



Pirates of the Asia-Pacific: analyzing APEC digital piracy

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Abstract: The emergence of the internet as a platform for exchange of digital goods has provided new growth opportunities for the economies connected to them. Despite the growing sophistication and reach of the digital economy, piracy of virtual goods continues to persist in many countries. This paper aims to understand the factors that affect digital piracy, focusing on the Asia-Pacific Economic Cooperation and the implications to the Trans-Pacific Partnership. Using data from the World Bank and World Economic Forum we provide an econometric framework that uses panel estimation and analysis. It was found that lower consumer prices and more internet users bring piracy rates down. The results suggests that increased access, through lower prices freeing up income, and a growing internet community leads more consumers to purchase software through legal means, instead of choosing the cheaper and virtually costless yet illegal alternative. Additional factors in the analysis include intellectual property rights (IPR) enforcement, computer and communications trade, and overall trade policy. Findings show that IPR enforcement was insignificant in curbing piracy, while computer and communications exports and trade policy positive significant effect. These factors are potential areas for further research. IPR and trade policies are complex factors, and their effects on piracy should be delved in for more detail.

Key Words: Trans-Pacific Partnership; Asia-Pacific Economic Cooperation; digital piracy; econometrics; Intellectual Property Rights

1. INTRODUCTION

Not all treasure is silver and gold, as Captain Jack Sparrow would rightly say. Modern day treasures now come in the form of financial instruments and luxury goods. The latter, in this technological epoch, is often stolen in virtual form through digital piracy. These goods vary in value and genre, i.e. from software to media, and theft of this

degree extrapolates a variety of concerns: intellectual property rights (IPR), tradability, revenue and GDP, internet law enforcement and policy, and even well being.

The digital trade imperative has been interestingly highlighted in the recent Trans-Pacific Partnership (TPP) and specified in the Asia-Pacific Economic Cooperation (APEC) summits towards innovative investments to entrepreneurship and



small-medium enterprises (SME). The emergence of digital trade and e-commerce has innovated international trade, making it inclusive and beneficial across diverse markets; however, rampant piracy of virtual goods has served otherwise.

According to the BBC (2015) in December, millions of illegal film downloads created more than roughly \$7.3m in losses. That is in the film industry alone. According to the BSA (2011), the commercial value of pirated software "climbed from \$58.8b in 2010 to \$63.4b in 2011." One may think, to curb or stop piracy, that either increased measures in intellectual property protection should be imperative or to halt digital production and distribution until the former can be enforced.

Industries take to the digital platform to "capitalize on new ways of boosting productivity, streamlining operations, and facilitating creativity and problem solving, which in turn spurs job creation and growth." (BSA, 2012) Moreover, according to Fraj & Lachhab (2015), the development of information technology has "created an infrastructure that has made it easier to share digital products and reproduction at zero cost." This initiative, like others, provides benefits with risks. With a leading nominal deterrent, i.e. millions in losses, through the prevalence of digital piracy though, one has to consider piracy itself to fathom and remove it as a threat.

Related literature contests that the allure of piracy is in the no-cost aspect, in terms of nominal and consequential costs. This highlights two particular elements: income and law enforcement. Of course, the act of piracy itself cannot be accomplished without internet access. However, according to Athey & Stern (2013), GDP per capita, i.e. income, had no significant impact on piracy rates. This prompts us to seek a proxy, i.e. that is, we use consumer prices instead measured through inflation. The findings from an anti-piracy law study found that weak enforcement had increased the incidence of piracy, following other results (Adermon & Liang, 2014).

According to Chen, Chen & Yeh (2012), empirical evidence illustrated income, inflation, unemployment, and exports had positive relationships to piracy while IPRs, computer

ownership and article publishing counts had negative relations.

According to the U.S. Trade Representative (2015) on the TPP and its Intellectual Property (IP) chapter, "[The TPP] will promote high standards of protection, safeguard... exports and consumers against IP infringement, and provide fair access to legal systems in the region to enforce those rights... [which] includes commitments to combat counterfeiting, piracy and other infringement, including trade secret theft; obligations to facilitate legitimate digital trade, including in creative content; and provisions to promote development of, and access to, innovative and generic medicines."

In light of the TPP, the scope of this study focuses on the APEC countries from 2005-2013. To understand the factors of piracy and illegal digital trade, we provide an econometric framework that uses panel estimation and analysis. This is elaborated in Section 2. Section 3 shows the quantitative results with a critical analysis. The conclusions and recommendations are found in Section 4.

2. METHODOLOGY

With roughly 137 observations across 20 countries in a span of nine years, we constrict our scope to APEC variables of piracy rates, internet users, consumer price inflation, IPR, computer and communications trade, and an enabling trade index. These variables are sourced from World Economic Forum, World Bank, and Global Competitiveness Index. We previously used GDP per capita to proxy income; however, since the variable will likely produce insignificant results given literature review, we use consumer price inflation because it will lend itself to reflect the accurate perception that incentivizes piracy to begin with.

Given the longitudinal nature of the study's scope, we look into using a panel regression to capture how the factors affecting piracy change across spatial and temporal dimensions. We find four options: pooled OLS, fixed effects, random effects, and instrumental variable estimation. We perform a series of diagnostic tests, and rule out pooled OLS

due to a violation of one of the five core aspects necessary to use this procedure – that is, non-normality of the residuals. Furthermore, in proxying GDP with inflation, we rule out instrumental variable estimation because inflation was not exogenous to the error term.

Thus, we look between fixed effects and random effects to account for the non-normality, heteroschedasticity and potential autocorrelation for the cross-sectional and time series nature of the dataset, respectively. We utilize a Hausman test to identify which estimation method would better suit the data, and find that fixed effects is more appropriate. This is so because there is a trend in the aggregated data over time, evidencing no sign of a random walk; thereby, in the time series sense, there is stationarity. The quantitative results for our methodology are provided through STATA, and are discussed in Section 3.

$$pr_{it} = \beta_0 + \beta_1(iu_{it}) + \beta_2(inf_{it}) + \beta_3(ipr_gci_{it}) + \beta_4(com_ex_{it}) + \beta_5(com_im_{it}) + \beta_6(et_{it}) + \mu_{it} \quad (\text{Eq. 1})$$

where:

- pr_{it} = Rates of unlicensed PC software installations
- iu_{it} = Internet Users per 100 persons
- inf_{it} = Inflation, consumer prices (annual %)
- ipr_gci_{it} = Intellectual Property Rights Index Computer, communications and other services (9)
- com_ex_{it} = of commercial service exports)
- com_im_{it} = (% of commercial service imports)
- et_{it} = Enabling Trade score
- ut_{it} = Error term

3. RESULTS AND DISCUSSION

Notably, the F-statistic and R-squared values attest to the overall significance of the model at 83.39% goodness of fit. The most significant regressors are internet users, inflation, exports and tradability. All follow a priori expectations. This robust regression reduces our 137 observations to 34, removing outliers and focusing on the values that have the best merit for accurate estimates.

Table 1. Fixed effects regression

Variable	Coef.	P> t
Internet Users	-0.1836344	0.082*
Inflation	0.4096274	0.031**
IP Rights	-2.164734	0.208
Exports	0.6304974	0.001***
Imports	-0.1493769	0.249
Tradeability	2.685762	0.061*
Constant	39.21408	0.018**

Source: Author's computations
 Note: significant at 1%*** 5%** 10%*

Following the coefficients and their signs, we find that there is a negative relationship between piracy rates and internet users. This was an ambiguous relationship because internet behavior is not homogenous; there are pirates, and there are not, but both groups require internet access. To find this relation is curious nonetheless, and significant.

Inflation, i.e. consumer prices, and piracy rates have a positive relationship, following our expectations. In the previous model, we found income and piracy to have a negative relationship, further fortifying our analysis: the allure of a free means to a desired good, especially when its price is very high, is accentuated by income constraints, leading to the significant choice to pirate.

IPR and piracy have a negative relation, showing that -- as a proxy for law enforcement against piracy -- there is effective governmental intervention to mitigate piracy. However, this estimate is insignificant. Given that APEC comprises of both developed and developing countries and that these rates have been indexed accordingly, we can attest that there is still a need for all these countries to review and enforce IPRs thoroughly since this



value may be skewed more towards the developed economies.

Exports and piracy have a significantly positive relationship, showing that more computer and communications service exports increases piracy rates. It may be that those exporting such services opt to minimize costs by using pirated software. With virtually no cost or consequences for in some countries, software piracy would be a tempting choice to keep a competitive edge. This requires further research at a more microeconomic scale to better capture firm behavior. Consequently, imports showed the reverse but at an insignificant relation.

The enabling trade score and piracy have a positive relation. This goes in line with the positive effect of computer and communications exports. Friendly trade policies seem to provide an environment for firms that allows or encourages them to pirate. More research is needed at the firm level to assess the effect in more detail.

Lastly, the intercept at a significant p-value shows that piracy rates had been increasing over time during this period, but has whittled down in recent years. The rate, however, does not capture the revenue losses equivalent to all digitally pirated goods. It would be best for future studies to expound.

4. CONCLUSIONS

We conclude that, to address piracy, the APEC goal of inclusive growth must be emphasized with specification to the digital platforms of SMEs. Economic activities that fuel wealth accumulation and job creation are encouraged in line with the benefits anticipated from the TPP. There is also a need to foster a more competitive environment to give consumers more choices and lower prices.

When income is unburdened with high inflation, consumers may opt to purchase digital goods in legitimate ways despite the temptation of

low cost pirated alternatives. As the use of the internet expands so does the access to digital goods. This may explain the reduction of pirated digital software as more consumers participate in the digital market and abide by legal means of purchase.

Interestingly enough the score on intellectual property rights had an insignificant effect on piracy rate. This is counterintuitive and requires further research on the dynamics of intellectual property rights in specific APEC economies. On the other hand, trade, in terms of computer and communications exports and enabling trade index, was significant but had a positive relation to piracy.

Due to the macroeconomic scope of the paper and its inherent limits, the details on why these variables behave this way. Further study is needed at a more micro level in order to examine the piracy environment in each country. Doing so would give insights in what affects piracy and its impact, thus helping greatly with agreements and policies that aim to reduce it. True enough, not all treasure is silver and gold; the real treasure lies in expounded research regarding the micro-level behavioral patterns of market agents in the digital economy to understand and address piracy.

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