., & Peltier, J. (2010). Factors that influence software piracy: a review from Germany. *Communications of the ACM***,** 53(6), 131-134.

Nill, A. & Shultz, C. J. (2009). Global software piracy: Trends and strategic considerations. *Business Horizons*, 52, 289-298.

Rahim, M. M., Rahaman, M. N., & Seyal, A.H. (2000). Software piracy among academics: An empirical study in Brunei Darussalam. *Information Management & Computer Security*, 8(1), 14-26.

Rahim, M. M., Seyal, A. H., & Hahaman, M. N. (1999). Software piracy among computing students: A Bruneian Scenario. *Computers and Education*, 32, 301-321.

Rawlinson, D. R. & Luption, R. A. (2007). Cross-National Attitudes and Perceptions Concerning Software Piracy: A Comparative Study of Students from the United States and China. *Journal of Education for Business*, November/December, 87-93.

Robertson, C. J., Gilley, K. M., Crittenden, V., & Crittenden, W. F. (2008). An analysis of the predictors of software piracy within Latin America. *Journal of Business Research,* 61, 651–656.

Schore, B., Venkatachalam, A. R., & Solorzano, E. (2001). Softlifting and piracy: Behavior across cultures. *Technology in Society,* 23, 563-581.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Schrank, A. (2003). The Software Industry in North America: Human Capital, International Migration, and Foreign Trade in Industrial Agglomeration: Facts and Lessons for Developing Countries, edited by M. Kagami and M. Tjusi. Chiba: IDE.

Shim, J. P. & Taylor, G. S. (1989). Practicing managers' perception/attitudes toward illegal software copying. *OR/MS Today*, 16(4), 30-33.

Shin, S. K., Gopal R. D., Sanders G.L., & Whinston A.B. (2004). Global Software Piracy Revisited. *Communications of the ACM*, 47(1), 103-107.

Sims, R. R., Cheng, H. K., & Teegen, H. (1996). Toward a profile of student software pirates. *Journal of Business Ethics*, 15, 839-849.

Siponen, M., Vance, A., & Willison, R. (2012). New insights into the problem of software piracy: The effects of neutralization, shame, and moral beliefs. *Information and Management*, 49, 334-341.

Solomon, S. L., & O'Brien, J. A. (1991). The effect of demographics factors on attitudes toward software piracy. *The Journal of Computer Information Systems*, 30(3), 40-47.

Tan, B. C. Y., Wei, K. K., Watson, R. T., Clapper, D. L., & McLean, E. R. (1998). Computer mediated communication and majority influence: Assessing the impact in an individualistic and a collectivistic culture. *Management Science*, 44(9), 1263-1278.

Traphagan, M., & Griffith A. (1998). Software piracy and global competitiveness; report on global software piracy. *International Review of Law Computers*, 12 (3), 431-451.

Wooley, D. J., & Eining, M. M. (2006). Software Piracy among Accounting Students: A Longitudinal Comparison of Changes and Sensitivity. *Journal of Information Systems*, 20(1), 49-63.

World Bank Data (2013): http://data.worldbank.org/.

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APPENDIX

Survey on Legal/Illegal Software Uses

Demographics: Please circle one best answer for each question. Thank you!

1. My gender: Male, Female
2. My age: 17-21, 22-25, 26-35, 36-45, 46-55, Above 55 years
3. My marital Status: Single, Married, Divorced
4. My Annual Income Compared to National Average:
   Much Lower National Average Much Higher
   1 2 3 4 5
5. My education status: (Please answer 5A OR 5B)
   5A. for students: Freshman, Sophomore, Junior, Senior, Master, PhD
   5B. for employees: High School, Associate degree, Bachelor, Master, PhD
6. My work experience:
   Less than 1 year, 1-3 years, 4-6 years, 7-9 years, more than 9 years
7. My experience using computer software, such as system software, application software, and Internet browser:
   Less than 1 year, 1-3 years, 4-6 years, 7-9 years, more than 9 years
8. My daily time spent using computer software:
   Less than 1 hour, 1-3 hours, 4-6 hours, 7-9 hours, more than 9 hours

Please indicate to what extent you agree with the following statements

	Complete Disagree		**Agree**		**Strongly Agree**
9. Of all the software I use, 100 percent are LEGAL copies.	1	2	3	4	5
10. I always purchase legal software copies.	1	2	3	4	5
11. I think original software is too expensive.	1	2	3	4	5
12. I notice most people around me copy software without license.	1	2	3	4	5
13. I believe that no one will be hurt when software is copied without license.	1	2	3	4	5
14. I think it is fine to copy software without license.	1	2	3	4	5
15. It is easier to copy than to buy software.	1	2	3	4	5
16. I always read the terms of the license agreement of the software I use.	1	2	3	4	5
17. I fear that I will get caught for making illegal software copy.	1	2	3	4	5
18. I have been educated about the punishment for making/using pirated copies.	1	2	3	4	5
19. I care about the interests of software publishers.	1	2	3	4	5
20. I believe I can make/use illegal software copies if the copied software is made for education purposes, not for commercial reason.	1	2	3	4	5
21. I fully understand the concept of a software					

licensing audit, where a software user is audited for license compliance.	1	2	3	4	5
22. I fully understand the consequences of software license violation.	1	2	3	4	5

Thank you very much for your help!

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