

The Efficacy of Planned Obsolescence Strategies in the College Textbook Market

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Abstract

College textbook producers are implementing many strategies to reduce competition from the secondhand market. However, the direct impact of these changes is not yet understood. This research is a study of producer strategies in the college textbook market. A sample of 330 current edition college textbooks from the four main textbook publishers, Pearson, Cengage, McGraw-Hill, and MacMillan, was collected. We found that three main strategies were being used to drive down the value of used textbooks: increasing publication frequency, offering supplemental online materials, and offering e-textbook options. These strategies did not seem to have direct effects on the resale value of textbooks, but we did find evidence to suggest that producer strategies have an indirect effect on resale value. We also found evidence that supports the argument that producers are moving away from print textbooks entirely.

I. Introduction

In 2019, Cengage Learning and McGraw-Hill, two giants of the college textbook industry, proposed a merger. The merger would have granted the companies a combined 45% of the college textbook market, edging out Pearson's 40% stake for the largest publisher of American textbooks (Allen 2021). But why did these companies, who traditionally boast high sales and stable profit, elect to merge? The decision came in the face of continued declines in annual revenue, which marked the need for changes in the once stable market for college textbooks. While the merger ultimately failed, the need for new strategies to preserve sales and maximize profit remained.

For years, textbooks have been a critical part of success in higher education. Because these textbooks were necessary, and the options to obtain them so limited, producers had the

lion's share of power in the market. As a result, they could set high prices; college students could expect to pay \$1,226 annually on textbooks (Hanson 2022). These market conditions allowed for college textbook publishing to blossom into a \$4.85-billion-dollar industry by 2014. However, since then, market revenue has seen an average year-over-year decline of 6.01%. By 2020, market revenue had fallen to \$3.10 billion dollars.

Just as market conditions led to the rise of the textbook industry, new market conditions are leading to its decline. Increased access to e-textbooks, used and rental alternatives, and free online resources have given consumers more choices for textbook alternatives. These changes have led to a new textbook market, where cheaper options have driven an increasing number of students away from new, hardcopy textbooks.

While producers do capture revenue from e-textbook sales, revenue from used textbooks and most rentals is lost. Due to this, producers are incentivized to produce textbooks that lose value faster, a strategy commonly referred to as planned obsolescence. By reducing the utility of the secondary market goods, producers hope to drive consumers back to the primary market.

Planned obsolescence in the textbook market is not new. An article published in the 1974 edition of the *Journal of Political Economy* discussed this exact situation. The study outlines how textbook producers were incentivized to "kill off" the secondhand market almost fifty years ago. However, with the growth of consumer choices, there has been increased pressure on producers to find ways of competing with their own used products. This has created a powerful incentive to find new planned obsolescence strategies, which puts producers in an interesting position. Textbooks' value comes from the information contained within them. To decrease resale value, producers must find ways to devalue this information in the secondhand market.

In this study, we quantify the relative value of new textbooks to their used alternatives. This relationship is approximated by Proportional Textbook Resale Value (PTRV), the percentage of the original value a textbook retains in the secondary market. While imperfect, PTRV can be used to quantify the efficacy of planned obsolescence strategies. These strategies are defined as any feature of a textbook, chosen by the producer, that has a potential effect on PTRV. While these strategies vary, they all intend to decrease demand for used textbooks by minimizing the value available to second-hand consumers while simultaneously maximizing value in the primary market. In effect, producers seek to “kill off” the used market by minimizing PTRV. The lower the PTRV, the more of a textbook’s value is available only at original purchase.

Literature Review

While the producer’s goal to kill off the used market is clear, their means to do so are limited. The challenge for producers is to kill off resale value without sacrificing product quality for the initial consumer. There are three producer strategies identified in the literature that are both widely identified and easily measurable. These strategies, used together, are the primary tools the producer has in their battle against the used market.

The first strategy is to increase publication frequency. Since the 1970’s, it has been understood that the goal of a new edition was to make the previous editions irrelevant (Miller 1974). Although this was always a strategy to increase profits, given the current market conditions, producers are relying on this strategy more than ever.

The second strategy is where producers opt to include supplemental material online, accessible only through a non-transferable code. These codes mean that new textbooks come

with features inaccessible in the secondary market, which producers hope will entice consumers to purchase new textbooks (Young 2012). Often, online codes include graded course assignments, making the online codes crucial to student success.

The third strategy is to offer an e-textbook alternative. The goal of providing an e-textbook option is to move consumers out of the hardcopy market all together. While e-textbooks are generally a cheaper option, they have their own drawbacks. When surveyed, students preferred print text to e-textbooks, and this relationship was not related to prior experience with e-textbooks (Baker, Daniel, Douglas 2010). E-textbooks also cannot be shared because access codes prevent multiple students from using the same e-textbook. This eliminates a viable cost-saving option in the hardcopy market, sharing textbooks with friends (Young 2012). While students often dislike online textbooks, the cheaper price tag of e-textbooks entices many students to select this option.

While many sources point to these strategies as key factors in new-used textbook market interaction, the literature is unclear on the efficacy of these strategies. This study intends to quantify the effects of these strategies on PTRV among the four largest college textbook producers in the United States.

II. Empirical Analyses

Data

To quantify the effects of these producer strategies, we needed a large set of textbooks from across the four major producers. We sorted textbooks within producers into three fields: Humanities, Science and Mathematics, and Professional. The Humanities field contained the publisher's textbooks on English, Drama, Philosophy, and History. The Science and Mathematics

field contained books on Math, Science, Engineering, and Computer Science. Finally, the Professional section contained textbooks on Trades, Business, Law, and Management. Most publishers had self-sorted their textbooks into these three fields, which allowed us to easily determine each textbook's field.

To create our random sample, we numbered every book in each Field for each publisher, not including old editions or repeats. This process was tedious, but it ensured that repeat textbooks did not create bias and allowed us to give proper weights to our observations. Once this was complete, we used a random number generator to select books for the sample.

For Pearson, Cengage, and McGraw-Hill, we collected 30 Titles from each field. MacMillan was the exception because they had just over 40 Titles in their Professional Field. This was problematic since collecting a sample would violate the 10% rule*. To avoid this, these 40 books were added to the Science and Mathematics Field. This made sense, as these textbooks were from fields like Computer Science and Engineering, which was consistent with the Science and Mathematics field for other publishers. In total, the sample consisted of 330 titles, stratified by publisher and field. Table 1 shows the population of textbooks across fields and publishers. Across all substrata, populations are large enough that our sample does not violate the Central Limit Theorem.

*The 10 percent condition states that sample size must be less than 10% of the population size to insure sampling independence. This allows us to assume that the means from our sample are normally distributed.

For each of our observations, we recorded 16 variables. These variables fall into two categories: producer variables and nonproducer variables. Producer variables are defined as an aspect of a textbook that can be chosen or set by the publisher. This includes Online Codes, E-textbook price, Cover Type, and Publication Frequency. Also included were statistics on which textbooks were first edition, as well as which textbooks were only offered in loose leaf on the producer website. Nonproducer variables are variables that the producer has little to no control over, such as Age, Field, Amazon New Price, etc. It was also important to consider what happened to textbooks once a newer edition was published. For textbooks with multiple editions for sale on the publisher website, we also recorded the previous edition's new and used prices. Table 2 shows these variables and their summary statistics.

Sample Characteristics

Table 1: Total Number of Textbooks in each Field

Field	Pearson	Cengage	McGraw-Hill	MacMillan	Total
Humanities	640	1203	549	842	3234
Mathematics	2177	957	753	315	4202
Professional	2299	1544	755	---	4598
Total	5116	3704	2057	1157	12034

Table 2: Variable Analysis

Variable	Mean	(Minimum-Maximum)	Observations
Producer Variables			
New List Price (USD)	140.25	(5 – 513.84)	330
Publish Frequency (Years)	5.24	(1 – 78)	245
Online Code (Binary)	.44	(0 – 1)	330
E-Textbook Price (USD)	52.57	(3.99 – 268.99)	248
Loose Leaf Only (Binary)	.14	(0 – 1)	330
First Edition (Binary)	.26	(0 – 1)	330
Old List Price (USD)	186.18	(40 – 439.95)	48

Non-Producer Variables			
Used Price (USD)	62.89	(1.46 - 563.93)	330
Proportional Textbook Resale Value (%)	.48	(.01 - 2.69)	330
Amazon New Price (USD)	112.78	(7.41 - 513.84)	325
Age (Years)	6.77	(-1 - 69)	330
Old Used Price (USD)	34.61	(3.82 - 199.68)	48
Old Amazon Price (USD)	102.21	(28.36 - 307.96)	48

Note: Recorded in addition to the variables listed above were Field and Area that the textbook was published in, and the type of cover that the textbook had. These were nominal variables, and do not have meaningful averages.

Prevalence of Producer Strategies in Textbook Market

After the data was collected, it was important to first evaluate if the strategies outlined in the literature were being used in the market. Three producer strategies were of interest: increasing the publication frequency, adding single use online codes, and offering e-textbook versions of titles. Age, defined as years since the publication of the newest edition, was regressed on the prevalence of these strategies allowed us to quantify the relationship between age and each strategy.

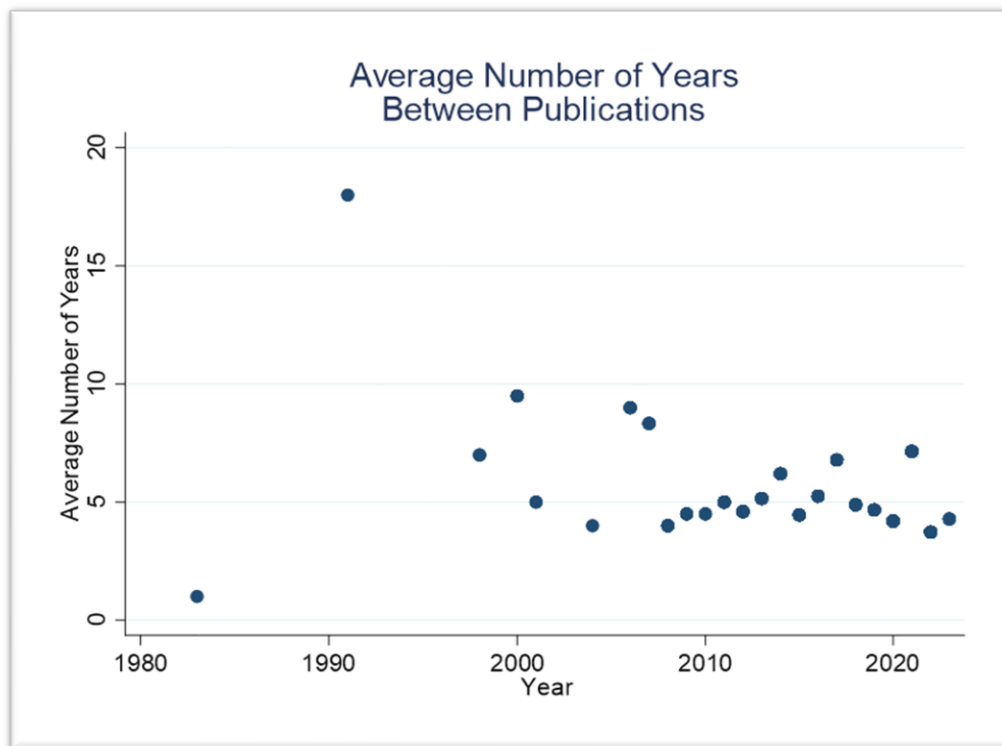
Table 3: Regressing Publication Frequency, Online Codes, and E-Textbooks by Age

	(1)	(2)	(3)
	Publication Frequency	Confidence Interval	Online Code
			Confidence Interval
			E-Textbook Option
			Confidence Interval
Age	.1129** (.017) [2.4]	(.02, .21)	-.02939*** (.000) [-7.9]
			(-.037, -.022)
			-.0147*** (.000) [-4.49]
Constant/ Intercept	4.27*** (.000) [12.73]	(3.6, 4.9)	.63*** (.000) [17.97]
			(.56, .70)
			.88*** (.000) [28.49]
Observation	245		330

Note: *** p < 0.01, ** p < 0.05, * p < 0.1, Robust standard errors in parentheses, t-statistics in square bracket.

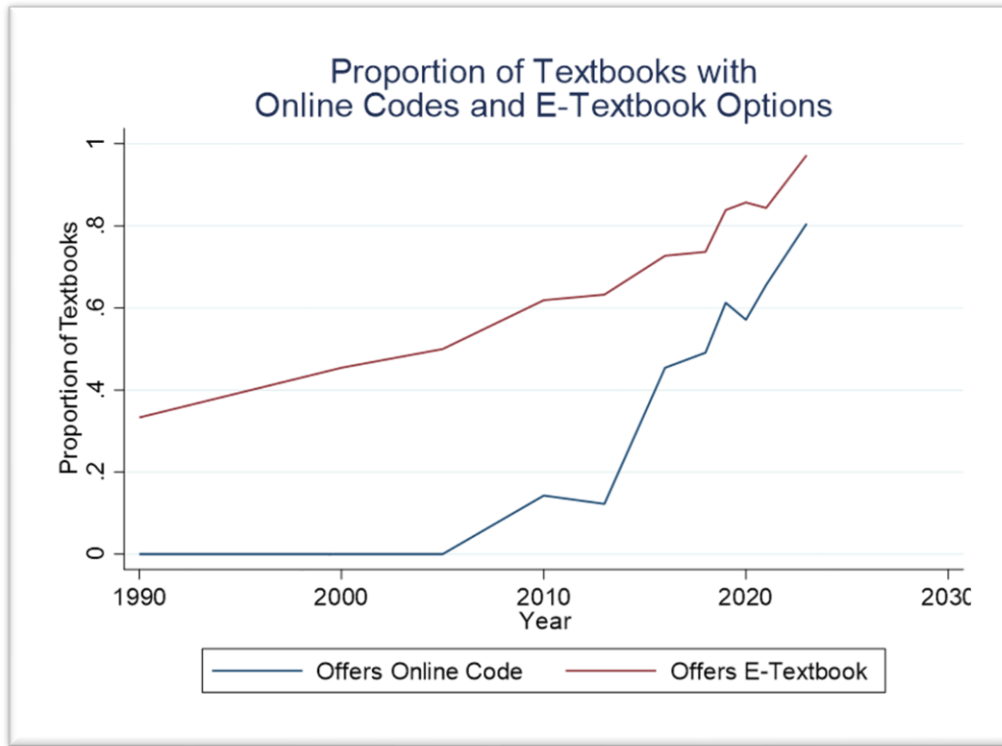
Table 3 shows a significant relationship between the age of textbooks and the prevalence of these strategies. The negative coefficients on online code and e-textbook option suggest that older textbooks are less likely to have these options. Similarly, the positive coefficient on publication frequency suggests that older textbooks have a larger gap between publication of new editions.

Figure 1:



Note: Each dot on this graph represents the average publication frequency for all books for that particular year in this study. Books that are first editions and therefore do not have a publication frequency are not included.

Figure 2:



Note: The graph above shows the increase in the prevalence of e-textbooks and online codes over time. Each point on the line represents the proportion of books that have online codes or e-textbooks.

There is strong evidence to suggest that these producer strategies are being used in the market. Figure 1 shows that since 2000, a gradual, but significant, decline in average publication frequency has occurred. Even more significantly, Figure 2 shows that online codes and e-textbook options are becoming almost ubiquitous. While less than half of the books from 15 years ago have these options, almost all books have these options today: in the last five years, 61.3% of textbooks have online supplements and 83.8% have an e-textbook option. Textbooks from 2017 had a new edition published every 6.79 years on average. Textbooks from 2022 have a new edition published every 3.73 years on average.

Effects on PTRV

While these strategies are becoming more common, it is also important to quantify each strategy's relationship to PTRV. This was accomplished through a simple regression of PTRV on these strategies, controlled for age, page length, and cover type.

Table 4: Textbook Attributes Effects on PTRV

	Coefficient	Confidence Interval
Age	-.056*** (.000) [-6.40]	(-.073, -.038)
Age * Age	.0013*** (.000) [3.64]	(.001, .002)
McGraw Hill	.13** (.017) [2.41]	(.024, .24)
Pearson	.091** (.041) [2.05]	(.004, .18)
Mathematics	-.088* (.070) [-1.82]	(-.18, .007)
E-Textbook Option	.055 (.387) [.87]	(-.07, .18)
Online Code Option	-.042 (.323) [-.99]	(-.13, .042)
Publication Frequency	.0082 (.106) [1.62]	(-.0018, .018)
Hard Cover	.046 (.788) [.27]	(-.29, .38)
Constant/Intercept	.61*** (.000) [5.83]	(.40, .81)
Observations	243	
R-Squared	.2994	
F(12, 230)	8.19	p-value=.0000
Note: *** p < 0.01, ** p < 0.05, * p < 0.1		

Figure 3:

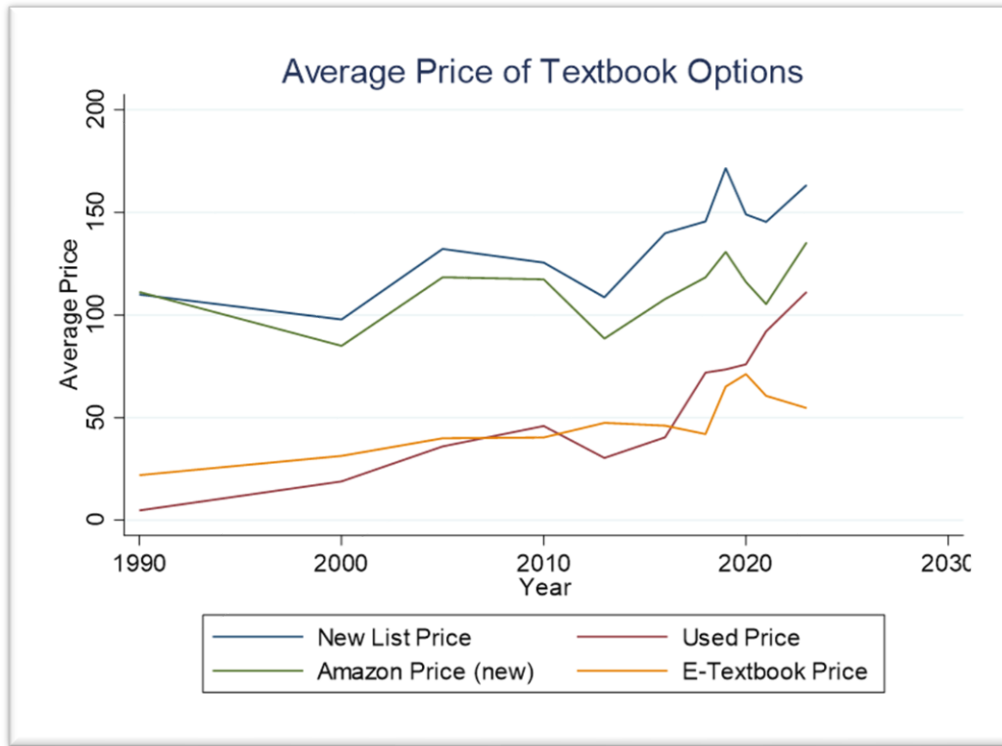


Table 4 shows that the Age and Age Squared terms were the most significant predictors of PTRV. Age correlated negatively with PTRV; PTRV was expected to fall by 5 percentage points every year after its initial publication, with this decline becoming smaller each year due to the positive Age Squared coefficient. Figure 3 shows that decline in PTRV is driven largely by the decline in used price: average used price falls by 95.7% from 2022 to 1990 compared to a 32.7% decline in new price over the same period.

The relatively steep decline in the value of used textbooks could be due to two main factors: wear and tear and decline in information value. Neither cover type nor page length are significant predictors of PTRV, suggesting that books of different cover types and lengths do not age differently. However, two publishers, Pearson, and McGraw-Hill, had positive coefficients; both had textbooks that tended to have more value in the used market. Since textbooks from

Cengage and Macmillan lost value faster, it is possible that they employ more effective planned obsolescence strategies that were not captured by the variables in this study.

Across publishers, science and mathematics textbooks tended to have a lower average PTRV. This difference persisted across cover type and page length, so it is unlikely that this was due to differences in physical degradation. Instead, it is likely that the value of information within textbooks degrades quicker in this field. This could be due to subjects like computer science and engineering, which make up 20% of all science and mathematics textbooks. Information in these subjects may become obsolete faster on average, thus driving down the used price quicker than in subjects like English.

While several of the controls had significant relationships to PTRV, all three producer strategies did not. With a p-value of 0.106, publication frequency came the closest to statistical significance. With a larger sample, it is possible that a relationship between publication frequency and PTRV in current edition textbooks could be positively identified. However, based on the data, we cannot conclude that any of these strategies are effective in killing off the used market; used textbooks have the same proportional value regardless of whether these strategies are in place or not.

Another interesting relationship shown in Figure 3 is between used price and e-textbook price. The lines take on similar values and shape over time, which suggests that e-textbooks may be designed to present an alternative to used textbooks. New, hardcover textbooks are preferred to both used textbooks and e-textbooks (Baker, Daniel, Douglas 2010). However, it is hard for these new textbooks to compete with the heavy discounts that the alternatives offer; many consumers are simply seeking the cheapest viable textbook option, and they are willing to pay for worse options if significant savings are available. To these consumers, the new textbook is

too expensive, and thus they will choose the used option. However, an e-textbook option allows producers to offer a good that can compete in price with used textbooks without having to drop the price of their hardcopies. They can even do so while making similar profit, since e-textbooks have a marginal cost near zero, any e-textbook sale is effectively pure profit.

Producer Profit Maximization

Since producers have two products on the market, each with different prices and profit margin, it was not apparent which product producers preferred to sell. While hardcopy textbooks sell for much more, they are also expensive to produce. The profit margin for college textbooks is only 20% (Kestenbaum 2016). Using this figure, the average profit from a textbook, with an e-textbook option in our data set is \$30.43. E-textbooks, on the other hand, have a marginal cost near zero (Kestenbaum 2016). With an average cost of \$52.57, nearly all profit, e-textbooks yield more profit than their hardcopy alternatives.

It is possible that producers sell these two products in order to cater to those willing to pay a premium for a preferred product. However, these products may also be listed to frame the e-textbook option as more affordable; paying \$50 to view an electronic textbook may seem excessive, but compared to the \$200 hardcopy, it seems much more reasonable. This explanation is especially plausible because some textbooks on producer sites were listed as currently unavailable but were still given a list price. While these hardcopies could not be bought, they may still nudge consumers toward the e-textbook option. Further research is needed to determine if this strategy has any behavioral effects.

The Value of Current Edition

While publication frequency was not shown to influence PTRV in our regression, it may affect the textbook market in ways that are more dynamic. For a textbook to be sold in the secondary market, it generally must be used by a primary consumer. Since most consumers buy textbooks for one-semester courses, there are very few used, current edition textbooks available in the first semester after a new edition is published. This means that when producers publish a new edition, they temporarily kill off almost the entire used market. While publication frequency did not have significant effects on a current edition textbook's PTRV, it may have indirect effects on the market; when a new edition is published, all used books in circulation are no longer current editions. Exploring the relationship between current and non-current textbooks' PTRV was key to uncovering these indirect effects.

Figure 4:

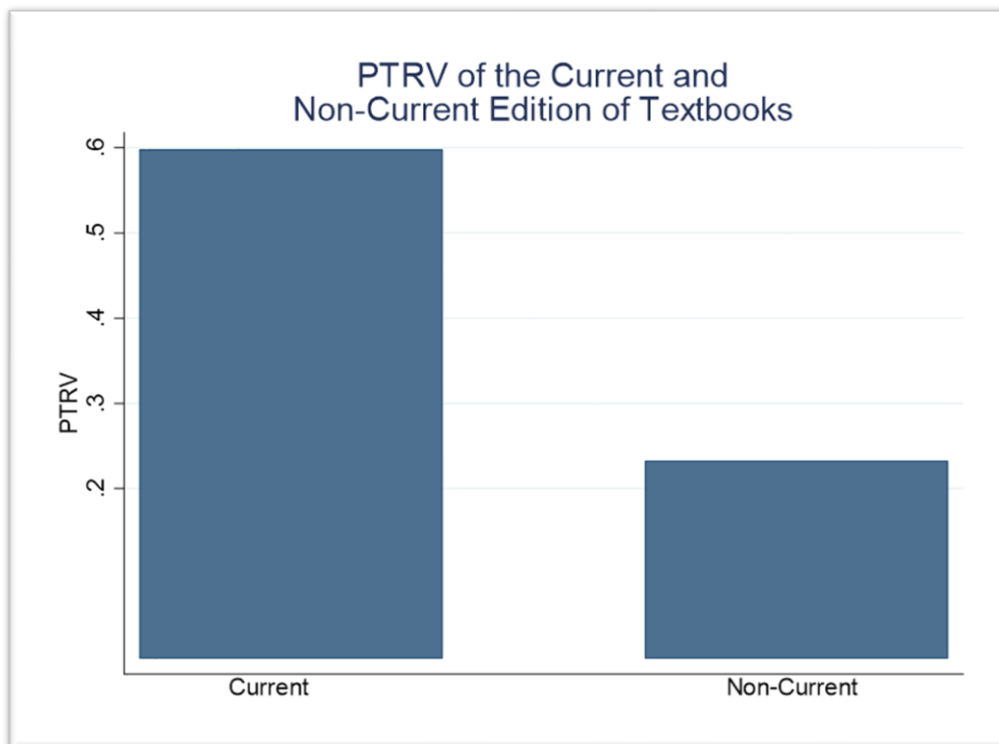


Figure 4 shows that when textbooks lose their current edition status, they lose 60.1% of their PTRV. This statistic controls the age of the textbooks by artificially reversing the age of the older versions. We reversed their age by adding back the loss in PTRV that that book experienced between its release and the release of its subsequent edition. This sudden decline suggests that a textbook's status as current edition has a large, positive relationship to PTRV. When a new edition is published, all used textbooks lose this status, along with over half of their PTRV.

Although our original regression did not recognize a relationship, it seems that publication frequency may be producers' best tool in killing off the used market. While its direct effects on PTRV are insignificant, each new edition, when published, briefly kills off the used market. This eliminates one of the two affordable options available to consumers. Without used textbooks, there is only one price-comparable substitute: the e-textbook. Publication of new editions restricts consumer choice, which likely drives consumers towards the e-textbook option.

III. Conclusion

The data does not suggest that producer strategies have any effect on the relationship between new and used prices. Age is the most significant predictor of PTRV, and of the variables in the study, explained most of the variation in PTRV. Aside from age, Cengage and Macmillan textbooks tended to have lower PTRV than McGraw-Hill's or Pearson's. Perhaps this is due to differences in strategy that were not in the scope of this study. Publication frequency did have some indirect effect on this relationship, as publishing new editions effectively killed off the value of prior editions.

While producer strategies had few effects on the relationship between new and used prices, they may still influence the market by pushing consumers to leave the hardcopy textbook market altogether. Producers are incentivized to do this because online materials yield higher profit than hardcopy versions. In a way, this transition is a win for consumers too, as e-textbooks are, on average, 65.5% less expensive than hardcopies.

While this may save consumers some money, the online space gives producers much greater market control; consumers have fewer options. Almost all online materials are only legally available on password-protected producer platforms. Additionally, most e-textbooks are more akin to rentals, offering only limited access. Combined, these factors kill off the used market entirely. Due to this, the producer is often the only source for obtaining the online textbook, compared to a series of options in the hardcopy market. This allows producers to keep e-textbook prices relatively high despite low production costs.

The conditions of the online textbook market are attractive to producers, and this may be why strategies to limit PTRV do not appear to be effective: producers are not as concerned with conditions within the hardcopy market. Instead, their primary goal is getting consumers out of the hardcopy market, buying their online products instead. This goal is reflected by the prevalence of e-textbook and online material. These are not meant to affect new-used dynamics, but instead entice consumers to steer away from new and used options. Several publishers are also moving towards subscription-based textbook access. Pearson+ and Cengage Unlimited are both services that offer “free” textbook access for a monthly fee, usually between \$10 and \$20 per month. These services further reflect this transition from physical to digital space.

This study focuses on the relationship between the primary and secondary market, and the strategies available to producer to kill of secondary market. We quantified relationships

between new and used textbook value, but with the rise of e-textbooks, this metric may be less meaningful. The best way for producers to kill off the secondary market is to move online, where consumers have fewer alternatives and less market power. While it is still in producers' best interest to reduce PTRV, the best planned obsolescence strategy is to simply offer an e-textbook instead: e-textbooks cannot be resold, meaning there is no secondhand market to contend with at all.

With this better understanding of the textbook market, it is clear that the online market is the priority for producers. And, while market conditions are largely in their favor, there are new e-textbook alternatives they must contend with. Some students elect to pirate the textbook or to skip out on buying one altogether, alternatives that are both difficult to measure and combat. Further research is needed to determine the effect of these alternatives on the e-textbook market.

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