

A Panamanian Case Study of the Effect of Copyright Enforcement on the Market for Primary School Textbooks in a Developing Country

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ABSTRACT

This paper examines the effect of increased copyright protection for textbooks in a developing country. It adopts elements from a model developed by Harbaugh and Khemka (2010) to describe the market for copyrighted goods facing competition from infringing competitors. Parameters are adjusted to account for differing elasticities of demand likely associated with 1) the quasi-essential nature of textbooks for enrolled students, and 2) the presence of inequality and poverty in the market. Survey data on how primary school students obtained textbooks from the World Bank's Living Standard Measurement Survey conducted in Panama in 2003 and 2008 – before and after an increase in copyright enforcement – demonstrates the model's predicted effects.

The hypothesis tested is that stronger copyright enforcement leads to higher overall prices for textbooks, as providers of illegal low-priced copies were forced out of business and publishers costs to enforce copyrights increase along with their market power. This, in turn, exacerbates “textbook inequalities” – who is able to purchase books, who is able to obtain books through their schools, and who must do without textbooks. Analysis of the data finds that copyright enforcement had the expected effect overall. Regarding inequalities, children in rural areas (where more households experience poverty) were less likely to have books purchased by their family, and more likely to go without textbooks than children in urban areas. However, the decline in students receiving textbooks from their schools was similar for students in rural and urban areas.

Introduction

In 1996, the WTO created the first set of minimum intellectual property (IP) rules that would be enforceable through the world's trade infrastructure, the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). It was highly controversial in the global South. Intellectual property protection confers greater market power – often monopoly power – to producers, leading inevitably to higher prices for consumers while it remains in force. This is considered one side of a bargain in which higher prices incentivize further investment in the creation of new patented inventions or copyrighted works.

During the negotiation of the TRIPS Agreement, however, developing countries that argued that they were net importers of intellectual property, so while they would be face higher prices for IP-protected goods, the incentivized innovation would take place in the North. In their view, stronger protection of intellectual property rights would amount to a transfer of rents from richer countries to poorer ones. Yet TRIPS was included in the deal to establishing the WTO, so it was part of the price paid by developing countries to gain access to developed country markets (Sell, 2001). Since then, many developing countries have passed even stricter IP laws and increased enforcement of them. In many cases this has been due to pressure from developed country governments, either through trade pressures, subsequent trade agreements, or through other types of diplomacy. Picard et. al. (2007) note that many developing countries have passed IP laws clearly outside of their self interest in response to these trade pressures, and Deere (2008) provides a good overview of the politics involved in pressuring the South to adopt the stronger IP policies developed for Northern markets.

Textbooks, protected by copyright yet often illegally copied, are an example of goods that may be affected by stronger IP protection (Chon, 2007). They are an important tool for education, which is largely agreed to play an important role in economic development (Cremin and Nakabugo, 2012).

This paper will examine the effect of increased copyright protection for textbooks in a developing country. It adopts a model developed by Harbaugh and Khemka (2010) to describe the market for copyrighted goods facing competition from infringing competitors. Parameters are adjusted to account for differing elasticities of demand likely associated with 1) the quasi-essential nature of textbooks for enrolled students, and 2) the presence of inequality and poverty in the market. Finally, survey data from the World Bank's Living Standard Measurement Survey conducted in Panama in 2003 and 2008 – before and after an increase in copyright enforcement – demonstrates the model's predicted effects.

The hypothesis to be tested is that stronger copyright enforcement leads to higher overall prices for textbooks, as providers of illegal low-priced copies were forced out of business and publishers costs to

enforce copyrights increase along with their market power. This, in turn, exacerbates “textbook inequalities” – who is able to purchase books, who is able to obtain books through their schools, and who must do without textbooks.

Literature Review

The economics literature on textbook publishing in developing countries is very thin, so my review includes literature on copyright economics in developed countries as well as other literature that describes demand for essential goods in developing countries.

General Literature on the Textbook Market

Most of the economics literature on copyright focuses on developed markets, the producer, or both. However, many of these articles describe market conditions relevant to the present study. They provide a framework for a model of a textbook market in which producers are legally supposed to have a “monopoly” on a copyrighted product, but in reality compete with various secondhand sources – both legal and illegal – which may undercut them.

Png and Chen (1999) examine the difference in returns to social welfare resulting from two different ways that copyright owners can respond to piracy – through lowering prices to increase volume of legitimate sales or through greater monitoring and enforcement. Their model includes decision making by potential buyers, and perceived differences in quality between original products and illegal knockoffs. Customers may choose between paying full price for the original good, a lower price for the illegal, possibly inferior good, and not buying the good at all. Png and Chen’s paper’s main contribution is to layout a model in which the decisions of consumers and producers feed off of one another in a market with significant amounts of piracy. It is written from the point of view of a software producer, and does not take into account developing country concerns, but many subsequent papers incorporate these basic assumptions.

Picard et. al. (2007) consider consumer utility and copyright enforcement from a macroeconomic standpoint, asking what the best policy is for the government to pursue, noting that many countries are obliged to increase copyright protection beyond the national-welfare maximizing point by trade obligations. Citizen utility depends on consumption of both legal and illegal goods, and the overall return on illegal activity is negatively related to amount of resources spent enforcing the international treaty obligations. Furthermore, the total amount of illegal activity has a negative impact on production of the legal good. Countries without large domestic industries reliant upon copyright will be better off with weaker copyright enforcement. (Annual reports from the Latin American publishers’ trade group confirms that the majority of textbooks that enter the Panamanian market each year are imports. (CERLALC, 2012))

Other studies have examined the resale market, which also competes with publishers of new textbooks. Miller (1974) argues that secondary textbook markets will force publishers to up new good prices in order to extract maximum possible profit from the onetime sale of a new good. Ghose et. al. (2006) disagree, describing the addition of digital markets for textbooks in the United States as overall utility-enhancing, because greater competition leads to lower prices for consumers. Ghose et. al.'s model share Png and Chen's assumption that most of the cost of production is fixed costs up front. The cost of the paper and binding of each legitimate copy is a small proportion of the overall cost of production.

Arnold and Saliba (2003) use the online college textbook market to test a theoretical model of persistent price dispersion in a market with homogeneous products and perfect information about the prices charged by multiple firms. They argue it is the cost and uncertainty of finding the lower priced good that drives some consumers towards the higher priced good in this model. Some consumers' value of convenience and certainty drive them toward the higher-priced product, allowing firms to compete against lower-priced competitors for the nearly-exact same good. Hausman and Leonard (2002) argue that consumer utility is shaped both by the use of a product and the expected return from a future sale of that product.

Though these studies focus on second hand markets in developed countries (and often online), their insights are useful to the present paper. Developing country textbook markets will also have second hand markets that raise overall utility (especially for those who would be priced out of the higher priced new-copy market. Yet there will still be some consumers who are able to pay the markups for the new texts from the seller.

Harbaugh-Khemka (2010) offer a model that I adopt in this paper, to be described in more detail below. The model includes 1) separate demand functions for new books from the publisher and illegal copies of books; 2) the related elements of quality and a subset of consumers willing to pay relatively higher prices for newer books, and 3) a way to explain the effects of copyright enforcement in the consumer market – as the expected price of a copy rises, the price of all books rise, forcing some people to pay more and some people to leave the market.

Literature on Demand for Necessities in Societies with Inequality and Poverty

Literature on the demand for essential goods describes how different levels of wealth may affect demand elasticities. Much of the literature (though not all of it) focuses on medicines – another type of good that is protected by IP, but which may face competition from both legal and /or illegal sources (generic manufacturers and /or counterfeits). Demand for necessities is known to be relatively inelastic. If prices rise, demand may still be robust, at least for the relatively well-off consumers. Schut and van

Bergeijk (1986) showed precisely this type of elasticity for pharmaceuticals. This type of inelasticity is relevant to this study because textbooks may be thought of as quasi-necessities. Though not as essential as food or shelter, students enrolled in school are generally required to have textbooks, so consumers able to afford textbooks should have a relatively high willingness to pay for either a legal or illegal copy.

Second – and despite the quasi-necessity status of textbooks – developing countries will have significant segments of the population unable to afford textbooks. People in groups more likely to be poor will have higher demand elasticities, and will be more likely to be priced out of the market. Dubihlela and Sekhampu (2014) have shown empirically that elasticities for many household necessities vary with levels of poverty in the South African township of Bophelong. The very poor were more likely to react to price changes for goods like staple foods, electricity, and transportation. Wong (2002) studies the demand for patented pharmaceuticals in a cross section of countries with varying degrees of income inequality. She finds that demand is partially determined by income distribution and poorer people have higher elasticities than richer ones, despite the fact that medicines are often necessities.

Hollis and Flynn (2008) build on Wong's paper, describing this type of demand structure for essential goods in unequal societies leads to highly convex demand curves. Studying national pharmaceutical markets, they propose that the demand for essential goods is partially dependent on income distribution. Low elasticities of demand at higher incomes and high elasticity at lower incomes lead to more convex demand curves, indicating that small changes in price will lead to big shifts in demand for large segments of the population with low incomes.

Other Factors Regarding Copyright Infringement and Enforcement in the Global South

It is well known that there is an abundance of illegal copies of copyrighted goods in the South. The chief economist of the World Intellectual Property Organization acknowledges that infringing goods of all types are often favored over relatively expensive originals, as resource constraints leave consumers more willing to accept possibly lower-quality substitutes. One reason for this is that the cost of copyright enforcement is high. It is high for rightholders relative to the potential returns from small markets, and high for governments that must meet a variety of other policy goals with limited resources (Fink, 2008). The cost of copyright enforcement is often overlooked in economic models, but it is a positive cost that is at least partially borne by firms and thus may be passed onto consumers.

The Model

The Harbaugh-Khemka Model

Harbaugh and Khemka develop a model of “widely applied” copyright enforcement, meaning that the enforcement includes actions against large-and-small scale sellers, rather than only the large entities engaged in piracy. The model includes two types of sellers, copyright owners and illegal competitors, and it considers both price and quality. Goods sold by the copyright owner are considered to be higher quality than illegally copied goods.

The quantity of copyrighted goods demanded by the entire market is considered a continuum $q = [0,1]$, which forms the horizontal axis of the familiar demand graph. Each point along the horizontal axis represents a consumer, and the distance between two points on the axis is a percentage of total demand. The buyers’ willingness to pay (demand) for a new book from a publisher is represented by the downward sloping function $V(q)$ and their willingness to pay for a copy is $v(q)$. Since new books are thought to be of greater quality, $V(q) > v(q) > 0$ at every point along the axis. The producer will set a price that maximizes its profits, given $V(q)$, which is influenced by the degree of competition it faces from copies. Consumers who value the quality of the new books at or above this price will purchase new books from the publisher. Others will obtain illegal copies at price points along $v(q)$.

The function for illegal copies, $v(q)$, is actually an *expected* price, which is a function of the actual price paid to the seller, additional transactions costs if there is effort involved in locating or evaluating the quality of the copy, and the risk of having illegal copies confiscated. In the absence of copyright enforcement, this risk is equal to zero.

When copyright enforcement is introduced to the Harbaugh-Khemka model, it effects the expected price of illegal copies. Copyright enforcement may drive people selling pirated goods out of the market, thus raising the search and other transactions cost for the end consumer, and/or it may raise the risk that the consumer will be caught with an illegal good, and it will be confiscated. This enters the model as a uniform cost c that is added to $v(q)$ in the expected price of an illegal copy. Consumers with the lowest willingness to pay would will no longer purchase illegal copies if he expected the price is lower than the cost of enforcement (if $v(q) < c$). Assuming that copyright enforcement is wide enough to affect buyers at the individual level, it will allow sellers to raise their prices across the board. As the market for copies dries up consumers are pushed out of the market, copyright owners face less (possibly no) competition from low-priced copies, and the extra market power allows them to raise prices.

Adaptation of Harbaugh-Khemka to the Textbook Market in the South

This paper adjusts the Harbaugh-Khemka framework for the purpose of explaining the textbook market in the South. First, the original Harbaugh-Khemka model has only two tiers of seller (publisher v. illegal seller), but textbook markets in both the North and the South include many types multiple sellers of

used books. These may be individual or commercial, and may operate through stores, informal markets, or online. The distribution of textbooks also includes family members and friends who may give or loan books. (Secondhand sales or gifts may be previous issues, and may be marked up, so are of lower quality.) The expanded model considers that a potential book buyer has many options to choose from, including publishers, the variety of second hand sellers, and sellers of illegal copies. The paper refers to any of the goods that are not legitimate new copies from the publisher as “competitor copies.” For simplicity, the revised model will list still two demand functions, one for originals and one for competitor copies, but the latter now represents multiple types of seller, some legal, some not.

Second, Harbaugh and Khemka present their model using linear demand functions, but this revised model uses convex demand functions, indicating a lower elasticity of demand at the higher prices, but a high elasticity of demand at the lower prices. This accounts for the fact that people with the lowest income will have the most difficult time adjusting to a change in price. The functions for originals and competitor copies, therefore have the following qualities:

$$\begin{aligned} D_{\text{pub}}'(q) < 0 \quad \text{and} \quad D_{\text{copy}}''(q) < 0 \\ D_{\text{pub}}''(q) > 0 \quad \text{and} \quad D_{\text{copy}}''(q) > 0 \end{aligned}$$

Third, the model is adjusted to account for the fact that some potential consumers will be unable to purchase books at any price, even before enforcement raises the expected price of copies. The assumption that all consumers have a willingness to pay that is greater than zero is replaced by the assumption that all consumers have a willingness to pay that is greater than or equal to zero:

$$D_{\text{pub}}(q) > D_{\text{copy}}(q) \geq 0$$

Fourth, the revised model assumes – as explained in Hollis and Flynn – that more unequal segments of the population will have more convex demand functions. A more convex demand function leads to greater elasticity on the far right of the demand curve. A raise in the price (or expected price, due to enforcement) would price more people out of the market when the tail of the curve is flatter.

Finally, enforcement does not come free for the publishers, as pointed out by Fink. In order to make enforcement work, publishers must monitor markets and work with police and prosecutors to ensure that illegal copies are taken off of the market. This raises the publishers’ cost function, and leads to higher prices for new textbooks.

The adapted model is illustrated in Figure 1. The horizontal axis represents the continuum of potential consumers running from 0 to Q_{total} , which represents the full market. D_{pub} and D_{copy} are convex demand curves with the properties described above. Note that neither demand curve extends to point Q_{total} ,

because there will be some share of the population unable to access books no matter what the cost. Without copyright enforcement, the price charged by the publisher is P_{pub} , which is sold at quantity Q_{pub} . The publisher will sell to the segment of the market between 0 and Q_{pub} , because this is the segment that is willing to pay prices P_{pub} or higher for new books. The quantity between Q_{pub} and Q_{copy} represents the segment of the market in which consumers choose to buy competitor copies, and the segment to the right of Q_{copy} represents those who will not buy books.

Enforcement is added to the model as represented by the red horizontal line c . This shows the cost of enforcement to potential consumers, raising the expected price. Consumers with the lowest willingness to pay (for whom $D_{copy} < c$) can no longer afford low priced illegal copies, and are now priced out of the market. This unserved portion of the market increases from $Q_{total} - Q_{copy}$ to $Q_{total} - Q_{copy}'$.

Since the seller incurs a cost to enforcement its copyrights, it will raise prices to the point that maximizes its profits. This increase in price of new books from the publishers is represented by the movement along D_{pub} from P_{new} to P_{new}' and the corresponding quantity of books from the publisher falls to the segment of the graph between 0 and Q_{pub}' . The segment between Q_{pub}' and Q_{copy}' is the area of the market that is still served by the lower priced competitor copies (some of which may or may not be still illegal).

It should be noted that “consumers” in a developing country textbook market may include students (or their families) as well as school districts, local governments, civil society groups or international IGOs such as the World Bank. These bulk buyers may be as sensitive to price as consumers if they have fixed budgets for the purchase of textbooks.

Case Study: Panama

This section of the paper examines changes to the market for primary school textbooks in Panama before and after an increase in copyright enforcement, after a very brief overview of the educational system and policy changes in the between 2003 and 2008 regarding copyright enforcement.

Education in Panama in the mid-2000s.

During the mid-2000s, education was compulsory for children in Panama, and attendance rates were high. The government acknowledged that the education sector had been underfunded, and it was working with international aid agencies to increase funding. Some of these efforts focused on traditionally under-resourced segments of the population. The government initiated projects in 2004 to improve education at the primary level, which included building new facilities, repairing older ones, and purchasing textbooks for schoolchildren. The World Bank provided extra funding for outreach to indigenous areas (Harris, 2007).

The government also gave assistance to children in rural areas to attend school as part of a program to eradicate child labor (Government of Panama, 2012). By 2011, however, government spending on education remained low, and there were still significant disparities between the adequacy of funding in urban and rural schools. One bright spot was that promotion of education for females through secondary school seemed to have paid off, and girls tended to remain in school for slightly longer than boys (CIA, 2012).

Textbooks were provided freely for a significant-but-minority share of primary school students. According to the World Bank LSMS data, approximately 40% of primary school students in 2003 and 30% of primary school students in 2008 received books free. In both cases, the majority of free books were given to students in rural areas.

The market for textbooks in Panama is relatively small, and dominated by foreign publishers. Data from the CERLALC – a group representing Latin American publishers – shows there were only 628 new books registered with ISBN numbers from Panama in 2008, and the nation consistently imports more books than it exports to the U.S., EU and the rest of Latin America. (CERLAC 2012)

Policy Change Regarding Copyright Enforcement

In the early 2000s, a trade group of American publishers known as the International Intellectual Property Association complained that large scale piracy of textbooks was common in Panama. It sought the intervention of U.S. trade officials, noting that "the major forms of piracy afflicting the U.S. book publishing industry in the region involve commercial photocopying piracy" (IIPA, 2004). Panama was engaged in various trade negotiations with the U.S. in the early-to-mid 2000s (first as part of the failed Free Trade Area of the Americas, then as a party to bilateral trade agreement negotiations which were ultimately successful), giving the U.S. leverage to seek policy changes regarding the enforcement of copyrights.

Following interventions by the U.S., Panama strengthened enforcement of copyrights in the mid-2000s. Laws passed in 2003, 2004 and 2007 increased civil and criminal penalties for both large scale and small scale infringement.¹ Additional administrative rules at the federal level were enacted in 2006.² With support from the U.S. State Department, Panama held a series of trainings for police officers and judges to teach them to enforce the laws more strongly (U.S. Dept. of State, 2004). Panama's improved enforcement of copyrights over this period was reported by the U.S. Trade Representative in its annual Special 301

¹ Law No. 45 of June 9, 2003, Law No. 1 of January 5, 2004, Law No. 14 of May 18, 2007. All available at the World Intellectual Property Organization "Lex" database. <http://www.wipo.int/wipolex/en/profile.jsp?code=PA>

² Resolution No. 013 of 9 March 2006, cited as proof of stronger copyright enforcement in the WTO Trade Policy Review, 2012.

Review of other countries' intellectual property law (U.S. Trade Representative, 2004), and by the World Trade Organization in its Trade Policy Review (WTO, 2007).

Data Description

Data on how primary school students obtained (or failed to obtain) textbooks is taken from the World Bank Living Standards Measurement Surveys (LSMS) of Panamanian households. They contain data from 2003 and 2008 – before and after the strengthening of copyright enforcement in the mid-2000s. This allows an event study that examines consumption methods before and after the policy change. Survey respondents were asked how each student in their household obtained books – whether they purchased books, rented books, received books from school, received books at a discount through the school, borrowed books, received books as a gift, photocopied books, or whether they did not have books.

There were 3723 respondents in primary school in 2003 and 3952 in 2008 (parents answered the survey on behalf of children). These include sizable subsamples from all of the income deciles, though there were more children in the lower income deciles than from the upper income ones. The dataset includes 10% more males than females in 2003 and 14% more males than females in 2008 from both rural and urban environments, and both female and male. It includes 40% more rural than urban students in 2003 and 44% more rural than urban students in 2008. Note that different households surveyed in each period, so the dataset is not a panel dataset.

Table 1 shows how students in the sample obtained textbooks in each year, before and after the strengthening of copyright enforcement.. 9% of students had no books in 2003, but 17% had no books in 2008. There was an increase in the percentage of students whose families purchased textbooks (from 37% to 42%), but there was a larger decrease in the number of students receiving books from their schools (from 40% to 30%). Together, these three outcomes account for 87% of the observations in 2003 and 90% of the observations in 2008, so the logit regressions described below use these three outcomes as dependent variables. The changes are demonstrated graphically in Figure 2, which illustrates that the increase in the percentage of students with purchased books was more than offset the decreases in other ways students obtained books, resulting in an increase in the number of students without books.

The dataset includes data on prices paid by those who purchase books. It shows an increase in the prices paid by consumers that exceeded inflation, but the figures must be treated with caution. The price data does not differentiate between the prices paid for original books from the publisher, secondhand books, or illegal copies. Respondents who purchased books were asked to report the price paid for their textbooks for the school year, and the question instructs them to give the price whether they purchased a book or a photocopy of a book. In 2003, the average expenditure per student on textbooks, among those

who purchased books, was 24.70. In 2008 it was 36.93. This amounts to a nominal increase of 49%. In comparison, the overall rate of inflation (as measured by the overall growth in consumer prices) over the period was 10.5%³.

Analysis of rural and urban likelihoods of textbook outcomes

This section tests the hypothesis that some communities will be more effected by copyright enforcement than others. Students in communities with greater levels of poverty and inequality will be less likely to obtain textbooks because their 1) their families may be unable to afford to purchase books, and 2) they may attend schools which have historically lacked resources.

In the mid-2000s there was a great deal of inequality between the rural and urban communities in Panama. Two variables from the LSMS illustrate: 65% of rural respondents in 2003 and 76% of rural respondents in 2008 said that their household had experienced poverty (had fallen below a consumption-based poverty line) at some point in the last year, relative to 23% of urban respondents in 2003 and 29% in 2008. Furthermore, the distributions of consumption were different in the different sectors. In both 2003 and 2008, overall consumption in the rural sector was both lower and more skewed, indicating both greater poverty and inequality.

The raw breakdown of rural and urban responses to the survey question asking how they obtained textbooks is presented in Table 1(b) and 1(c). It is clear from casual observation that a larger percentage of students in rural areas were more likely to have no textbooks than their counterparts in urban areas. In both periods, urban students were more likely to purchase books than rural, and the increase was larger for urban students. In both periods, many more rural students were likely to receive textbooks from school. The decrease in the number of students obtaining books from school was smaller for rural students.

The hypothesis is tested using a series of pairs of logit regressions (one for each year), in which the dummy variable *rural* is the independent variable of interest, and control variables from the LSMS dataset are added. Gender is entered into the equation using the binary variable *female*. Consumption is entered into the equation via an ordinal variable indicating each student's household's decile of consumption. A set of eleven dummy variables to controls for the twelve Panamanian provinces. I run pairs of regressions on three binary dependent variables: *nobook*, *fromschool*, and *purchase*, which equal 1 if the student had no textbooks, obtained them freely from school, or had a member of the family purchase books, respectively.

Table 2 presents the results, with the location dummies omitted for presentation purposes. Column (1) presents the results for the regression on *nobook* in 2003, and the marginal effect of the rural dummy is

³ World Bank Development Indicators.

statistically insignificant. This indicates that before the strengthening of copyright enforcement, there was no significant difference in the likelihood that a rural student or an urban student would be unable to obtain a textbook. For 2008, however, the marginal effect is positive and statistically significant to the 99% level, indicating that a rural student was 6% more likely to be unable to obtain a textbook than an urban one.

The logit regressions on *school* shown in columns (2) and (3) have positive, highly significant coefficients on the *rural* independent variable, with similar marginal effects in each year (17% in 2003 and 16% in 2008). These indicate that rural students were more likely to receive books from school than urban students, and this did not change after the policy change.

The logit regressions on *purchase* have negative coefficients on *rural* that are significant at the 99% level in both years, and the marginal effect grows after the policy change. Rural students were 17% less likely to purchase textbooks than urban students in 2003, but in 2008, they were 69% less likely to purchase textbooks than urban students.

The control variable for gender (*female*) is insignificant in all of the regressions for 2003, indicating no significant difference between male and female students in the way they obtained or failed to obtain textbooks. However, female students were less likely to obtain books from their schools and more likely to purchase them than male students after copyright enforcement was strengthened. The coefficients on the consumption decile variable (*decile*) are significant at the 99% level for all regressions. As expected the likelihood a student will have no textbooks is negatively related to income and the likelihood she will purchase a book is positively related to consumption decile. The likelihood that a student received books from school is negatively related to consumption decile. Most of the dummies used to control for the province in which student households are located (omitted from Table 2) are significant at the 95% or 99% level, indicating differing levels of access to books among provinces in Panama.

Discussion

There are three points made by the analysis of Panamanian household survey data above. First, prices were observed to rise, and to rise more quickly than overall consumer goods. This shows the expected positive relationship between intellectual property enforcement and prices. Though the available data does not provide a detailed account of the prices paid in different transactions, it does demonstrate at the birds-eye level that those who purchased books paid higher prices.

Second, an increase in enforcement was followed by changes in how students obtained, or failed to obtain textbooks in Panama. Most students either obtained books freely from their school, purchased books out of pocket, or failed to obtain them at all. After the policy change, there was an increase of students

purchasing books at higher prices, but this was offset by a larger decrease in the percentage of students obtaining books from their schools. The percentage of students without access to textbooks rose from 9% to 17%.

Third, the hypothesis that the strengthening of copyright enforcement would have an unequal effect on different segments of students was proven correct, though not entirely as expected. Rural students were more likely to be unable to obtain textbooks, and were less likely to purchase textbooks than their urban counterparts. However, the change in policy did not affect the difference in the likelihood that students in rural as opposed to urban areas would receive books from their schools. This may indicate that the programs instituted by the Panamanian government and the World Bank remained committed to maintaining a sense of balance in the distribution of textbooks in the face of a price increase. Overall, fewer books were distributed, but rural students did not bear the brunt of the decrease in distribution.

It was surprising to see that female students seemed to adjust to the price change as-well-or-better than male students. After the increase in enforcement, the likelihood that a female student (or her family) would purchase textbooks was 15% higher than the likelihood that a male student would purchase them. This indicates a social commitment to educating girls, and deserves greater analysis in future studies.

Two policy implications follow from this research:

- Governments that strengthen copyright enforcement should be prepared to allocate more money in their education budgets for textbooks, which are likely to become more expensive. In doing so, they should be mindful of communities with higher levels of poverty
- It may be wise to consider greater uptake of free textbooks available under open copyright licenses. Such textbooks could be legally distributed, and the only cost to the educational system would be the cost of printing them. Civil society groups and governments in various countries have been investing in the creation of free textbooks. The quality and availability of these books has been growing, and may offer a way to free up funds that could be spent on other types of educational needs.

Further research on the effects of copyright enforcement on textbook markets would be useful to further test the assertions made in this paper. If data allows, research that analyzes different prices for new, second hand, and illegally copied textbooks before and after a change to copyright policy would allow policy makers to see more specific effects of that policy change. Research that compares data in different countries might be able to prove that price movements in response to policy changes apply generally, regardless of any country's particular situations.

Appendix: Figures and Tables

Figure One: Increase in the enforcement of copyrights in a market for textbooks

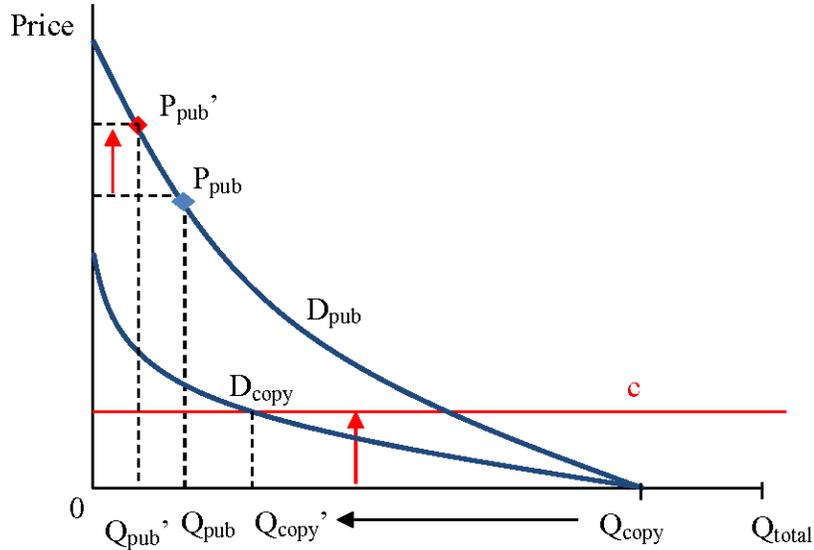


Figure 2: How primary school students obtained, or failed to obtain, textbooks

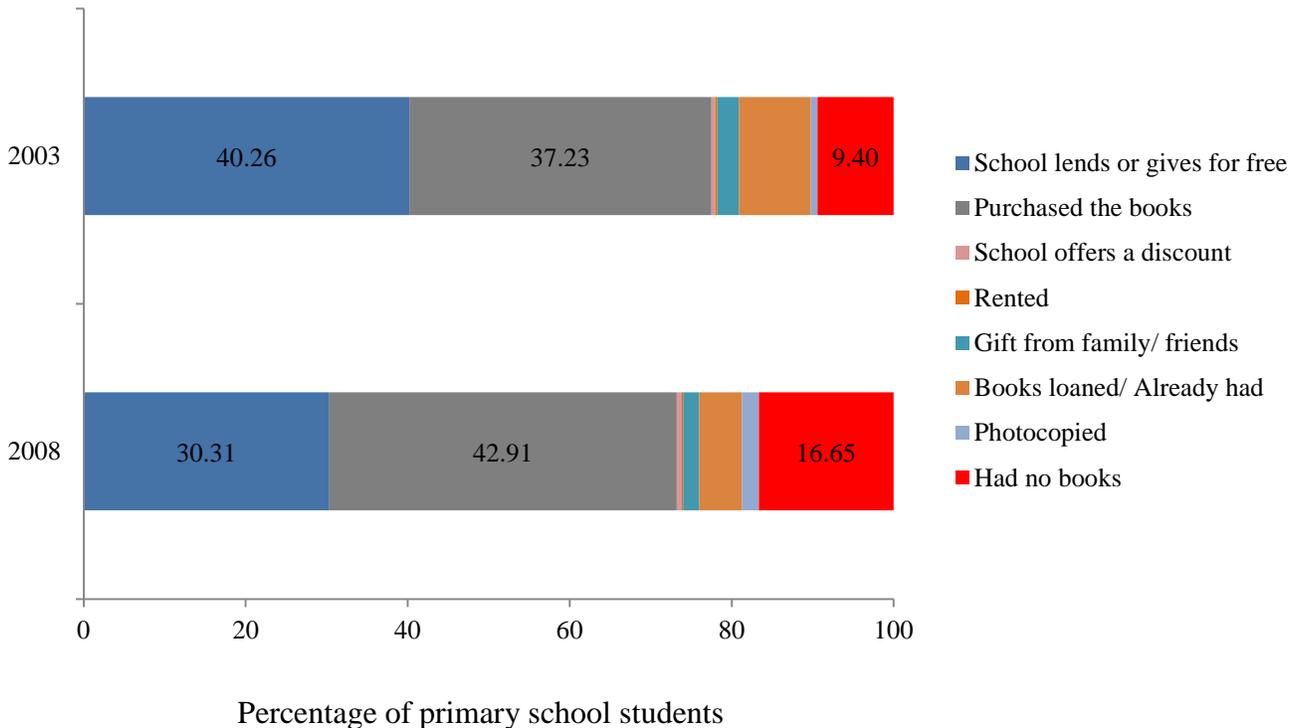


TABLE 1: Ways in which respondents obtained books, as a percentage of the total, rural and urban primary school students in the sample

(a) Total Sample:

HOW STUDENTS OBTAINED BOOKS (%)	2003	2008	Change
Had no books	9.40	16.65	7.25
Books loaned/ Already had	8.86	5.26	-3.60
Gift from family/ friends	2.71	2.00	-0.71
School lends or gives for free	40.26	30.31	-9.95
School offers a discount	0.46	0.61	0.15
Purchased the books	37.23	42.91	5.68
Rented	0.24	0.18	-0.06
Photocopied	0.83	2.07	1.24
n	3,723	3,952	

(b) Rural Households

HOW STUDENTS OBTAINED BOOKS (%)	2003	2008	Change
Had no books	11.53	21.64	10.11
Books loaned/ Already had	10.61	5.36	-5.25
Gift from family/ friends	3.09	2.14	-0.95
School lends or gives for free	53.46	44.69	-8.77
School offers a discount	0.51	0.69	0.18
Purchased the books	20.16	24.72	4.56
Rented	0.18	0.13	-0.05
Photocopied	0.46	0.64	0.18
n	2,168	2,334	

(c) Urban Households

HOW STUDENTS OBTAINED BOOKS (%)	2003	2008	Change
Had no books	6.43	9.46	3.03
Books loaned/ Already had	6.43	5.13	-1.30
Gift from family/ friends	2.19	1.79	-0.40
School lends or gives for free	21.86	9.58	-12.28
School offers a discount	0.39	0.49	0.10
Purchased the books	61.03	69.16	8.13
Rented	0.32	0.25	-0.07
Photocopied	1.35	4.14	2.79
n	1,555	1,618	

TABLE 2: Marginal Effects of Logistic Regressions

I.V.s	(1) No books 2003	(2) No books 2008	(3) From Schl. 2003	(4) From Schl. 2008	(5) Purchase 2003	(6) Purchase 2008
Rural	-0.015 (0.0123)	0.058*** (0.0089)	0.172*** (0.0210)	0.158*** (0.0195)	-0.169*** (0.0212)	-0.694*** 0.0973
female	0.0091 (0.0086)	-0.009 (0.0104)	-0.005 (-.0176)	-0.031** (0.0152)	0.0025 (0.0177)	0.153** 0.0803
decile	-0.012*** (0.0023)	-.0.0262*** (0.0028)	-0.045*** (0.0043)	-0.039*** (0.0041)	0.061*** (0.0042)	0.339*** 0.0191
Obs	3688	3952	3723	3952	3688	3952
Pseudo R ²	0.05	0.09	.16	0.26	.27	0.30
LR Chi ²	126	343	814	1259	1339	1633
Prob > Chi ²	0.00	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses
Sector dummy variables not shows
*** p<0.01, ** p<0.05, * p<0.1

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