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Higher Education Opportunity Act and Textbook Prices: Theoretical Approach

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Higher Education Opportunity Act and Textbook Prices: Theoretical Approach

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Abstract
Section 133 of the Higher Education Opportunity Act (HEOA), which took effect on July 1, 2010, requires academic institutions to supply textbook information on their courses at the time students register for the courses. One of the rationales for this provision is that it gives students extra time to purchase the textbook from suppliers other than a college or university textbook store. It is argued that this should put a downward pressure on prices in the textbook store. This paper constructs a theoretical model to check the validity of this argument. The findings indicate that this policy does not necessarily reduce textbook prices. On the contrary, under some conditions the textbook prices in college and university bookstores could increase. Given that students and parents often complain about the cost of textbook prices, examination of this issue is well-warranted and has important implications for consumers and policymakers.

Keywords: Textbook prices; monopoly pricing.

1. Introduction

The Government Accountability Office (GAO) report [1] found that textbook prices increased twice the rate of inflation between 1984 and 2004. According to the report, textbook prices in the United States increased at a rate of 6% per year, while average price levels in the economy rose at a rate of 3% per year during the 20-year time period. The textbook price increases have important policy implications because full-time students spend around $1000 annually on books (see [2, 3]). Furthermore, higher textbook price levels increase the overall cost of attending college, and therefore, put a greater strain of federal, university and college budgets because financial aid calculations incorporate the cost of textbooks [4]. Thus, examination of textbook prices is well-warranted.

The reasons for textbook price increases include lack of downstream competition, price discrimination, frequent publication of new editions, misalignment of professor and student incentives and bundling traditional textbooks with various instructional supplements (see [1, 4–8]). It is also important to note that some researchers suggest that textbook price levels are not related to monopoly pricing, retail cost differences or impediments to entry [9]. While different proposals to reduce the cost of college textbooks were suggested, section 133 of the Higher Education Opportunity Act (HEOA), which took effect on July 1, 2010, requires academic institutions to supply textbook information on their courses at the time students register for a course [10]. Prior to the act, many students found out which textbooks were used in their classes only in the beginning of the semester. Since many students register for courses a couple of months prior to the beginning of the semester, this provision of the act gives students extra time to purchase textbooks from suppliers other than a college or university textbook store. Thus, it could be argued that the act puts a

downward pressure on textbook prices because the college and university bookstores face greater competition from online book suppliers. This paper constructs a theoretical model to check the validity of this rationale for the HEOA.

The findings indicate that the textbook provision of the HEOA does not necessarily reduce textbook prices and that price levels in the college and university bookstores could increase under certain conditions. The intuition for this result is that the act reduces students' switching costs to alternative suppliers. Then, price sensitive students are more likely to switch to an alternative supplier, such as internet textbook suppliers, while price insensitive students are likely to stick with the local textbook supplier. Then, it could be profitable for the local textbook store to increase its price in order to maximize its profits because the store is mostly serving price insensitive students. This is a new result since previous literature mostly studied how used book sales influence new textbook prices (see [6–8]) or how free examination copies provided to professors influence textbook prices (see [11, 12]) and did not investigate how HEOA could affect textbook prices in the college and university bookstores.

2. Model

Let consumer i's valuation of a textbook be v_i, where v_i is a random variable with a cumulative probability distribution function $F(v)$. The domain of $F(v)$ is $[0, v^{\max}]$. Assume that $F(v)$ is twice continuously differentiable and that $F'(v) = f(v) > 0$. Let P_S denote the textbook price at a local bookstore and P_I denote the textbook price at an alternative supplier. There is an additional cost associated with buying the textbook from the alternative supplier, where this cost could represent the cost of shipping, search costs, transactions costs, etc. Consumer i's additional cost of buying the book from the alternate supplier is φ_i, where $\varphi_i = \theta v_i$ and $0 < \theta < 1$. Then, consumer i's marginal utility (gain) when it buys from a local bookstore is $v_i - P_S$, and consumer i's marginal utility when it buys from an alternative supplier is $v_i - P_I - \varphi_i$.

The bookstore is a local monopolist and its marginal cost of providing an additional unit is c, where $c < v^{\max}$. The textbook price P_I at the alternative supplier is determined in a competitive market and the bookstore takes it as given when choosing its own price level. Then, consumer i buys the textbook from the local bookstore if:

$$v_i \geq P_S \quad \text{and} \quad v_i - P_S \geq v_i - \varphi_i - P_I \tag{1}$$

Condition (1) can be further simplified as shown below.

$$v_i \geq P_S \quad \text{and} \quad v_i \geq (P_S - P_I)/\theta \tag{2}$$

Consumer i buys the textbook from the alternative supplier if:

$$v_i \geq \varphi_i + P_I \quad \text{and} \quad v_i - P_S < v_i - \varphi_i - P_I \tag{3}$$

Then, the demand function for the bookstore is:

$$D(P_S) = 1 - F((P_S - P_I)/\theta) \quad \text{if} \quad P_S \geq P_I/(1-\theta) \quad \text{and} \quad D(P_S) = 1 - F(P_S) \text{ if } P_S \leq P_I/(1-\theta) \tag{4}$$

It is clear that $D(P_S)$ is continuous in P_S. The store's profit function is $\pi(P_S) = D(P_S)\,(P_S - c)$ and the store's optimization problem is shown below.

$$\underset{P_S \in [c,\, v^{\max}]}{\text{Max}}\; D(P_S)(P_S - c) \tag{5}$$

Because the domain of P_S is complete and because the profit function is continuous in P_S, the optimization problem described in (5) has a solution. Suppose there is a solution such that $P_S^* > P_I/(1-\theta)$. Then, the first- and second-order conditions are shown below.

$$\pi'(P_S^*) = (1 - F(\frac{P_S^* - P_I}{\theta})) - f(\frac{P_S^* - P_I}{\theta})(P_S^* - c) = 0 \tag{6}$$

$$\pi''(P_S^*) = -2f(\frac{P_S^* - P_I}{\theta}) - f'(\frac{P_S^* - P_I}{\theta})(P_S^* - c) < 0 \tag{7}$$

3. Results and Discussion

Proposition 1. Suppose there is an interior solution $P_S^* > P_I/(1-\theta)$ such that conditions (6) and (7) are satisfied in the neighborhood of P_S^*.

(i) If $f(\frac{P_S^* - P_I}{\theta}) + f'(\frac{P_S^* - P_I}{\theta})(P_S^* - c) > 0$, then $dP_S^*/d\theta > 0$ and $dP_S^*/dP_I > 0$.

(ii) If $f(\frac{P_S^* - P_I}{\theta}) + f'(\frac{P_S^* - P_I}{\theta})(P_S^* - c) < 0$, then $dP_S^*/d\theta < 0$ and $dP_S^*/dP_I < 0$.

Proof of proposition 1.

Using the implicit function theorem, the formula for $dP_S^*/d\theta$ is:

$$\frac{dP_S^*}{d\theta} = -\frac{\partial \pi'(P_S^*)/\partial \theta}{\pi''(P_S^*)} = -(\frac{P_S^* - P_I}{\theta^2})\frac{f(\frac{P_S^* - P_I}{\theta}) + f'(\frac{P_S^* - P_I}{\theta})(P_S^* - c)}{\pi''(P_S^*)} \tag{8}$$

Because $\pi'' < 0$ and $(P_S^* - P_I) > 0$, $dP_S^*/d\theta > 0$ if condition (i) holds. Similarly, $dP_S^*/d\theta < 0$ if condition (ii) holds.

Using the implicit function theorem, the formula for dP_S^*/dP_I is:

$$\frac{dP_S^*}{dP_I} = -\frac{\partial \pi'(P_S^*)/\partial P_I}{\pi''(P_S^*)} = -(\frac{1}{\theta})\frac{f(\frac{P_S^* - P_I}{\theta}) + f'(\frac{P_S^* - P_I}{\theta})(P_S^* - c)}{\pi''(P_S^*)} \tag{9}$$

Because $\pi'' < 0$, $dP_S^*/dP_I > 0$ if condition (i) holds. Similarly, $dP_S^*/dP_I < 0$ if condition (ii) holds.

Proposition 1 has important implications when analyzing the effects of the HEOA that requires academic institutions to supply textbook information on their courses at the time students register for courses. The rationale for the provision is that it reduces θ by giving students extra time to purchase the textbook from suppliers other than a college or university textbook store. Contrary to this argument, decrease in θ would increase the price of textbook prices if condition (ii) of proposition 1 holds. To understand this result, suppose θ decreases. Then, lower valuation consumers are more likely to switch to an alternative supplier, while higher valuation consumers are likely to stick with the local textbook store. Then, the local textbook store either reduces its price in order to hold on to some of its lower paying customers or tries to maximize its profits by

concentrating on higher valuation customers. When the store concentrates on serving higher valuation customers, it increases its price in response to a decrease in θ. Similarly, when the price of an alternative supplier decreases, the local store's price may decrease or increase depending on the shape of the demand function.

It is important to highlight that condition (i) in proposition 1 holds if $f' \geq 0$. For example, condition (i) holds when v_i is distributed according to a uniform distribution. Condition (ii) holds only if $f' < 0$.

Proposition 1 described the store's behavior when $P_S^* > P_I/(1-\theta)$. This condition is satisfied when c is high enough, for example, when $c \geq P_I/(1-\theta)$. Now, consider the store's choices when $P_S^* < P_I/(1-\theta)$. Then, the first- and second-order conditions for profit maximization are shown below.

$$\pi'(P_S^*) = (1 - F(P_S^*)) - f(P_S^*)(P_S^* - c) = 0 \tag{10}$$

$$\pi''(P_S^*) = -2f(P_S^*) - f'(P_S^*)(P_S^* - c) < 0 \tag{11}$$

When $P_S^* < P_I/(1-\theta)$, the store's price is low enough, so that consumers don't switch to an alternative supplier. Under these conditions, as described in proposition 2 below, small changes in θ and P_I do not have an effect on the local store's pricing policy.

Proposition 2. Suppose there is an interior solution P_S^* such that $c < P_S^* < P_I/(1-\theta)$ and conditions (10) and (11) are satisfied in the neighborhood of P_S^*. Then, $dP_S^*/d\theta = 0$ and $dP_S^*/dP_I = 0$.

Proof of proposition 2.
Using the implicit function theorem, $\dfrac{dP_S^*}{d\theta} = \dfrac{\partial \pi'(P_S^*)/\partial \theta}{\pi''(P_S^*)} = 0$ and $\dfrac{dP_S^*}{dP_I} = -\dfrac{\partial \pi'(P_S^*)/\partial P_I}{\pi''(P_S^*)} = 0.$

4. Conclusion

The theoretical model presented in this paper implies that the HEOA does not necessarily reduce textbook prices in college and university bookstores and could even increase textbook prices under some conditions. Because the act's rationale does not hold in a simple model described in this paper, it is unlikely that the act's rationale would hold in more complicated models. Further research could extend the model and investigate the act's longer-term effect in a dynamic framework. In addition, since the theoretical model provides ambiguous prediction, further research could empirically study the effects of the HEOA.

Competing Interests

The author declares that he has no competing interests.

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