# University of California – Berkeley

## The Relationship between IP Infringement and Economic Indicator

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# Introduction

Every year, the United States has suffered great economic losses due to infringements of intellectual property rights (IPRs) of U.S. business entities by infringers in both U.S. and foreign countries. Although IPRs infringement occurs in all countries, such U.S. business entities have asserted that the high infringement rates in developing countries is the main reason for their great losses. U.S. business entities put political pressures on the U.S. government and demand that it exerts pressures on developing countries to improve their IPRs protection, regarding such action as the best method to solve their problem of copyright infringement. The conventional wisdom is that such external pressures can improve actual IPRs enforcement in developing countries. The external pressures include disqualifying an infringing country by the U.S. Generalized System of Preferences (GSP) Program, using Special 301 action against any infringing country, and using the World Trade Organization (WTO) as a forum to deny both most favorable nation (MFN) status and concession on agricultural and textile products to any developing country which does not comply with The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs).

Another piece of conventional wisdom is that strong IPRs protection provided by a country is an important inducement for foreign direct investment (FDI) flowing into that country. The overwhelming concern for most developing and least-developed countries is not IPRs

protection but economic development. However, they believe that by improving their IPRs protection, they will attract more FDI to promote their economic development. In the last couple of decades, the competition for international FDI has been fierce among developing countries. Consequently, the IP laws of most developing countries have been improved significantly, even beyond the requirement of TRIPs. For example, all but three of the 30 least developed countries (LDC) in Africa are already providing patent for pharmaceutical products despite that they do not need to do so until 2016 at the earliest.

Combining these two convention wisdoms mentioned above, we have a push-and-pull model of IPRs protection where the external pressures push developing countries to improve their IPRs protection, and FDI inflow acts as an economic incentive to pull developing countries towards improving their IPRs protection.

This article examines available empirical data and has found that the above model of IPRs protection is not as accurate as it is commonly held to be. This model fails, inter alia, in the following two aspects. First, a quantitative analysis of the effect of Special 301 action on the actual IPRs enforcement in many developing countries shows that external pressure is not effective in improving actual IPRs enforcement in developing countries. For example, in the past decade, China has been constantly under heavy Special 301 pressure form U.S. to improve its actual enforcement records. However, the piracy rates of software, movie recordings, and music recordings in China are among the highest in the world.

Second, although the least developing countries recently have made significant improvements in their IP law, their shares of FDI inflow still lag far behind the world as a whole in both absolute and relative amount. On the other hand, China with one of the world's highest infringement rates in computer software, entertainment software, movie video, and music surpassed the U.S. as the world's largest FDI recipient in 2002, and has widened its lead over the U.S. as the most preferred location for foreign direct investment.

The failures of this push-and-pull model presented in the last two paragraphs put its accuracy and usefulness in doubt. Consequently, this leads to an investigation of other factors that may significant affect the actual IPRs enforcement in developing countries. The investigation reveals surprising findings which lead to a new model showing the inter-relationships among economic factors, IPRs protection, and FDI inflow and a regression model for predicting IPRs protection.

External pressure is not a factor in this new model because IPRs infringement is an economic activity that follows the basic economic rule of supply and demand. External pressure on governments of developing countries cannot change the high demand of cheap counterfeited products by poorer consumers in those countries. The suppression of the supply of counterfeited products by governments of developing countries is mostly ineffective because of corruption and their lack of resources to fight organized infringement.

The new model emphasizes the strong link between economic factors and IPRs protection, and also the strong link between economic factors and FDI inflow. Many commentators have contended that there is a link between IPRs protection and FDI inflow. This article argues that the plausible link between IPRs protection and FDI inflow is not only just a mathematical consequence of the two primary links, but also a weaker link than the two primary links. Therefore, the fundamental relationships are the two primary links.

This article presents empirical data to support that the two primary links are very strong and fundamental. The data show that there is strong correlation between economic factors such as income and corruption and IPRs protection. A regression model is presented for predicting IPRs protection based on economic factors alone.

In addition to economic factors mentioned above, this article also presents empirical data to determine the role of culture or civilization on IPRs protection. This article evaluates the cultural difference in the economical effect on IPRs protection and reveals some surprising results.

# Tables

## Political Corruption

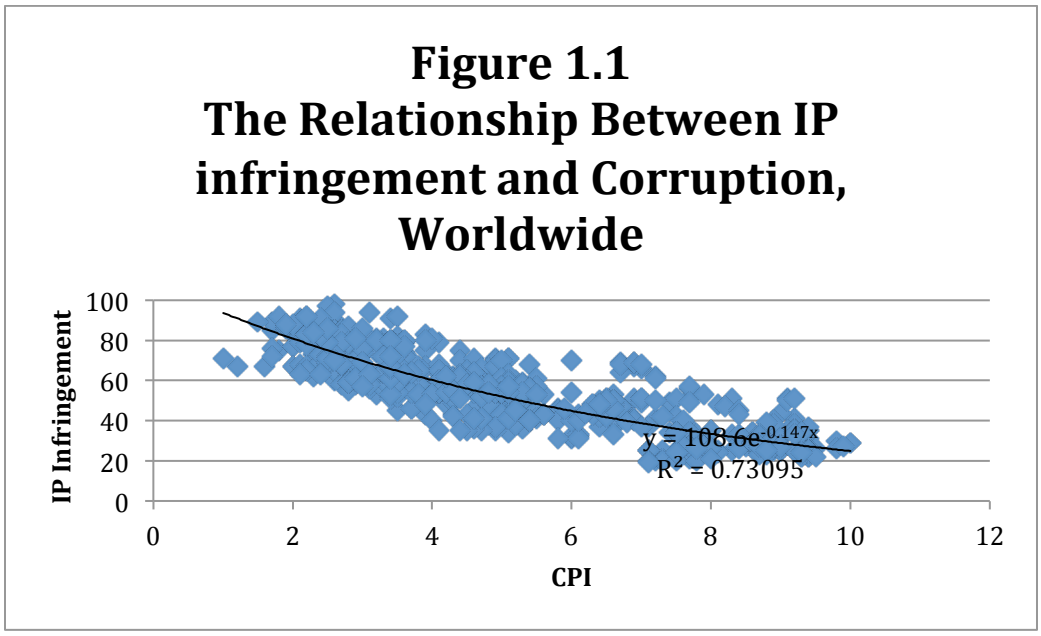



Figure 1.1 shows that the relationship between IP infringement and corruption, worldwide. After plotting all data from the Software Alliance (BSA), it shows a strong correlation between IP infringement and corruption, a negative exponential function of

$$IP\ Infringement = 108.6e^{-0.147(CPI)}$$

The strong relationship between IP infringement and political corruption is not surprising. When there is a high amount of political corruption, where politicians are routinely breaking the law, respect for relatively minor intellectual property laws is the last thing on peoples' minds. If the government breaks the law, there is less incentive for citizens to care when they break the law, especially for a relatively minor crime as intellectual property theft. However, when a country is less corrupt, people begin to feel more respect for the law, which leads to less people wanting to violate intellectual copyright.

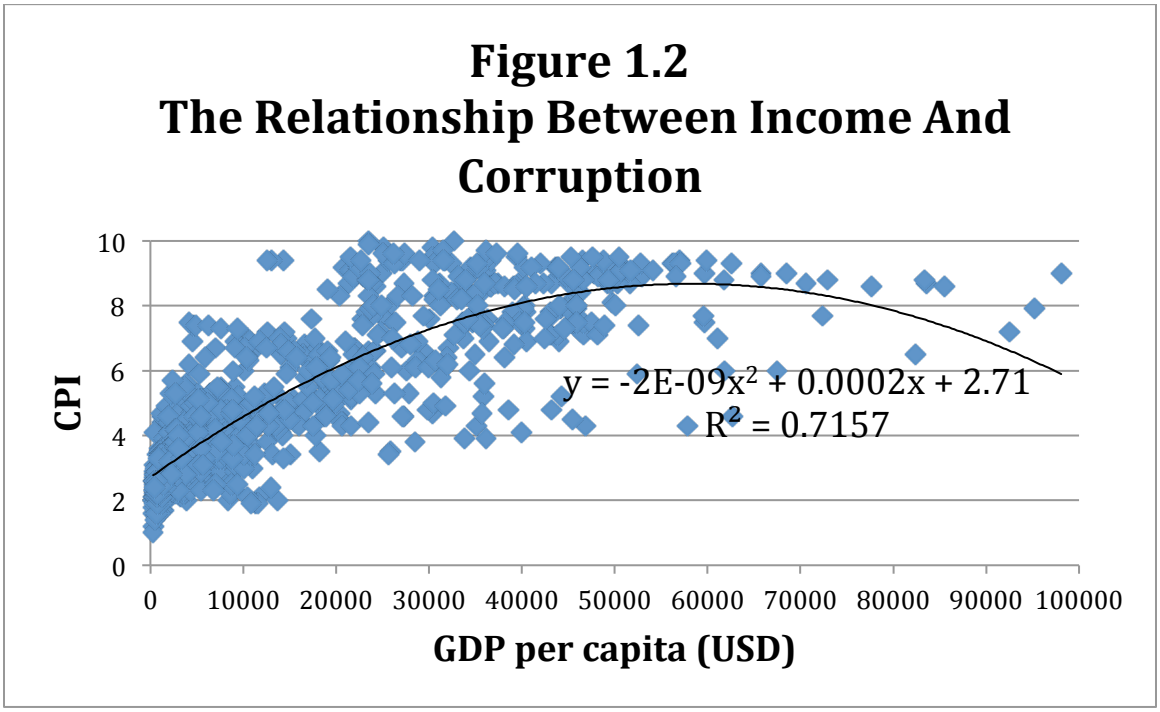



Figure 1.2 shows the relationship between GDP per capita (USD) and corruption, worldwide. Here, there is a polynomial relationship where

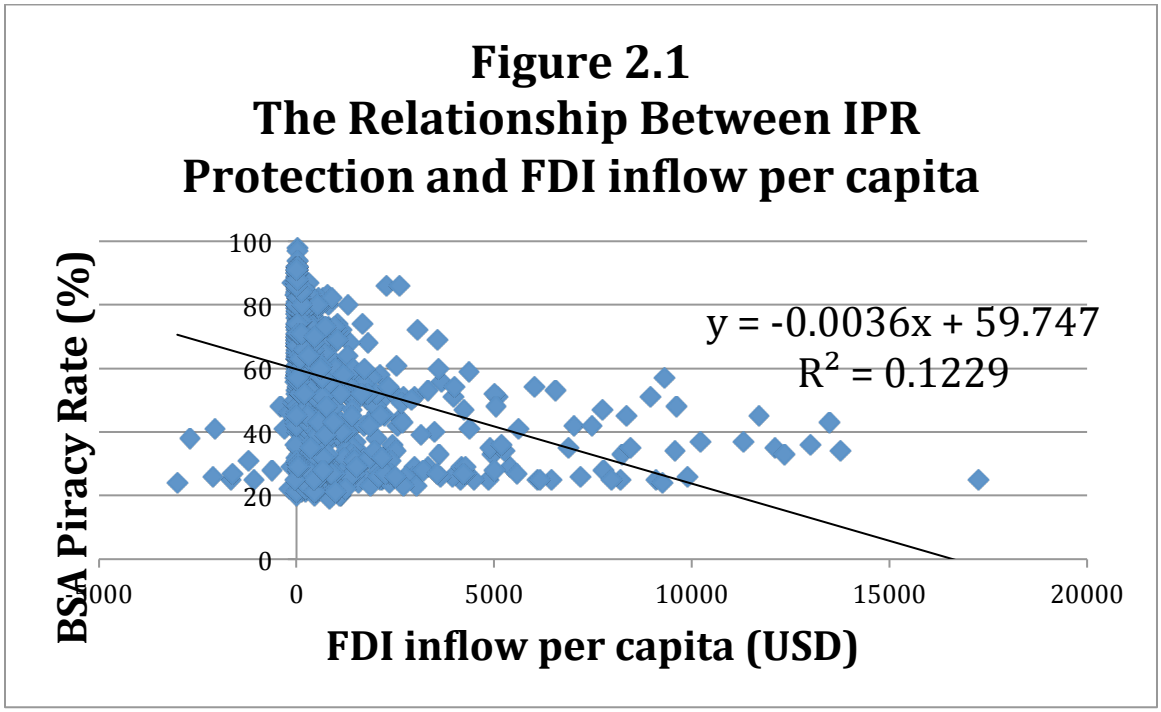
$$Corruption = -(2 * 10 - 9) * (GDP\ per\ capita)^2 + 0.0002(GDP\ per\ capita) + 2.71$$

There is a strong goodness of fit of $R^2 = 0.7157$ between GDP per capita and corruption, indicating a strong correlation between income and political corruption. The graph shows that

very low average incomes are correlated with very high corruption, and initially as income rises, corruption decreases. This relationship makes sense, as poorer countries tend to have more corrupt governments on average. However, after a certain point when a society becomes rich enough, even more average income beyond that point is correlated with more corruption, not less. This relationship is rather interesting.

The strong fit between income and corruption and between IP infringement and corruption leads us to predict that income and IP infringement are strongly correlated as well.

## Relationship Between IP infringement and other Variables




From Figure 2.1, we can see that there is little or no correlation between IP infringement and foreign investment per capita. With an $R^2$ value of only 0.1229, there is little that indicates a relationship between the foreign investment and intellectual piracy. From this, we can discard the

idea that strong intellectual property laws promote more foreign investment which leads to greater economic growth.

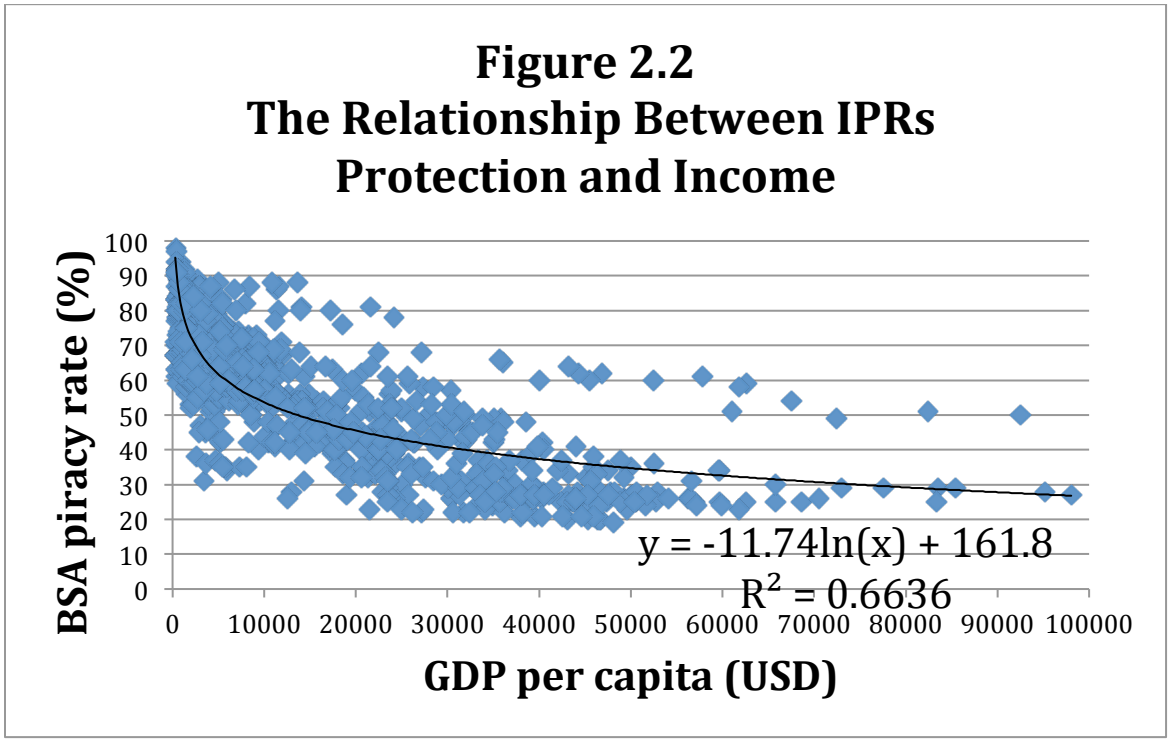



Figure 2.2 shows that the relationship between IPR Protection and income is very strong, with $R^2 = 0.66$.

$$IP\ Infringement\ Rate = -11.74ln(GDP\ per\ capita) + 161.8$$

Such a relationship between IP infringement and income makes sense, because at very low incomes, people are much more likely to pirate, seeing as they don't have the money to buy such products with the income they have. This is why college students, with low sources of income and high access to technology, pirate more on average than any other demographic. However, the effect of income on lessening IP infringement declines, as income stops becoming a barrier between legally owning these products.

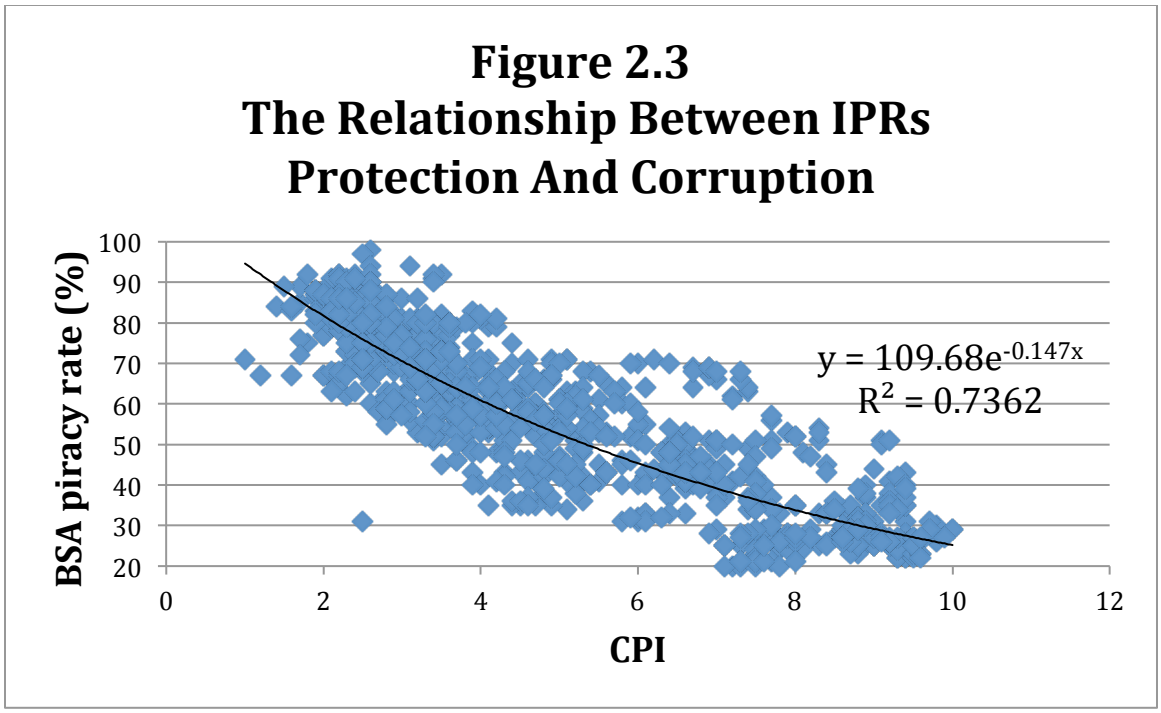



Figure 2.3 shows that there is a strong correlation between IPR Protection and Corruption with the goodness of fit $R^2 = 0.7362$.

$$(IP\ Infringement) = 109.68e^{-0.147(CPI)}$$

**Sorted data by Regions**

## I) Western Countries

a. The Relationship Between IPRs and GDP per capita

b. The Relationship between GDP per capita and Corruption

c. The Relationship Between IPRs and FDI inflow

## II) Orthodox Countries

a. The Relationship Between IPRs and GDP per capita

b. The Relationship between GDP per capita and Corruption

c. The Relationship Between IPRs and FDI inflow

## III) Latin Countries

a. The Relationship Between IPRs and GDP per capita

b. The Relationship between GDP per capita and Corruption

c. The Relationship Between IPRs and FDI inflow

## IV) Confucian Countries

a. The Relationship Between IPRs and GDP per capita

b. The Relationship between GDP per capita and Corruption

c. The Relationship Between IPRs and FDI inflow

## V) Islamic Countries

a. The Relationship Between IPRs and GDP per capita

b. The Relationship between GDP per capita and Corruption

c. The Relationship Between IPRs and FDI inflow

**Figure 3.1(a) The Relationship Between IPRs and GDP per capita for Western Countries**

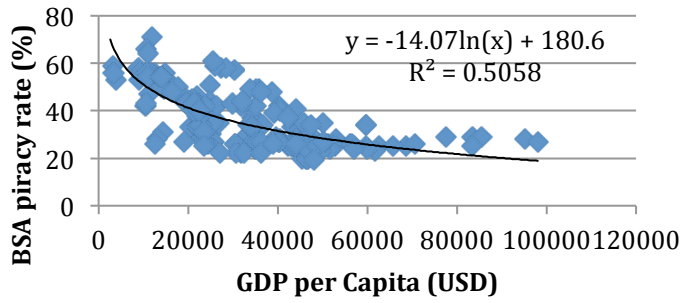
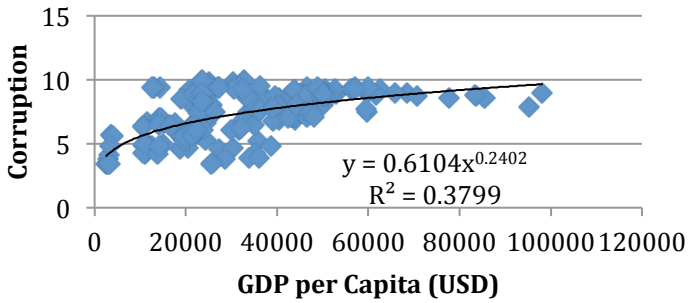
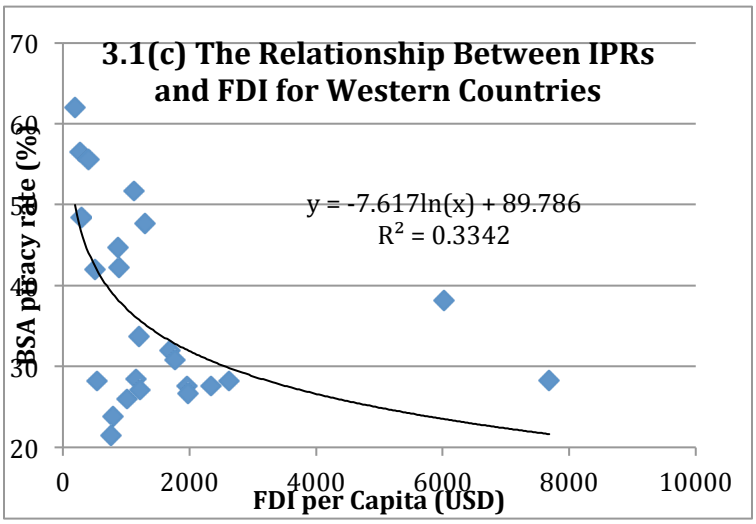
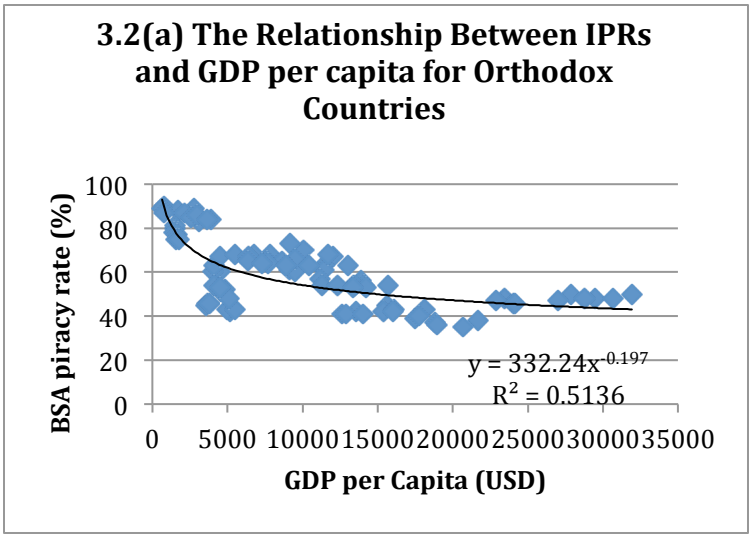


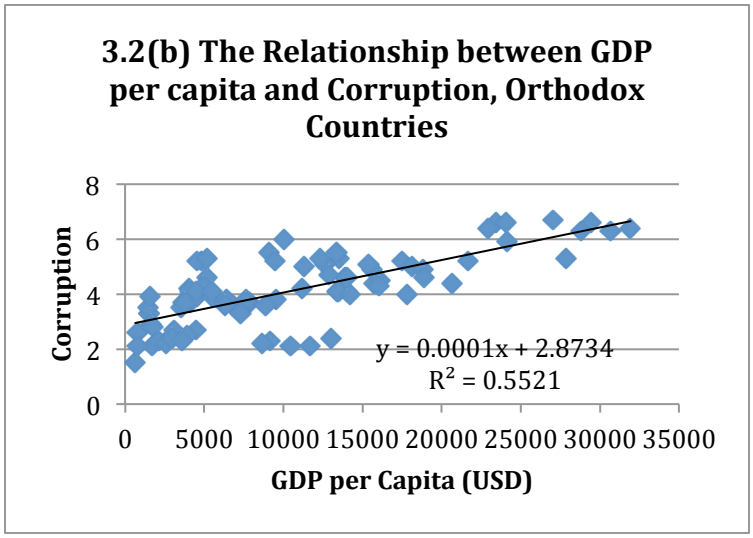

**Figure 3.1(b) The Relationship between GDP per capita and Corruption, Western Countries**




From Figures 3.1 (a), (b), (c), only (a) is reliable with goodness of fit $R^2 = 0.5058$. (b) and (c) relativel shows weak relationship between Corruption vs GDP and BSA piracy rate vs FDI resepectilvly. In Western Countries, BSA piracy rate and GDP have a negative natural logarithm relationship, meaning as BSA piracy rate increases GDP per capita decreases exponetially.



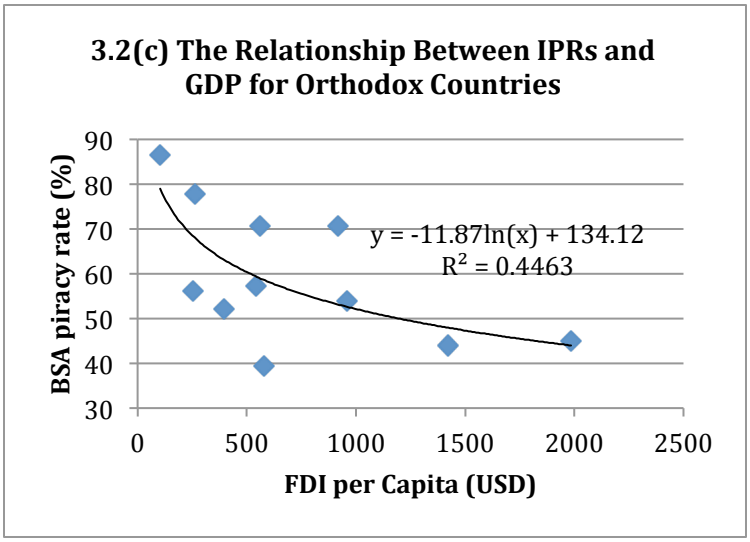
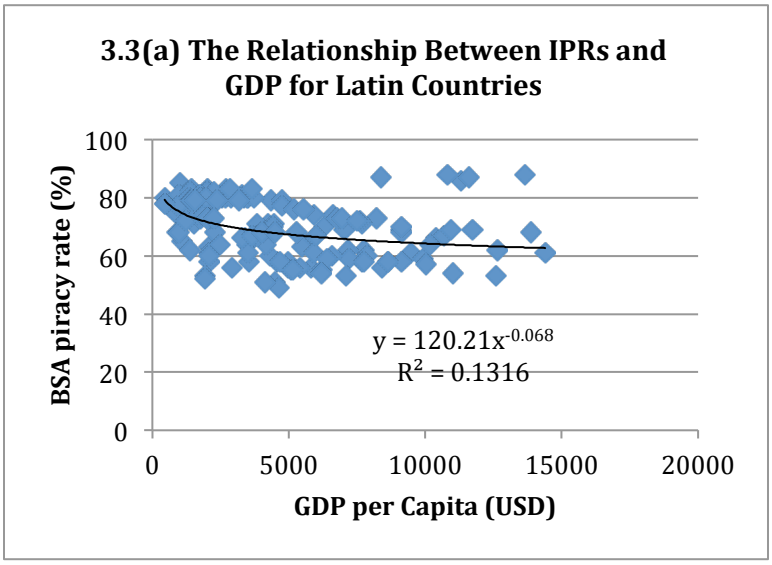
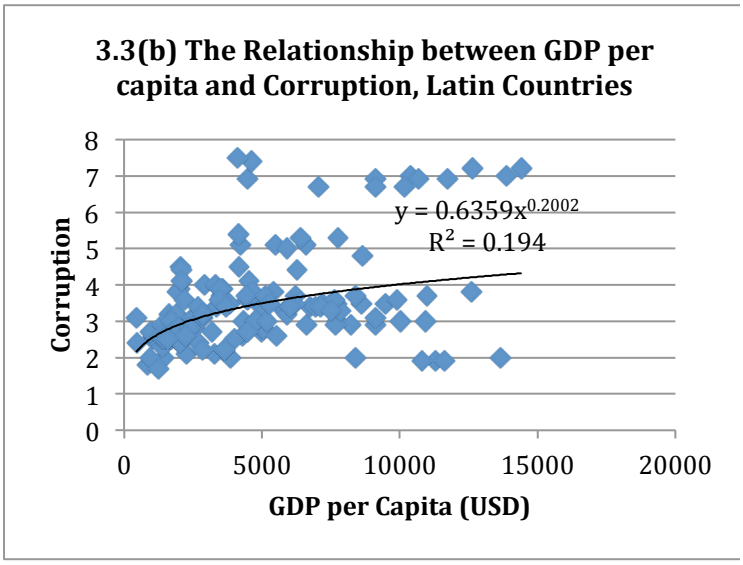
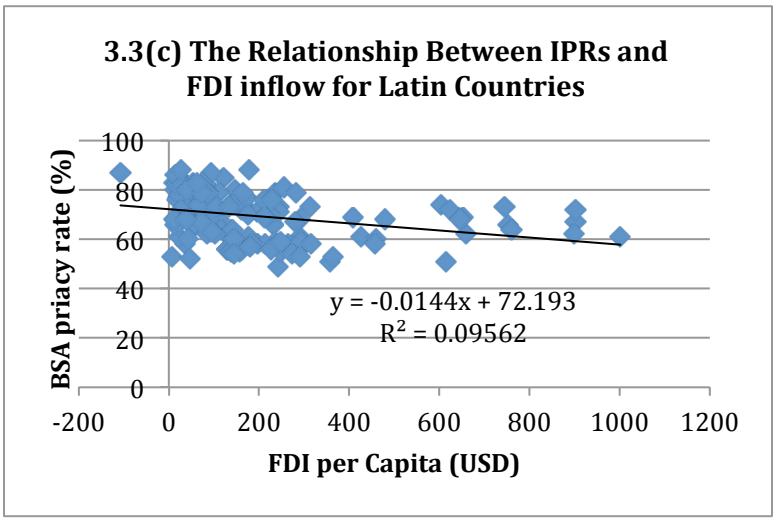



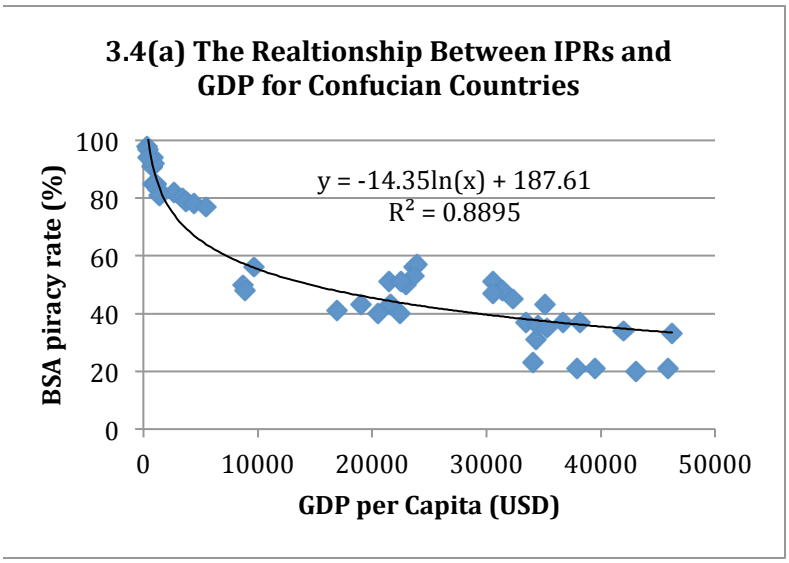

Figure 3.2 shows that (a) and (b) have fair goodness of fits, 0.5136 and 0.5521 respectively, yet (c) only has 0.4463. Figure 3.2 (a) has an exponential decrease relationship while (b) shows linearly increasing relationship. In other words, as BSA piracy rate increases, GDP in Orthodox countries decrease exponentially. However, if GDP increases, corruption in Orthodox countries increases in small increasing rate. These two graphs show that if BSA piracy rate decreases in developed countries, it won't effect as much in corruption yet their GDP keeps increasing.

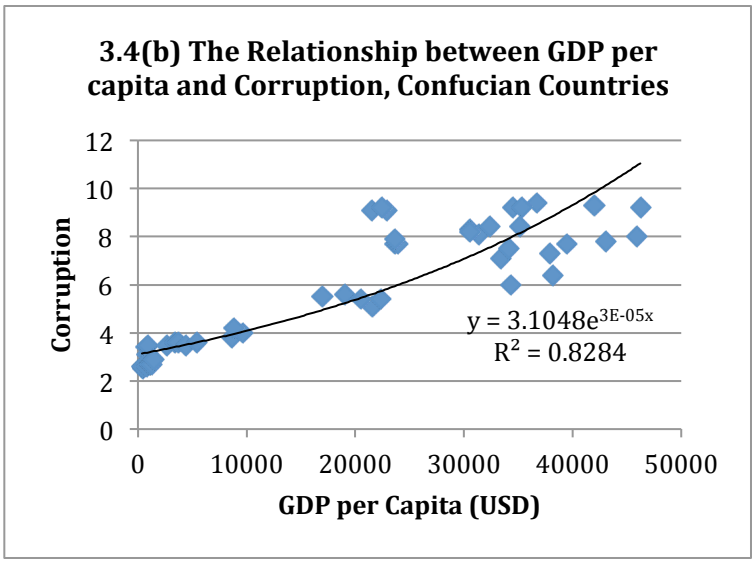


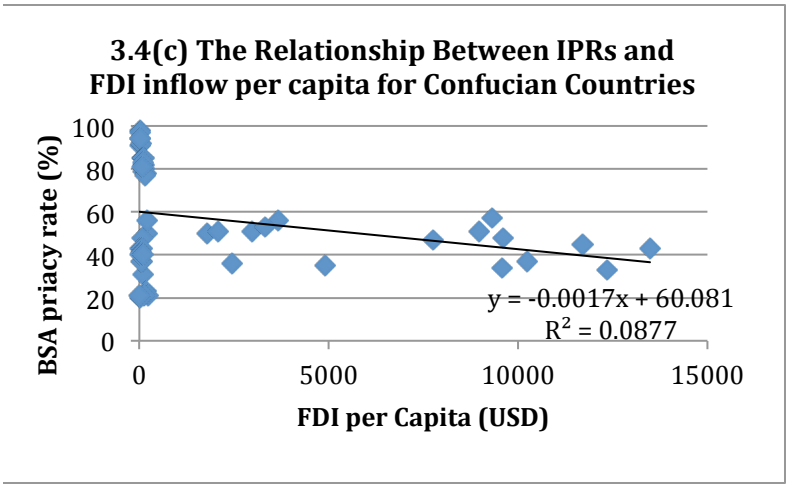




In Latin Countires, the relationship between IPRs VS GDP (a), GDP per capita vs Corruption (b), and IPRs vs FDI inflow have weak relationships respectively, 0.1316, 0.194 and 0.09562. In other words, Latin Countries do not have any relationship in Piracy and GDP growth.

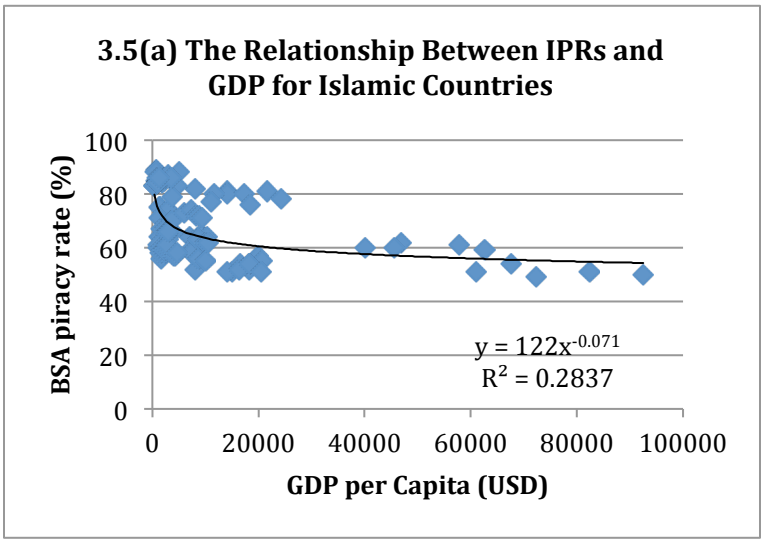


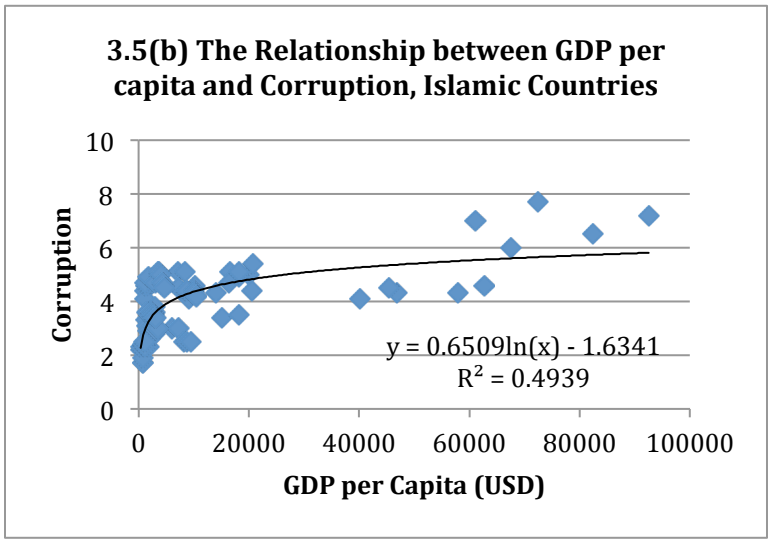



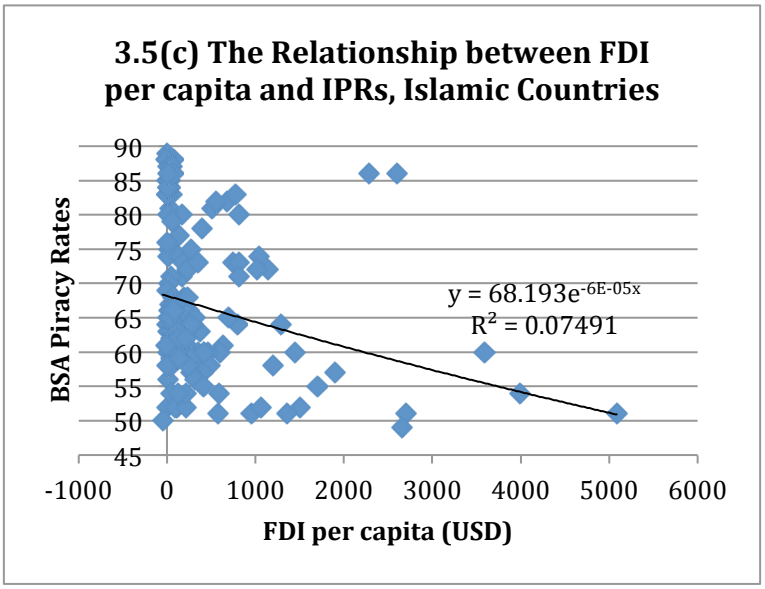




From figure 3.4(a) and (b) we can see that they have strong goodness of fits in IPRs vs GDP ($R^2 = 0.8895$) and GDP vs Corruption ($R^2 = 0.8284$) in Confusion countries. However, IPRs vs FDI inflow has really weak $R^2 = 0.0877$. From figure 3.4(a), countries tended to do more piracy when they were in low GDP in confusion countries.

However, as their GDP grows, their BSA piracy rate exponentially decreases. Yet, their BSA piracy rate does not have any relationship with FDI.




In Islamic Countries, they do not have strong goodness of fit between IPRs and GDP yet they relatively have a $R^2 = 0.4939$ goodness of fit in GDP vs Corruption. As the corruption increases, their GDP exponentially increases as well. However, Islamic countries do not have many data in high GDP because they are still developing, it is hard to tell they will exponentially grow in future.

# Conclusion

As the above data has shown, the previous model of lower IP infringement encouraging greater foreign investment per capita leading to higher economic welfare does not properly reflect reality. There is little to no correlation, both worldwide and on a regional scale, that indicates that foreign investment and IP infringement are correlated in any way. However, GDP per capita, our measurement of economic welfare, and IP infringement have been shown to have a strong relationship worldwide. In some regions, such as in Asia, the correlation has been very strong, while in other regions, such as the Middle East, the correlation is not very strong. This indicates that different regions and cultures have different attitudes towards IP infringement. For regions such as Latin America and the Middle East that have a recent history of exploitation by countries that promote combating IP infringement, such as the US, this lack of respect for IP infringement is not surprising. Viewing IP laws as another form of economic exploitation by countries opposed to their interests, it is not surprising that these countries would not follow IP laws regardless of economic well-being.

Furthermore, with the old model now discredited by our data, we must now ask whether IP infringement promotes economic welfare, or if the relationship is in the other direction. Is it that economic well-being encourages people to violate IP less often? The positive correlation of corruption with both GDP per capita and IP protection points in this direction. When corruption is low, economic welfare is high, and people are more respectful of the law, and less willing to violate that law. When corruption is high, society tends to be poorer, and people seeing their leaders violate the law regularly, have much less respect for the law, and are more willing to infringe on IP rights.