

## CROSS ELASTICITY OF SUPPLY: AS BIG A SECRET IN CANADA AS IT IS IN THE U. S.

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### Abstract

In a prior study, the author determined that cross elasticity of supply is rarely discussed in intermediate microeconomics, and industrial organization textbooks used in U. S. universities. He did, however, find that the American judicial system has increasingly relied upon the concept in defining product markets. In the present paper, the author examines cross elasticity of supply in economics textbooks in Canadian universities. Similar to his prior study, the author found virtually no mention of the concept in the Canadian textbooks. However, unlike the prior study, he found no appreciable reliance upon cross elasticity of supply in defining product markets by Canadian courts. Though perplexed over its lack of academic discussion, the author is encouraged by the deference paid to cross elasticity of supply by American courts.

### Introduction

Virtually all students enrolled in intermediate microeconomics classes, and a great many enrolled in principles of microeconomics classes, are exposed to the concept of cross elasticity of demand. They learn that this is a useful indicator of the way goods are related, if related at all, from the consumer's point of view. Specifically, a coefficient of cross elasticity of demand is computed by dividing the percentage change in the quantity demanded of one good by the percentage change in the price of a different good. This coefficient measures the response in the quantity demanded of one good (the dependent variable) to a change in the price of a different good (the independent variable). The sign of the coefficient indicates the particular relationship between the two goods in question, with a positive coefficient suggesting substitutes and a negative coefficient suggesting complements. The establishment of a substitute relationship, in particular, may be useful in the delineation of a market, that is, in the identification of firms that are, in the eyes of consumers, sellers of competitive or substitutable products.

Surprisingly, however, it seems that few students are exposed to the concept of cross elasticity of supply, a measure of substitutability or interchangeability of products through the eyes of producers or suppliers. This is regrettable, if, for no other reason, that such students are given an incomplete method for determining appropriate market definitions. The regret is even more pronounced for economics majors who aspire to be professional economists. Similar to the cross elasticity of demand coefficient, the sign of the coefficient of cross elasticity of supply, derived by dividing the percentage change in quantity supplied of one good by the percentage change in price of a different good, is suggestive of the relationship between the two goods in question. The interpretation of the respective signs of the coefficient of cross elasticity of supply, however, is exactly the opposite of that for the coefficient of cross elasticity of demand. That is, a positive coefficient of cross elasticity of supply suggests that suppliers of these two goods view them as complements. A negative coefficient of cross elasticity of supply suggests

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that the suppliers of the two goods consider them to be substitutes for one another. The establishment of such a substitute relationship, here again, may be quite helpful in the identification of the sellers, both current and potential, to include within a given market.

Sole reliance on the cross elasticity of demand coefficient to the exclusion of the cross elasticity of supply coefficient could, in fact, lead to an improper definition of the relevant product market. For example, one would not be inclined to include producers of children's shoes and producers of adult shoes in the same industry on the basis of the cross elasticity of demand coefficient. Clearly buyers (users) of these two types of shoes generally do not consider the shoes to be interchangeable in use. Suppliers or prospective suppliers of these different types of shoes, however, may consider themselves in the same industry. They can easily shift resources away from the production of one type of shoes toward the production of their rivals' type of shoes in response to an increase in the price of the rivals' shoes. The same could be said, for example, of the producers of right-handed baseball gloves and of left-handed baseball gloves.

In a resource market context, the concept of cross elasticity of supply could be applied to determine the participants (suppliers) in the market for terminal finance faculty in academic institutions. On the surface, these suppliers seem to be solely those with terminal degrees in the area of finance, but many individuals with terminal degrees in economics have entered the market for finance faculty as the average remuneration for finance faculty has steadily risen above that for economics faculty. That is, as the price paid to finance faculty rises, the quantity supplied is enhanced by those economics graduate students who take increased financial economics courses or finance courses; those who switch their terminal degree program to finance; and the existing Ph. D.'s in economics who redirect their research efforts primarily into the area of finance. These individuals then enter the academic market as suppliers of finance expertise.

Moving from the hypothetical to an actual example, the FTC ruled in a 1975 case that the relevant antitrust product market included two types of van trailers because of the ease of shifting production facilities. (Budd Co., 1975). The coefficient of cross elasticity of supply, of course, addresses this issue of supplier substitutability and, therefore, increases the accuracy of the market delineation process for both products and resources. This capability is especially important in antitrust litigation.

Yet many students of economics are simply not introduced to the concept of cross elasticity of supply. A significant contributing factor to this phenomenon is the fact that the concept is hardly ever mentioned in microeconomic principles texts, intermediate microeconomic texts, or industrial organization and policy texts. Perhaps, authors of such texts are trying to "economize" space, in their texts, believing that readers can intuitively infer the concept of cross elasticity of supply from their discussion of cross elasticity of demand. It seems that such authors should, at least, mention cross elasticity of supply in a footnote. Most authors do not even deign to do this. This leads one to believe that authors of these texts omit a discussion of or any references to cross elasticity of supply either because they believe that the concept is totally irrelevant or because they have never been exposed to it themselves. Any thoughtful person should consider the concept not only relevant, but also crucial to the proper delineation of product markets. Hence, one is inclined to believe that authors of the aforementioned texts tend to omit any references to cross elasticity of supply because they are, amazingly, unfamiliar with the concept.

Greco (2005) examined the coverage of cross elasticity of supply in upper-level economics textbooks in the United States, as well as the reliance on this concept by U. S. Courts

in defining product markets. This paper seeks to determine the coverage allotted to cross elasticity of supply in economics textbooks used in Canadian universities, as well as the reliance on this concept as a criterion for defining product markets in the Canadian judicial system.

### **Prior Review**

The earlier aforementioned study (Greco, 2005) sought to determine the extent of exposure given by past and current economic textbooks commonly used in U. S. institutions of higher learning. This inquiry was confined to upper-level economic texts, both intermediate microeconomics texts and industrial organization and policy texts, because the large number of economic principles texts on the market made the review a rather onerous task, and more importantly, because economics majors are the students most likely to be enrolled in intermediate microeconomics and industrial organizations and policy courses. One would suspect that such majors are the most likely to be exposed to cross elasticity of supply.

In the end, 13 contemporary and 17 older intermediate microeconomics texts, as well as three contemporary and 18 older industrial organization and policy textbooks, were examined. Although the number of books actually examined is not definitive, it was taken to adequately represented the treatment accorded the cross elasticity of supply concept in upper-level economic textbooks. Ten of the 13 contemporary intermediate microeconomics texts discussed cross elasticity of demand, but none of them discussed cross elasticity of supply. Only one of the 17 older intermediate microeconomics texts discussed cross elasticity of supply. Thirteen of these older texts did, however, discuss cross elasticity of demand. Hence, only one of the 30 intermediate microeconomics texts examined by Greco (2005) discussed cross elasticity of supply, and that one was published in 1966.

Only one of three contemporary industrial organization texts examined by Greco (2005) discussed cross elasticity of supply as well as cross elasticity of demand. The remaining two such texts discussed only cross elasticity of demand. Eleven of the 18 older industrial organization texts discussed cross elasticity of demand only. Five of these texts discussed both cross elasticity of demand and of cross elasticity of supply. Two of the older industrial organization texts did not discuss either of the cross elasticity concepts. Hence, only six of the 21 industrial organization texts discussed cross elasticity of supply, none after 1997.

In summary, only one of the 16 contemporary U. S. texts and six of the 35 U. S. older texts discussed cross elasticity of supply; that is, only seven of the 51 total U. S. texts reviewed dealt with this topic. In contrast, 43 of these 51 texts did discuss cross elasticity of demand, while seven of the 51 did not discuss either cross elasticity concept (Greco, 2005).

### **Review of Canadian Texts**

Having examined U.S. texts, the author turned to the examination of the coverage of cross elasticity of supply in Canadian economic textbooks reported here. Initially a letter and/or e-mail message was sent to the Economics Departments of all Canadian universities requesting information on their coverage of cross elasticity of supply in the appropriate economics courses. Sadly, the response was nonexistent. Therefore, in order to build a representative sample of economics textbooks, the author sought to determine the most-widely used microeconomics principles, intermediate microeconomics, and industrial organization and policy texts across the various Canadian universities.<sup>2</sup> An industry source who wished to remain anonymous provided

<sup>2</sup> Antitrust and Government and Business texts were not examined per se both because of the difficulty of obtaining them and also because the author believed that an examination of the leading Industrial Organization and

the names of the four most frequently-used microeconomics principles and intermediate microeconomics texts, as well as the names of the two most popularly-used industrial organization and policy texts. The top four microeconomics principles texts had a combined Canadian market share of 76 percent. All of these texts discussed cross elasticity of demand, but none discussed cross elasticity of supply. The reader will recall that economic principles texts were not examined in the earlier study and, therefore, these four principles texts were not included in the prior study.

The four most predominantly-used intermediate microeconomics texts hold 55 percent of Canadian market sales. The American version of three of these four texts were included in the author's previous study. Here again, while all four texts discussed cross elasticity of demand, none of them discussed cross elasticity of supply. Finally, both of the two most commonly-used industrial organization and policy texts, which command 70 percent of Canadian market sales (with the most commonly used of these two holding a 50 percent share) discussed cross elasticity of demand exclusively. One of these two texts had been included in the author's earlier work.

Hence, none of the three categories of textbooks discussed cross elasticity of supply. Apparently, students in Canadian universities aren't any more familiar with cross elasticity of supply than their counterparts in U. S. universities. On the one hand, this is due to the use of Canadian editions of the same texts used in U. S. universities. Nevertheless, the fact that the concept is not covered in a text does not necessarily mean that the concept (cross elasticity of supply in this case) is not being presented within the course. One must suspect that its absence in textbooks probably does mean that its discussion has been minimized, if not virtually eliminated, in classroom settings. Table I below lists the Canadian textbooks examined.

None of the above is to suggest that the cross elasticity of supply used in conjunction with the cross elasticity of demand are definitive criteria for use in the formulation of product market definitions. Both of these cross elasticity concepts are subject to certain theoretical and practical difficulties which the author has reviewed elsewhere (Greco, 2005). To be sure, these cross elasticity concepts are to be used with other criteria to formulate accurate product market definitions. The point is that cross elasticity of supply is one of the criteria which should not be neglected in such formulations.

### **Supply Substitutability in the Courts**

Interestingly, despite its lack of attention in academic textbooks, the concept of cross elasticity of supply seems to be gaining increasing judicial attention in the U. S. (Greco, 2005, 2008). The U. S. Supreme Court has only rarely acknowledged supply substitutability and has not done so in over 40 years. The court concluded in *U. S. v. Columbia Steel* (1948) that the producers of rolled steel products could make other such products interchangeable with the shapes and plates supplied by U. S. Steel and its subsidiaries. The Court was attempting to determine the relevant product market that might be foreclosed as a result of a proposed acquisition by U. S. Steel. Fourteen years later in a footnote, the Court mentioned that "cross elasticity of production facilities" might be somewhat useful in the delineation of markets (*Brown Shoe Co. v. U. S.*, 1962). Then, in the *Rome Cable* case of 1964, three Justices dissented from the Court majority opinion and argued in favor of supply flexibility in the determination of the relevant product market involved (*U. S. v. Aluminum Co. of America*, 1964). Finally, in the

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Policy texts would suffice to assess the coverage of cross elasticity of supply at the intermediate undergraduate level.

**TABLE I**  
**CANADIAN ECONOMICS TEXTBOOKS EXAMINED**  
**FOR CROSS ELASTICITY OF SUPPLY COVERAGE**

|                |   | <b>Coverage of Cross Elasticity of Supply</b> |           |
|----------------|---|---|-----------|
| <b>I.</b>      | <b>Microeconomics Principles Texts</b>  | <b>YES</b>                                    | <b>NO</b> |
|                | Mankiw, <u>Principles of Microeconomics</u> , 3 <sup>rd</sup> Canadian Edition, 2006, Thomson                                 |   | X         |
|                | McConnell/Brue/Barbiero, <u>Microeconomics</u> , 10 <sup>th</sup> Canadian Edition, 2005, McGraw-Hill                         |   | X         |
| <b>Cont'd.</b> |   | <b>Coverage of Cross Elasticity of Supply</b> |           |
| <b>I.</b>      | <b>Microeconomics Principles Texts</b>  | <b>YES</b>                                    | <b>NO</b> |
|                | Parkin, <u>Microeconomics: Canada in the Global Environment</u> , 6 <sup>th</sup> Edition, 2006, Pearson Education Canada     |   | X         |
|                | Ragan/Lipsey, <u>Microeconomics</u> , 11 <sup>th</sup> Canadian Edition, 2005, Pearson Education Canada                       |   | X         |
| <b>II.</b>     | <b>Intermediate Microeconomics Texts</b>  |   |           |
|                | Frank, <u>Microeconomics &amp; Behavior</u> , 3 <sup>rd</sup> Canadian Edition, 2007, McGraw-Hill Ryerson Canada              |   | X         |
|                | Eaton/Eaton, <u>Microeconomics</u> , 16 <sup>th</sup> Canadian Edition, 2005, Prentice Hall                                   |   | X         |
|                | Pindyck/Rubinfeld, <u>Microeconomics</u> , 6 <sup>th</sup> Edition, 2005, Prentice Hall                                       |   | X         |
|                | Perloff, <u>Microeconomics</u> , 4 <sup>th</sup> Edition, 2007, Addison-Wesley  |   | X         |
| <b>III.</b>    | <b>Industrial Organization Texts</b>  |   |           |
|                | Carlton/Perloff, <u>Modern Industrial Organization</u> , 4 <sup>th</sup> Edition, 2005, Addison-Wesley                        |   | X         |
|                | Church/Ware, <u>Industrial Organization: A Strategic Approach</u> , 2 <sup>nd</sup> Edition, 2008, Cambridge University Press |   | X         |

*Grinnell* decision of 1966, the Court gave recognition to the consideration of supply substitutability in its identification of the relevant product market. Therefore, the Court has rarely considered, much less endorsed, the use of supply substitutability (cross elasticity of supply).

There has been more recognition of and/or reliance upon supply substitutability by the Circuit Courts of Appeals. The number of cases in which this is true, however, is surprisingly small, numbering only ten over the years 1962-1995. In the first of these cases, the Circuit Court for the District of Columbia, in its *Reynolds Metals* decision of 1962, rejected supply substitutability as a basis for market definition (*Reynolds Metals Co. v. FTC*, 1962). In two subsequent circuit court decisions, the use of supply substitutability was also virtually discounted (*L. G. Balfour v. FTC*, 1971; *Columbia Metal Culvert v. Kaiser Aluminum*, 1978). The concept began to gain recognition as a market-determining measure in 1972 and was relied upon to some extent in seven cases in the 1972-1995 period. (*Calnetics Corp. v. Volkswagon*, 1972; *Twin City Sportservice*, 1972; *Telex Corp. v. IBM*, 1975; *Yoder Bros.*, 1979; *U. S. Anchor*, 1993; *Virtual Maintenance*, 1993; *SBC Communications*, 1995).

Finally, the author has identified 37 District Court decisions in 14 states as well as 6 Federal Trade Commission rulings in which supply substitutability was discussed (Greco 2005, 2008). Supply substitutability was rejected altogether as a criterion for determining market structure in two of these decisions, while it was disallowed as such a criterion on technical grounds in three other cases. Of the remaining 38 cases, a broad market definition was adopted in 18 cases (suggesting a greater acceptance of supply substitutability), whereas, a narrow market definition was adopted in 20 cases.

As an example of a broad market definition, an Illinois district court ruled in *Science Products Co.* (1974) that the relevant product market was not merely garden chemicals but also included all products that affect plant or insect life in and around the home. Further, an FTC case of 1975 found the relevant product market to include two types of van trailers because of the ease of shifting of production among these two types (*Budd Co.*, 1975).

A more narrow market definition was adopted by the D. C. District Court in the *Southern Pacific Communication* decision. Therein, the plaintiffs contended that the relevant product market was all business and government intercity telecommunications services, nationwide in scope. This would have placed such types of services as MTS and WATS in the same industry as private line services (PLS). The court limited the relevant market to private line services. (*Southern Pacific Communications Co. v. AT&T*, 1982). Then again in *U. S. v. Ivaco, Inc.* (1989), the U. S. District Court for the Western District of Michigan, Southern District, agreed with the U. S. Government's narrow product market definition of automatic tampers, as opposed to the defendants' broader product market definition which included manual tampers and the newer high technology continuous action tamper made exclusively by one company.<sup>3</sup>

The increased attention that U. S. courts and the U. S. legal profession have paid to cross elasticity of supply suggests that this concept may be taught in U. S. law schools, even if it is not being taught in mainstream undergraduate and graduate curricula. This suggests an investigation of the curricula of U. S. law schools which is beyond the scope of the current study.

According to a former member of the Canadian Competition Tribunal, there is apparently little competition litigation in Canada.<sup>4</sup> Most of the cases under the Competition Law of Canada

<sup>3</sup> Tampers are machines used to place ballast underneath a railroad tie.

<sup>4</sup> Letter of July 24, 2007, from Larry Schwartz, former member of the Canadian Competition Tribunal.

are decided by the Competition Tribunal, not by the Canadian courts, but many of these cases are settled privately with the Tribunal. Little if any discussion of the techniques used for formulating market definitions are available for Tribunal cases. Therefore, it is very difficult to ascertain the methods employed to formulate these market definitions.

Other evidence suggests that there is no strong reliance on cross elasticity of supply as a market-defining mechanism in Canada. An expert report obtained by the Canadian Bureau of Competition Policy in the landmark *Superior Propane* merger litigation estimated own – and cross – price demand elasticities of various energy commodities based on a complete demand system, but apparently did not address own – and cross- price supply elasticities. (Ryan and Plourde, 1999). Even the use of cross – elasticities of demand is usually limited by the large amount of data required to compute these or any cross elasticity coefficients. The author was informed that there are cases in which the estimation of own – and cross – price elasticities are facilitated by the use of scanner data but apparently such situations are relatively rare.<sup>5</sup> Further, the new Canadian Merger Guidelines focus explicitly on demand-side substitution to define relevant markets. Apparently, this approach attempts to avoid the data requirements of cross – price estimation by relying almost exclusively on own – price demand elasticity as a major determinant of product market definitions. While this may be convenient, it is unfortunate in that it may often result in inaccurate definition of product markets.

The U. S. Department of Justice initiated Merger Enforcement Guidelines in 1968. These guidelines were revised in 1982. The most significant of the 1982 revisions was the adoption of the hypothetical monopolist test in defining or delineating markets. Essentially the guidelines maintain that a market is the smallest group of products in the smallest geographical area such that a hypothetical monopoly of all those products in the area could significantly raise price (usually by 5 percent) and not induce a significant shift of buyers to substitute goods within a reasonable period of time, usually assumed to be one year. (Carlton and Perloff, 2005; Shepherd, 1997).

Then in 1992, the U. S. Department of Justice and the Federal Trade Commission issued revisions to the Merger Enforcement Guidelines which implicitly broadened the approach to market definition by the inclusion of supply substitutability. Section 1.3 of the revised Guidelines specifically deals with the identification of the firms participating (selling) in a relevant market. Current sellers in such a market are discussed in Section 1.31 of the Guidelines. Section 1.32, however, brings in firms that “Participate Through Supply Response.” These are referred to as “uncommitted entrants,” essentially defined to be those firms which should be included as suppliers in the relevant market due to their probable supply response. That is, these are the firms who, within one year and without the expenditure of significant costs, would become active sellers in said market in response to a small but significant nontransitory price increase. (Horizontal Merger Guidelines, 1992). With this significant revision to the Merger Enforcement Guidelines, the Executive Branch of the federal government like the U. S. Judicial system, has officially recognized supply substitutability as an important criterion in formulating product market definitions.

Interestingly, the Canadian Bureau of Competition issued Merger Guidelines in 1991 patterned on the 1984 U. S. Merger Guidelines’ hypothetical monopolist paradigm. (Werden,

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<sup>5</sup> Ibid.

2002). Then in September 2004, the Canadian Bureau of Competition released revised Merger Enforcement Guidelines consistent with the 1992 U. S. Merger Guideline revisions. (Hewat and Lloyd, 2005) Nevertheless, the Canadian Judicial System does not appear to rely upon supply substitutability as a criterion in defining product markets.

### **Summary**

In an earlier study, the author determined that the concept of cross elasticity of supply is rarely discussed in intermediate microeconomics, and industrial organizations and policy textbooks used in the U. S. The American judicial system, however, has over the years increasingly relied upon cross elasticity of supply in determining appropriate product market definitions.

An examination of the coverage given to the concept of cross elasticity of supply in similar economics textbooks used in Canadian universities finds virtually no mention of the concept. Further, no appreciable reliance on the concept of cross elasticity of supply as a criterion for defining product markets is found in the Canadian judicial system. Although the neglect of cross elasticity of supply in the academic world is somewhat perplexing, the increasing reliance on the concept of cross elasticity of supply in the U. S. judicial system, as reinforced in the U. S. Department of Justice/FTC Merger Guideline Revisions of 1992, is both intriguing and encouraging. This may suggest that U. S. law schools are teaching the concept even if academic undergraduate and graduate programs are not.



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