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Innovations in Support of the Unitary Injury Test in U.S. Unfair Trade Cases

*Richard D. Boltuck**

I. Introduction

Unfair trade allegations fall into two categories: dumping and countervailable subsidies.¹ The right of the General Agreement on Tariffs and Trade (GATT) signatory nations to collect antidumping duties and countervailing duties intended to remedy (that is, offset the trade effects of) foreign unfair practices is set out in Article VI of the GATT, together with the Antidumping Code² and the Subsidies Code.³

Dumping is the practice of selling in an export market at prices that are below fair value, i.e. those charged in the producing firm's home market, or at prices that are less than production cost.⁴ Countervailable subsidies arise when export subsidies, or domestic production subsidies, encourage an expansion of exports.

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1. Whether unfair trade practices are, in any sense, unfair or unethical need not be resolved in order to appreciate the significance of international agreement against these practices. By offering a safety valve for industries that seek protection, unfair trade remedies contribute to the political feasibility of GATT's broader multilateral trade liberalizing theme. By limiting remedial measures to instances where certain factual preconditions are demonstrated in an extensive investigation, at least some industries that would otherwise win protection through direct political means are turned away. In addition, the extent of the protection granted is restricted by the magnitude of the dumping margin or subsidy rate, as determined in the investigation.
 2. Formally, the Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade, Apr. 12, 1979, GATT B.I.S.D. (26th Supp.), at 171 (1980).
 3. Formally, the Agreement on Interpretation and Application of Articles VI, XVI and XXIII of the General Agreement on Tariffs and Trade, Apr. 12, 1979, GATT B.I.S.D. (26th Supp.), at 56 (1980).
 4. For the purpose of comparison, prices or costs are measured at the producing company's factory gate. If the home market is found to be not viable under applicable tests, prices to third country markets are used to establish fair value. If neither the home market nor third country markets are found to be viable, then fair value is based on a measure of constructed production costs. If the country under investigation is a non-market economy (NME), then surrogate country factor costs are used to establish a constructed production cost.
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Generally, antidumping (AD) or countervailable subsidy (CVD) investigations are initiated following receipt by the administering government authorities of a petition prepared by a domestic industry. The petition must contain the appropriate allegations and assertions of fact. Before the authorities may issue remedial orders, two findings must be reached:

- * First, the alleged unfair practice, or others identified by the authorities, must be occurring, and the magnitude of the dumping margin or subsidy rate⁵ must not be *de minimus*.
- * Second, the practice must be causing material injury to a domestic industry producing the product or products that are like the subject imports. The U.S. industry must be determined to be "materially injured by reason of" the imports that are subject to investigation.⁶

The focus of this paper is on the appropriate economic methodology to support application of the material injury test under the but-for approach to injury.⁷ Section II sets out in general terms the U.S. experience with the injury test, including developments over the past several years. During this period, economic methods that rely on comparative static price-theoretic economic models were introduced in both AD and CVD investigations.

Section III details two innovations in economic modelling that contribute to more precise analysis in both AD and CVD investigations. The first innovation permits examination of the significance of U.S. export markets in CVD investigations. The second innovation is based on a recent economic submission before the International Trade Commission (ITC), and extends the analysis of the impact of dumping to oligopolistic market structures in the United States. Finally, Section IV offers concluding thoughts.

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5. The dumping margin or subsidy rate is measured as a percentage of the U.S. import price. The U.S. Department of Commerce, International Trade Administration, is responsible for determining the dumping margin or subsidy rate.
 6. The AD law also requires that a remedial order be issued if a U.S. industry is determined to be suffering a real threat of imminent injury from future subject imports, or if a U.S. industry is materially retarded in its development and growth because of subject imports. As a practical matter, material retardation is virtually never an issue in U.S. AD investigations. The remainder of this paper addresses the current injury test, and does not further discuss threat or material retardation.
 7. Throughout this paper, references are to the injury test as applied in the United States, and with respect to subject imported merchandise. The analytical methods presented are generally applicable in the administration of unfair trade laws in other countries as well.
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II. The U.S. Experience With Competing Approaches to the Injury Determination.

The injury test in the U.S. unfair trade statutes is administered by the U.S. ITC, an independent quasi-judicial entity comprised of six commissioners.⁸ To promote independence and impartiality, positions on the Commission are divided between members of the major political parties, although nominees are also occasionally independent of any political affiliation.⁹ Similarly, the Commission's chairmanship alternates between members affiliated with different parties.

The Commission is split into two factions that apply sharply distinct methodological approaches in assessing whether the U.S. industry is materially injured. These approaches are called the bifurcated (or trends) approach and the unitary (or but for) approach.¹⁰ Interestingly, the two factions have co-existed for over a decade, and have not generally aligned along political party lines. Regardless of approach, commissioners must determine individually whether the amount of injury suffered by the industry surpasses his or her inherently subjective "materiality" threshold.¹¹

The unitary approach asks whether the U.S. industry would have been materially better off "but for" the sales of dumped or subsidized imported merchandise. If so, then the industry is materially injured by reason of the imports. Thus, this approach compares the condition of the U.S. industry in the presence of "unfair" imports with an analytic estimate of the condition of the industry were such imports absent.

Commissioners who most rigorously apply the unitary approach have generally expressly interpret the counterfactual absence of dumped or subsidized imports to be equivalent to the absence of the underlying unfair foreign trade practice itself, i.e., dump-

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8. The current members are Chairman Peter Watson, Vice Chairman Janet Nuzum, and Commissioners Carol Crawford, David Rohr, Donald Newquist, and Lyn Bragg.
 9. Commissioner Susan Liebler who served in the mid-1980s was a political independent.
 10. For an excellent discussion of the various approaches used both currently and historically by ITC commissioners, see Seth Kaplan, *Injury and Causation in US ITC Antidumping Determinations: Five Recent Approaches*, in POLICY IMPLICATIONS OF ANTIDUMPING MEASURES 143 (P.K.M. Tharakan ed., 1991). Seth Kaplan is presently an economic consultant at Trade Resources Company. See also The Cass/Eckes Debate on the Future of Injury Analysis at the International Trade Commission, at the University Club, Washington, D.C. (July 17, 1990) (transcript available from A.B.A.) for a lively exposition of the merits and weaknesses of both methodological approaches by Ronald Cass and Al Eckes, former commissioners and proponents, respectively, of the unitary and bifurcated approaches.
 11. The AD and CVD statute defines "material injury" to be "harm which is not inconsequential, immaterial, or unimportant."
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ing or countervailable subsidization.¹² A competing interpretation is to define the comparative counterfactual to require the absence of all such merchandise from the U.S. market, regardless of whether it would have been sold had import prices equalled fair value.¹³ Plainly, removal of all subject imports from the U.S. market would necessarily confer a greater benefit to the U.S. industry than simply requiring that any subject imports that are sold be priced at fair value.¹⁴

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12. Recently-retired Commissioner Anne Brunsdale, one of the most ardent advocates of the unitary approach on the Commission, articulated the rationale most eloquently, by noting in *New Steel Rails from Japan, Luxembourg, and the United Kingdom*, Inv. Nos. 731-TA-557-559 (Preliminary), ITC Pub. No. 2524, June 1992, at 43, that:

In determining whether a domestic industry is materially injured by reason of dumped imports, I consider, as the statute directs, the volume of subject imports, the effects of these imports on the price of the like product, and the effects on the domestic industry producing the like product.* [Footnote:] *Of course, the elimination of the dumped imports could be accomplished by raising the price of those imports to the point where they are no longer being dumped.

Id. (emphasis added).

13. Commissioner Watson applies the unitary approach, but has clearly stated that he *does not* assess the impact of the unfair practice. For instance, in *Softwood Lumber from Canada*, Inv. No. 701-TA-312 (First Remand), ITC Pub. No. 2689, October 1993, at 8, he joined Commissioners Rohr and Newquist (who both apply the bifurcated approach), in indicating that:

In making this determination, we consider the impact of the unfairly traded imports, and not just the effects of the unfair practice. We cannot therefore look just to what would be the case if that 28 percent of supply were fairly traded. Rather, we must consider what effect the 28 percent of supply that is unfairly traded has on the domestic industry.

14. A hallmark distinction between commissioners who attribute injury to the imports themselves and commissioners who attribute injury to the unfair practice, is that members of the latter group have considered the magnitude of the margin of dumping in reaching their determinations. Doing so is supported by compelling logic. This logic is recognized in the Uruguay Round GATT Agreement on Revising article 3.4 of the ANTIDUMPING CODE which includes, for the first time, the magnitude of the dumping margin among the factors that must be considered in evaluating material injury. This new requirement is also captured in the draft U.S. Uruguay Round Implementing Legislation. The dilemma with which this development seemingly confronts commissioners who have not conventionally attributed injury to the unfair practice has been recognized by Commissioner Donald Newquist. See *Implementation of the GATT Uruguay Round Amendments to Title VII*, mimeo, Prepared by the Staff of Don E. Newquist, Chairman, U.S. International Trade Commission (undated), at 6-7. Commissioner Newquist is among those commissioners who have believed that Congress intends that the ITC consider the effects of the sales of the total volume of subject imports, not simply the effects attributable to sales that occur because of the unfair practice. See *New Steel Rails from Japan, Luxembourg, and the United Kingdom*, *supra* note 13. For a further discussion of the significance of introducing the dumping margin among those factors that the ITC must consider, see Richard Boltuck, *The Injury Determination in U.S. Antidumping Law and Practice: The Impact of the Uruguay Round*, presentation delivered to a symposium organized by the Korean Trade Commission, Seoul (June 28, 1994).
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Application of the unitary approach is generally supported by ITC staff-generated estimates of the impact of dumping or countervailable subsidies on the U.S. market equilibrium, that is, volume, price, and industry revenue effects. The estimates are obtained through use of comparative static price-theoretic economic models, including principally the Comparative Analysis of Domestic Industry Condition (CADIC) model in AD investigations,¹⁵ and the staff's newer Commercial Policy Analysis System (COMPAS) spreadsheet model, in CVD investigations.¹⁶ Both models are Armington-style partial-equilibrium models, and are solved through linearization.¹⁷

By contrast, the bifurcated approach asks a sequence of two questions: first, is the U.S. like product industry materially injured? That is, is the industry financially or otherwise unhealthy, or in declining health? This first question is called the "injury test."¹⁸

If the industry is materially injured, the bifurcated approach then asks whether the subject imports have made more than a *de minimus* contribution to the industry's condition. This second question is called the "causation" test, and applies a contributory causation standard. The contributory causation standard permits the great bulk of the legally cognizable injury identified in the injury test to be caused by factors other than the subject imports. The 1979 GATT Antidumping Code requires, however, that "the injuries caused by other factors must not be attributed to the dumped imports."¹⁹ The consistency of the contributory causation standard with this GATT mandate has often been questioned, although the matter has not been resolved before any GATT dispute resolution panel.

In evaluating injury, commissioners who apply the bifurcated approach typically place considerable weight on the U.S. industry's financial condition, and trends in financial performance, together with other industry performance trends. Sometimes, cross-sectoral comparisons are used to support inferences about the health of the industry. In evaluating causation, bifurcated-approach commissioners seek evidence that import trends are correlated with declining industry health, and that the subject imports have undersold the domestic product:

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15. See Richard Boltuck, *Assessing the Effects on the Domestic Industry of Price Dumping*, in POLICY IMPLICATIONS OF ANTIDUMPING MEASURES 99 (P.K.M. Tharakan ed., 1991) (for a full exposition of the CADIC model).
 16. For details regarding the COMPAS subsidy spreadsheet, see *An Economic Analysis of the Effects of Subsidies*, mimeo, prepared by the Office of Economics, ITC, June 23, 1992 (especially the Technical Appendix).
 17. The Armington assumption is that consumers or industrial end users regard products as differentiated based on national origin. For the seminal contribution to this literature, see P.S. Armington, *A Theory of Demand for Products Distinguished by Place of Production*, in IMF STAFF PAPERS, 159-176 (1969). Product differentiation arises because of any systematic quality or characteristic differences among products from different countries, together with factors associated with the transaction. Transaction factors include delivery time and reliability, warranty and after service, product liability, and other such factors that attach intrinsically to acquisition of the product and that prospective customers take into account.
 18. The term "injury test" is also used to refer generically to the entire injury determination, whether derived from a unitary or a bifurcated analysis. Its meaning is apparent in context.
 19. ANTIDUMPING CODE, art. 3.4 (1979). Similar language appears in the Uruguay Round text. The House Ways and Means Committee's draft version of the U.S. Uruguay Round Implementing Legislation, however, would explicitly legalize use of the contributory causation standard in U.S. administrative practice, but apparently not to the exclusion of the unitary approach.
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Although the two methodological approaches are at logical odds with each other, reflecting disparate and mutually inconsistent readings of the law, the U.S. Court of International Trade (CIT), the ITC's appellate court, has deferred to commissioners who have applied each approach. The unitary approach is currently under challenge before the CIT in appeals by the U.S. steel industry. The steel petitioners assert in their appeal that the CIT has approved only the contributory causation standard that underlies the bifurcated approach's causation test, to the exclusion of the unitary approach.

The analytically-based application of the unitary approach evolved over the past decade. It was motivated in part by a plain-language interpretation of the statute that held that the injury measured must be directly attributable to the subject imports.²⁰ But it was also motivated in part by the development and popularization of the economic tools that made simulation modelling a reasonably straightforward and transparent exercise.

Prior to the release of the first version of the CADIC model in 1987, Commissioner Paula Stern had been the only recent member of the ITC to forcefully articulate commitment to the unitary approach. Commissioner Stern, however, relied on an analytically flawed method for assessing whether the imports had caused injury.²¹

Reportedly, when the ITC's General Counsel reviewed the unitary approach in the early 1980s, he concluded that although it was not illegal, it was practically infeasible to implement. At the time, the prevailing view was that in order to measure the quantum of injury correctly attributable to the subject imports alone, the effects of other known factors must be subtracted from the "total injury" endured by the industry. The residual injury is then attributable to the imports. Such a subtraction approach is cumbersome at

20. Both the AD and CVD statutes require the ITC to determine that the material injury is "by reason of" the subject imports. Moreover, neither statute, on its face, lays out or appears to contemplate a two-part test in reaching this determination.

Commissioner Carol Crawford, a commissioner who applies the unitary approach, notes in a footnote to her determination in *Certain Flat-Rolled Carbon Steel Products from Argentina, et al*, Inv. Nos. 701-TA-319-332, 334, 336-342, and 347-353 (Final) and Inv. Nos. 731-TA-573-579, 581-592, 594-597, 599-609, and 612-619 (Final), Volume I: Determinations and Views of the Commission, ITC Pub. 2664, August 1993, at 45, n.267, that:

The Commission is not to determine if the [subject] imports are "the principal, a substantial or a significant cause of material injury." [citing the legislative history. She then concludes that,] [r]ather . . . [the Commission] is to determine whether any injury "by reason of" the [subject] imports is material. That is, the Commission must determine if the *subject imports* are causing material injury to the domestic industry.

Id. (emphasis in the original).

21. Commissioner Stern used "margins analysis," which compared the size of the margin of underselling to the margin of dumping. If the margin of underselling was less than the margin of dumping, causation was inferred. Her method properly recognized that any analysis of the impact of the unfair practice would require consideration of the dumping margin or subsidy rate. Nonetheless, a direct comparison of the margin of underselling to the dumping margin does not properly reveal the effects of dumping. Indeed, a product sold at a lower price in the United States because of dumping or subsidization can injure U.S. producers even if it *oversells* the U.S. like product.

best, and practically impossible to apply at worst. As a result of this insight, the General Counsel strongly advanced the bifurcated approach as a preferable alternative, chiefly because the questions it poses may be defensibly answered within statutory time limits and based on a typical investigative record.

The advent of comparative static modelling, which controls analytically for all factors other than the imports to which injury must be attributed, increased the appeal of the unitary approach significantly. Moreover, the models rely on a relatively sparse set of parameters, including market shares, behavioral elasticities, and the dumping margin or subsidy rate.²² Consequently, investigations, including written submissions by interested parties, and hearing presentations, have focused increasingly on the limited array of factual issues that inform judgments about reasonable, empirically-supported ranges for the required parameters.

The models are constructed to be user friendly and portable. Parties to investigations use the models to better assess the strength of their cases, and to direct their advocacy toward the issues with the greatest potential benefit. Indeed, in ITC AD and CVD investigations, the adversary process itself is designed around the application of comparative static analysis.

For several years now, the ITC economics staff has prepared a prehearing memorandum in each final investigation that sets out the staff's best judgment about reasonable ranges in which parameters required for the modelling exercise are most likely to fall. Parties generally offer comments at the hearing or in posthearing submissions about facts that bear on these judgments. The staff considers and responds to these comments, sometimes revising its parameter range estimates, in a posthearing (final) economics memorandum. This procedure enlists all of the interests represented in an investigation in a concerted effort to better evaluate the parameters needed to generate effects estimates.

Critics, who are frequently economists, often contend that the bifurcated approach is intrinsically more "protectionist" than the unitary approach, or vice-versa. It is difficult to sustain any strong position on this question, however, since any factual characterization of the magnitude of cognizable injury under either approach must then be filtered through the subjective materiality threshold, which is inherently individual to each commissioner.

The unitary and bifurcated approaches, though, do favor differing fact patterns. The unitary approach, for instance, is more likely than the bifurcated approach to yield an affirmative outcome when the U.S. industry is in good or improving financial condition. Under such circumstances, the bifurcated approach necessarily finds a lack of injury, but the unitary approach may still demonstrate that the industry would have been materially

22. The estimated impact on U.S. industry revenue is generally most sensitive to three parameters: (1) the margin of dumping or the subsidy rate; (2) the subject import penetration rate; and (3) the difference between the Allen partial elasticity of substitution that relates the like product and the subject import, and the absolute value of the composite demand elasticity. The second and third of these parameters combine to imply the cross-price elasticity of demand for the like product with respect to the price of the subject import. The first parameter is important in determining the magnitude of the price impact of the unfair practice on the U.S. price of the subject import. The composition of the revenue effect between price and volume reductions is determined by the U.S. industry's production supply elasticity.

better off but for the dumped or subsidized imports.²³ The unitary approach also favors an affirmative determination whenever the Commerce Department has reported a large dumping margin or subsidy rate, regardless of whether the margin or rate reported reflects actual unfair practices, or whether it reflects significant biases in the methodology applied at Commerce.²⁴

On the other hand, the bifurcated approach favors situations where the subject imports have, in fact, contributed only slightly to the U.S. industry's poor or declining performance. In such an instance, the contributory causation standard allows the effects associated with numerous unrelated causes to be aggregated in assessing injury.²⁵

Actual ITC outcomes depend substantially on the self-selection process that determines which industries will seek AD or CVD relief by filing petitions. Pursuing a claim before the Department of Commerce and the ITC is an expensive undertaking, that generally requires use of legal counsel and consultants. The expected rewards to this expenditure are greatest for industries that can offer facts that best match the approach used by at

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23. For this reason, some protectionist interests have supported the unitary approach, even though, in general, it has been embraced by commissioners who, individually, have been regarded as sympathetic to more liberal trade practices. For example, according to an October 1991 study entitled, *Competing Economies: America, Europe, and the Pacific Rim*, prepared by the Congressional Office of Technology Assessment, at 150:

The injury test poses a particular problem for firms seeking relief in good economic times, at the beginning of a product cycle, or before much damage has been done. As the ITC has interpreted the test in some recent cases, industries that appear fairly healthy in an absolute sense and whose health has not recently declined will likely fail the injury test, even if they would have done far better if not for the subsidized or dumped imports. . . . The majority approach can make it hard for U.S. firms to win dumping cases early in a product cycle (when markets are growing) or before significant damage has been done.

Id. This study generally endorsed protectionist policies in other contexts throughout, but cited favorably those commissioners who assess injury "primarily in terms of the effect of the dumping, rather than the general health of the industry." *Id.* (emphasis added).

24. See generally, *DOWN IN THE DUMPS: ADMINISTRATION OF THE UNFAIR TRADE LAWS* (Richard Boltuck & Robert E. Litan eds., 1991) for extended analysis of the many upward biases in the Commerce Department's procedures for calculating dumping margins and subsidy rates. Numerous legal representatives and consultants who represent or work for respondents before the ITC have expressed concern that overstated margins or rates reported by the Commerce Department flow through to the unitary approach at the ITC, and cause further unjustified determinations that are adverse to the interest of foreign producers and importers.
25. Research by Keith Anderson, an economist in the office of former Chairman Anne Brunsdale, has carefully analyzed the determinants of ITC vote outcomes. His profit analysis of ITC voting indicates that the single best predictor of ITC determinations is the impact on U.S. industry revenue of the unfair foreign practice, as estimated by a CADIC-type comparative static model. In fact, his one-variable unitary approach profit model correctly predicted nearly the same proportion of outcomes as his six-variable bifurcated approach profit model. The unitary model performed better than the bifurcated model according to the Akaike information criteria. For details, see Keith B. Anderson, *Agency Discretion or Statutory Direction: Decision Making at the U.S. International Trade Commission*, 36 J. L. & ECON. 915 (1993).
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least three ITC commissioners.²⁶ Consequently, regardless of whether the unitary approach faction or bifurcated approach faction is dominant, a high proportion of investigations that are initiated pursuant to petition would be anticipated to end in affirmative determinations.²⁷

III. Innovations in the Economic Models that Support the Unitary Approach.

This section examines two proposed innovations in the comparative static models used at the ITC. The first innovation extends the analysis of the COMPAS subsidy spreadsheet to take proper analytic account of the significance of export opportunities available to U.S. producers. The second innovation indicates how a comparative analysis of dumping should be performed when the U.S. market is characterized by Bertrand competition, a form of oligopoly structure.

A. INCORPORATING THE U.S. INDUSTRY'S EXPORT OPPORTUNITIES IN THE SUBSIDY MODEL

The current ITC staff COMPAS subsidy model, as applied to foreign production subsidies, analyzes changes in the equilibrium within the U.S. market alone. The U.S. CVD law, however, requires the Commission to consider the impact of the subject imports on "U.S. production operations as a whole," including, naturally, those production operations that serve U.S. export markets.²⁸ Consequently, any impact that subsidized imports have on U.S. export sales must be taken into account in correctly estimating the full effects on the U.S. industry as a whole.²⁹ The existence of export opportunities lessens the impact of subject imports. In addition to presenting the adapted model, this section also demonstrates the potential significance of this innovation by comparing estimates obtained both with and without allowance for export opportunities.

Export opportunities, which are not permitted in the current COMPAS subsidy package, are a significant feature of the world, and result in attenuated impacts on the U.S.

26. Three votes are required to obtain an affirmative ITC determination and the consequent AD or CVD remedial order.

27. It is possible that because of its transparency and predictability, the unitary approach reduces the expected cost of obtaining protection. On the other hand, the unitary approach does not allow commissioners to exercise as much discretion in reaching defensible determinations as the bifurcated approach. As a result, there is less opportunity for political considerations or other extraneous factors to intrude on the analysis. Thus, the unitary approach tends to insulate the injury-determination process from the more direct forms of political influence.

28. In the pre- and posthearing staff reports, for example, export sales are always included in reporting the U.S. industry's financial performance.

29. Export effects are incorporated in the Comparative Analysis of U.S. Equilibrium (CAUSE) model, developed by Richard Boltuck and Seth Kaplan, and released to the public by Trade Resources Company in 1992. The structure of the CAUSE model is documented mathematically for the first time in this paper.

industry.³⁰ Foreign production subsidies adversely affect U.S. producers who themselves trade in world markets through two distinct channels: first, subsidies increase competition within the U.S. market through increased imports. Second, subsidies increase competition with U.S. producers outside of the United States. The U.S. CVD law, however, requires that the injury be "by reason of imports of the merchandise subject to the order." Accordingly, only the effects that flow through the first channel are cognizable under the law.³¹ Increased U.S. exports, induced by increased, subsidized imports, must be counted because they are a direct consequence of the imports.

To appropriately separate the import effects from the effects of increased competition in the rest-of-the-world, it is necessary analytically to convert the production subsidy into

30. The ITC staff acknowledged the potential significance of U.S. export markets in correctly analyzing the impact of imports: "[I]n individual cases, the interaction of the U.S. market with markets outside the United States may also significantly affect the impact of subsidies on the domestic industry." [Footnote:] *We understand the CAUSE model emphasizes such effects." See RICHARD BOLTUCK AND SETH KAPLAN, *COMPARATIVE ANALYSIS OF U.S. EQUILIBRIUM: A GUIDE FOR USERS OF THE CAUSE MODEL* (1992). See *An Economic Analysis of the Effects of Subsidies*, *supra* note , at 2.

31. The improper inclusion of effects attributable to the direct impact of U.S. production subsidies in third country markets was at the heart of a GATT Dispute Resolution Panel's decision to uphold a U.S. complaint against a determination to impose countervailing duties on U.S. grain corn by the Canadian Import Tribunal (CIT, since renamed the Canadian International Trade Tribunal):

The Panel noted however that whereas the CIT equated the world market price decline with the decline and depression of the price for corn in the Canadian market, the CIT did not attempt to make a link between subsidized imports and the price decline and depression in the Canadian market. No positive evidence was adduced on this point.

Panel Report, Jan. 1992, par. 5.2.6, at 26.

The Panel continued,

In the view of the Panel, the CIT's findings of injury and causality were themselves largely based on factors other than subsidized imports: in particular, the factor of a dramatic decline in world market prices resulting in large part from a United States subsidy under the 1985 Farm Bill. [footnote omitted] Clearly, if there is a general and dramatic decline in world market prices for grain corn, this will affect Canadian producers. It will affect Canadian producers even if Canada does not import any grain corn from the United States, even if it imports grain corn from third countries, even if it is not completely self-sufficient in grain corn or, indeed, even if it is a net exporter of grain corn, as it was in some crops [sic] years during the period of the CIT investigation. In each case, the Canadian price for corn would still be directly impacted -- in a material way -- by the world price decline. Thus the price depression experienced in the Canadian market would have occurred in all such cases, and the imposition of countervailing duties would be contrary to Article 6.4, which requires that price depression or prevention of price increases caused by other factors must not be attributed to subsidized imports.

Id., par. 5.2.9, at 27-28.

Since the United States itself petitioned GATT for relief from the erroneous Canadian CVD order, it is reasonable to conclude that the interpretation of Subsidies Code obligations sought and obtained from the Panel is in accord with U.S. law.

an equivalent export subsidy targeted at the United States. The equivalent subsidy is defined as the targeted export subsidy that would have an effect identical to that of the production subsidy on the price of the subsidized merchandise in the U.S. market.³²

The equivalent export subsidy would have two effects on production and sales of the subject merchandise. First, it would encourage the diversion to the U.S. market of existing foreign production that would otherwise be sold outside of the United States. Second, it would encourage additional production. To the extent production increases, the (unsubsidized) price of the subject merchandise outside of the United States would rise, since quantity-supplied and price vary directly with each other.

The increased importation of merchandise that receives a targeted export subsidy encourages U.S. producers to increase their own exports, and thereby insulate themselves, to the extent possible, from the impact of the imports. U.S. producers respond in this way both because of intensified competition within the U.S. market, and because the rest-of-the-world market is more attractive to the extent the price of the subsidized merchandise outside of the United States has risen.

The CAUSE model, or an appropriate adaptation of the COMPAS subsidy model, must separate the effects attributable to the imports from those attributable to competition outside of the United States, and also recognize that export opportunities moderate the impact of increased subject imports on U.S. producers. Such an adaptation requires that both the U.S. and rest-of-the-world markets are modelled, and that market shares and production shares sold in each market be arithmetically consistent.

The first step in constructing an adapted model is to note the differing role played by a production subsidy and a targeted export subsidy. As in the COMPAS model, three competing, but Armington-differentiated, products are distinguished: (1) the domestic (U.S.) like product; (2) the subject (unfairly traded) import; and (3) the non-subject (fairly traded) import. The structural difference between the equilibrium conditions for the two types of distortions allows conversion of a production subsidy to an equivalent targeted export subsidy. A production subsidy raises the supply price of the subject merchandise, but reduces its demand price to all customers or end users:

$$D_d(P_d, P_u, P_f) + D_s^*(P_d, P_u, P_f) = Q_d(P_d) \quad (1)(a)$$

$$D_u(P_d, P_u, P_f) + D_u^*(P_d, P_u, P_f) = Q_u(sP_u) \quad (1)(b)$$

$$D_f(P_d, P_u, P_f) + D_f^*(P_d, P_u, P_f) = Q_f(P_f) \quad (1)(c)$$

In equations (1)(a)-(c), the left sides reflect, respectively, global demand for the domestic (U.S.) like product (denoted by the subscript "d"), the subject (unfairly traded) product (denoted by "u"), and the non-subject (fairly traded) product (denoted by "f"). In each case, global demand is the sum of U.S. demand and rest-of-the-world demand (denoted by "*"). The right sides of each equation reflect the global supplies of each product. In each

32. For an intuitive discussion of the concept of an export equivalent subsidy in a single product model, see Joseph F. Francois, *Countervailing the Effects of Subsidies: An Economic Analysis*, 26 J. WORLD TRADE 15 (1992).

instance, demand is a function of the prices of the three competing products, whereas supply is a function of the price of the product supplied. Note that the supply price of the unfairly traded product is augmented by an *ad valorem* production subsidy at rate $(s - 1)$.³³ The objective of a production subsidy, of course, is to encourage expanded production by raising the supply price.

In contrast to a production subsidy, a targeted export subsidy raises not just the supply price of the subject product, but also the demand price in the rest-of-the-world, i.e. outside of the United States, which is the targeted export market. Formally,

$$D_d(P_d, P_u, P_f) + D_d^*(P_d, sP_u, P_f) = Q_d(P_d) \quad (2)(a)$$

$$D_u(P_d, P_u, P_f) + D_u^*(P_d, sP_u, P_f) = Q_u(sP_u) \quad (2)(b)$$

$$D_f(P_d, P_u, P_f) + D_f^*(P_d, sP_u, P_f) = Q_f(P_f) \quad (2)(c)$$

In equations (2)(a)-(c), s is a targeted export subsidy at *ad valorem* rate $(s - 1)$. In this equilibrium, the subsidy is paid for exports destined for consumption in the United States. That is, re-export of the subsidized imports from the United States to the rest-of-the-world market must be precluded, or the subsidy ceases to be, in effect, targeted.

The second step in converting a production subsidy to an equivalent targeted export subsidy is to logarithmically differentiate both sets of equilibrium conditions with respect to their respective subsidy rates. Doing so results, in each case, in a corresponding set of three linear equations that may be summarized in matrix notation:

$$A \beta = C(s - 1) \quad (3)$$

$$A \beta = C^*(s - 1) \quad (4)$$

Equation (3) corresponds to equations (1)(a)-(c) and equation (4) corresponds to equations (2)(a)-(c). In equations (3) and (4), β is a 3×1 column vector of proportional price changes, which are the "unknown" variables in each of the simultaneous equation systems. The right sides of these equations, C and C^* , are also 3×1 column vectors, and contain the "constants" in the non-homogeneous linear systems.

33. Frequently, production subsidies are conferred indirectly, in the form of subsidies to the use of production factors. In this event, a factor subsidy may be converted into an equivalent production subsidy by multiplying the *ad valorem* factor subsidy rate by the share of total production cost attributable to the factor, and then multiplying this product by the output elasticity of the factor. An output elasticity is defined as the percentage change in use of a factor that is associated with a one percent increase in production, at constant factor prices. For a thorough discussion of output elasticities, see EUGENE SILBERBERG, *THE STRUCTURE OF ECONOMICS: A MATHEMATICAL ANALYSIS* 262-67 (2nd ed. 1990).

To illustrate the structure of coefficient matrix A, consider the value of the upper left cell:

$$a_{11} = \gamma_d \eta_d + \gamma_d^* \eta_d^* - \epsilon_d \quad (5)$$

Cells on the main diagonal, such as the upper left cell, contain a weighted average of the own-price demand elasticities in the United States and the rest-of-the-world (denoted by "" and "*", respectively, with the appropriate product-specific subscript), where the weights are the share of total production of each product sold in each market (denoted by "Y" and "Y*").³⁴ The production supply elasticity (denoted by "ε") is then subtracted from this weighted average.

Cells off the main diagonal, such as the cell immediately to the right of the upper left cell, contain weighted averages of cross-price elasticities of demand, and do not include supply elasticities:

$$a_{12} = \gamma_d \eta_{du} + \gamma_d^* \eta_{du}^* \quad (6)$$

For the purpose of converting a production subsidy to an equivalent targeted export subsidy, second-order small terms, i.e., terms that contain the product of the subsidy and a price change, that would otherwise appear in coefficient matrix A, are properly ignored. Linearization assures that these terms approach zero within a sufficiently small neighborhood about the point around which the approximation is made.

Constant vector C, derived from the production subsidy equilibrium, contains a single non zero value in its second cell, the elasticity of production supply of the unfairly traded product, u. Constant vector C*, derived from a targeted export subsidy, contains values in each of its three cells. The first cell, for instance, contains $-\gamma_d^* \eta_{du}^*$. The second cell in C* contains $\epsilon_u - \gamma_d^* \eta_{du}^*$, whereas the third cell resembles the first cell, with the appropriate changes.

The third step consists of two sub-steps. First, all market shares (in value terms) and production shares (in quantity terms) are specified, and second, the market shares together with appropriate elasticities are used to derive a consistent system of product-specific, market-specific own-price and cross-price elasticities of demand. The results are then applied in numerically completing the two linear systems set out above.

In general, an ITC investigation will obtain sufficient evidence to directly specify U.S. market shares (denoted by "V" and the appropriate subscript) for the U.S. like product, subject imports, and non-subject imports, together with the production shares.³⁵ If total expenditure in the U.S. market on all three products is represented by T, and total expendi-

34. Demand elasticities, by convention, are negative.

35. The production shares for non-subject merchandise are often not available as a product of the investigation, and as a result the model should be tested as to sensitivity to the value of this share within a reasonable range.

ture in the rest-of-the world market by T^* , then the ratio of T^* to T may be expressed in terms of the U.S. market shares, and global production shares:

$$\frac{T^*}{T} = (\frac{Y_u^*}{Y_u})V_u + (\frac{Y_d^*}{Y_d})V_d + (\frac{Y_f^*}{Y_f})V_f \quad (7)$$

Note that $Y_u + Y_u^* = 1$, and similarly for the other pairs of production shares.

Based on equation (7), the market shares of each of the three products in the rest-of-the world may be calculated. For instance, V_u^* is given by,

$$V_u^* = V_u \frac{Y_u^*}{Y_u} \frac{T}{T^*} \quad (8)$$

Now, equipped with a full complement of market shares for both markets, a full demand structure may be specified.³⁶ These elasticities are obtained through application of the Hick's derived-demand relationships. For example, the own-price demand elasticity for the U.S. product in the U.S. market, η_d , is given by,

$$\eta_d = V_d \eta - V_d \sigma_{du} - V_f \sigma_{df} \quad (9)$$

In this equation, the σ 's are Allen partial elasticities of substitution and η is the demand elasticity for the composite product, which aggregates all three sub-products. The other five own price product-specific demand elasticities (two in the U.S. market and three in the rest-of-the-world market) follow the same form, with the appropriate changes.

The cross-price elasticities are obtained in a similar manner. For instance, the cross-price elasticity of demand for the U.S. like product with respect to the price of the unfairly traded product in the U.S. market, η_{du} , is given by,

$$\eta_{du} = V_u (\eta + \sigma_{du}) \quad (10)$$

The other eleven cross-price elasticities of demand (five in the U.S. market, and six in the rest-of-the-world market) follow this same form, with the appropriate changes.

The fourth step in solving the model is to calculate the equivalent export subsidy. Since the equivalent export subsidy is defined by the rate that generates the same impact on the U.S. price of the unfairly traded product, the solution requires setting these two

36. Keith Hall, head of the ITC's Applied Economics Division, Office of Economics, noted in his discussant remarks on this paper that modeling the non-U.S. rest-of-the-world market presented the ITC and its staff with problems of data availability not presently encountered. Production share data for both the subject foreign producers and the U.S. industry, together with U.S. market shares, are typically available in current investigations. These data are required in evaluating equation 7. The principal new data required are the production shares of non-subject imports, which are not currently collected. In many investigations, however, the estimated rest-of-the-world market shares derived in equation 8 (which relies on equation 7) are not highly sensitive to reasonable variation in the value of non-subject import production shares. In general, the Commission staff should consider obtaining estimates of these production shares in future investigations in order to better implement an analytical approach that appropriately answers the statutory injury question.

price impacts equal to each other, and then calculating s_{sob} , the solved value of s . To solve the linear systems in matrix equations (3) and (4), it is first necessary to invert the coefficient matrix A , before solving for the equivalent subsidy. In this solution, the individual cells of the inverted matrix are designated by " a_{ij}^{-1} ":

$$s_{sol} = \frac{a_{22}^{-1} c_2 (s - 1)}{a_{21}^{-1} c_1 + a_{22}^{-1} c_2 + a_{23}^{-1} c_3} + 1 \quad (11)$$

The fifth and final step is to solve the vector, p , based on equation (4) and the export equivalent subsidy, s_{sol} .³⁷

$$p_{sol} = A^{-1} C' (s_{sol} - 1) \quad (12)$$

Thus, the impact of the unfair practice on the price of the U.S. product, conveyed through imports, is the value of the first cell in the solution vector in equation (12), namely, p_d (log derivatives or proportional changes are denoted by " $\wedge$ "). The impacts on the U.S. industry's volume and revenue may be found through the supply response:

$$\hat{Q}_d = \rho_d \varepsilon_d \quad (13)(a)$$

$$\hat{R}_d = \rho_d (\varepsilon_d + \rho_d \varepsilon_d + 1) \quad (13)(b)$$

Correcting for the existence of export opportunities, and not counting injury conveyed through third-country effects of a production subsidy, can yield significant changes in estimated effects, as revealed in a simple example.

Consider a 30 percent countervailable production subsidy. Suppose that subject imports account for 10 percent of the U.S. market whereas the like product accounts for 80 percent. Fifty percent of subject production and 20 percent of non-subject foreign production is sold in the U.S. market. U.S. producers export 15 percent of their production. Suppose further that the composite demand elasticities in both markets equal -0.3 and the elasticities of substitution all equal 5. Finally, assume that all supply elasticities equal 4.

Based on this parameterization, U.S. industry revenue would appear to decline by 6.8 percent consequent to the subsidy, before the correction is made to isolate the effects of the imports. Once the correction is made, however, the revenue impact is reduced to just 4.1 percent, which is less than the notional five percent materiality threshold that has been applied by some commissioners who use the unitary approach.

Finally, the author has further adapted this model to account for transportation and other costs that are incurred after the product has left the factory, but before it has been delivered to the consumer or end user. This adjustment, although not complicated, is not elaborated here.³⁸

37. A slight and seemingly imperceptible improvement involves re-specifying the middle column in the coefficient matrix A to include the second-order small terms.

38. Details may be obtained through direct correspondence with the author.

B. BERTRAND OLIGOPOLY WITHIN THE U.S. MARKET

A common criticism levelled at the CADIC model of price dumping is that the structure imposed on competition in the U.S. market does not correspond to that actually encountered in many investigations.

The CADIC model assumes structurally that the importer exercises some market power in its sales of the subject merchandise in the United States, although a lesser degree of market power than is exercised in the producer's home market.³⁹ Thus, the price of subject merchandise, both in the home market and the U.S. market, is determined by a mark up over marginal cost.⁴⁰

By contrast, however, the CADIC model treats the U.S. producers as a perfectly competitive industry in the U.S. market. That is, the U.S. like product price in the United States just equals marginal cost.

This structure is not objectionable in some investigations. For instance, when many U.S. producers comprise the U.S. industry, but comparatively few producers account for subject imports, the pricing structure built into the CADIC model captures reasonable modelling abstractions. In other investigations, the segment of the broader market served by the U.S. industry is itself at least as highly concentrated as the segment served by the foreign subject industry. In such circumstances, an alternative market structure is clearly desirable.

In a recent investigation, Professor Paul Krugman argued that the U.S. market structure was more appropriately characterized by Bertrand oligopolistic competition.⁴¹ Professor Krugman's model was simplified for pedagogic clarity. A more robust version requires substitution of a sufficiently flexible and realistic demand system for the linear demand system that Professor Krugman set out in his paper. A constant elasticity of substitution (CES) demand system was used in place of the linear system to generate comparative estimates in a submission prepared by Trade Resources Company (TRC) in the CNPP investigation.⁴²

Bertrand pricing assumes that each firm behaves strategically under the belief that its competitors will not alter price in response to its own price changes. An alternative form of oligopoly behavior, Cournot pricing, arises if each firm believes its competitors will not alter quantity sold in response to its marketing decisions. Bertrand oligopoly behavior is

39. If the home market is deemed to be not viable, then the comparison market is a third country export market in which the foreign producer exercises a greater degree of market power than is exercised in the United States.

40. CADIC ver. 2.0 introduced Cournot oligopoly among subject foreign producers, which limits the degree of market power exercised by individual firms.

41. International Market Segmentation, Innovation and Competition: A Theoretical Analysis of the CNPP Market, by Paul Krugman, submitted as part of prehearing filings on behalf of Kodak in Certain Color Negative Photographic Paper and Chemical Components Thereof From Japan and the Netherlands (CNPP), Inv. Nos. 731-TA-661-662 (final investigation, subsequently suspended pursuant to a suspension agreement).

42. Volume III of Prehearing Brief: Economic Submission on behalf of Petitioner Eastman Kodak Company, submitted by Seth Kaplan, Richard Boltuck, Paul Zucker, Jerry Hausman, and Paul Krugman, Aug. 16, 1994, as part of prehearing filings in the CNPP final investigation, subsequently suspended.

regarded as generally more appropriate than Cournot behavior when capacity restraints do not limit quantity responses, and when price competition is plainly evident in the market.

It is well known that in the absence of any product differentiation, Bertrand prices collapse to marginal cost. This result is known as the Bertrand paradox.⁴³ Product differentiation, however, regardless of how minor, is sufficient to assure mark up pricing. The usual CADIC assumption of Armington differentiation thus implies that prices will exceed marginal cost.

Professor Krugman posited that two types of end-use customers purchase the product. "Home" customers are dedicated purchasers of the product manufactured by the firm in the home country, whereas the purchase decisions of "swing" customers are sensitive to relative price variation. This framework permits national asymmetries to arise solely because of different distributions of customer types.

The TRC CNPP model relies on Armington differentiation together with a CES demand structure to implement the basic Krugman framework. Demand elasticities facing the U.S. industry and the subject importer, respectively, are consistent with Hick's derived-demand conditions. CES demand of U.S. swing customers for the U.S. product, for instance, is given by,

In this equation, S_d is the quantity of the U.S. like product demanded by swing customers in the United States. AUS is a constant calibrated to the composite level of demand in the U.S. market. The Allen partial elasticity of substitution, U , relates the U.S. like product and the subject import in the United States, whereas US is the composite demand elasticity for the two products.

Although the revised CADIC model could be solved through linearization, it is equally tractable, and otherwise preferable, to avoid linearization error by programming the model in software that solves non-linear equations numerically.⁴⁴

The practical significance of Bertrand oligopoly in the U.S. market, in place of the conventional CADIC structure, depends critically on the facts in an investigation. Even in a situation where the Bertrand assumption is demonstrably better suited to the market structure than the usual CADIC assumption, it may not generate substantially different estimates. For instance, if under either structure, the magnitude of the dumping margin is so great as to drive the subject imports entirely from the U.S. market, then the resulting estimates must be identical.

Moreover, in the context of supporting application of the unitary approach, the estimates are used to infer whether the actual impacts exceed or fall short of a commissioner's subjective materiality threshold. For this purpose, two estimates that are both clearly on one side or the other of this threshold contain the same effective information content. Nonetheless, such a coincidence cannot be known in advance of applying both versions of the model, and in light of the actual market structure, one or the other version's estimates will offer greater credibility.

43. See, for example, JEAN TRIOLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* 209-211 (1988).

44. Examples of such software include GAUSS, GAMS, and MathCAD.

IV. Conclusions

This paper has proposed two innovations in economic tools that are currently used at the ITC in AD and CVD investigations, and relied on by at least some commissioners who apply the unitary approach. These innovations by no means exhaust the possibilities for further exploration and improvement. In investigations that cover high technology products, for instance, dynamic cost reductions attributable to cumulative production experience (learning-by-doing), might be of critical importance in any valid simulation of the effects of import sales. Numerous other case specific modifications could be identified. The innovations examined here, however, appear to be applicable in a sufficient range of investigations as to merit general attention.

It is clear that ITC commissioners who would like to promote a greater reliance on economic tools such as CADIC and COMPAS must remain thoroughly open minded with respect to improvements that better match the exercises they purport to conduct to the underlying markets they seek to understand.

Finally, this paper has not attempted to review the social wisdom of the unfair trade laws from an economist's perspective, or from any other perspective. Virtually all economists disparage, with little qualification, the very existence of these laws. From an economic practitioner's perspective, however, two basic questions are in need of continuous study: Given the existence of the laws, is there a better or worse way of administering them? What role does forensic economics have to play in this process?