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THE RELATIONSHIP BETWEEN
DOMESTIC DEMAND AND U.S. EXPORTS:
A TEST OF THE
DEMAND PRESSURE HYPOTHESIS

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THE RELATIONSHIP BETWEEN DOMESTIC DEMAND AND U.S. EXPORTS: A TEST OF THE DEMAND PRESSURE HYPOTHESIS

By

Michael Raymond Myler

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ABSTRACT

THE RELATIONSHIP BETWEEN DOMESTIC DEMAND AND U.S. EXPORTS: A TEST OF THE DEMAND PRESSURE HYPOTHESIS

By

Michael Raymond Myler

An inverse relationship between domestic demand and export performance has been hypothesized by several writers. Empirical tests of this proposition (called the Demand Pressure Hypothesis) have, to date, yielded mixed results. The usual test has involved a single-equation model with the export quantity as the dependent variable and the export price, some measure of world demand, and an indicator of domestic demand pressure as the explanatory variables.

This dissertation develops a structural model of supply and demand at the commodity level. From this simultaneous equation system, reduced forms are derived for export price and export quantity. Besides the use of both price and quantity as endogenous variables, this study improves on the literature by the inclusion of factor prices in the supply function.

Four models of export behavior are tested on U.S. quarterly data for the period 1965.1 through 1979.4. The tests are run on thirty-one 7-digit commodities from Standard International Trade Classification (SITC) Sections 5, 6, 7, and 8. The four models differ from each other with respect to the effect of the capacity utilization rate on the relationship between domestic demand and exports (both price and quantity). In the models that depend upon a distinction between low and high demand pressure, four different capacity utilization rates (83, 85, 86, and 87 percent) are tested as the separation rate between low and high pressure for each commodity.

The data for twenty-seven of the thirty-one commodities provide at least some support for the Demand Pressure Hypothesis. The Hypothesis is supported in 89 out of 305 tests. For fifteen of the commodities there is evidence that suppliers treat exports as a residual. An interesting implication of the study is that for several commodities, average total cost curves have horizontal segments.

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ACKNOWLEDGMENTS

This research project has taken a long time to complete, and over the years the debts have accumulated.

My initial interest in economics can be traced to Howard Swaine of Northern Michigan University. Alan Nichols and Habib Zuberi of Central Michigan University encouraged me to pursue a doctoral program. My thanks to all three.

Albion College was most generous in making its computer a free good (in the language of the public choice theorist, the individual consumption-payment link was broken). John Williams, Director of Academic Computing at Albion, spent many hours loading the econometric software onto the Burroughs 6700 and debugging it; and he freely furnished programming advice, even during his vacations. I owe a debt of gratitude to James McCarley, Professor of Economics at Albion College, for a key methodological insight. Arthur Mullier of the United Nations furnished data on world industrial production. The contributions from two Albion students deserve special recognition. Donald Luciani patiently and accurately tabulated the preliminary statistical results and devoted a Christmas break to the summarizing of several articles. In the final moments of the dissertation, deadlines could not have been met if Scott Harrison had not willingly set aside his other

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responsibilities and helped with the editing of the text.

The members of my dissertation committee were most helpful and deserve special thanks. Ed Sheehey offered several suggestions that encouraged me to be more explicit about the conclusions to be drawn from the econometric analysis. Lawrence Officer's questions and comments are reflected at several points in the manuscript. Mordechai Kreinin served as chairman of the committee. His careful scrutiny of the drafts and detailed suggestions for revisions contributed crucially to the scholarly content of the final document. Without his advice and encouragement, this dissertation could not have gotten past the proposal stage.

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CHAPTER 1

INTRODUCTION

The purpose of this dissertation is to investigate the relationship between domestic demand and a country's exports. The country selected for the test is the United States. The hypothesis to be tested is that an increase in domestic demand pressure affects exports adversely; this effect can surface as a reduction in the quantity of exports or as an increase in the price of the exports. This hypothesis, which shall be called the Demand Pressure Hypothesis (DPH), is of theoretical and practical (or policy-making) interest. As shall be shown in Chapter 3, it appears that what the DPH is all about is the shape (more precisely, the specification) of the export supply function, which in turn depends crucially upon the Marginal Cost function. Planners and analysts engaged in macroeconomic policy will find the results of this project interesting because of the implications the hypothesis has for the export function in the standard neo-Keynesian paradigm. In the usual Keynesian-cross presentation, exports--if treated at all--are assumed to be independent of income; the DPH, however, suggests that the export function should be plotted with a negative slope. Anti-recessionary demand-management policies, then, cause a deterioration in the balance of

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trade (or place downward pressure on the exchange value of the currency) not only because imports rise but also because exports decline. The important result is that part of the increase in domestic demand can be satisfied by a reduction in exports rather than by an increase in domestic production. All other things remaining the same, the foreign purchasers will switch their demands to their own domestic (or other foreign) production. In an analogous fashion, when domestic demand declines, domestic production need not decline by the same amount because resources can be switched from production for the home market to production for the export market. The original demand-management policy is thus transmitted to other countries; and, from the point of view of the domestic labor force, the policy's impact on the unemployment rate is weakened. Furthermore, the Hypothesis applies not only to policy-induced changes in domestic demand but also to changes that occur as a routine result of the business cycle or as a result of shocks to the system. If the evidence is overwhelmingly in favor of the Demand Pressure Hypothesis, then the lessons to be learned by studying the closed-economy macro model are somewhat reduced.

The study proceeds along the following lines. Chapter 2 reviews the literature, beginning with the seminal 1965 article by Brechling & Wolfe.[1] Chapter 3 is the "theory" chap

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chapter; it develops several models that would appear to capture the flavor of the Demand Pressure Hypothesis and suggest the kinds of relationships that would have to show up in the evidence in order to refute or support the hypothesis. A desirable feature of the models is that they are natural outgrowths of basic neoclassical views of firm behavior and thus are well-grounded in microeconomic theory.

Chapter 4 describes the data to be used for testing the hypothesis. Compared with other studies, one unique feature of this study is that the export data used are for seven-digit industries. The greatest degree of disaggregation used in other contributions to this topic is that of a four-digit industry. Another unique feature is that the export quantity is measured in actual physical units such as tons or board-feet. The commodities chosen for this study come from Standard International Trade Classification (SITC) Sections 5, 6, 7, and 8, which are, respectively, chemicals and related products, manufactured goods classified chiefly by material, machinery and transport equipment, and miscellaneous manufactured articles.

Chapter 5 takes the reduced form equations derived in Chapter 3, explains how they were estimated, and then presents the results of the regression analysis. The

[1]Dunlevy (1980), however, claims that the concept is implicit in the formal models of Nurske (1956).

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discussion is organized by SITC Section, but on several occasions the similarities or differences between commodities from different sections were important enough to merit explicit mention.

Finally, Chapter 6 summarizes the results and suggests some policy implications of these results.

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CHAPTER 2

REVIEW OF THE LITERATURE

This chapter reviews the literature on the relationship between exports and changes in domestic demand. Section I introduces several versions of the Demand Pressure Hypothesis that can be culled from the literature. Section II traces the intellectual development of the Demand Pressure Hypothesis and evaluates the theoretical contributions of several writers. Section III reviews the empirical literature.

I. Introduction.

The most general statement of the Demand Pressure Hypothesis is that changes in domestic demand have an inverse effect on that country's exports. Phrased in this manner, the Hypothesis encompasses all the variations on the same general theme that have appeared in the literature. The following versions of a Demand Pressure Hypothesis can be identified from this literature:

1. Changes in domestic demand pressure lead to changes in the opposite direction in the quantity of exports.

2. When domestic demand pressure is high, changes in domestic demand pressure lead to opposite changes in the quantity of exports.

3. The negative effect on the quantity of exports as domestic demand pressure increases is greater than the positive effect on this quantity as domestic

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demand pressure decreases. This is sometimes called the ratchet effect.

4. There is an inverse relationship between the quantity of exports and the rate of change of domestic demand pressure.

5. Changes in the demand for exports will have an effect on exports when domestic demand pressure is low but not when domestic demand pressure is high.

6. The change in the quantity of exports that results from a change in domestic demand can be separated into two distinct changes. First, the change in domestic demand may cause the export price to change, which in turn will cause a change in the quantity demanded. Second, the change in domestic demand will cause a change in the quantity of exports in addition to (and independent of) any price-induced change in the quantity demanded.

7. An increase in domestic demand will cause the equilibrium export price to rise and equilibrium export quantity to decline. A decrease in domestic demand will cause the opposite responses.

Not all these versions are mutually exclusive. Indeed, the separation between price and non-price effects described in No. 6 can be made a part of most of the other versions. The tendency to identify the Demand Pressure Hypothesis as a quantity effect and to ignore the effect of domestic demand on export price led unfortunately to two theoretical problems. First, some writers ignored price completely, as though price were not affected by changes in export supply. Second, when it was recognized that price could indeed change, the claim was made that this price change would by itself cause a change in the quantity of exports demanded. This claim is reasonable as long as one keeps in mind that it

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it was the change in the quantity of exports producers were willing to offer at each possible price (that is, a shift in the export supply function) that initially caused the change in price; and that as the price now rises, not only will the quantity demanded decline but also the quantity supplied will increase. In pursuit of the effect of domestic demand on export quantity, this simultaneous determination of price and quantity was ignored, and it was asserted that the effect on quantity was greater than the change in quantity that arose from a movement along the demand curve. This latter quantity was attributed to changes in relative prices and was called a price effect (it is interesting to note that it was always the movement along a demand curve, never the movement up or down a supply curve, that was called a price effect). The remaining quantity change became known as the non-price effect, the quantity effect, or the capacity effect. In graphical terms, the implication is that the new quantity is not indicated by the intersection of the demand curve and the new supply curve.

There is no evidence that the early writers were aware of their excursion into disequilibrium analysis; but later writers, intent on explaining the non-price effect as though it were the essence of the Demand Pressure Hypothesis, recognized that neoclassical economic analysis did not predict such an effect. Scenarios developed to explain why

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such an effect might exist used the concepts of non-clearing markets and non-price rationing. Whereas the Hypothesis evolved into a claim that the observed "total" change in quantity was greater than the price-induced change (apparently excluding the possibility of a quantity-induced change in price), more traditional microeconomics would claim that the observed change is only part of the "total" change, where "total" change in this case refers to the change in export quantity that would result from a change in domestic demand if the export price were to remain constant. This is measured by the horizontal shift in the export supply function and is what one might be willing to call a non-price or capacity effect. The actual--that is, observed--change in quantity is less than this because the price will change; and a price change will induce a change in the quantity supplied which will offset part of the capacity effect. In this view, the observed change is explained entirely by what the other view calls the price effect, but this view recognizes that price and quantity are both dependent variables.

Recent attempts to give the Hypothesis a firmer grounding in microeconomic theories of producer behavior (while continuing to exclude a relative price effect) have required excursions into non-clearing markets and non-price rationing. Whereas the early papers could simply claim that

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individual firms viewed exports as a residual, the more recent ones try to give some economic meaning to the concept of "residual," to show why a firm would voluntarily and repeatedly produce excess output that could then be sold in foreign markets. The argument has generally been phrased in terms of a domestic producer who desires to keep his plant running at full capacity regardless of the state of domestic demand for his product--if demand is strong he sells all his output at home, and as demand weakens, he sells increasing amounts of it on the export market. Despite the initial intuitive appeal of the explanation, deficiencies in the analysis become apparent from the papers that try to build a model of the firm that retains profit-maximization as an objective, employs the tools of marginalism, and yields the desired conclusions. These deficiencies are that the traditional argument requires a specific definition of capacity (a physical limit to production) and the assumption that price is irrelevant to the producer; that is, quantity supplied is an exogenous variable because the producer keeps the plant running at full capacity. An additional and yet necessary assertion that producers favor the home market has not been adequately justified.

The Hypothesis that is developed in Chapter 3 avoids the difficulties just mentioned. The specific wording of the Hypothesis is that increases (decreases) in domestic

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demand will lead to decreases (increases) in the quantity of exports and to increases (decreases) in the price of exports. This differs from much of the literature in that there is no artificial distinction between price effects and capacity effects. The desirability of making this departure was becoming evident by the time of Henry (1970) but was not finally asserted and defended until Dunlevy (1980).

The Demand Pressure Hypothesis has developed from a macro to a micro phenomenon and from a micro theory relying (at first, unwittingly) on non-clearing markets to a neoclassical microeconomic theory that uses the market-clearing mechanisms implicit in a simultaneous system of equations. This development is traced in Section II below.

II. The Relationship between Exports and Domestic Demand: Theoretical Development.

The theoretical treatment of the relationship between exports and domestic demand can be based on macroeconomic theory or on microeconomic theory. The macroeconomic approach uses the standard Keynesian paradigm. Microeconomic approaches are much more prevalent in the literature; and, in order to analyze these, we shall group them into the following four categories: (1) standard market-clearing models, (2) non-market-clearing models, (3) models that interpret "price" more broadly than usual, so t

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that it includes delivery lags and credit terms, and (4) models that define the commodity more broadly than usual, so that, for example, the availability of repair facilities (or other services) is an integral part of the item being purchased.

Subsection A below looks at the Keynesian implications, and Subsection B considers the microeconomic models.

A. Macroeconomic Theory.

In Keynesian analysis, changes in real national income are the key variable affecting the trade balance and the balance of payments. Because of an implicit assumption that prices are independent of real income changes, exports are not directly affected by domestic demand. Artus (1970, p. 249) points out that in a Keynesian framework exports and domestic demand are positively related. An increase in national income in an open economy (Country A) will lead (through the marginal propensity to import) to an increase in that country's imports. This increase in the Rest-of-the-World's exports is an increase in aggregate demand, and the resulting rise in foreign national income will lead to an increase in ROW imports from Country A. Thus, in Country A the initial increase in domestic demand caused exports to increase (through foreign repercussions) rather than to decrease as the DPH predicts.

B. Microeconomic Theories.

This Subsection discusses the four types of microeconomic explanations of the relationship between exports and domestic demand. It considers, in turn, market-clearing, non-market-clearing, true-price, and true-quantity models.

(1) Market-Clearing Models. There are two models which use the traditional concepts of clearing markets--that of a price-discriminating monopolist and that of a competitive industry both at home and abroad.

In the international trade literature a price-discriminating monopolist model is more often called the dumping model, because it is used to explain the behavior of a firm that practices persistent dumping. (For a development of this model in the context of dumping, see Kreinin, 1979, pp. 337-341.) As Cooper, Hartley, & Harvey (1970, pp. 52-56), Artus (1970), and Ball (1961) have shown, as long as the marginal cost curve is upward sloping, a change in domestic demand will lead to an inverse change in the quantity of exports. If foreign demand is infinitely elastic (as in Figure 2-1) the export price will not change; but if the firm does have some monopoly power in the export market (see Figure 2-2), then the export price and export quantity will be inversely related. With a horizontal marginal cost curve (Figure 2-3), exports will not be affected by changes in domestic demand. If the marginal co

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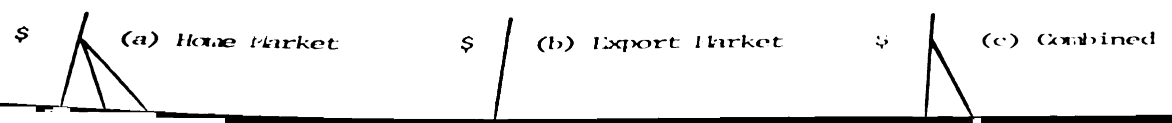
cost curve is downward sloping (Figure 2-4), however, an increase (decrease) in domestic demand will lead to an increase (decrease) in the quantity of exports also.



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(a) Home Market
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(b) Export Market
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(c) Combined

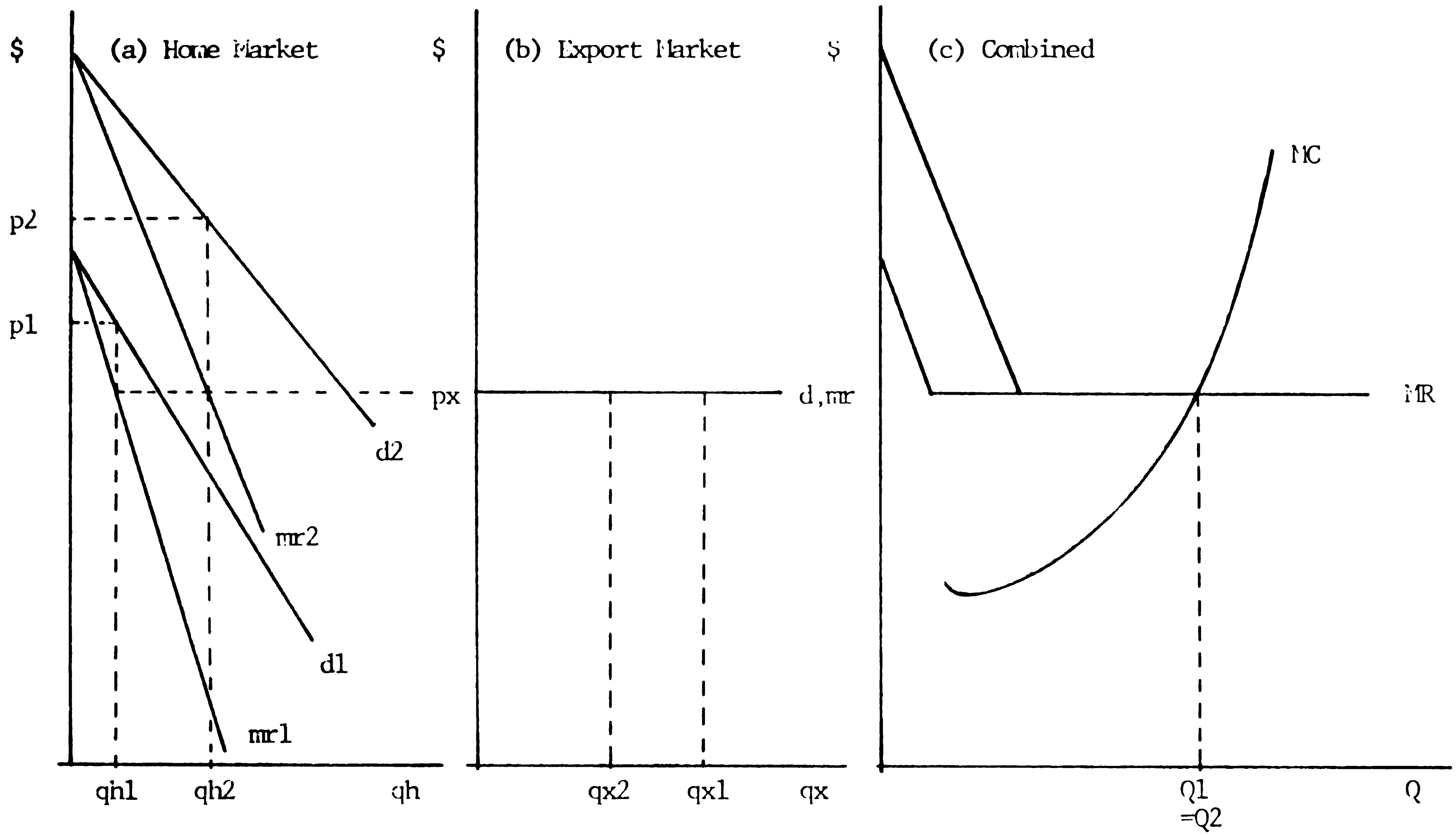

Figure 2-1. The Dumping Model: Infinitely Elastic Demand for Exports.

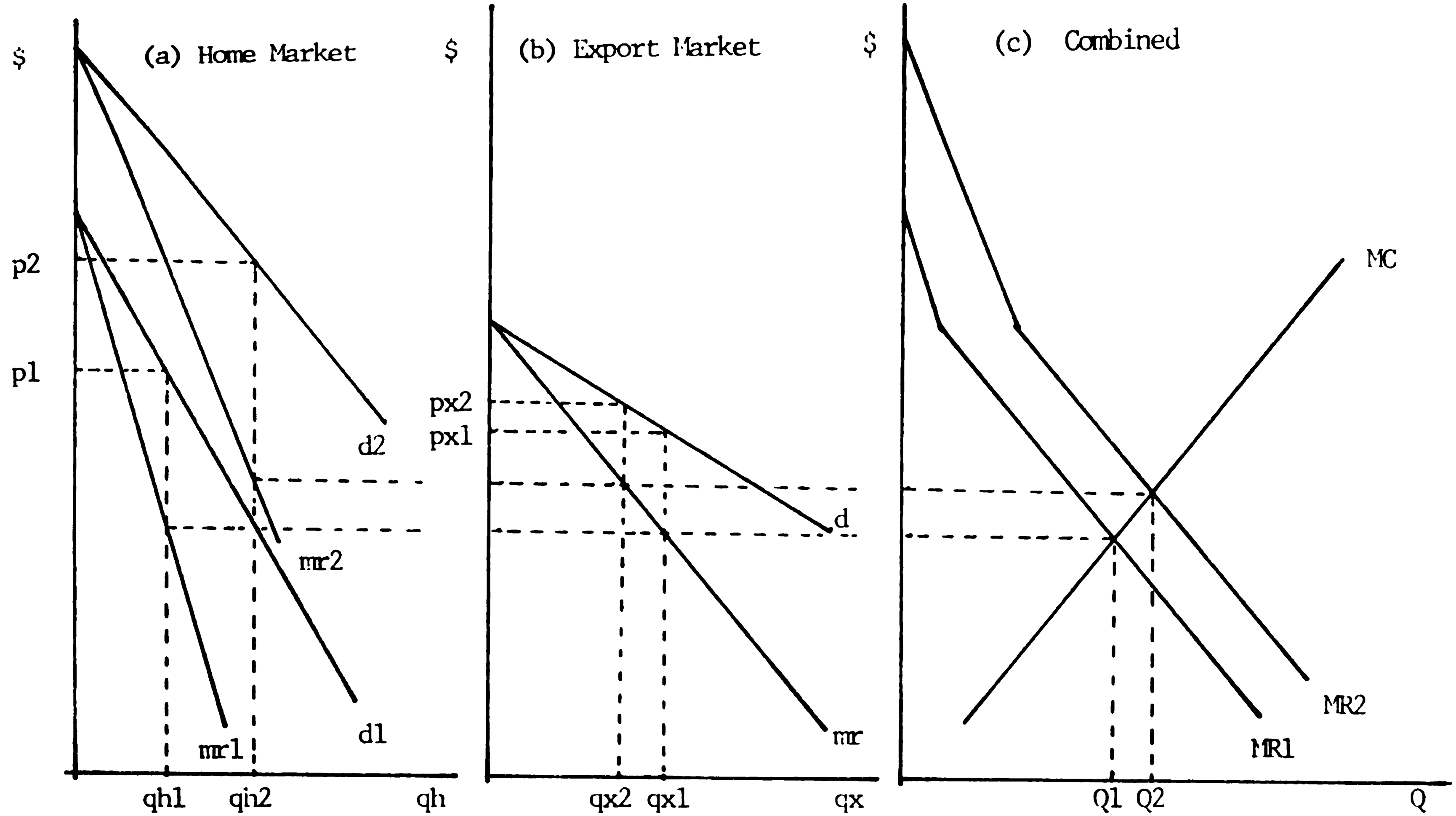

Figure 2-2. The Dumping Model: Less Than Infinitely Elastic Demand for Exports.

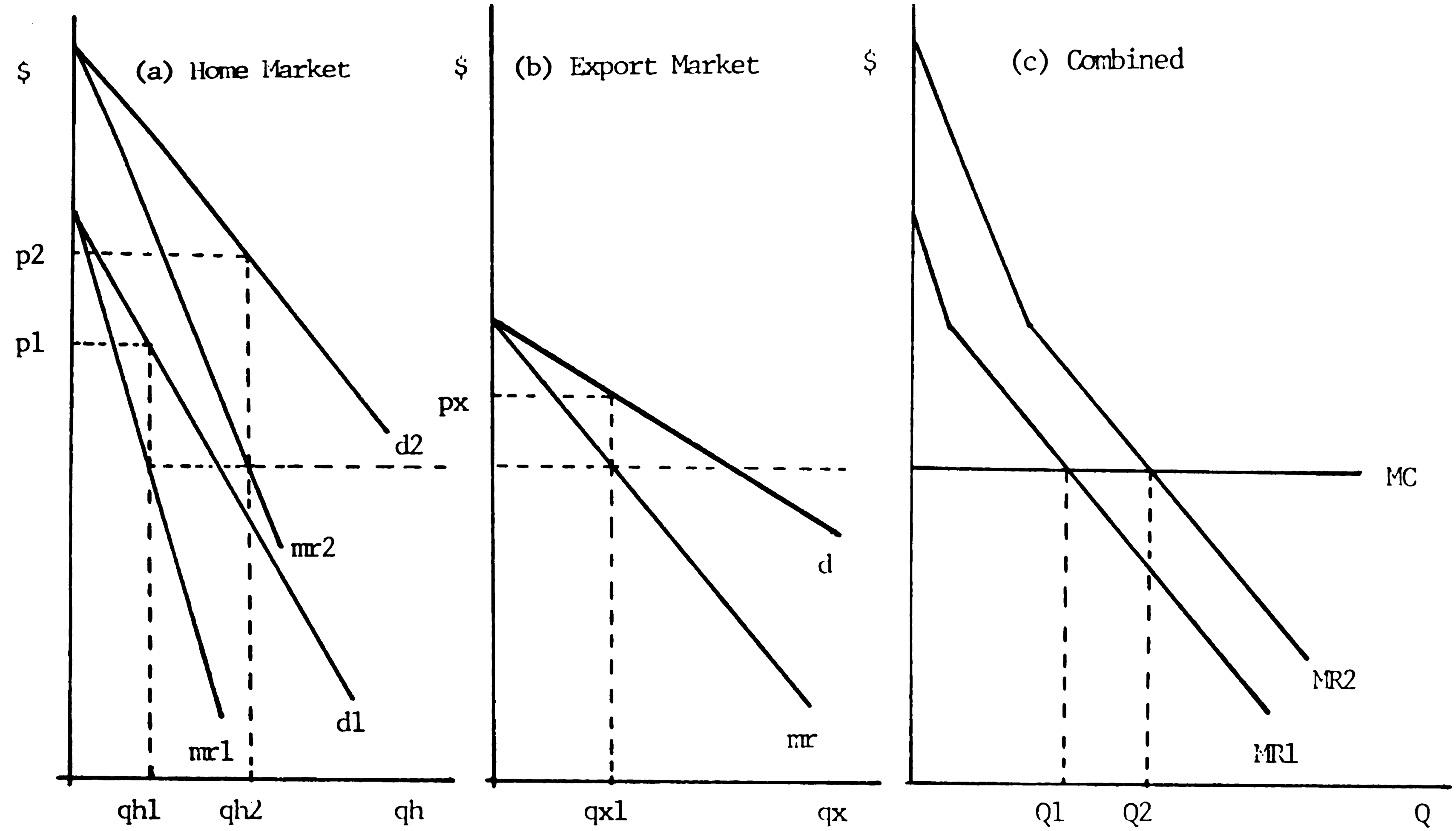

Figure 2-3. The Dumping Model: Horizontal Marginal Cost.

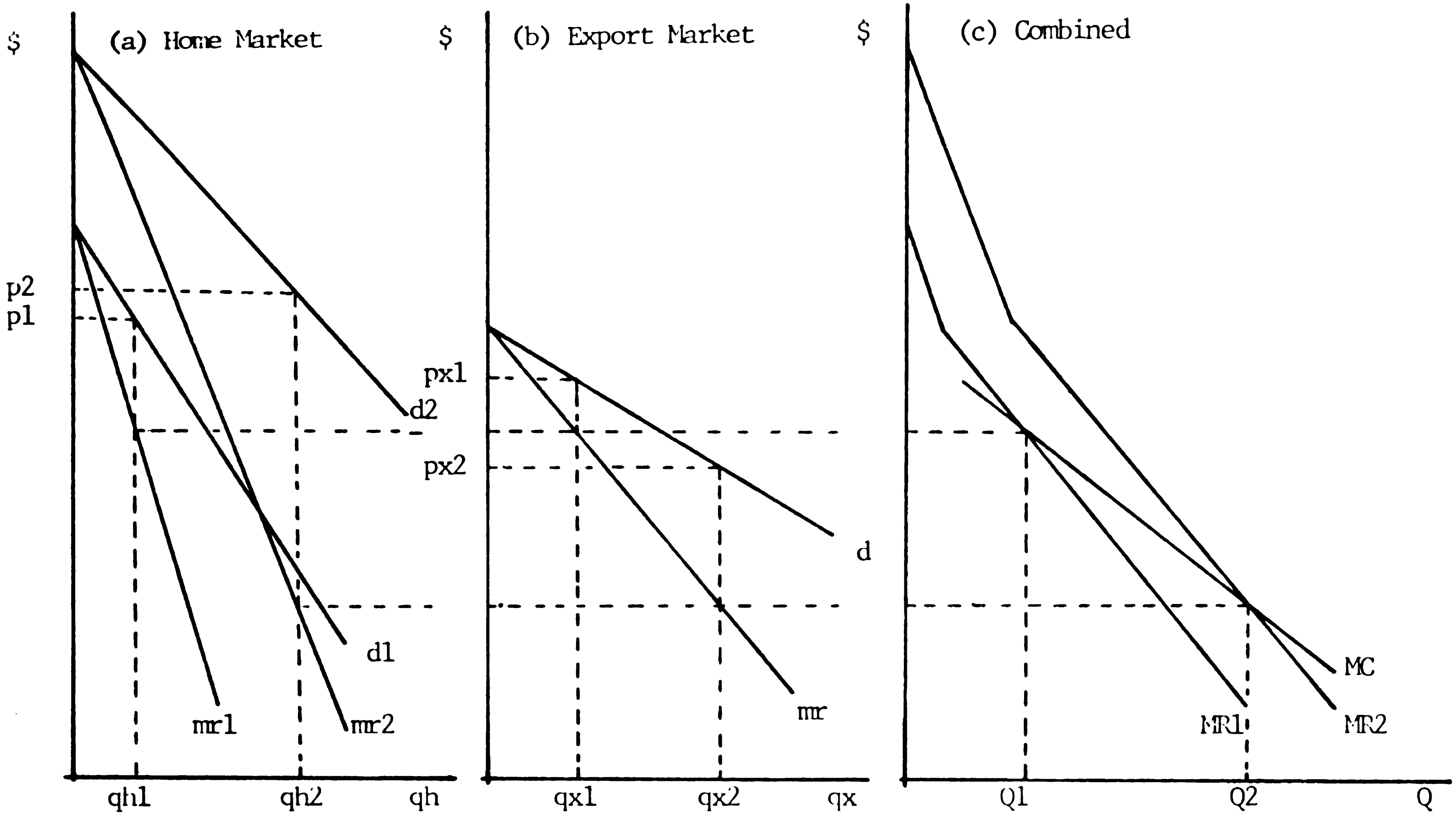

Figure 2-4. The Dumping Model: Downward Sloping Marginal Cost.

Consider now the case of a competitive market. The home country's export supply curve and the Rest-of-the-World's import demand curve (that is, ROW's demand for the home country's exports) can be derived from the appropriate domestic demand and supply curves (for such a derivation, see Kreinin, 1979, pp. 276-279). A change in domestic demand will be associated with an inverse change in the quantity of exports (see Figure 2-5). In addition, if the world import demand function is downward sloping, then the export price will change also. If, however, the home country faces an infinitely elastic demand for its exports, the price of those exports would not change.

Both the dumping model and the competitive model yielded the same conclusion. Provided that marginal cost curves are upward sloping, an increase in domestic demand will reduce exports and a decrease in domestic demand will increase them. The behavior of export price depends upon whether the marginal cost curve is horizontal or upward sloping and upon the elasticity of foreign demand for these exports. With respect to price, it is interesting to note that most discussions--as well as most empirical work--treat price as an exogenous variable. Dunlevy (1980) is the first to insist that even in the context of this debate both price and quantity should properly be treated as endogenous variables.

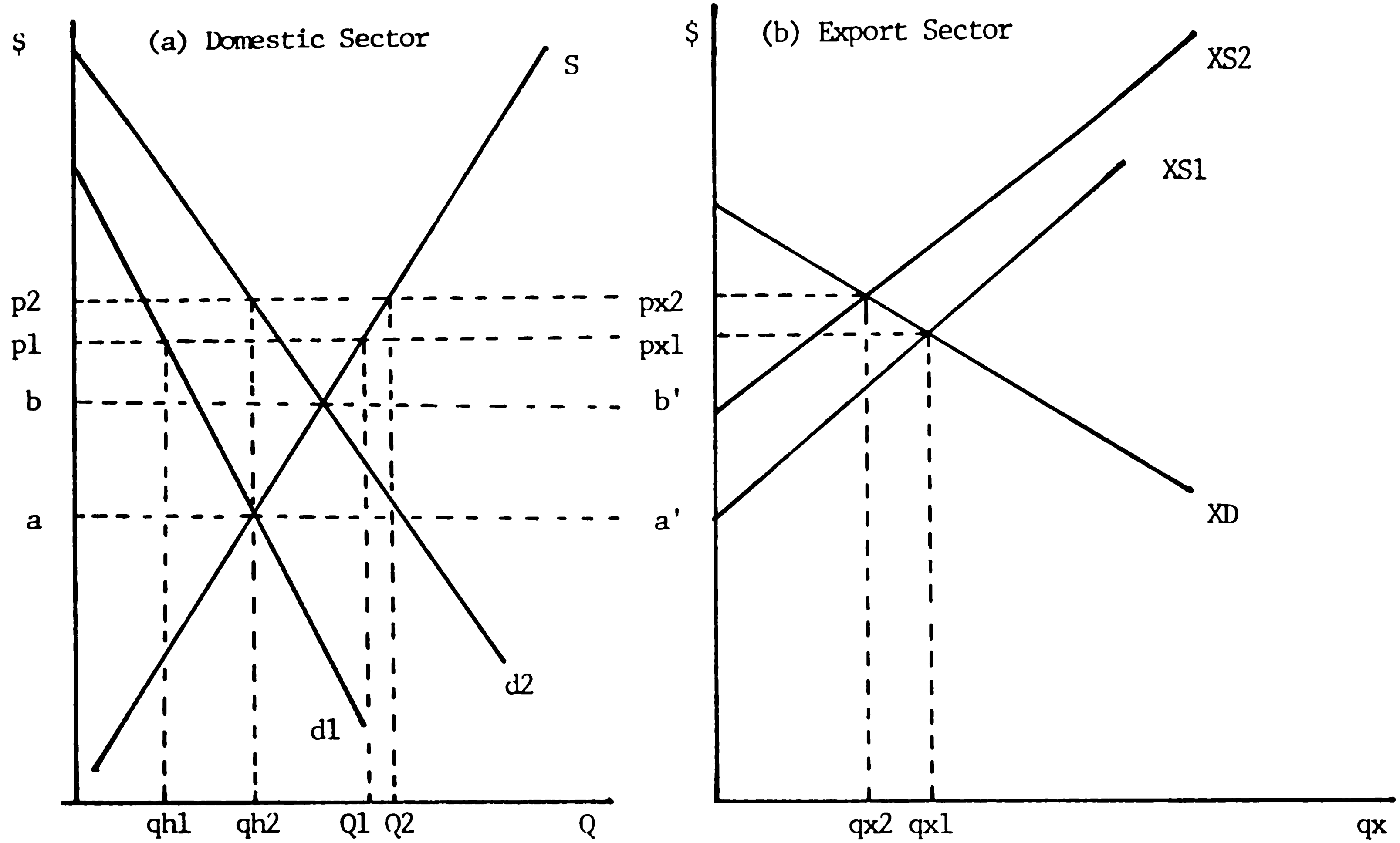

Figure 2-5. The Competitive Model: Less Than Infinitely Elastic Demand for Exports.

(2) Models of Non-Clearing Markets. This sub-section considers models of non-clearing markets, a category which includes the explanations of export behavior which assume the existence of excess demand and the non-availability of price as a rationing mechanism. Consider the domestic market and the export market for any commodity. The two interesting cases are, first, excess demand in both markets and, second, excess demand in the export market but not in the home market. If there already is excess demand in both markets, a rationing rule was clearly required in order to determine the degree to which the two sets of demands were to be satisfied. If domestic demand should now change, output can be (re-)allocated according to the existing rationing rule. If there is excess demand in the export market only, it is necessary to consider separately the case of a decrease in domestic demand and the case of an increase in domestic demand. If domestic demand decreases, the quantity of exports will increase. If domestic demand increases, however, there will be excess demand in both markets; and once again a rationing rule is required in order to determine whose demands shall be satisfied.

Three rationing rules have been proposed thus far and none is entirely satisfactory. All three appeared in Ball (1961). One suggestion is that the percentage of a firm's production that is exported is not permitted to fall below some minimum. This rule cannot tell how exports respond to a change in domestic demand as long as the export percentage is above the required minimum. If the export percentage is equal to the desired minimum, an increase in domestic demand will have to be ignored (in order to prevent a constant amount of exports from becoming a smaller portion of a greater total output) or will be the cause of a corresponding increase in exports as the firm tries to maintain the appropriate ratio of export sales to domestic sales. This rule predicts the opposite of what the DPH predicts. A second suggestion is that a minimum absolute level of exports is maintained. By itself this rule does not bring any determinacy into the problem, but it could be used (serving, for example, as a constraint) in conjunction with another rationing rule. Thus, some other rule could be followed for the rationing of output provided that exports were not allowed to fall below some arbitrary minimum. The third possible rationing rule is that the domestic market is satisfied first. It implies that there cannot be excess demand in the domestic market as long as the export quantity is greater than zero. It is this third rule that has received most attention, and therefore, it will be considered further.

Why might suppliers give preference to domestic customers when there is excess demand in the export market?

One possibility is that a higher unit profit on domestic sales induces producers to take care of the home market first.[2] Another possibility is the force of habit. The existence of search costs can make habits, traditions, and customs economically more efficient than the alternative of re-evaluating all business relationships each period. If customers grant a producer the privilege of being a regular supplier, the producer may find it in his long-run interest to satisfy the short-run changes in demand on the part of these traditional customers, even at the expense of temporary reductions in other sales. It is necessary, of course, to show that these well-established business relationships are more likely to be part of the domestic market than the export market. Although one can appeal to the costs of transportation, the difficulties of communication, and the general barriers created by cultural differences, it is still possible that for a particular firm, the force-of-habit explanation would imply that the export market rather than the domestic market is favored. A final possibility is patriotism or nationalism. Just as buyers are often encouraged to buy from local suppliers,

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[2]This explanation is implicit in Ball's (1961) contention that the price is likely to exceed the export price. Others who have picked up on the theme of profitability include Ball, Eaton, & Steuer (1966), Cooper, Hartley, & Harvey (1970), Henry (1970), and Winters (1974).

producers can feel obligated during periods of full capacity operations to take care of local requirements first.[3]

(3) "True"-Price Models. A third group of theories of export behavior is what may be called "true"-price models. These models claim that in addition to the price of a commodity (even when adjusted for inflation) buyers consider such factors as credit terms and delivery lags in making purchase decisions. Certainly this is important in the case of large ticket items such as aircraft or machinery, as evidenced by the current controversy over export credit subsidies. Both of these factors can be viewed as part of the complete price. As domestic demand declines, a seller may prefer to offer more liberal trade credit rather than change the quoted price. As domestic demand increases, credit terms may become more stringent. Alternatively (or simultaneously) the market adjustment might occur by fluctuations in the waiting time that the buyer has to tolerate.[4] During periods of high demand, the customer

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[3]These last two explanations are the ones apparently favored by Henry (1970).

[4]This issue was addressed specifically by Steuer, Ball, & Eaton (1966) in their investigation of the effect of waiting times on export orders for machine tools. The concept has also been used by Brechling & Wolfe (1965), Smyth (1968), Artus (1970), and Winters (1974). The most thorough treatment to date can be found in Greene (1975).

either receives the merchandise later than desired or, in order to assure timely delivery, commits himself to a purchase decision earlier than usual. This suggests that the true export price is indeed fluctuating in response to changes in domestic demand, and that these fluctuations allow markets to clear. But the fluctuations are occurring in the credit term or time lag component rather than in the direct monetary component of the price.

(4) "True"-Quantity Models. The final group of microeconomic explanations of export behavior is what may be called the "true"-quantity models. This category includes explanations that rely on a broadened concept of what is actually being purchased when one unit of a commodity changes hands. A purchase of an automobile usually includes the acquisition of a property right in the form of a warranty that covers major repairs for a specified period of time. Convenience and location of a dealer's repair shop, perhaps staffed with competent personnel, is also a part of the purchase price.

A customer buys more than just a commodity; he also "buys" a service and repair facility, the availability of spare parts, the use of temporary replacements, an exchange and refund policy, and professional consultations with the supplier's technical staff. As domestic demand increases, the producer may choose to reduce some of these ancillary services. Thus the "quantity" of the good being exported may not be recorded as having changed, but indeed the foreign purchaser is getting "less" of the good. The importance of these auxiliary facilities was recognized by Artus (1970) and Henry (1970) but not incorporated formally into a model. The theoretical treatment of Ball (1961) incorporates what he calls "selling services." Although it can be argued that the true-quantity models are simply a variation of the true-price models, the approach taken here is to distinguish between the two. This distinction is helpful because in the true-price models, the commodity being purchased remains physically the same while the date of delivery changes or the date of payment (along with interest expense) changes. In the true-quantity models, different "versions" of the commodity are being purchased--for example, a bicycle with a repair facility one mile away rather than a bicycle with a repair facility 250 miles away.

C. The Current Status of the Debate.

The best discussions of the Demand Pressure Hypothesis re contained in the writings of Cooper, Hartley, & Harvey 1970) and Dunlevy (1980). Cooper, Hartley, & Harvey rovide a comprehensive analysis of a neoclassical profit-aximizing producer of a homogeneous product being sold in o distinct markets. They examine the various combinations price-maker's and price-taker's markets in cases of increasing, constant, and decreasing marginal costs. What appears in Chapter 3 below draws heavily on the microeconomic, marginalist foundations that they have developed. In addition, they investigate the implications of three other models of the firm full-cost pricing, sales maximization, and satisfying behavior.

Dunlevy's contribution is to point out that much of the discussion has focused on unnecessary issues; they arose because of failure to recognize, or an inability to cope with, the endogenous character of export prices. From the beginning the posited inverse relationship between exports and domestic demand has been justified--sometimes explicitly, sometimes implicitly--on the basis of non-clearing markets. It may indeed be the case that markets do not clear (rapidly), and it may be true that the existence of non-clearing markets combined with certain types of rationing rules will produce an inverse relationship between domestic demand pressure and exports. But this reliance on non-clearing markets is unnecessary. Rather, the Demand Pressure Hypothesis is a logical consequence of market-clearing behavior, where, for example, a rightward shift in the domestic demand function will cause a leftward shift in the export supply function--the usual result (depending upon elasticities) is that the export price rises and the quantity of exports decreases. In such a framework, both price and quantity are endogenous variables. As Dunlevy points out, it is not an interesting question to ask how much of a change in quantity is induced by the price change. Rather, the issue now is to identify the cause of both the price change and the quantity change; that is, the theoretical task is to identify the determinants of supply and of domestic demand (these two sets together become the determinants of export supply) and the determinants of demand for exports. Changes in any of the non-price determinants will have effects on export price and export quantity. The empirical task relevant to the Demand Pressure Hypothesis is to measure these effects as caused by changes in the determinants of domestic demand.

Dunlevy presents a structural model where the quantity of a country's total exports demanded by the Rest of the World is a function of the home country's export unit value index, a unit value of all world exports (including exports of the home country), and the aggregate value of world exports (less the home country's imports). In turn, the quantity of exports supplied is a function of export unit value, domestic price, domestic economic capacity, and measures of domestic capacity pressure. The equilibrium requirements is that the quantity of exports supplied be equal to the quantity demanded.

Having established the theoretical attractiveness of the simultaneous equation approach, it is worthwhile carrying the analysis one step further than does Dunlevy. And this is to point out that two Demand Pressure Hypotheses can be deduced from this simultaneous system. The first is the more general one; it would consider any change in the domestic demand function as the initiating shock which affects exports of a particular commodity. This version claims that it is the domestic demand pressure prevailing in one particular industry that affects the exports of that industry.[5] The second version is a special case of the first: rather than considering all the determinants of domestic demand, it considers only the income determinant. As industrial production, Gross National Product, and Personal Income change, the domestic demand function for an individual commodity will shift. This, in turn, will lead to a shift in the export supply function.[6]

Although Dunlevy is apparently the first to use a simultaneous equations approach to the Demand Pressure Hypothesis, others--for example, Morgan & Corlett (1951),

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[5]As will be seen below, this is consistent with the use by Artus of industry-specific capacity utilization rates.

[6]This version better captures the flavor of most of the discussion in the literature. It is consistent, for example, with the use of the economy-wide capacity utilization rate as an indicator of domestic demand pressure.

Bergstrom (1955), Swamy (1966), and Goldstein & Khan (1978)--have used a similar technique in their models of export supply and demand.

III. Empirical Development of the Demand Pressure Hypothesis.

The previous section surveyed the contributions to the Demand Pressure Hypothesis from the point of view of economic theory. This section considers the empirical contributions. With the notable exception of Ball (1961), who is interested solely in deriving theoretical implications rather than in any empirical research, the papers to be reviewed are to a large extent the same as those in the previous sections. The reason for this is that the theoretical development of the Hypothesis has taken place in the empirical literature. First to be examined are three studies concerned mainly with issues other than the DPH, but which included in their export function a variable that represented the pressure of domestic demand on capacity. Next to be considered are those tests of the DPH that used single equation models, to be followed finally by the available studies that employ a simultaneous equations model to test the Demand Pressure Hypothesis.

A. Three Estimates of Exports Functions.

To be considered here are the studies by Renton (1967), Donges (1972), and Batchelor & Bowe (1974).

In an attempt to forecast United Kingdom exports of manufactures to industrial countries, Renton (1967) estimates eight differently specified equations, each having the value of U.K. exports of manufactures as the dependent variable. The independent variables in three of them include a variable meant to measure the pressure of domestic demand, proxied by the ratio of an index of seasonally adjusted U.K. manufacturing production to the trend value of this index. Fitted to quarterly data for 1956.1 through 1966.3, all three equations show a significant negative coefficient of the pressure variable.

Donges (1972) analyzes the demand and supply factors that affect Spain's exports of manufactured items. He fits a single equation model to annual data for the period 1951-1969 for Spanish exports (dollar value) of total manufactures and for each of twenty manufacturing industries. The variable that measures domestic demand pressure is a specially constructed series of capacity utilization rates for each industry (used in the single-industry equations) and for all industries (used in the total manufactures equations). In the series, capacity output is measured according to the Wharton method (Klein & Summers, 1966). For three industries (processing food, leather and leather manufactures, and non-metallic mineral manufacturers), the coefficient of the capacity utilization rate is negative and significant at the 10% level or better; for two industries (tobacco and chemicals), it is significantly positive at the 10% level.

Batchelor & Bowe (1974) develop a general equilibrium model for forecasting U.K. international trade as an aid to investment planning in the waterborne shipping industry. They use two-stage least squares (2SLS) to estimate U.K. export demand and U.K. export supply equations for forty-five commodities. In the export supply equation, export price is the left-hand variable, so that a positive coefficient on the pressure variable (which is the ratio of U.K. output for the industry to its trend value) would support the DPH. For the following six industries, there is such a positive coefficient, significant at the 10% level or better: (1) sugar and sugar preparations, (2) beverages, not elsewhere specified, (3) organic chemicals, (4) road vehicles, n.e.s., (5) motor cars, and (6) glass and pottery.

B. Tests of the Demand Pressure Hypothesis.

The standard test of the DPH reported in the literature is a single-equation model that regresses the value or the volume of exports against several explanatory variables chosen from the following list: export price, world prices, domestic prices, world economic activity, domestic economic activity, and a measure of domestic demand pressure. The following discussion considers, in turn, three fundamental aspects of these studies.[7] First, what is being explained; that is, what is the dependent or left-hand variable in the equation? Second, what variable is chosen to represent domestic demand pressure and how does it enter the model? Third, how does the author interpret the econometric results? Do these results support or fail to support the Demand Pressure Hypothesis?

(1) The Dependent or Left-Hand Variable. In all the studies, the dependent variable is some measure of export performance, with the different authors selecting differing degrees of aggregation, making different choices with respect to the volume-or-value question, and employing different indicators of "performance." Consider first the degree of aggregation.

In a graphical (non-econometric) study, Brechling & Wolfe try to explain the U.K. trade gap (imports minus exports) in current prices. In the econometric studies, Winters and Dunlevy use total exports; Ball, Eaton, & Steuer and Smyth use total manufacturing exports; and Cooper, Hartley, & Harvey, Artus, and Henry use individual commodities as the left-hand variable. All studies use the U.K. as the home country. In addition, Dunlevy also tries to explain total exports from the U.S.; and Henry runs individual regressions for thirteen commodities exported

[7]The discussion covers the following studies: Brechling & Wolfe (1965), Ball, Eaton, & Steuer (1966), Smyth (1968), Cooper, Hartley, & Harvey (1970), Artus (1970), Henry (1970), Winters (1974), and Dunlevy (1980).

from Belgium and for eight commodities from the U.S. as well as for five commodities from the U.K.

Although much of microeconomic analysis speaks in terms of quantity, no study thus far has used an actual quantity, such as tons, gallons, carloads, or dozens, to measure the dependent variable, perhaps because the data sets have been too highly aggregated. Instead, the volume of exports is often taken as a proxy for the quantity of exports, where volume is calculated by dividing the current value by a suitable price index. Winters, Henry, and Dunlevy, for example, each measure the dependent variable in volume terms. Smyth uses both value and volume (but in separate equations). Ball, Eaton, & Steuer try the several possible combinations of value or volume with level of exports or U.K. share of world exports. The dependent variable for Artus is a current-value index of exports at the industry level. Cooper, Hartley, & Harvey measure exports of individual U.K. industries to three separate markets--the markets are Australia, Canada, and the U.S. The exports are measured in current value terms (in the receiving country's currency) and the tests employ (separately) the level of exports and the U.K. share of the total imports of that commodity into that country.

(2) <u>The Pressure Variable</u>. The variable selected to represent the pressure of demand against the available

capacity has been some variation of three basic choices: home sales, unemployment rate, and capacity utilization rate.

Home sales, as a proxy for domestic demand pressure, has been employed by Henry and by Cooper, Hartley, and Harvey.

Brechling & Wolfe and Smyth use the unemployment rate as the pressure variable. Smyth constructs a time series for unemployment in manufacturing, with industries weighted by average exports from 1954 through 1965. He then tests two hypotheses; in one the pressure variable is the level of unemployment, and in the other it is the absolute change in the level of unemployment. Cooper, Hartley, and Harvey use the national (or sometimes the regional) unemployment rate to represent domestic demand pressure.

Ball, Eaton, & Steuer, Artus, Henry, Winters, and Dunlevy use the capacity utilization rate as the pressure variable. Artus, who studies the U.K. chemical and auto industries, specifies a polynomial distributed lag model employing lagged values of the capacity utilization rate in the relevant industry in the U.K. In a lag model without smoothness constraints (that is, not polynomially distributed), he employs the ratio of the U.K. industry-specific capacity utilization rate to the weighted average of the capacity utilization rates in the U.S., France, and

Germany (where the weights are the relative shares of these three countries in world trade in, first, the chemical industry and, then, the auto industry).[8] In Henry's study, for each commodity tested, he uses the ratio of the index of industrial production of the commodity to its trend value in order to divide the sample into high pressure periods and low pressure periods. His model then predicts that the two mutually exclusive samples will yield different coefficients on the "home sales" variable. Winters employs as a pressure variable the ratio of the capacity utilization rate in U.K. manufacturing to the capacity utilization rate in O.E.C.D. (excluding U.K.) manufacturing. As with Henry, the capacity utilization rate is the index of production divided by its trend value. Dunlevy uses two pressure variables in the same regression: the current capacity utilization rate and this rate divided by the rate for the previous time period.

(3) Summary of the Results. The first econometric test (Ball, Eaton, & Steuer, 1966) found support for the Demand Pressure Hypothesis when the dependent variable was the U.K. share of world trade in manufactures, but not when the dependent variable was the U.K. level of exports of manufactures. Smyth not only found support for the Demand

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[8]It is not clear whether the competitors' capacity utilization rate is industry-specific or all-manufacturing.

Pressure Hypothesis but also found that the effects are asymmetrical; that is, his results support the existence of a ratchet effect. Artus found support for the DPH from the U.K. motor vehicle industry but not from the U.K. chemical industry. Cooper, Hartley, & Harvey investigated four U.K. industries (pottery, motor cycle, pedal cycle, and office machinery) and found mixed results, but their tentative conclusion was that the pressure hypothesis was supported.

In Henry's regressions the coefficient on the domestic demand variable is significantly negative for six out of twenty-six commodities during periods of high capacity utilization rates. However, in what he calls a "weak test" of the DPH, he hypothesizes that during periods of low pressure on capacity, exports should respond well to changes in world demand; and during periods of high pressure, world demand should be able to change without inducing a corresponding change in exports. The weak test that he proposes is that the coefficient on the world demand variable should not be significantly different from zero during periods of high pressure on capacity. According to this weak test, there is support for the DPH in the case of ten out of the twenty-six commodities.

Winters finds support for the hypothesis that the profitability of exports relative to that of domestic sales determines the strength of the depressing effect on exports as the pressure on capacity increases. Much of the literature had been claiming that the reason producers would satisfy home demand first is that home sales are more profitable. Winters is the only one thus far to test this proposition directly. Unfortunately, he does not have data on profits, and as a proxy for relative profitability he uses the ratio of the domestic price index for manufactures to the export unit value index for manufactures. This ratio is then multiplied by the ratio of the U.K. capacity utilization rate to an appropriately weighted capacity utilization rate for the rest of the O.E.C.D. For the resulting variable, he reports an estimated coefficient that is significantly less than zero (as predicted) at the 5% level.

Dunlevy employs two-stage least squares to estimate a simultaneous equations model of total exports from the U.S. and (separately) total exports from the U.K. His data are quarterly observations for the period 1957-1975. In a reversal of Henry's results, he finds support for the DPH from the U.S. but not from the U.K. Consistent with the Brechling & Wolfe result, he finds that the rate of change in demand pressure is more important than the level of demand pressure:

> The major--and surprising--finding is that the capacity pressure effect is not captured by the level of capacity utilization. If the capacity pressure effect is operative, it appears to arise from the speed

> with which capacity utilization is changing. This suggests that previous studies that indicated a negative effect of capacity pressure on export performance could be misleading because of their use of actual rather than the trend value of production as an explanatory variable. (Dunlevy, 1980, p. 135)

That this finding should not be viewed as "surprising" may be seen in a summary statement of Brechling & Wolfe fifteen years earlier:[9]

> The basic proposition which we have put forward here can now be stated summarily as follows: It is not only the level of the pressure on capacity but also its rate of change which in a cyclical upswing creates bottle-necks and structural maladjustments. These cause a lengthening of delivery dates and a rise in prices which, in turn, encourage imports and discourage exports. (Brechling & Wolfe, 1965, p. 28, emphasis in original)

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[9]In some preliminary tests using single-equation models, for several of the commodities described in Chapter 4 below, this rate-of-change hypothesis was not supported using either the unemployment rate or the capacity utilization rate as the measure of demand pressure. The idea, however, is intriguing and might lend itself to testing in the context of a simultaneous system such as that employed in Chapter 5.

IV. Summary.

The theoretical treatment of the Demand Pressure Hypothesis, which began as single equation models that treated price as exogenous, has progressed to simultaneous equation models that permit price to be endogenous. Explanations were originally macroeconomic, and now efforts are directed at both macro rationale and the microeconomic underpinnings. Empirically, the DPH is far from being confirmed. The evidence provides only partial support; so that, combined with the intuitive appeal of the theory, the hypothesis remains interesting. The challenge is to devise a more convincing test of the hypothesis.

CHAPTER 3

THE THEORETICAL BASIS FOR THE DEMAND PRESSURE HYPOTHESIS

Section I of the previous Chapter discussed and evaluated several theoretical treatments of the Demand Pressure Hypothesis. This Chapter develops some alternative economic models that appear to overcome the deficiencies of the earlier versions. The objective is to employ the microeconomic analysis of the DPH furnished by Cooper, Hartley, & Harvey (1970), and extend their model so as to maintain (in the spirit of Dunlevy, 1980) the endogeneity of both price and quantity in the testable version of the new model.

Section I of this Chapter derives the demand-for-export function. Section II explains the export supply function. A large part of the discussion is devoted to the concept of "capacity" because of its importance to the Demand Pressure Hypothesis. In Section III, demand functions and supply functions are combined with equilibrium requirements to form complete models.

I. Derivation of the Demand-for-Exports Function.

The demand of the rest of the world (ROW) for the exports of one country depends upon the real price of those exports and real world income. Let the home country's currency be translated into a ROW currency by an appropriately weighted exchange rate and denote it XRINDX, defined so that an increase in XRINDX indicates an increase in the foreign exchange value (that is, an appreciation) of the home currency. It seems reasonable to assume that market conditions at the individual commodity level will have only negligible effects on the exchange rate; that is, at the commodity level, the exchange rate can be assumed to be an exogenous variable. Over the long run, however, one would expect that in the aggregate the price level at home relative to the price level in the rest of the world would be a determinant of the foreign exchange value of the domestic currency.[10] The exchange rate, then, can be expressed as a function of the price levels in the two countries:

$$XRINDX = XRINDX\ (PRINDXROW, PRINDX), \qquad (3\text{-}1)$$

where PRINDXROW and PRINDX represent price indexes in the ROW and the home country, respectively, and from this the following can be written:

$$PRINDXROW = PRINDXROW(XRINDX, PRINDX). \qquad (3\text{-}2)$$

Letting PXN denote the nominal export price (of an individual commodity) in the exporting country, the real ROW price of the exports is given by the following expression:

$$PXROW = PXN * XRINDX/PRINDXROW; \qquad (3\text{-}3)$$

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[10]See Yeager, 1976, pp. 210-230, for a development of the Purchasing Power Parity doctrine and Officer, 1980, for a recent test of the theory.

which in functional notation is:

PXROW = PXROW (PXN, XRINDX, PRINDXROW),

and in light of Equation (3-2) can be written as follows:

PXROW = PXROW (PXN, XRINDX, PRINDX). (3-4)

Letting YROW denote real ROW income, the demand for U.S. exports is the following:

QXD = QXD(PXROW,YROW), (3-5)

which can be combined with Equation (3-4) and re-written as

QXD = QXD(PXN,XRINDX,PRINDX,YROW).

By letting PX denote the real domestic price of the exportable commodity, PX = PXN/PRINDX, the export demand function can be written as follows:

QXD = QXD (PX,XRINDX,YROW). (3-6)

In other words, the demand for U.S. exports is a function of the U.S. export price, the weighted dollar exchange rate and ROW income.

II. Derivation of Export Supply Function.

The derivation of the export supply function will proceed in three steps: derivation of the domestic demand function (Subsection A); discussion of supply conditions (Subsection B); and formation of the export supply function on the basis of the domestic demand and the supply schedules (Subsection C).

A. The Domestic Demand Function.

It is reasonable to assume that any exportable commodity will also be demanded at home. Its quantity demanded will depend upon the real domestic price of the item (PH) and real home income (YH). Letting QHD denote the quantity demanded at home, the domestic demand function is written as follows:

$$QHD = QHD(PH, YH). \qquad (3\text{-}7)$$

B. The (Total) Supply Function.

The quantity of goods supplied (QS) by U.S. producers will be supplied partly to the home market (QHS) and partly to the export market (QXS). The total quantity supplied will depend upon the real prices received in the two markets (PH at home and PX abroad) and the real prices of inputs (denoted as PLAND, PL, and PK for the prices of land, labor, and capital). the supply function can be written as follows:

$$QS = QS(PH, PX, PLAND, PL, PK). \qquad (3\text{-}8)$$

If plant size and capital equipment are long-run decisions of the firm, the prices of these types of inputs would not be expected to have a noticeable effect on short-run variations (say, quarterly) in the quantity of output produced. The price of short-term capital such as tools and raw materials and the cost of borrowing to maintain inventories can be expected to be relevant to current production decisions. Furthermore, during any particular quarter, the firm--and by implication, the aggregate of firms--has a fixed plant size with a certain capacity output. This idea of a fixed capacity output has been an underlying premise in all writings on the DPH. Because of its importance in the history of the Hypothesis, the concept of capacity merits further discussion. What needs to be developed is an intuitively appealing rationale for claiming that the degree to which capacity is being utilized will affect the willingness of producers to supply commodities to the export market. This is done in the following five subsections; but, first, the term itself must be defined.

Three alternative definitions of capacity are available. First, capacity can be defined as the maximum amount that can be produced; this would be the quantity (QC2 in Figure 3-1) at which the marginal cost curve becomes vertical (or asymptotically approaches a vertical line). In this case, once full capacity is reached, there can be no quantity-response to an increase in demand. Alternatively, following Klein (1960) it can be interpreted as the largest output that can be produced without encountering rising average costs (denoted QC1 in Figure 3-1). With such a definition, output can be increased in response to a higher market price even if the firm is already producing at 100 percent of capacity. In a third interpretation, Stigler (1966, pp. 156-158) presents a convincing argument for defining capacity as the output at which short-run marginal costs equals long-run marginal cost. The following subsections examine the concept of capacity with reference to perfect competition, monopoly, and dumping. Given the absence of historical data on long-run marginal cost, Stigler's definition of capacity, although theoretically interesting, will not be empirically helpful. Unless a different definition is specifically mentioned, the capacity definition used in the following discussion is that of Klein. This definition will be shown to be theoretically helpful in understanding the DPH and, relative to the other definitions, can be more readily reconciled with published capacity utilization rates.

(1) Perfect Competition. Consider first a perfectly competitive market. Kreinin (1979, pp. 276-282) presents a graphical derivation of the export supply and demand for

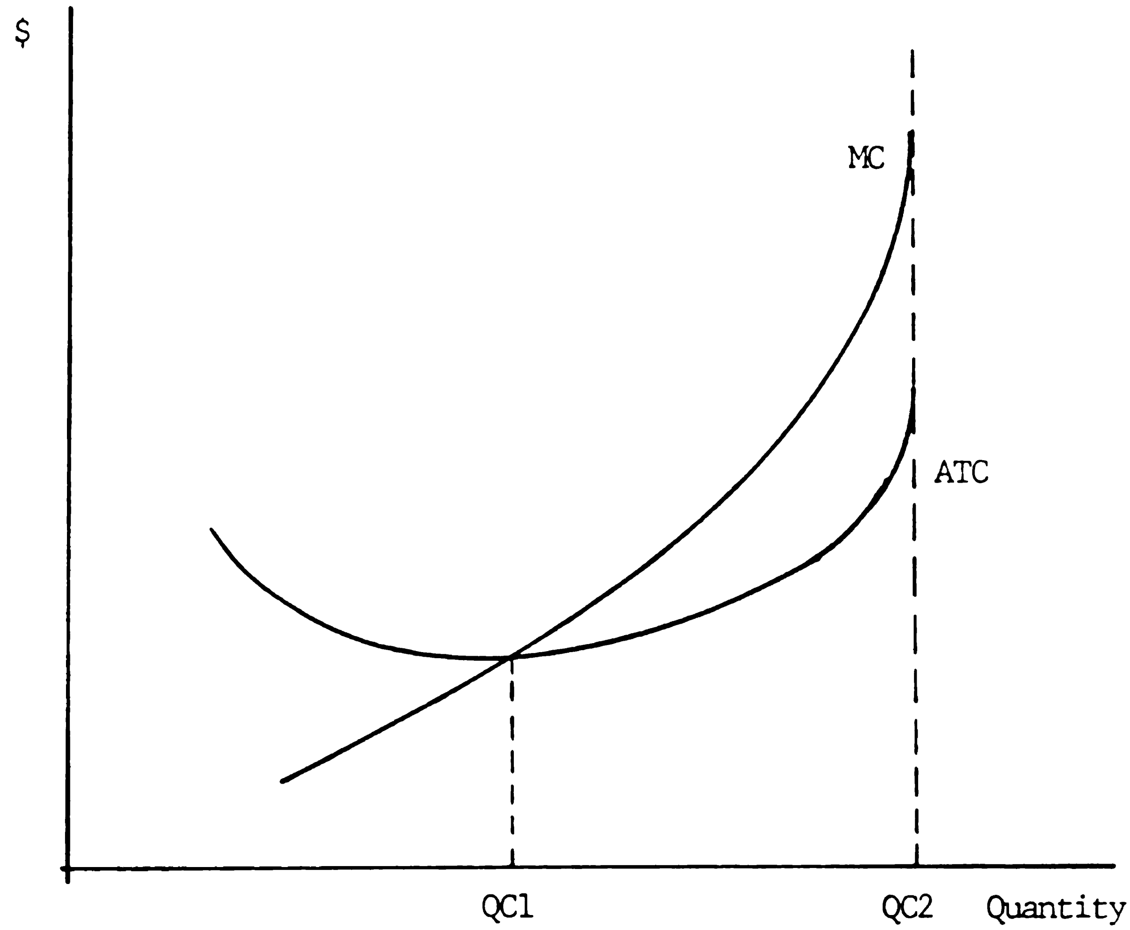

Figure 3-1. Alternative Definitions of Capacity.

export functions.[11] Figure 3-2 consists of two panels which depict the domestic and foreign sectors. It can be seen that an increase in domestic demand from QHD to QHD2 will cause a reduction in export supply. The equilibrium quantity of exports declines and the equilibrium price rises. If the demand-for-exports curve (QXD) were perfectly elastic, price would not change but the quantity of exports would decrease. If the supply curve (QS) were vertical (a result of firms operating on a vertical marginal cost curve), the export supply function (QXS) would still be upward sloping and the above conclusions would remain intact. All these implications are consistent with the Demand Pressure Hypothesis: an increase in domestic demand causes exports to decline and their price to rise.

In the neoclassical treatment of the firm, it is assumed that the objective of the firm is to maximize profits. For neither perfect competition nor monopoly is this synonymous with producing at capacity. Consider the

[11]Convention suggests that the term should be "import demand" rather than "demand for exports," but in a sense that would treat both countries as the "home" country because the same commodity is then sometimes called an import and sometimes called an export. Following other writers on the DPH, this paper uses "export demand" and "demand for exports." The reason for this choice of expressions is that the point of view is always that of the supplier, and it seems natural to refer to the demand for our exports--that is, the demand-for-exports function.

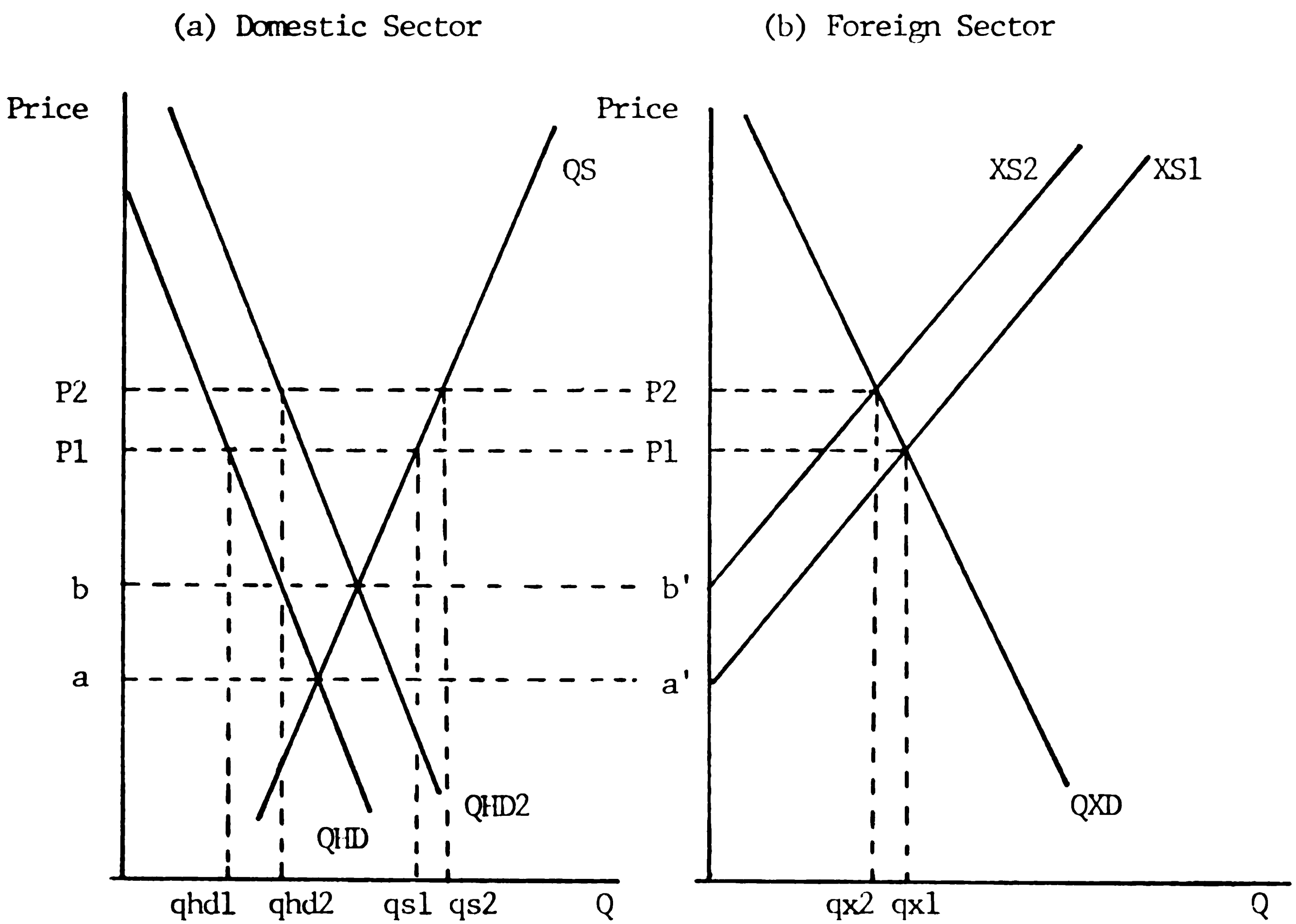

Figure 3-2. The Effect of an Increase in Domestic Demand on Export Supply.

firm depicted in Figure 3-3. For each marginal revenue curve (MR1, MR2, MR3, MR4), there is an optimum output (Q1, Q2, Q3, Q4). There is no inherent reason for the optimum output to coincide with capacity output; and this is true whether QC1 (unit costs start to rise) or QC2 (absolute limit on production) is used to designate full-capacity output. In general, however, the competitive firm has no inducements to strive to produce at capacity. The firm depicted would produce at capacity only if marginal revenue happened to be MR2 (or MR4 under the absolute-limit-to-output definition of capacity).

(2) Monopoly. Similar conclusions apply to the monopoly case, depicted in Figure 3-4: for each marginal revenue curve (MR1, MR2, MR3, MR4), there is an optimum output (Q1, Q2, Q3, Q4), and this optimum output does not necessarily equal capacity output. If profit-maximization is the goal of the monopolist, capacity utilization is immaterial. The capacity utilization rate is a statistic that can be derived from observation of industrial production--provided that the measurement of capacity output can be agreed upon. Under the neoclassical assumption that firms are profit-maximizers, a capacity utilization rate of, say, 85 percent implies only that demand and cost conditions are such that profits are maximized when firms produce at that level of capacity.

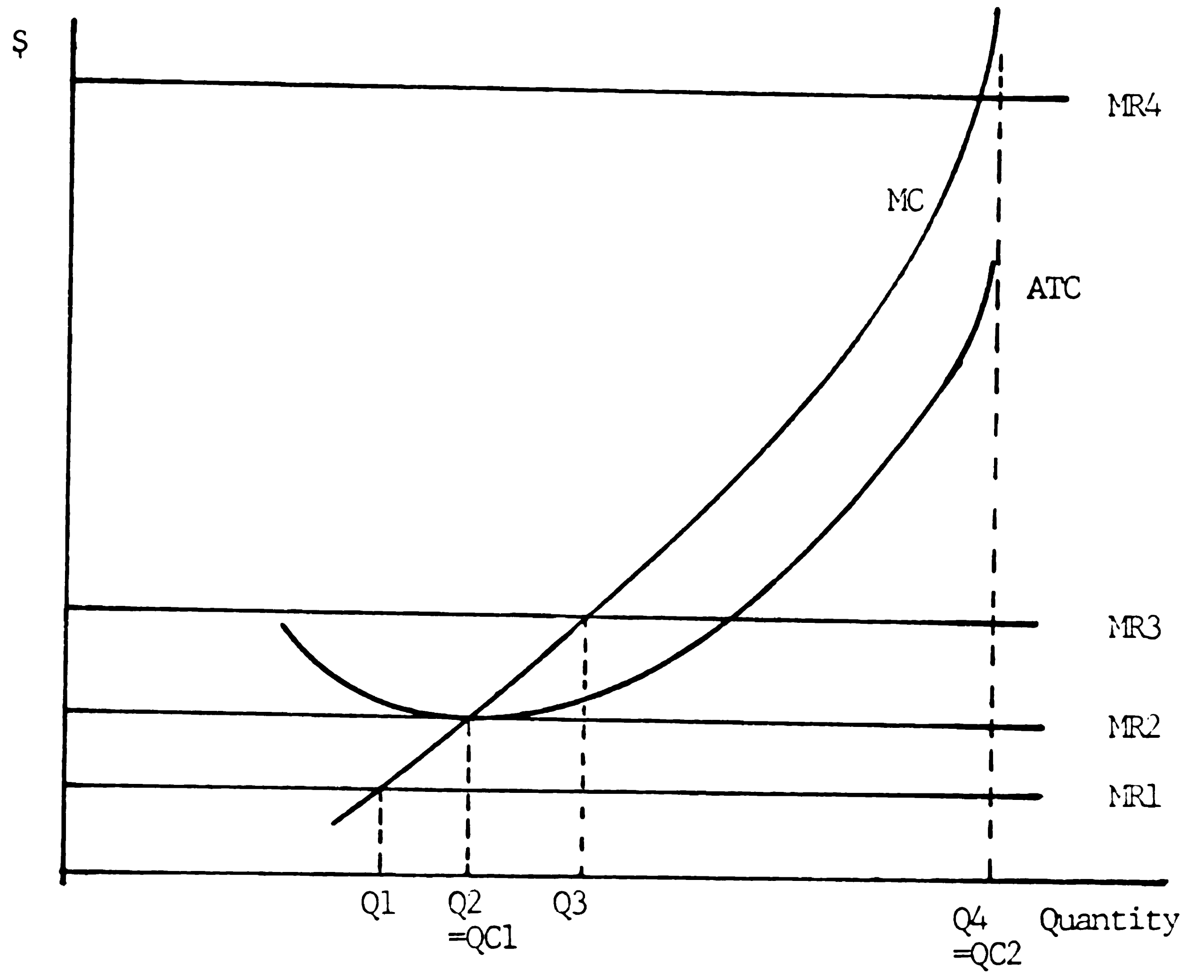

Figure 3-3. Profit Maximization vs. Capacity Output: Perfect Competition.

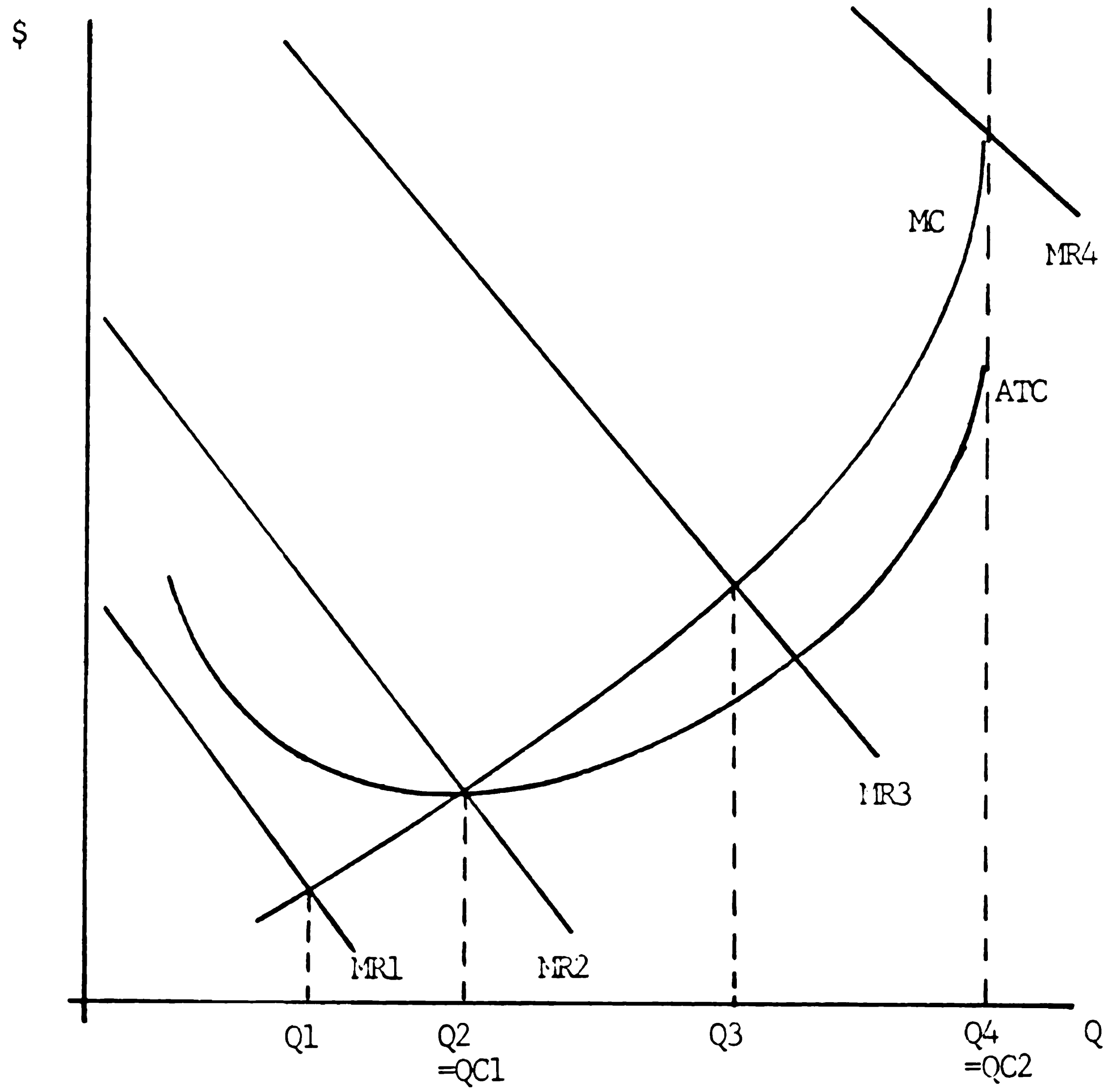

Figure 3-4. Profit Maximization vs. Capacity Output: Monopoly.

(3) A Discussion of Published Capacity Utilization Rates. In a world of multi-product firms where heterogeneous products seldom make definitions of industries totally satisfactory, finding the minimum points on average cost curves for an entire industry is not an easy task. Empirical attempts to measure capacity and capacity utilization do not clearly adopt either of the three definitions presented above. In their presentation of the Federal Reserve System's estimates of capacity utilization, Raddock & Forest (1976) refer to capacity and capacity utilization as "elusive concepts" and point out that "there are neither universally accepted definitions nor comprehensive tabulations of capacity for the productive facilities of the economy" (p. 893). They note that the Federal Reserve accepts the definition of capacity which is implicit in surveys and that respondents to surveys appear to use a concept of "practical maximum capacity." This leads them to point out that the Census Bureau

> defines practical capacity as the greatest level of output that a plant can achieve within the framework of a realistic work pattern, assuming a normal product mix and an expansion of operations that can be reasonably attained in the particular locality and considering only equipment in place. (Raddock & Forest, 1976, p. 893, emphases added)

The fact that plant and equipment are fixed suggests simply that the Census Bureau is referring to the short run, but the definition is not very precise. An elusive concept like practical capacity is defined by other elusive concepts: realistic work pattern, normal product mix, and reasonable expansions of output.

The Wharton index of capacity utilization employs a trends-through-peaks technique for finding capacity. In this method, actual output is plotted against time and the major peaks are connected with straight lines. These connecting lines indicate capacity output. The Wharton method is saying that if, at a peak production period, a firm produces a given rate of output then that rate must certainly be within the firm's capacity to produce. If several quarters later the firm exceeds that output, then capacity has increased; indeed capacity has increased smoothly from one peak to the next. Capacity is determined by actual rates of output rather than estimates of what the firm could have produced. Production rates above capacity are ruled out by definition.[12]

As the demand for the output of one industry increases, it is possible but unlikely that the demand for each product in that industry is increasing at the same rate. Rather it is plausible that the demand for some products expands more rapidly than that for others in the same industry, so that

[12] Raddock & Forest (1976) discuss these and other problems involved with measures of capacity and capacity utilization.

not all firms reach capacity at the same time. The same can be said for supplier firms and customer firms. Bottlenecks can appear while some firms are still producing below capacity. But the closer the industry is to capacity output the greater will be the number of individual firms that are at capacity or beyond, and therefore, the greater the number of entrepreneurs who will be reluctant to increase production if prices are rigid; and the greater will be the price increase required to induce them to accept the added wear and tear on their machines that would result from expanded production. If every firm in the industry is producing below capacity, then the entire industry can expand output at the existing price. If only half the firms are below capacity, then half the industry can increase output at existing prices and perhaps some of the others might be willing to increase also.

4) The Price-Discriminating Monopolist. This subsection considers the behavior of a monopolist that has two separate markets, a domestic and a foreign. The situation is depicted in Figure 3-5. As demand increases in the home market, marginal revenue for that market shifts from mr1 to mr2 to mr3. As long as the combined marginal revenue either (MR1, MR2, or MR3) intersects the marginal cost curve where average cost (and therefore marginal cost) is constant, the firm will expand production to handle the

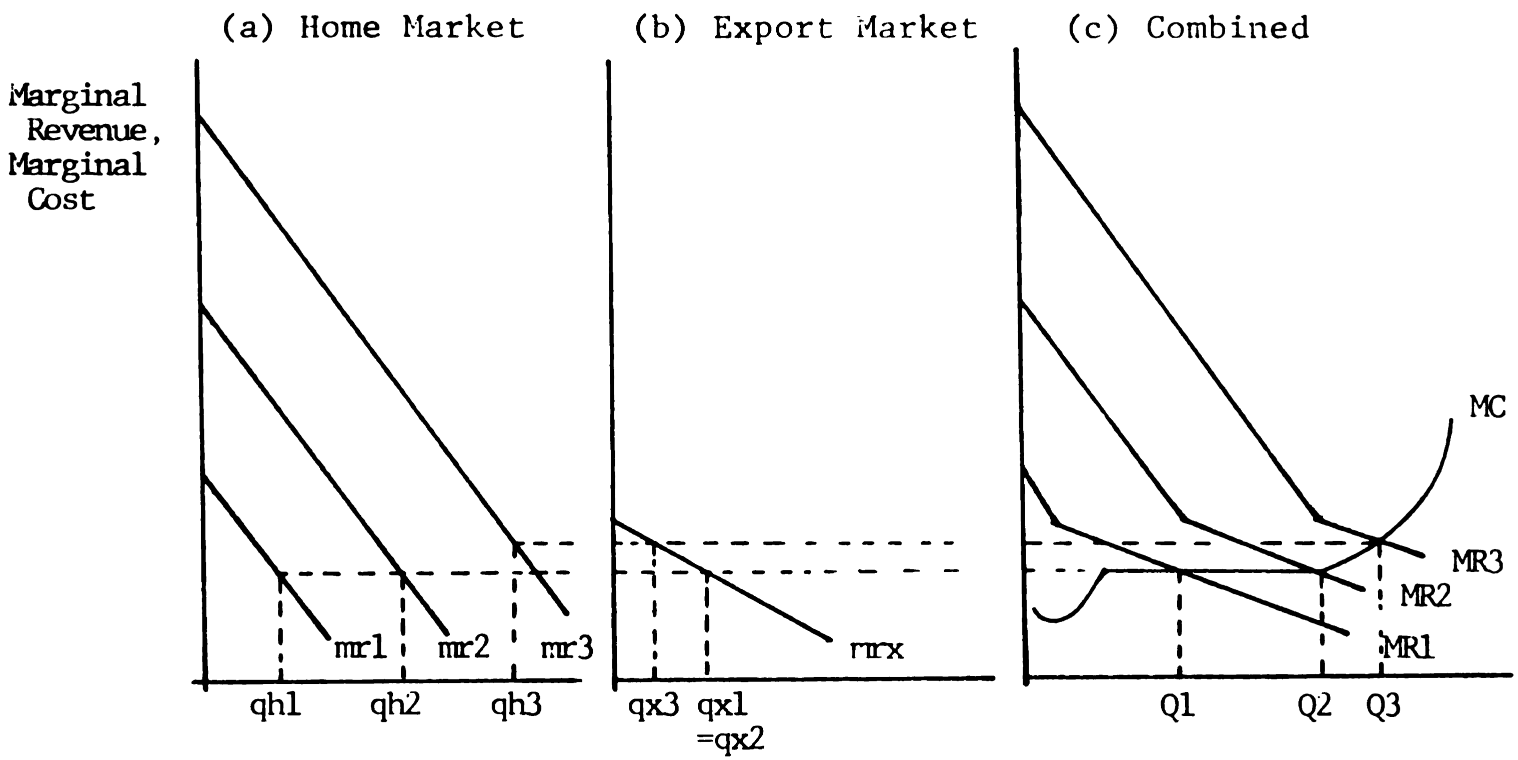

Figure 3-5. The Effect of an Increase in Domestic Demand on the Quantity of Exports: The Price-Discriminating Monopolist.

additional home sales and will not alter its exports. This is the case when domestic demand conditions cause marginal revenue to go from mr1 to mr2 at home (MR1 to MR2, combined). Once the plant reaches capacity output (Q2), however, an increase in domestic demand (causing a shift from mr2 to mr3) will cause exports to fall from qx2 to qx3 and the price of exports (not shown) to rise.

Aggregating across firms to form an industry, it is seen that the closer the industry is to capacity output, the greater will be the number of firms at or near capacity and the more likely will it be that an increase in domestic demand will lead to a reduction in exports. That is, an increase in domestic demand does not affect exports when there is excess capacity in the industry; it is likely to reduce exports if the industry is approaching, at, or beyond full capacity. Contrast this with the earlier discussion of a more typically neoclassical firm with a U-shaped average total cost curve. For such a firm (and for an industry of such firms), an increase in domestic demand will always reduce exports.

(5) Implications of Capacity Utilization Rates. From the discussion thus far, it appears that the demand pressure hypothesis is actually a hypothesis about the shape of the average total cost curve. When this curve is horizontal, changes in domestic demand will not affect exports; when

this curve is upward sloping or U-shaped, an increase (a decrease) in domestic demand will reduce (increase) exports. Stated somewhat differently, a contractionary macroeconomic policy designed to improve the country's trade balance by reducing imports and increasing exports will have an affect only on imports if the economy is operating under conditions of constant unit costs; exports will be affected only if the contraction can cause incremental costs to decline. Note that the capacity utilization rates collected via the Wharton method would not be consistent with the segments of the above discussion that relied on the Klein concept, because the Wharton method precludes capacity utilization rates above 100% whereas the above discussion admits them. In the above exposition, a capacity utilization rate of 100% indicates that the average total cost curve is upward sloping and the Demand Pressure Hypothesis is effective. It is worth emphasizing that it is not the capacity utilization rate that affects exports directly. Rather, it is the increase in domestic demand that affects exports, and this occurs only when the capacity utilization rate is above 100%. This means that in a regression analysis the coefficient on the domestic demand variable will be different at a 100% capacity utilization rate than what it was when the rate was below 100%. The implication is that those studies that have included a capacity utilization rate as an explanatory variable in the regression equation have misspecified the model. The capacity utilization rate is a signal that the relationship between domestic demand and exports has changed.

Empirically, it is not possible to use a capacity utilization rate of 100% as the desired cut-off point because capacity utilization rate are not collected along the lines of the Klein concept. If the time series on capacity is created by the Wharton method, average total cost might start rising, for example, at a rate of 95% or perhaps at 85%. The models developed below take account of this ambiguity, and the empirical analysis (described in Chapter 5) investigates four cut-off rates for each commodity. These are 83%, 85%, 86%, and 87%. Thus, the test constructed for the Demand Pressure Hypothesis will show at what capacity utilization rate demand pressure becomes effective.

C. The Export Supply Function.

Next to be derived is the export supply function. In order to avoid the difficulties of developing a world market model in which several countries simultaneously export and import a homogeneous commodity, it is possible to assume that two-way trade in the same commodity simply does not exist. A more cumbersome but more plausible assumption is that for the exportable commodities under study, there are no good substitutes available as imports. That is, imported commodities are sufficiently differentiated from exportables so that the prices of imports can be treated the same way as are the prices of all other commodities. Conceptually, in the domestic demand function the import price is one of the "all other prices" and it is taken into account when the nominal price of the exportable commodity is converted to a real price.

Turning now to the specification of the export supply function, the quantity supplied to the export market is the difference between the quantity supplied and the quantity demanded in the home market:

$$QXS = QS - QHD. \qquad (3\text{-}9)$$

Substituting Equation (3-7) for QHD and (3-8) for QS yields the following export supply function:

$$QXS = QXS(PX,PH,YH,PLAND,PL,PK). \qquad (3\text{-}10)$$

Although Equation (3-10) is derived from Equation (3-9), which is true by definition, a simpler export supply function can be specified under certain circumstances. If the average cost and marginal cost curves are horizontal, it was shown above that changes in production for the home market will not affect exports. In that case the two terms in Equation (3-10) having to do with domestic demand (PH and YH) can be eliminated; and an alternative export supply function is derived:

$$QXS = QXS(PX,PLAND,PL,PK). \qquad (3\text{-}11)$$

Equation (3-10) says that domestic demand always has an effect on export supply; Equation (3-11) says that domestic demand never has an effect on export supply. When the complete models are specified below, Model A uses Equation (3-11) as its export supply function and Model B uses Equation (3-10). If Model B is viewed as the Demand Pressure Hypothesis, Model A becomes the null hypothesis.

Another possible export supply function is one that says that Equation (3-11) holds when capacity utilization rates are low (marginal cost and average cost are horizontal) and that Equation (3-10) holds when capacity utilization rates are high (marginal cost and average total cost slope upward). Such an export supply function would be specified in the following way:

$$QXS = \begin{cases} QXS(PX, PLAND, PL, PK) & \text{if } dMC/dQ = 0, \\ QXS(PX, PH, YH, PLAND, PL, PK) & \text{IF } dMC/dQ > 0,\ dATC/dQ > 0. \end{cases} \qquad (3\text{-}14)$$

Equation (3-14) permits the coefficients on all the terms, not just the domestic demand terms, to change when capacity output is reached.

Two export supply functions which assert that all the coefficients except the domestic demand coefficient are independent of capacity utilization rates would require the use of interactive terms and can be derived in the following manner. Let DUMCAP be a dummy variable that equals one when ATC and MC are both upward sloping and equals zero otherwise. Define the variables PHCAP and YHCAP as follows:

PHCAP = PH*DUMCAP,
YHCAP = YH*DUMCAP.

The variable YHCAP takes on the value of YH whenever the Average Total Cost curve is upward sloping (that is, when the firm reaches capacity) and takes on the value zero otherwise (that is, below capacity). The same applies to PHCAP. A modification of Equation (3-14) would then be the following:

QXS=QXS(PX,PHCAP,YHCAP,PLAND,PL,PK). (3-15)

Equation (3-14) is more general than Equation (3-15): Equation (3-15) states that the relationship between QXS and PK (that is, dQXS/dPK) is the same whether the firm is at capacity or below, while Equation (3-14) would permit the relationship to change once capacity output is reached.

A final export supply function borrows from three developed earlier: Equations (3-10), (3-14), and (3-15). Domestic demand is part of Equation (3-10) for all observations; and it is part of Equations (3-14) and (3-15) only if marginal cost is rising (that is, only if domestic demand is high). Domestic demand, however, enters the next export supply equation in such a way that different responses to home income can be hypothesized when marginal cost is constant than when marginal cost is rising. That is, different responses to home income can be hypothesized when production is beneath capacity than when production is at or beyond capacity. In this version, not only are PH and YH in the export supply function but so are PHCAP and YHCAP. Recall that YHCAP is equal to zero when the firm is producing beneath capacity and becomes equal to YH at capacity output. This technique allows us to test for an "average" relationship between the quantity of exports supplied and home demand (this will be the coefficient on YH) and also to test for the change in this relationship when the firm is producing at high capacity (this will be the coefficient on YHCAP). This export supply function can be written as follows:

QXS=QXS(PX,PH,PHCAP,YH,YHCAP,PLAND,PL,PK). (3-16)

III. The Complete Models

A complete model must consist of demand and supply functions and an equilibrium condition. The demand-for-export function, derived earlier as Equation (3-6), can be forwarded without change as Equation (3-12):

QXD = QXD(PX,XRINDX,YROW). (3-12)

In turn, there are five export supply functions--Equations (3-10), (3-11), (3-14), (3-15), and (3-16). Equation (3-11) claims that there is no relation between exports and domestic demand; while the other four assert that such a relation does exist, with each specifying a somewhat different effect on exports from changes in domestic demand.

The equilibrium condition is that the quantity of exports supplied be equal to the quantity demanded:

$$QXS = QXD. \tag{3-13}$$

Combining the demand for export function with each of these export supply functions, under the equilibrium condition, yields five simultaneous-equation models of export behavior. The models--denoted A, B, C, D, and E--are presented in Figure 3-6. In all five models the equilibrium quantity of exports (QX) and the equilibrium export price (PX) are dependent variables; the other variables are independent. The reduced form equations for these models are presented in Figure 3-7. For convenience the variables are listed alphabetically and defined in Figure 3-8.

Model A, Constant Marginal Cost:

Supply:	QXS=QXS(PX,PLAND,PL,PK)	(3-11)
Demand:	QXD=QXD(PX,XRINDX,YROW)	(3-12)
Equilibrium:	QXS=QXD	(3-13)

Model B, Rising Marginal Cost:

Supply:	QXS=QXS(PX,PH,YH,PLAND,PL,PK)	(3-10)
Demand:	QXD=QXD(PX,XRINDX,YROW)	(3-12)
Equilibrium:	QXS=QXD	(3-13)

Model C, Constant and Then Rising Marginal Cost:

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Supply:          {  QXS(PX,PLAND,PL,PK)
           QXS = {       if dMC/dQ = 0                  (3-14)
                 {  QXS(PX,PH,YH,PLAND,PL,PK)
                 {       if dMC/dQ > 0, dATC/dQ > 0.
Demand:          QXD=QXD(PX,XRINDX,YROW)               (3-12)
Equilibrium:     QXS=QXD                               (3-13)
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Model D, Constant and Then Rising Marginal Cost:

Supply:	QXS=QXS(PX,PHCAP,YHCAP,PLAND,PL,PK)	(3-15)
Demand:	QXD=QXD(PX,XRINDX,YROW)	(3-12)
Equilibrium:	QXS=QXD	(3-13)

Model E, Eventually Rising Marginal Cost:

Supply:	QXS=QXS(PX,PH,PHCAP,YH,YHCAP,PLAND,PL,PK)	(3-16)
Demand:	QXD=QXD(PX,XRINDX,YROW)	(3-12)
Equilibrium:	QXS=QXD	(3-13)

Figure 3-6. Simultaneous Equation Models: Models A, B, C, D, and E

Model A, Constant Marginal Cost:

QX = QX(YROW,XRINDX,PLAND,PL,PK) (3-17)
PX = PX(YROW,XRINDX,PLAND,PL,PK) (3-18)

Model B, Rising Marginal Cost:

QX = QX(YROW,XRINDX,PH,YH,PLAND,PL,PK) (3-19)
PX = PX(YROW,XRINDX,PH,YH,PLAND,PL,PK) (3-20)

Model C, Constant and Then Rising Marginal Cost:

1. When marginal cost is constant:

QX = QX(YROW,XRINDX,PLAND,PL,PK) (3-17)
PX = PX(YROW,XRINDX,PLAND,PL,PK) (3-18)

2. When marginal cost is rising:

QX = QX(YROW,XRINDX,PH,YH,PLAND,PL,PK) (3-19)
PX = PX(YROW,XRINDX,PH,YH,PLAND,PL,PK) (3-20)

Model D, Constant and Then Rising Marginal Cost:

QX = QX(YROW,XRINDX,PHCAP,YHCAP,PLAND,PL,PK) (3-21)
PX = PX(YROW,XRINDX,PHCAP,YHCAP,PLAND,PL,PK) (3-22)

Model E, Eventually Rising Marginal Cost (No "a priori" statement on Marginal Cost initially):

QX = QX(YROW,XRINDX,PHCAP,YH,YHCAP,PLAND,PL,PK) (3-23)
PX = PX(YROW,XRINDX,PHCAP,YH,YHCAP,PLAND,PL,PK) (3-24)

Figure 3-7. Reduced Forms: Quantity and Price Equations

PH	The real home price of the exportable commodity.
PHCAP	Interaction term. Equals the home price of the exportable commodity when the capacity utilization rate is high and equals zero otherwise.
PK	The real price of capital.
PL	The real price of labor.
PLAND	The real price of land.
PX	The real price of the exported commodity.
QX	The quantity of exports (individual commodity).
XRINDX	The foreign exchange value of the domestic currency.
YH	Real home income.
YHCAP	Interaction term. Equals real home income when the capacity utilization rate is high and equals zero otherwise.
YROW	Real income in the rest of the world.

Figure 3-8. Definitions of Variables.

CHAPTER 4

DATA

I. Introduction.

This chapter describes the data used to estimate the models developed in Chapter 3. Particular attention is paid to the handling of missing data and to describing some necessary adjustments to the statistics (detailed descriptions are presented in Appendix 1). In addition, some reference is made to data that were used as explanatory variables in preliminary experimentations but that were not included in the final formulations (a complete discussion is presented in Appendix 2).

II. Trade Data.

U.S. export data come from the U.S. Department of Commerce monthly foreign trade report FT 410 *U.S. Exports: Schedule E Commodity Groupings, Schedule E Commodity by Country*. These are 7-digit commodities classified according to Schedule B prior to 1978 and according to Schedule E beginning in 1978. Commodities were selected at random, subject to the constraints of data availability and the desire to have representation from each of SITC Sections 5, 6, 7, and 8. Of the forty-seven commodities for which data had been originally collected, sixteen were eliminated from the study because of the difficulties of matching the pre-

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1978 Schedule B numbers with the new Schedule E numbers. For those commodities that could be carried forward to the end of 1979, concordance was obtained by going from old Schedule B (which was based on SITC) to the new Schedule B (based on the Tariff Schedule of the U.S.) and then from new B to new Schedule E (which is SITC-based).[13] The quarterly data span the period 1965.1 to 1979.4, for a total of sixty observations. The commodities are identified here by their Schedule E numbers.

Figure 4-1 lists the commodities along with their schedule E numbers. The right hand column shows the previous number, with which the new number was concorded on the basis of the descriptions and with the aid of the concordance tables.[14]

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[13]The desired export data are published in FT 410, a foreign trade report fo the Department of Commerce. Prior to 1978 commodities in FT 410 are classified according to Schedule B, which was SITC-based. Beginning in January 1978, the Schedule B numbering system changed, and the new Schedule B is now based on the Tariff Schedule of the U.S. A new schedule was created, called Schedule E, that is SITC-based. Schedule E is similar to, but not identical with, the old Schedule B and now forms the basis for classification of commodities in FT 410. There is no concerdance table available that goes directly from old Schedule B to new Schedule E--that is, from old FT 410 to new FT 410.

[14]Commodity No. 525 6030 is missing an observation for 1965.3; this precludes finding quarterly data for 1965.4. Rather than discarding the observations for 1965.1 and 1965.2 and beginning the regressions with 1966.1, observations for 1965.3 and 1965.4 were approximated by linear extrapolation.

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Schedule E Number	Brief Description	(Schedule B) Previous Numbers
525 6030	Iron oxides and hydroxides, pigment grade	513 5030 (1965-69) 513 5320 (1970-77)
553 2000	Printing inks	
588 3060	Rubber cement	621 0210 (1965-77)
641 1000	Newsprint	
671 2000	Pig iron, including cast iron	
673 2005	Concrete reinforcing bars (also includes since 1978: 673 2010.)	673 2420 (1965-77)
682 2160	Copper alloy wire, bare	682 2150 (1965-77)
682 2400	Copper and copper alloy powders and flakes	
684 2140	Aluminum and aluminum alloy wire, except insulated	684 0130 (1965-77)
684 2420	Aluminum and aluminum powders and flakes (also includes since 1978.2: 684 2440.)	684 2400 (1965-77)
686 3220	Zinc and zinc alloy sheets, plates, and strip	686 2010 (1965-77)
691 1020	Door and door and window sash, frames, and molding and trim, of iron and steel	
691 2020	Door and door and window sash, frames, and trim, of aluminum	691 2010 (1965-77)
695 3140	Hacksaw blades, hand and power (beginning in 1979.1 this number splits into 693 3139 and 693 3143; both are included here.)	695 2140 (1965-77)
695 4145	Twist drills and drill bits, metal cutting.	695 2440 (1965-77)
696 0340	Safety-razor blades	696 0320 (1965-77)
716 4042	Motors, AC, polyphase-induction, not over 20 HP	722 1034 (1965-77)
721 2220	Combines, self-propelled	712 2010 (1965-77)
723 4052	Dozers, for mounting on tractors	718 4244 (1965-77)
724 3920	Needles, sewing machine	717 3070 (1965-77)
742 4026	Centrifugal pumps for liquids, single-stage, single-suction, close-coupled, under 2 inch outlet	719 2120 (1965-73) 719 2121 (1974-77)

Figure 4-1. Description of Commodities Tested

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Number	Brief Description	Previous Numbers
743 1035	Air compressors, stationary, over 100 HP	719 2220 (1965-77)
751 1040	Typewriters, standard, non-portable, electric, new	714 1010 (1965-77)
762 0040	Radios, household-type, without phonograph	724 2010 (1965-77)
775 4030	Shavers, electric	745 0410 (1965-77)
775 7520	Vacuum cleaners, electro-mechanical	725 0320 (1965-77)
775 8625	Toasters, automatic, electric, household type	725 0520 (1965-77)
884 2220	Sun or glare glasses and sun goggles	861 2010 (1965-69) 861 2210 (1970-77)
885 2020	Clocks, electric	864 0120 (1965-69) 864 0320 (1970-77)
891 0945	Tape, pressure-sensitive plastic	893 0045 (1965-77)
895 2115	Ball-point pens and ball-point pencils	895 2120 (1965-77)

Figure 4-1. Description of Commodities (cont.)

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III. Macroeconomic Data.

Five basic categories of macroeconomic data are needed: world output, exchange rates, U.S. output, domestic demand pressure, and factor prices.

A. World Output.

Data furnished by the United Nations Statistical Office were used to construct a time series of Value Added by the rest-of-the-world (that is, the world excluding the United States) in mining, manufacturing, electricity, gas, and water. The series is denoted VAROW and was computed in the following way. First, the World value-added figures are constructed by multiplying quarterly index numbers of world industrial production times the value-added by the world in 1975 (expressed in 1975 U.S. dollars). The result is a quarterly time series for world value added, expressed in 1975 dollars. Second, use of the same procedure for the United States yields quarterly data for U.S. value added, also expressed in 1975 U.S. dollars. Finally, by subtracting U.S. value-added from world value-added, the time series VAROW is constructed. VAROW enters the regressions denominated in millions of 1975 U.S. dollar.[15]

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[15]The countries that comprise the "world" do not remain constant throughout the sample period. In 1965, for example, the world excludes China (Mainland), North Korea, North Viet-Nam, U.S.S.R., and Eastern Europe. In 1968 and 1969, the world excludes China (Mainland),

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B. Dollar Exchange Rate.

To measure the effective exchange rate of the U.S. dollar, a time series was constructed (and denoted as the variable XRIMF) from the International Monetary Fund's series on effective exchange rates. XRIMF is defined to indicate a rise in the value of the dollar as XRIMF increases. The series is derived from the Fund's Multilateral Exchange Rate Model (MERM) and is published as line "amx" in the Fund's International Financial Statistics. The weights used in constructing the series are generated by the Fund's Multilateral Exchange Rate Model and represent the model's estimate of the effect on the U.S. trade balance of a one percent change in the dollar value of one of the other currencies.[16] It is an arithmetic average for the period rather than an end-of-period value and is constructed as an index in which the par values in May 1970 are set equal to 100.

Beginning with the third quarter of 1979, the base period was changed to the average market exchange rates during 1975. The 1975-based series had to be converted into

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Mongolia, Democratic People's Republic of Korea, and the Democratic Republic of Viet-Nam. By 1977 and 1978, the world excludes Albania, China, Mongolia, Democratic People's Republic of Korea, and Socialist Republic of Viet-Nam.

[16] A description of the series can be found in IMF (1980).

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a 1970-based series for the last two observations (1979.3) and 1979.4) in the regression analysis. This was done in the following way. Back values of the 1975-based index are furnished by the IMF beginning with 1976.1. For the period 1976.1 through 1979.2, therefore, the values for both the 1970-based series and the 1975-based series are available from the IMF. During this period, the average relationship between the two series is: 1970-based index equals 0.8352398 times 1975-based index. That conversion factor was used to obtain 1970-based values for 1979.3 and 1979.4 from the 1975-based index. The effective exchange rate series gives the value of the dollar vis-a-vis twenty other major currencies.

The published series begins with the value for 1972.1. In order to get a series going back to 1965, the Fund's index was used for all observations from 1972.1 forward and this index was approximated backwards into the Bretton Woods era by taking into a account the devaluations and revaluations of the currencies of Canada, Germany, France, and the United Kingdom. The method used to accomplish this is described in Appendix 1.

C. U.S. Output.

U.S. Gross National Product at 1972 prices was used to measure U.S. output. This variable is given the name GNP72$. In some preliminary work, the Federal Reserve

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System's Index of Industrial Production was employed, but this was abandoned in favor of GNP72$.

D. Demand Pressure.

Domestic demand pressure is measured by the Federal Reserve System's capacity utilization rates as published in each issue of the Federal Reserve Bulletin. The Federal Reserve measures capacity as a percent of 1967 output. Output is converted to an index (1967 = 100), and then the capacity utilization rate is output divided by capacity. Three of the Federal Reserve System's series were tried: total manufacturing, primary processing, and advanced processing. Because the three are so highly correlated with each other, there is no significant advantage in using one over the other two. Consequently the capacity utilization rate for total manufacturing was used for all the regression analysis.

E. Input Prices.

In order to measure the prices of the factors of production, two nominal series from the Bureau of Labor Statistics, Employment and Earnings, were converted into real terms by dividing by the GNP deflator. To obtain a series measuring the price of labor, the series called "unit labor cost, private sector, non-farm" was converted into real terms and called PL. To obtain a series measuring the prices of both capital and land, the series called "unit non-l

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non-labor payments, private sector, non-farm" was converted into real terms and denoted PK. Several other measures of factor costs are published by the Bureau of Labor Statistics and were tried in preliminary investigations. For a description of these and their relationship to PL and PK, see Appendix 2.

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CHAPTER 5

RESULTS OF REGRESSION ANALYSIS

I. Estimation Procedure.

Two modifications have to be made to the reduced form equations of Figure 3-7. First, the price of land and of capital are combined into one term--unit non-labor cost (PK). This was dictated by data availability. Second, the domestic price of the home country's exported commodity (PH) is eliminated from all equations. This was dictated by inadequate concordance between export classification (Schedule E) and domestic classification (SIC) schemes, particularly at the 7-digit level. The reduced form equations that are to be estimated are presented in Figure 5-1. The generalized notation used in Chapter 3 has in several instances been replaced by notation that is more descriptive of the actual data series employed. Thus, for Rest-of-World Income the series used is Value-Added in the Rest of the World, and therefore, YROW becomes VAROW. The exchange rate index used in the regressions comes from the IMF, and thus XRINDX is replaced by XRIMF. Gross National Product in 1972 dollars is used as the measure of home income, and therefore, GNP72$ replaces YH. For each commodity, four different capacity utilization rates (83, 85, 86, and 87%) are tested as working definitions of full capacity, and thus the variable described earlier as YHCAP

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becomes four different variables: YHCAP83, YHCAP85, YHCAP86, and YHCAP87. Model B degenerates into Model A whenever the coefficient on the home income variable (GNP72$) is not significantly different from zero; that is, Model A asserts that domestic demand pressure does not affect exports.

In order to estimate Models C and D, a satisfactory method has to be found for determining when the economy is producing under conditions of constant unit costs and when it is experiencing rising marginal and average costs. The concept used here is the capacity utilization rate. Although capacity is defined theoretically in the Klein sense as the output at which unit cost begins to rise, it is recognized that the published Federal Reserve capacity utilization rates do not follow this definition. Part of the task of the regression analysis is to find the Federal Reserve capacity utilization rate that corresponds to the Klein view of a 100% capacity utilization rate. For each commodity, four different Federal Reserve capacity utilization rates (83, 85, 86, and 87%) are tested as working definitions of Klein's 100% capacity utilization rate. This technique furnishes a link between the theoretical treatment of Chapter 3 above and the practical necessity of employing the data that are available. Of the sixty observations, thirty-seven have a capacity utilization

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rate of 83% or higher; thirty-one have a capacity utilization rate of 85% or higher; twenty-four, 86% or higher; and sixteen, 87% or higher. The next higher capacity utilization rate--88%--would reduce the number of observations in the high-pressure category to nine, and these would be the first nine quarters of the sample.

For interpreting the regression results one usually tests for the statistical significance of the estimated coefficients. The usual procedure is as follows.[17] The theory that one is trying to "prove" or "confirm" is the source of the alternative hypothesis. The null hypothesis is an implication of the current generally accepted theory or of an explanation which claims that there is no relationship among the variables being studied. If there is no relationship among the variables, the true coefficients in the equation are equal to zero, and any deviations from zero arise from random chance. If the null hypothesis is that B equals zero and the alternative is that B is not equal to zero, then the appropriate test is a two-tailed t-test. If the alternative hypothesis is that B is less than zero (rather than simply not equal to zero) the appropriate test is a one-tailed t-test.

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[17]See, for example, Kmenta (1971), p. 114 and pp. 236-237.

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Writers on the Demand Pressure Hypothesis have taken the view that the DPH is the alternative hypothesis and that some null hypothesis shall be accepted (more accurately "not rejected") unless the evidence is overwhelmingly in favor of the DPH (in which case the null hypothesis is rejected in favor of the DPH). The same procedure will be followed in this study. Some discussion is necessary, however, concerning the appropriate t-test--whether it should be one-tailed or two-tailed. The DPH claims that increases in domestic demand will cause the quantity of exports to decrease and the price of exports to increase. Thus, for the quantity equation the expected coefficient on the pressure variable is negative and for the price equation this expected coefficient is positive. It seems appropriate to use a one-tailed t-test for this particular class of coefficients. There is no intention here of testing any particular hypotheses regarding the other explanatory variables; that is, the DPH itself, which is the focus of this study, has nothing to say about the relationship between the export quantity or price and the non-pressure independent variables. In light of this the appropriate test, if any, for these variables would be a two-tailed t-test with a null hypothesis that the coefficient is zero and an alternative hypothesis that the coefficient is not zero.

Model A

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PX

Model B

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PX

Model C

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Model D,

QX =
PX =

Model E,

QX =
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Figure 5-1. R

Model A, Constant Marginal Cost (the Null Hypothesis):

QX = QX(VAROW,XRIMF,PL,PK)
PX = PX(VAROW,XRIMF,PL,PK)

Model B, Rising Marginal Cost:

QX = QX(VAROW,XRIMF,GNP72$,PL,PK)
PX = PX(VAROW,XRIMF,GNP72$,PL,PK)

Model C, Constant and Then Rising Marginal Cost:

1. When marginal cost is constant (low capacity utilization):

QX = QX(VAROW,XRIMF,PL,PK)
PX = PX(VAROW,XRIMF,PL,PK)

2. When marginal cost is rising (high capacity utilization):

QX = QX(VAROW,XRIMF,GNP72$,PL,PK)
PX = PX(VAROW,XRIMF,GNP72$,PL,PK)

Model D, Constant and Then Rising Marginal Cost:

QX = QX(VAROW,XRIMF,YHCAP,PL,PK)
PX = PX(VAROW,XRIMF,YHCAP,PL,PK)

Model E, eventually Rising Marginal Cost (No "a priori" statement on Marginal Cost initially):

QX = QX(VAROW,XRIMF,GNP72$,YHCAP,PL,PK)
PX = PX(VAROW,XRIMF,GNP72$,YHCAP,PL,PK)

Figure 5-1. Reduced Forms To Be Estimated.

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II. Discussion of Results.

A. Overview.

In the tables containing the regression results (Tables A-1 through A-80), the t-ratios for the pressure variables are marked with one, two, or three asterisks if the coefficient is statistically significant in a one-tailed t-test at the 10%, 5%, or 1% probability level, respectively. In an analogous fashion, the "#" symbol is used to denote statistical significance in a two-tailed t-test. Table 5-1 summarizes the results. The column entitled "Number of Tests" requires some explanation. An estimated regression equation is considered a "test" in this Table when the equation comes form Models B, D, or E. A test from Model C requires two equations: one at low demand pressure and one at high demand pressure. The most common number of tests is eight: one from each of Models B, C, D, and E for the quantity reduced form and one from each for the price equation. For several of the commodities, interesting (sometimes conflicting) results showed up at more than one definition of full capacity (that is, at more than one cut-off value for the capacity utilization rate). These are the commodities for which more than eight tests are reported.

Altogether, there are 89 cases in which the null hypothesis can be rejected in favor of the Demand Pressure

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Hypothesis at the 10% level or better and 216 cases in which the null hypothesis cannot be rejected. Of the 89 cases supporting the DPH, 47 come from the quantity equations and 42 from the price equations. In 19 cases (involving 12 different commodities), there is support for the DPH in both the quantity equation and the price equation of the same Model. Of the 31 commodities that are used for these 305 cases, there are only four commodities for which the null hypothesis cannot be rejected in any of the tests; that is, there is at least some support for the DPH in 27 out of the 31 commodities. The four commodities that lend no support to the DPH come from three different SITC Sections: 533 2000, printing inks, from Section 5; 684 2140, aluminum and aluminum alloy wire, not insulated, and 695 3140, hacksaw blades, hand and power, from Section 6; and 775 8625, toasters, automatic, electric, from Section 7. In the case of commodities from SITC Sections 5, 6, and 7, the effect of domestic demand pressure shows up more often on the quantity of exports than on the price of exports; whereas in the case of Section 8, the effect shows up on quantity five times and on price eleven times.[18] For the three commodities classified as

[18]Section 5 is chemicals and related products, not specifically provided for. Section 6 is manufactured goods classified chiefly by material. Section 7 is machinery and transport equipment. Section 8 is miscellaneous manufactured articles.

chemicals (SITC 5), four quantity equations and three price equations support the DPH. For the thirteen commodities in SITC 6 (Manufactured goods), support comes from nineteen quantity equations and thirteen price equations. And for the eleven commodities in Section 7 (Machinery), nineteen quantity equations and fifteen price equations support the Demand Pressure Hypothesis.

The results of the regression analysis are discussed below according to SITC Section. The first three commodities are discussed in greater detail than the rest in order to familiarize the reader with the procedures employed and the format of the tables in Appendix 3.

Table 5-1

Summary of Regression Results

(1) Commodity Number	(2) Brief Description	(3) Number of Tests	(4) Support the DPH QX	(5) Support the DPH PX	(6) Cannot Reject the Null Hypothesis QX	(7) Cannot Reject the Null Hypothesis PX
525 6030	Iron oxides	14	3	3	4	4
533 2000	Printing inks	8	0	0	4	4
588 3060	Rubber cement	8	1	0	3	4
		30	4	3	11	12
641 1000	Newsprint	12	4	2	2	4
671 2000	Pig iron	10	2	0	3	5
673 2005	Concr.reinforc.bars	8	2	1	2	3
682 2160	Copper wire	14	2	0	5	7
682 2400	Copper powder	8	0	1	4	3
684 2140	Aluminum wire	8	0	0	4	4
684 2420	Aluminum powder	8	0	1	4	3
686 3220	Zinc sheets	8	3	1	1	3
691 1020	Steel door frames	8	3	3	1	1
691 2020	Aluminum door frames	8	2	0	2	4
695 3140	Hacksaw blades	8	0	0	4	4
695 4145	Twist drills	8	1	2	3	2
696 0340	Razor blades	8	0	2	4	2
		116	19	13	39	45
716 4042	AC motors	14	2	3	5	4
721 2220	Combines	9	0	4	4	1
723 4052	Dozers	8	2	1	2	3
724 3920	Sewing mach. needles	8	4	1	0	3
742 4026	Centrifugal pumps	12	2	1	6	3
743 1035	Air compressors	12	3	3	3	3
751 1040	Electric typewriters	8	1	0	3	4
762 0040	Radios	8	1	0	3	4
775 4030	Electric shavers	8	2	2	2	2
775 7520	Vacuum cleaners	14	2	0	5	7
775 8625	Toasters	8	0	0	4	4
		109	19	15	37	38

(Continued on next page.)

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Table 5-1 Continued

(1) Commodity Number	(2) Brief Description	(3) Number of Tests	(4) Support the DPH QX	(5) Support the DPH PX	(6) Cannot Reject the Null Hypothesis QX	(7) Cannot Reject the Null Hypothesis PX
884 2220	Sun glasses	16	0	3	8	5
885 2020	Electric clocks	12	0	2	6	4
891 0945	Plastic tape	8	1	2	3	2
895 2115	Ballpoint pens	14	4	4	3	3
		50	5	11	20	14
	Total	305	47	42	107	109
	Total	305	89		216	

NOTE: Column 3 indicates the number of regression equations whose estimations are reported in Tables A-1 through A-80. Of these estimations, Column 4 shows how many quantity equations support the DPH, and Column 5 shows how many price equations support the DPH. Column 6 indicates how many quantity equations fail to support the DPH--that is, the number of quantity equations in which the Null Hypothesis cannot be rejected. Column 7 shows how many price equations fail to support the DPH. For each commodity, the sum of the entries in Columns 4, 5, 6, and 7 is equal to the entry in Column 3.

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B. Commodities from SITC Section 5 (Chemicals).

Consider the first commodity--525 6030, Iron oxides and hydroxides, pigment grade. Some of the estimated equations suggest that the Demand Pressure Hypothesis holds for this commodity while other equations contradict such a conclusion. Equations 1 and 2 from Table A-1 test Model B in Figure 5-1 and are reproduced below. They were estimated with an auto regressive technique; the numbers in parentheses under the parameter estimates are t-ratios, while the F-statistic numbers are the degrees of freedom in the numerator and in the denominator.

$$QX = \underset{(2.25)}{34300} + \underset{(.0265)}{.0522}\ VAROW - \underset{(-3.71)}{148}\ XRIMF - \underset{(-1.52)^{*}}{6.41}\ GNP72\$$$

$$- \underset{(-0.426)}{34.6}\ PL - \underset{(-1.14)}{52.6}\ PK + ERR,$$

$$Rho = \underset{(5.55)}{0.586},\ F(5,\ 53) = 4.58,\ \text{R-Squared} = .30,\ DW = 2.19.$$

$$PX = - \underset{(-1.60)}{1840} - \underset{(-0.793)}{.0966}\ VAROW + \underset{(1.18)}{3.45}\ XRIMF + \underset{(2.66)^{***}}{0.846}\ GNP72\$$$

$$+ \underset{(1.24)}{6.85}\ PL + \underset{(.0441)}{0.141}\ PK + ERR,$$

$$Rho = \underset{(11.9)}{0.840},\ F(5,\ 53) = 1.82,\ \text{R-Squared} = .15,\ DW = 2.36.$$

In the quantity equation, the coefficient on GNP72$ is negative as predicted by the DPH, and the t-statistic of -1.52 indicates the the coefficient is significantly less than zero at the 10% level. The price equation also supports the DPH: the coefficient of 0.846 on the GNP72$ term is sig

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significant at the 1% level (1-tailed t-test). It indicates that the export price rises as real domestic GNP increases, which is what the DPH predicts.

Tests of Model D are given as Equations 3 and 4 in Table A-1. In Model D the coefficient on GNP72$ is forced to be zero whenever the capacity utilization rate is beneath a certain cut-off rate. The rates tested for all commodities were 83, 85, 86, and 87 percent. With this model, the specific rate chosen for reporting purposes was the one with the most significant t-statistic (the unreported results are available from the author). For this commodity (iron oxides) the reported version of Model D uses 83% as the cut-off rate. The variable YHCAP83 is equal to GNP72$ whenever the capacity utilization rate is 83% or greater and is equal to zero whenever the rate is less than 83%. The DPH predicts that the coefficient on YHCAP83 will be negative in the quantity equation and positive in the price equation. The estimated equations, reproduced below, do not support the DPH. The coefficient on YHCAP83 is insignificant in both equations; although in the price equation it does have the predicted sign. The estimated Model D equations suggest that the negative coefficient on GNP72$ in the quantity equation of Model B is not arising from the pressure of high capacity utilization; the negative relationship between GNP72$ and the quantity of exports must be occurring at <u>low</u> rates of capacity utilization. Likewise, Model B showed a positive

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relationship between GNP72$ and the price of exports over the entire sample period, but Model D shows that the relationship between these two variables is not statistically significant at high capacity utilization rates. The positive (and significant) relationship evident in Model B must be arising during periods of low capacity utilization.

$$QX = \underset{(1.24)}{18600} - \underset{(-1.42)}{1.95}\ VAROW - \underset{(-2.63)}{105}\ XRIMF + \underset{(0.189)}{15.8}\ PL$$

$$- \underset{(-1.01)}{50.7}\ PK + \underset{(1.42)}{0.324}\ YHCAP83 + ERR,$$

$$Rho = \underset{(8.48)}{0.741},\ F(5,53) = 2.72,\ R\text{-}Squared = .20,\ DW = 2.33.$$

$$PX = - \underset{(-.0777)}{78.9} + \underset{(0.791)}{.0877}\ VAROW + \underset{(.0286)}{.0814}\ XRIMF + \underset{(0.349)}{1.94}\ PL$$

$$- \underset{(-0.124)}{0.422}\ PK + \underset{(0.279)}{.00421}\ YHCAP83 + ERR,$$

$$Rho = \underset{(14.7)}{0.886},\ F(5,53) = 0.218,\ R\text{-}Squared = .02,\ DW = 2.42.$$

This assertion is further supported by the results of Model E, which includes both GNP72$ and YHCAP83 as explanatory variables. The coefficients on GNP72$ are significant and indicate that quantity falls and price rises as real GNP increases; but the YHCAP83 term, which was intended to capture the extra impact of GNP on exports as the economy approaches capacity, shows that the quantity of exports actually rises (for a 2-tailed test, the t value of 1.76 is significant at the 10% level) with high demand pressure and that there is no apparent effect on prices. Model E equat

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equations are as follows:

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QX = 32800 + 0.974 VAROW - 140 XRIMF - 8.43 GNP72$
     (2.03)  (0.455)     (-3.33)     (-1.74)#

     -22.3 PL   - 53.0 PK + 0.435 YHCAP83 + ERR,
     (-0.267)   (-1.11)    (1.76)#

     Rho= 0.670, F(6,52)= 3.30, R-Squared= .28, DW= 2.21.
     (6.93)

PX = -1960   - 0.119 VAROW + 3.47 XRIMF + 0.967 GNP72$
     (-1.66)  (-0.921)      (1.18)      (2.67)###

     + 6.68 PL   + 0.454 PK   - .0123 YHCAP83 + ERR,
     (1.20)    (0.140)   (-0.777)

     Rho= 0.860, F(6,52)= 1.48, R-Squared= .15, DW= 2.38.
          (13.0)
```

Equations 7, 8, 9, and 10 in Table A-2 are tests of Model C, which hypothesizes that the coefficient on the pressure variable is zero at low capacity utilization rates and is negative for the quantity equation and positive for the price equation at high capacity utilization rates. Equations 7 and 8 use only those observations for which the capacity utilization rate is less than 83, and equations 9 and 10 use the observations for which the capacity utilization rate is 83 or greater. The quantity equation for low capacity utilization rates is shown below, followed by the one for high utilization rates.

```
QX = 22130   + 1.80 VAROW - 151 XRIMF - 5.53 GNP72$
     (-0.993)  (0.509)   (-4.48)     (-0.933)

     + 267 PL   + 74.6 PK   + ERR,
     (2.24)      (1.23)

     F(5,17) = 12.6,  R-Squared = .79.
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$$QX = 52500 + 6.17\ VAROW - 116\ XRIMF - 17.7\ GNP72\$$$
(4.34) (1.38) (-2.46) (-2.53)***

$$-120\ PL - 96.4\ PK + ERR,$$
(-1.63) (-1.59)

$F(5,31) = 11.7$, R-Squared = .65.

Similarly the estimated price equations are shown below, first for low capacity utilization rates and then for high capacity utilization rates:

$$PX = 1220 - 0.364\ VAROW + 5.86\ XRIMF + 1.04\ GNP72\$$$
(1.16) (-2.18) (3.70) (3.73)###

$$- 9.57\ PL - 8.99\ PK + ERR,$$
(-1.71) (-3.16)

$F(5,17) = 12.8$, R-Squared = .79.

$$PX = - 4350 - 0.535\ VAROW - 0.648\ XRIMF + 1.54\ GNP72\$$$
(-4.91) (-1.64) (-0.187) (3.00)***

$$+20.6\ PL + 8.00\ PK + ERR,$$
(3.82) (1.80)

$F(5,31) = 11.8$, R-Squared = .65.

For this commodity the coefficients on the GNP72$ term in Model C behave almost exactly the way the DPH predicts. For the quantity equation, the GNP72$ coefficient is not significantly different from zero at low utilization rates and is -17.7 (with a t-ratio of -2.53) at high rates. For the price equation the values are 1.04 (t= 3.73) at low rates and 1.54 (t= 3.00) at high rates; both t-ratios are significant at the 1% level.

These mixed results for iron oxide--with support for the DPH coming from Models B and C but not from Models D and E--can be reconciled somewhat if alternative cutoff rates for

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can be reconciled somewhat if alternative cutoff rates for capacity utilization rates are tested. This is discussed next.

Results for a cut-off rate of 85% are shown in Tables A-3 and A-4. Equations 11, 12, 13, and 14 in Table A-3 are comparable to Equations 3, 4, 5, and 6. The coefficients on YHCAP85 are insignificant for all four equations. The coefficient on GNP72$ continues to be negative in the quantity equation but no longer significant, and it continues to be positive and significant in the price equation.

An interesting feature of the Model C estimations is the behavior of the GNP72$ coefficient in the low-pressure equations as the definition of low pressure is changed. The equations in Table A-2 use a capacity utilization rate of less than 83% as the definition of low demand pressure; the equations in Table A-4 use a rate less than 85%. In the low-pressure quantity equations (7 and 15), the coefficient on GNP72$ goes from -5.53 (t= -0.933) to -7.79 (t= -1.71) when the cut-off rate is increased from 83% to 85%; that is, as we add observations from time periods of somewhat higher capacity utilization rates the export quantity is more negatively affected (and the coefficient is significant at a higher level). In the comparable price equations (8 and 16), the coefficient on GNP72$ goes from 1.04 (t= 3.73) to 1.45 (t= 4.49); that is, GNP becomes more strongly correlated with the export price. Both patterns--price as well as quantity--

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Support for the DPH, however, disappears when cut-off rates of 86% and 87% are tried. A conclusion that is intuitively appealing and which is consistent with these estimations is that increases in domestic demand pressure affect export supply (price and quantity) of this commodity along the DPH lines; but that the effect is felt at relatively low capacity utilization rates as these rates increase. Once the capacity utilization rate reaches 86%, there is no longer any relationship between GNP and exports. This might happen, for example, if this industry reaches full capacity before the rest of the economy does and, hesitant to raise prices even further, managers allocate output on a random basis or with some sense of "equity," of sharing the shortage, or of loyalty to old customers. This result would also be noticed if the industry had idle facilities that were "mothballed." Considering only the facilities currently being used, this industry might reach capacity output even though the economy-wide capacity utilization rate is less than 86% (and thus the demand pressure effect will be felt). As the capacity utilization rate rises above 86%, this industry might then decide to activate its idle, stand-by facilities. When this occurs, there is no longer a constraint on capacity, and there will be no evidence of a demand pressure effect. The start-up of these additional

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facilities could be used to satisfy the extra demand, and exports need not be affected by the increase in domestic demand.

For the other two commodities from Section 5--533 2000, Printing inks (Tables A-5 and A-6), and 588 3060, Rubber cement (Tables A-7 and A-8)--there is support for the DPH in only one equation, that being the quantity equation of Model C for rubber cement; and there are three instances of results that contradict the DPH. These contradictory results appear in the quantity equation of Model B for printing inks (Equation 1, Table A-5), where a GNP72$ coefficient of 6.24 (t= 2.75) is significant at the 1% level, and in two price equations for rubber cement. These latter two equations are from Model E (Equation 6, Table A-7) and from Model C (Equation 10, Table A-8). In Model E, the coefficient on YHCAP87 is negative (-.0287) and significant at the 10% level (t= -1.79). Because this is a price equation, a positive sign was expected. In Model C, the GNP72$ coefficient of -14.9 (t= -2.88) is significant at the 5% level. Once again, a positive coefficient was expected.

The estimation results of Model C, which divides the sample into a subsample with low demand pressure and a subsample with high pressure, can be interpreted cautiously as supporting the DPH in the case of printing inks (Table A-6). The price equations (8 and 10) have insignificant coeff

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coefficients for GNP72\$; but the quantity equation at low pressure (equation 7) has a GNP72\$ coefficient of 6.21 with a t-ratio of 2.18, which is significant at the 5% level (2-tailed test), and the quantity equation at high pressure has a GNP72\$ coefficient of 3.49 with a t-statistic of 0.626, which means that the 3.49 figure is not significantly different from zero at the 10% level or better (2-tailed test). Thus, as GNP rises, so do exports of printing inks--but this positive correlation disappears after domestic demand pressure increases enough to bring the capacity utilization rate to 87% or above. This transition from a positive correlation to zero correlation might be interpreted as weak support for the DPH.

Of the four tested cut-off rates for capacity utilization (83, 85, 86, and 87 percent), the appropriate rate is 83% in the case of one commodity (525 6030); domestic demand starts affecting exports when the capacity utilization rate reaches 87%. Printing inks (533 2000) is one of the commodities that showed no support for the DPH no matter which cut-off rate was used.

The results of the tests of commodities from Section 5 can now be summarized. Three commodities were tested: iron oxides, printing inks, and rubber cement. Iron oxides support the DPH in six out of fourteen tests. The support comes from both price and quantity, and it appears in Models

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B and C. There is one result (the quantity equation of Model E) that strongly contradicts the DPH. Printing inks offer no support whatsoever for the DPH. Rubber cement supports the DPH in one quantity equation and strongly contradicts the DPH in two price equations.

C. Commodities from SITC Section 6 (Manufactures).

In the case of thirteen Section 6 commodities tested, most tests do not support the DPH. As in the case of SITC 5, support for the DPH appears more often in the quantity equation (19 times) than in the price equation (13 times). A commodity from this section (691 11020--Door and window sash, frames, moulding and trim, of iron and steel) is one of the three that support the DPH more often than not (the other two are sewing machine needles and ball point pens, to be discussed below with SITC 7 and SITC 8, respectively). Also in this section are two commodities (aluminum wire and hacksaw blades) that do not support the DPH in any of the tests.

Commodity No. 641 1000, newsprint paper, gives conflicting results with respect to the capacity utilization rate at which domestic demand starts affecting exports. Consider first the quantity equations in Tables A-9 through A-12. Equation 1 (Model B) shows a GNP72$ coefficient of -147 (t= -3.47), which supports the DPH. In Equation 3, which is an estimation of Model D, the GNP72$ term has been

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replaced by YHCAP87 (which is equal to GNP72$ whenever the capacity utilization rate is 87 or higher and is equal to zero otherwise), and this term has a coefficient of -8.53 (t=-2.36). This is consistent with the DPH and indicates that a capacity utilization rate of 87% or greater adversely affects exports. Equation 5 includes both GNP72$ and YHCAP87 (this is Model E) and the coefficients are consistent with the ones from Equations 1 and 3. Equation 5 suggests that increases in domestic real GNP restrict exports at all capacity utilization rates (the coefficient on GNP72$ is -148, with t = -3.87) but that there is an additional restriction when utilization is 87% or above (the coefficient on YHCAP87 is -9.13, with t = -2.78).

However, Equations 9, 11, 13, and 15 suggest that the appropriate utilization rate is 83%. These four equations are estimations of Model C, which divides the sample into two mutually exclusive sets based on capacity utilization rates. Equation 13 is the low-pressure and Equation 15 is the high-pressure version for a cut-off rate of 87%. The DPH predicts that the coefficients on GNP72$ for the high-pressure equation will be negative, but the estimated value is 63.4 (t= 0.531). The coefficient is not significantly different from zero; indeed the F-statistic for Equation 15 (F = 0.738) indicates that none of the coefficients are significantly different from zero in that equation. Equations 9 and 11 are

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tests of the same model, but here the criterion for dividing the sample is a capacity utilization rate of 83%, and the coefficient on GNP72$ in the high-pressure version has the predicted negative sign (-130) and, with a t-ratio of -1.68, is significant at the 5% level. These results suggest that the DPH holds and that the crucial capacity utilization rate is 83%. However, using Model E to distinguish between 83% and 87% the evidence is clearly in favor of 87%. The Model E results are presented for comparison purposes in Table A-10 as Equations 7 and 8. These equations use 83% for the shift variable YHCAP83. In order to be consistent with Equation 11, the coefficient on YHCAP83 in the quantity equation should be negative and significant. The estimated coefficient is positive (4.42) and not statistically significant at the 10% level. In the price equation, the coefficient is admittedly close to zero, but it does not have the predicted positive sign (it is -0.0154) and it is statistically significant at the 5% level in a two-tailed test (t = -2.15).

Following is a summary of the results for newsprint paper: Model B supports the DPH; Model C supports the DPH if the definition of high pressure is a capacity utilization rate of 83%-and-higher, but says nothing if the definition is 87%-and-higher; Models D and E support the DPH if the definition is 87%-and-higher; but Model E, in direct

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opposition to Model C, contradicts the DPH if the definition of high demand pressure is a capacity utilization rate of 83%-and-higher.

It is not inconsistent with the DPH to find support for it coming from more than one definition of high pressure. Indeed, a pattern like this is to be expected. Therefore, when there are consistent results with the various definitions, only one definition is used in the results reported here for each commodity. If the models support the DPH for a particular commodity but the different models imply two different definitions for high demand pressure, then the results for both definitions are reported in all models. What is inconsistent with one's expectations is a set of results such as those pertaining to newsprint paper. Statistically, either one rejects the null hypothesis (in favor of the DPH) or one cannot reject the null hypothesis. Here, we are claiming that the evidence supports the DPH whenever the pressure coefficient is statistically significant in a one-tailed test and has the predicted sign. In all other cases the evidence does not support the DPH, but particular attention is paid to the special cases where the pressure coefficient has the opposite sign from that predicted and is statistically significant at the 10% level or better in a two-tailed test. It seems reasonable to interpret results of this nature as strong evidence contradicting the Demand Pressure Hypothesis.

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The test results for the commodities from Section 6 can now be summarized. Thirteen commodities were tested: newsprint paper, pig iron, concrete reinforcing bars, copper wire, copper powder, aluminum wire, aluminum powder, zinc sheets, steel door frames, hacksaw blades, twist drills, and razor blades. Two of these, aluminum wire and hacksaw blades, offer no support for the DPH. Three commodities--pig iron, copper wire, and aluminum door frames--support the DPH in at least one quantity equation but not in any price equations. Copper powder, aluminum powder, and razor blades support the DPH in at least one price equation each but not in any quantity equations. The remaining five commodities support the DPH in at least one quantity equation and at least one price equation. Five commodities strongly contradict the DPH in one equation each, and three do so in two equations each.

D. Commodities from SITC Section 7 (Machinery).

Among the Section 7 commodities the following three give inexplicably inconsistent results in the quantity equations: 742 4026, centrifugal pumps; 751 1040, electric typewriters; and 775 7520, vacuum cleaners. For centrifugal pumps the results are shown in Tables A-50, A-51, and A-52. The inconsistency is between Equation 3 and Equations 11, 12, 13, and 14, all of which are quantity equations. Equation 3, which is Model D, suggests that the quantity of exports is adve

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adversely affected by domestic demand pressure when the capacity utilization rate is 83% or higher. The coefficient on YHCAP83 is -7.09 and, with a t-ratio of -1.32, is significantly less than zero at the 10% level. However, if the same model is run with a capacity utilization rate of 85% (Equation 11), the coefficient on YHCAP85 is 8.42 with a t-statistic of 1.47, which is significantly greater than zero in a one-tailed test at the 10% level and not significantly different from zero in a two-tailed test at the 10% level. These results, which do not support the DPH, are reinforced by the estimation of Model E using YHCAP85 (Equation 12). Here, the coefficient is again positive (16.8) and is significant (two-tailed test) at the 1% level (t = 2.77). Further evidence strongly contradicting the DPH is found by using YHCAP86 in the estimation of Model D (Equation 13) and Model E (Equation 14). In both cases the coefficient on YHCAP86 is positive and significantly different from zero at the 1% level.

For electric typewriters, the quantity equation of Model C (Equation 9 in Table A-57) supports the DPH; but the quantity equations (and also the price equations) of Models D and E (Table A-56) strongly contradict the DPH. The Model B equations do not have statistically significant coefficients on the pressure variable.

For vacuum cleaners, the inconsistency lies in the reverse direction from that of centrifugal pumps: here, the evi

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evidence contradicts the DPH if 83%-and-higher in chosen for the capacity utilization rate, but supports the DPH at a rate of 85% or higher (Tables A-62, A-63, A-64, and A-65). When the capacity utilization rate is at least 85%, Equations 3 and 5 (Models D and E) indicate that the quantity of exports falls as GNP rises, but Equation 9 (Model C) indicates a positive correlation between GNP and the quantity of exports. If high pressure is defined as a capacity utilization rate of 83%-or-higher, the quantity equation (17) of Model C and the price equations (12 and 14) of Models D and E contradict the DPH. With this definition, there is no support for the DPH.

One commodity--762 0040, Radios, household type, without phonograph--shows support for the DPH in a quantity equation but contradicts the hypothesis in a price equation. The regression results are in Tables A-58 and A-59. The only equation supporting the DPH is No. 3, which is the quantity equation of Model D, where the YHCAP87 coefficient of -22.6 has the expected negative sign and is significantly less than zero at the 5% level (t= -2.29). The price equations (8 and 10) of Model C contradict the DPH. The low-pressure equation shows a significant positive correlation between GNP and price, while the high-pressure equation shows a significant negative correlation--the DPH predicts a positive correlation at high pressure.

An interesting feature of Commodity No. 716 4042--Motors, AC, polyphase, induction, not over 20 hp--is that the rate

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rate of capacity utilization at which domestic demand pressure begins to affect the quantity of exports is lower than the rate at which demand pressure begins to affect the price of the exports (Tables A-39 through A-42). Using a capacity utilization cut-off rate of 85%, the quantity equations for Model D (Equation 3) and Model E (Equation 5), show the expected negative coefficient on YHCAP85 and each is significant at the 1% level; but in the price equation, the YHCAP85 coefficient is not significant in Model D and is very small (.0138) and significant at only the 10% level in Model E.

When the cut-off rate is changed to 87%, the coefficients on YHCAP87 (which replaced YHCAP85) are not significantly different from zero in the quantity equations in either Model (Equation 11 is Model D and Equation 13 is Model E). In the price equations (12 and 14), the coefficients on YHCAP87 are virtually identical in the two models (0.0367 in D and 0.0368 in E), and are significantly greater than zero at the 1% level in a one-tailed t-test. This commodity supports the Demand Pressure Hypothesis. As domestic demand increases, the quantity of exports is affected first. Only later, at higher capacity utilization rates, is there pressure on prices to start rising.

Combines (No. 721 2220) behave according to the Demand Pressure Hypothesis with respect to price but not with respect to quantity (Tables A-43, A-44, and A-45). The price equa

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equations are Equations 2, 4, and 6, which are from Models B, D, and E, respectively. In all three cases, the pressure coefficient has the expected positive sign and is significant at the 1% level. Model C (Equations 7, 8, 9, and 10) does not support the DPH, but an adaptation of Model C provides some interesting results. Equations 11, 12, 13, and 14 in Table A-45 are the low--pressure versions of the price equations of Model C as the capacity utilization rate in the definition of low pressure is changed from less than 83%, to less than 85%, to less than 86%, to less than 87%. As the sample is enlarged to include observations from periods with higher capacity utilization rates, the coefficient on GNP72$ increases monotonically from -2.72 to 7.58 to 11.8 to 17.7.

The t-ratio also rises montonically: -0.149, 0.709, 1.41*, 2.31**. Thus, even though the high-pressure equations of Model C do not support the DPH, the low-pressure equations do offer support as the definition of low pressure is broadened to include higher demand pressure. It appears that increases in domestic demand pressure lead to higher export prices, but only up to a certain point. Once the economy-wide capacity utilization rate reaches 87%, the export prices in this industry no longer have any connection with the domestic economy. One explanation might be that the export price is initially lower than the world price of the closest substitutes. As domestic demand increases, the expo

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export price rises until it is equal to the substitute's price, at which point the forces of competition prevent any further price increase.

Commodity No. 775 8625--Toasters, automatic, electric, household type--is the one commodity from SITC Section 7 the lends no support whatsoever for the DPH. Four equations for this commodity (Tables A-66 and A-67) have pressure coefficients with the unexpected sign and yet are significantly different from zero at the 10% level or better. These are the quantity equations of Models B and C and the price equations of Models D and E.

The test results for the commodities from Section 7 can summarized as follows. Eleven commodities were tested: electric motors, combines, dozers, sewing machine needles, centrifugal pumps, air compressors, electric typewriters, radios, electric shavers, vacuum cleaners, and toasters. Only one commodity--toasters--offered no support whatsoever for the DPH. Three commodities--typewriters, radios, and vacuum cleaners--supported the DPH in at least one quantity equation but not in any price equation. Combines did just the reverse, offering support in (four) price equations but not in any quantity equations. The remaining six commodities supported the hypothesis in both price and quantity equations. Five commodities--centrifugal pumps, typewriters, radios, vacuum cleaners, and toasters--showed coefficients that strongly contradicted the DPH.

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E. Commodities from SITC Section 8 (Miscellaneous Manufactures).

Among the four commodities tested from Section 8, two (884 2220, sun glasses, and 891 0945, plastic tape) exhibit inconsistencies in the price equations, with plastic tape offering support for the DPH in the quantity equation and the other not offering any support in the quantity equation. A third commodity (885 2020, electric clocks) supports the DPH in two price equations but strongly contradicts the hypothesis in one of the quantity equations. The fourth commodity (895 2115, ball point pens) supports the DPH both in price equations and in quantity equations at the 10% level or better and has no equations that show significant pressure coefficients with an unexpected sign.

In the regressions for sun glasses (Tables A-68 through A-71), there is support for the DPH in the price equations when the shift variable YHCAP85 is used (Equations 4, 6, and 16), but the results are contradictory to the DPH when YHCAP86 is used instead (Equations 12, 14, and 18). The coefficients on YHCAP85 are significantly greater than zero, indicating that at high levels of demand pressure any increase in real domestic GNP will cause export prices to rise; this is, of course, consistent with the DPH. The coefficients on YHCAP86, however, are negative (and significantly different from zero), suggesting just the opposi

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opposite of what the DPH predicts. For this commodity none of the quantity equations have pressure coefficients significantly different from zero.

The price equations for plastic tape (Tables A-75 and A-76) support the DPH in Models D and E (Equations 4 and 6) when the dividing line between low and high pressure is a capacity utilization rate of 86%. The coefficients on YHCAP86 are 0.134 (t = 1.92) and 0.132 (t= 1.90) for Model D and Model E, respectively, and both of these are significantly greater than zero at the 5% level. But using the same dividing line (86%) in Model C, which is given as Equations 8 (low pressure) and 10 (high pressure), the coefficient on GNP72$ in the high-pressure equation is negative (-57.6) rather than the predicted positive and (with t = -3.06) is significantly different from zero at the 1% level in a two-tailed test. With the quantity equations, Model B contradicts the DPH, Model C supports it, and the null hypothesis cannot be rejected in the other models.

The results for electric clocks (885 2020) are similar to those of sun glasses: the quantity equations offer no obvious support for the DPH (Tables A-72 through A-74). Indeed, the quantity equations of Model C indicate that at low demand pressure an increase in GNP will adversely affect the quantity of exports but at high demand pressure there is no relationship between the two variables. If YHCAP85 is

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used as the shift variable in Model E, the quantity equation strongly contradicts the DPH and the price equation has an insignificant coefficient on the YHCAP85 term. If YHCAP83 is used, however, the price equation of Model D supports the DPH. However, the conclusion suggested earlier for iron oxides (525 6030) might be appropriate here: this industry may reach capacity output before the rest of the economy does. While the rest of the economy is still experiencing low demand pressure, this industry is reducing exports as domestic sales increase. By the time the rest of the economy is experiencing high demand pressure, this industry has reached capacity output but does not systematically discriminate against the foreign purchaser; and, therefore, no significant relationship shows up between industry exports and aggregate demand pressure.

Commodity No. 895 2115--Pens, ball-point type--supports the DPH in both the price equations and the quantity equations when high demand pressure is defined as a capacity utilization rate of 83% or higher (Tables A-77 and A-78). The quantity equations (3, 5, and 9) of Models D, E, and C show up with predicted (and significant) sign on the pressure variables. As for the price equations, support comes from Model C but not from Models B, D, or E. If a cut-off rate of 85% is used, support is lost from the quantity equations of Models D and E (Equations 11 and 13) but

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but is maintained in Model C (Equation 17). For the price equations, support continues in Model C (Equation 18) and appears for the first time in Models D and E (Equations 12 and 14).

The test results for the commodities from Section 8 can now be summarized. Four commodities were tested: sun glasses, electric clocks, plastic tape, and ball-point pens. All four support the DPH, sun glasses and electric clocks doing so in price equations only, while plastic tape and ball-point pens offer support in the quantity as well as the price equations. Although sun glasses support the DPH in three price equations, paradoxically they also strongly contradict the DPH in two different price equations. Similarly, plastic tape supports the hypothesis in two price equations and strongly contradicts it in another price equation. With respect to electric clocks, the support for the DPH comes from the price equations, and the strong contradiction of the DPH shows up in a quantity equation. The fourth commodity, ball-point pens, supports the DPH more often than does any other commodity tested.

F. The Tables.

The tables containing the regression results are presented as an appendix below in numerical sequence by commodity number. Figure 5-2 describes the independent variables and the other notation used in the tables of results.

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Figure 5-

Capacity Util. — This pertains to Model C only and indicates the capacity utilization rate that was used to divide the sample into low-pressure and high-pressure subsamples.
.LT. = Less than; .GE. = Greater than or equal to. For example, ".LT.83" means Capacity Utilization is less than 83%.

Constant — The constant term in the regression. (For all variables, the numbers in parantheses are t-ratios.)

VAROW — Value Added, Rest of World (World except U.S.).

XRIMF — Exchange rate index from IMF's Multi-lateral Exchange Rate Model. The value of the Dollar rises when XRIMF rises.

GNP72$ — U. S. GNP in 1972 dollars.

PL — Unit labor cost, non-farming, deflated.

PK — Unit non-labor cost, non-farming, deflated. This is a proxy for the price of land and the price of capital combined.

D781794 — Dummy variable. Equals 1 from 1978.1 to 1979.4 and equals 0 otherwise.

DUM___ — Dummy variable. For example, DUM653 equals 1 during 1965.3 and equals 0 otherwise.

YHCAP__ — Interaction term between Real Home Income and high capacity utilization rates. For example, YHCAP83 equals U.S. GNP in 1972 dollars when the capacity utilization rate is 83% or higher and equals zero otherwise.

Rho — The auto-regressive RHO. From U(t) = RHO * U(t-1) + e(t).

R-Squared — Coefficient of determination.

F = — F-Statistics.

df(num,den) — The degrees of freedom for the numerator and for the denominator of the F-Statistic.

DW = — Durbin Watson Statistic.

Figure 5-2. Explanation of Variable Names.

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CHAPTER 6

CONCLUSION

This Chapter summarizes the study and shows how its results fit into the current body of literature on the Demand Pressure Hypothesis. In addition, some possibilities for future investigation are suggested.

I. Summary.

The Demand Pressure Hypothesis postulates that increases in domestic demand would have an adverse impact on exports. Adverse impact is interpreted to mean that the quantity will decrease and/or the export price will increase. Starting with traditional microeconomic postulates about firm behavior, four different testable models were developed. The reduced forms for quantity and for price were estimated with Ordinary Least Squares and, when necessary, with an autoregressive model using a Cochrane-Orcutt type iterative procedure.[19] Tests were run on thirty-one seven-digit commodities exported from the United States for the period 1965.1 through 1979.4 using quarterly observations.

This study departs from previous studies in several ways. First, it retains the simultaneity of both price and quantity by using reduced forms rather than a single

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[19]The regression package was Version 2.4 of SHAZAM (see White, 1978).

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equation model with quantity on the left and price on the right side. Second, the quantity figures are actual physical units such as metric tons, number of items, or gallons. This is made possible by a high level of disaggregation. Third, the commodities are more narrowly defined, being at the seven-digit level rather than the conventional four-digit level or even the "all manufactures" level. Fourth, factor costs are brought explicitly into the analysis; given that the DPH is a theory about a supply function, the previous neglect of input prices needed to be overcome.

The same macroeconomic variables were used for all commodities. Although a case can be made for using explanatory variables that are specific to the commodity being tested, the use of macro variables avoids the problems of simultaneity. For example, one would not be comfortable using a capacity utilization rate for a seven-digit industry when trying to explain the quantity of exports of that industry, because the two variables are simultaneously determined. The capacity utilization rate for all manufacturing industries combined, however, should not be sensitive to the export success of one seven-digit industry. As another example, consider the price equations and the two right-hand variables unit labor cost and unit non-labor cost. If those two explanatory variables come directly from the same seven-digit industry as does the export price, for all practical purposes the estimation procedure is being applied not to an equation but to a definition.

The capacity utilization rate for total manufacturing is used as the indicator of domestic demand pressure. This variable does not enter the regressions directly. Instead, it is used to divide the sample into mutually exclusive subsets of high demand pressure and low demand pressure.

Five models were constructed. Model A is the null hypothesis and asserts that exports are unrelated to domestic demand. Model B claims that export quantity and price are related to domestic demand at all times. Domestic demand is measured by Gross National Product in 1972 dollars.

Model C asserts that the coefficients of the explanatory variables are different during periods of high domestic demand pressure than they are during periods of low domestic demand pressure. Using the capacity utilization rate to separate the sample into periods of high demand pressure and periods of low demand pressure, the equations of Model C were estimated separately for the two subsamples.

Model D claims that the relationship between exports and all the explanatory variables except real Gross National Product is the same regardless of the capacity utilization rate. With respect to GNP, the model asserts that changes

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in GNP do not affect exports if the capacity utilization rate is low, but they do if the capacity utilization rate is high. The procedure employed is to include a term (YHCAP) that is equal to GNP72$ when the capacity utilization rate is high and is equal to zero otherwise.

Model E is one step more general than Model D. Model E claims that the relationship between GNP and exports changes when the capacity utilization rate reaches some critical number indicating high pressure on capacity. This Model includes GNP72$ in the equation, but allows the coefficient on GNP72$ to change at high capacity utilization rates. Methodologically, this is accomplished by the addition of an interactive term (YHCAP) that is equal to GNP72$ when the capacity utilization rate is high and is equal to zero otherwise. The coefficient of GNP72$ indicates the average relationship between exports and GNP, and the coefficient of YHCAP indicates the change in this relationship during periods of high domestic demand pressure.

The data for twenty-seven of the thirty-one commodities lent at least some support to the Demand Pressure Hypothesis. As a summary statistic, the Hypothesis was supported in roughly one-third of the tests--specifically, in 89 out of 305 tests. The Hypothesis was contradicted in 26 quantity equations and 16 price equations; that is, the appropriate coefficient was statistically significant at the

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II. Comparative Performance of the Models.

Also of interest is the performance of the models themselves. Considering the number of instances in which each model supports the DPH, Models C, D, and E cannot easily be distinguished from each other, but each of these three is superior to Model B. Model B supports the DPH thirteen times, Model C twenty-four times, Model D twenty-seven times, and Model E twenty-three times. In every instance in which a quantity equation from Model B supports the DPH, at least one quantity equation from the other models also supports the hypothesis. With two exceptions (sewing machine needles and centrifugal pumps) an analogous statement for price equations is also true. The feature that distinguishes Model B from Models C, D, and E is that Model B asserts that increases in domestic demand have adverse effects on export performance at all levels of domestic demand pressure, whereas the other three models limit the adverse effects to periods of high demand pressure. Thus, the hypothesis underlying Models C, D, and E is clearly preferred to that of Model B. Domestic demand is more likely to affect exports when the capacity utilization rate is already high. Recall that the Average Total Cost curve in Model B is U-shaped and in Models C, D,

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and E has a horizontal range and then slopes upward at capacity output. Furthermore, if ATC remained horizontal for a particular commodity throughout the sample period, the DPH would not be supported. Thus, support for the DPH in Model B would be the only evidence in favor of the existence of U-shaped Average Total Cost curves. All other cases (including the 216 tests that did not support the DPH) suggest that ATC curves have a horizontal portion. The conclusion that Average Total Cost curves are indeed horizontal over a range seems an inescapable implication of this study.[20]

III. Comparative Performance of Cut-Off Rates.

For each of the three models (C, D, and E) requiring a numerical definition of full-capacity, four capacity utilization rates were tested: 83, 85, 86, and 87 percent. The cut-off rate that is most successful in supporting the DPH is 86 percent. The number of times that each rate supported the DPH is as follows: seventeen times for 83%, sixteen times for 85%, twenty-three times for 86%, and eighteen times for 87%. The value of testing four different capacity utilization rates for each commodity is that this technique allows demand pressure to be experienced in one

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[20]This is consistent with several of the more-direct tests of cost functions. A good introduction to the literature on statistical cost estimation can be found in Johnston (1960) or in Dean (1976).

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industry before it becomes a constraint in some other industry. Thus, when the economy is expanding, bottlenecks can start appearing in some industries sooner than in others, and this technique uncovers that information.

A priori one would expect that the greater the number of manufacturing stages the commodity goes through, the greater the opportunities for bottlenecks to appear somewhere in that process, and thus, the lower will be the economy-wide capacity utilization rate at which increases in domestic demand will adversely affect exports of the commodity. Conversely, the more nearly the item can be classified as a raw material, the fewer the chances for bottlenecks to interrupt the production of that commodity as the economy expands, and thus, the higher the economy-wide capacity utilization rate at which domestic demand pressure adversely affects exports. Broadly speaking, the evidence supports this expectation.

Figure 6-1 classifies the support for the DPH according to the capacity utilization rate used in Models C, D, and E. It is difficult to draw any conclusions regarding the commodities from Section 5 because of the limited support for the DPH in these Models. But the overall results for Sections 6 and 8 reflect the effect of the stage of production alluded to above. The commodities in Section 6 are primarily industrial materials that will undergo further proc

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processing or be used as tools to produce final items. Out of the twenty-eight instances of support for the DPH from these commodities, twenty-four occur when full capacity is defined as 86%-and-higher or 87%-and-higher and only four occur at lower definitions. In contrast, the commodities in Section 8 are primarily final consumer items. Here, support for the DPH is concentrated at the lower values for definitions of full capacity. Support for the DPH occurs eleven times with cut-off rates of 83% and 85%, and only three times with rates of 86% and 87%. Both groups of commodities behave according to expectations.

The commodities drawn from Section 7 are not as easy to categorize. Some, such as electric shavers and toasters, are final household items. Others, such as electric motors and self-propelled combines, are final business items that will be used in the production of other goods and services. To the extent that they are all final items, low capacity utilization cut-off rates are expected to be successful in the regression models, but no such behavior is apparent. One discernible pattern that does appear is that for these commodities as a group, the export quantity begins to be affected adversely by domestic demand at lower rates of capacity utilization than does the export price.

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Commodity Number	Brief Description	Capacity Utilization Rate QX 83	85	86	87	PX 83	85	86	87
525 6030	Iron oxides	1	1			1	1		
533 2000	Printing inks								
588 3060	Rubber cement				1				
		1	1	0	1	1	1	0	0
641 1000	Newsprint	1			2	1			
671 2000	Pig iron				1				
673 2005	Concr.reinforc.bars	1				1			
682 2160	Copper wire				2				
682 2400	Copper powder							1	
684 2140	Aluminum wire								
684 2420	Aluminum powder							1	
686 3220	Zinc sheets				3				1
691 1020	Steel door frames			3				3	
691 2020	Aluminum door frames			2					
695 3140	Hacksaw blades								
695 4145	Twist drills				1				2
696 0340	Razor blades							2	
		2	0	5	9	2	0	7	3

Figure 6-1. Comparison of Capacity Utilization Rates.

(Continued on next page.)

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Commodity Number	Brief Description	Capacity Utilization Rate QX 83	85	86	87	PX 83	85	86	87
716 4042	AC motors		2				1		2
721 2220	Combines					2			
723 4052	Dozers				1				1
724 3920	Sewing mach. needles		3						
742 4026	Centrifugal pumps	1							
743 1035	Air compressors	2		1				3	
751 1040	Electric typewriters	1							
762 0040	Radios				1				
775 4030	Electric shavers			2				2	
775 7520	Vacuum cleaners		2						
775 8625	Toasters								
		4	7	3	2	2	1	5	3
884 2220	Sun glasses						2		
885 2020	Electric clocks					1			
891 0945	Plastic tape			1				2	
895 2115	Ballpoint pens	3	1			1	3		
		3	1	1	0	2	5	2	0
	Total	10	9	9	12	7	7	14	6

NOTE: Entries denote the number of times that an equation using that capacity utilization rate for the definition of high pressure supported the Demand Pressure Hypothesis. The QX columns refer to the quantity equations and the PX columns refer to the price equations. The relevant Models are C, D, and E (see Figure 5-1).

Figure 6-1 (cont.)

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IV. Henry's Weak Test.

Chapter 2 contains a description of what Henry (1970) calls a weak test of the DPH. It postulates that during periods of high domestic demand, the link between world demand and exports is broken. That is, when there is excess capacity at home, world demand is a significant determinant of exports, but demand for these exports remains unsatisfied during periods of high pressure on capacity. Model C can be used to test this hypothesis. Henry considered only the quantity of exports, so the following test will be restricted to the quantity equations. The world demand variable is Value Added Rest of World (VAROW). The criteria for "passing" the test will be that the coefficient on VAROW be both positive and significant in the low-pressure equation but not positive and significant in the high pressure equation. Four out of the 31 commodities pass this test and, under Henry's interpretation, would support the DPH: newsprint paper, air compressors, vacuum cleaners, and electric clocks. However, each of these commodities already supports the DPH without resort to this weak test (although electric clocks support the DPH in price equations only and therefore the test does provide some supplementary information). What would have been helpful is if the four commodities lending absolutely no support for the DPH in the regular test had been able to pass this weak test.

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V. Exports As a Residual.

Next to be examined is the exports-are-a-residual argument. It maintains that manufacturers will keep their plants running at full capacity, sell what they can at reasonable price at home, and ship the left-over production to the export market for sale at any price obtainable. The argument has a certain amount of appeal, but it lacks firm analytical foundations. It requires, among other things, that full capacity output be synonymous with optimum output. Alternatively, one could assert that entrepreneurs are not optimizers, in which case economic analysis has little to contribute. No one has developed a satisfactory economic model which implies that exports are a residual. Henry's (1970) model comes the closest, but it relies on the existence of excess demand and a rationing rule that favors domestic customers. There also is the implication that the export price is irrelevant; that the firm has made its production decision (how much to produce) without regard to price (or marginal revenue).

There exists a model which leads to a special case of the exports-are-a-residual view; but even there the word *residual* is misleading because it turns out that the optimal quantity of exports varies in a one-to-one offset pattern with the quantity sold at home. The reference is to the dumping model with a downward sloping domestic demand curve

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curve, an infinitely elastic foreign demand curve, and an upward sloping marginal cost curve (see Figure 2-1 on page 13). In such a model, the export price cannot be dismissed as irrelevant because it is the export price (which is equal to the marginal revenue from the export market) that determines the optimum quantity to produce. The domestic demand and marginal revenue curves determine the portion of total output that is sold, in the home market and the price at which this output that is sold, but the total quantity produced depends on the export price. This dependence exists because the horizontal summation of the two marginal revenue curves will yield a combined marginal revenue curve that becomes a horizontal line at the same dollar value as the export price.

Ruling out the case where an increase in domestic demand is so great that exports fall to zero, it is clear that as domestic demand increases, total production remains constant, so that for every additional unit sold at home one less unit is sold in the export market. Total production remains constant because if the demand for exports does not change, the combined marginal revenue cannot change. The intersection of the marginal cost curve and the combined marginal revenue curve occurs at the same output as before.

The interesting feature of this model is that the change in domestic demand does not affect the export price. A test of the model would be that changes in domestic demand are inversely related to the quantity of exports but are not correlated with the price of exports.

This hypothesis would be supported by the following evidence. In Model B, the coefficient on GNP72$ should be significantly less than zero in the quantity equation and not be significantly different from zero in the price equation. In Model C the coefficient on GNP72$ should be significantly less than zero in the high-pressure quantity equation and not be significantly different from zero in the high-pressure price equation. In Models D and E, the coefficient on YHCAP should be significantly less than zero in the quantity equation and not significantly different from zero in the price equation.

Of the thirty-one commodities tested, fifteen support this hypothesis in at least one Model each. Six of these commodities are from SITC Section 6, eight are from Section 7, and one is from Section 8. None of the commodities drawn from SITC Section 5 support the hypothesis. The commodities supporting the hypothesis are listed in Figure 6-2.

VI. Evaluation of DPH.

The Demand Pressure Hypothesis is now well-grounded in generally accepted economic theories of producer behavior. What began as a proposition in macroeconomics, motivated by an interest in aggregate exports and the trade balance, has evolved quite properly into a microeconomic theory; and it is at the micro level that the theory must be tested. Given the intuitive appeal of the Hypothesis, discarding it would be difficult even if empirical research showed a total lack of support. Rather, the more attractive alternative would be the devising of increasingly more sophisticated tests. But there is empirical support for the Hypothesis, and this support is quite compelling.

As the theoretical treatment of Chapter 3 makes clear, the shape of the Average Total Cost curve is a crucial factor in the relationship between exports and domestic demand. In those instances in which the evidence does not support the DPH, it is tempting to conclude that either the tests or the data are not refined enough to detect the point at which the Average Total Cost curve starts sloping upwards.

VII. Future Research.

This research could be extended in several directions. First, it would be interesting to find out if micro-level explanatory variables are more useful than the macro variables used here. For example, following Artus (1970) one might be able to construct a time series for a capacity utilization rate for each individual industry. Problems of endogeneity would preclude the use of commodity-level capacity utilization rates, but industry-level rates might be helpful. Second, different mathematical specifications

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of the equations could be tried. For example, logarithmic relationships and various lag structures, such as polynomial distributed lags, could be hypothesized. Third, different econometric techniques could be employed. Although Dunlevy found that two-stage least squares offered no statistical improvement over single-equation Cochrane-Orcutt interative least squares, his tests were for total exports; and it would be interesting to use the 2SLS procedure at the commodity level.

Evidence Supporting the Hypothesis		Model			
Commodity No.	Brief Description	B	C	D	E
641 1000	Newsprint			D	E
671 2000	Pig iron	B	C		
673 2005	Concrete reinforcing bars	B	C		
682 2160	Copper wire			D	E
686 3220	Zinc sheets			D	E
691 2020	Aluminum door frames			D	E
716 4042	AC motors			D	
723 4052	Dozers	B			
724 3920	Sewing machine needles		C	D	E
742 4026	Centrifugal pumps			D	
743 1035	Air compressors			D	E
751 1040	Electric typewriters		C		
762 0040	Radios			D	
775 7520	Vacuum cleaners			D	E
895 2115	Ball-point pens			D	E
Totals:	15 commodities	3	4	11	8

Figure 6-2. The Exports-Are-A-Residual Hypothesis.

APPENDICES

APPENDIX 1

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Calculation of XRIMF

As mentioned in Chapter 4, the IMF's index of effective exchange rate for the U.S. dollar begins in 1972.1; and so values for this index have to be extrapolated for the sample period from 1965.1 through 1971.4. This appendix describes the method used for constructing an index (called XRIMF) that measures the exchange value of the U.S. dollar.

The index XRIMF is simply a backwards extension of the IMF's index. This was accomplished by taking into account the devaluations and revaluations of the currencies fo four of the world's major countries--Canada, Germany, France, and the United Kingdom. The par values of the currencies of two other major trading partners of the U.S.--Japan and Italy--did not change during this period. It is assumed that the currency realignments arising out of the Smithsonian Agreement of December 18, 1971, went into effect during the first quarter of 1972.

The weights used are the dollar values of U.S. exports to that country as a percent of total U.S. exports for the year; the weights, therefore, change each year. Unfortunately, the weighting scheme differs from that of the IMF, so that some inconsistencies are introduced into the index. If a bias has been introduced, it is in the form of too small a variation in the index values for the relevant time periods. In absolute value, the largest adjustment is 1.8486, which is not a very large adjustment to an index that is equal to 100.0 in the base year, absence of MERM-derived weights for the period 1965.1 through 1971.4. Given the index for 1965.1 - 1971.4 takes on a constant value equal to the Fund-reported value for 1972.1. The devaluations and revaluations that occurred and their effect on XRIMF are described below.[21]

On November 24, 1968, the Federal Republic of Germany lowered export subsidies from 11% to 7% and lowered border import taxes from 11% to 7%. Although this action affected only commodities, not services or capital, it is treated here as equivalent to a 4% revaluation. The reverse adjustments to the effective exchange rate index for the years 1968, 1967, 1966, and 1965 are, respectively, 0.19736, 0.21642, 0.22079, and 0.24021.

The French franc was devalued 11 percent on August 8, 1969. Therefore, in the beginning of 1969 the dollar was worth less than in the final quarter of 1969. The adjustment from this source for the first three quarters of 1969 is -0.3459; for 1968, 1967, 1966, and 1965, the adjustments are -0.34776, -0.35746, -0.36536, and -0.38871

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[21]For a description of these events in their historical context see Kreinin (1975, pp. 150-155). For a detailed account of the foreign exchange and balance of payments history of these six countries plus the U.S. since World War II, see Yeager (1976, pp. 459-588).

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On October 24, 1969, the German mark underwent a 9.29 percent revaluation and the German government restored the 11 percent export subsidy and import border tax. This action is treated as 5.29 percent revaluation. The adjustment arising from these two actions (Oct. 24, 1969, and Nov. 24, 1968) combined is 0.29816 for the first three quarters of 1969 and 0.45836, 0.50263, 0.5128, and 0.55788 for 1968, 1967, and 1965 respectively.

The 14.29 percent devaluation of the pound sterling on November 18, 1967, gives rise to an adjustment factor of -0.44412 for the fourth quarter of 1967 and -0.88824 for the other three quarters. For 1966 the adjustment is -0.81881 and for 1965 it is -0.8403.

On June 1, 1970, the Canadian dollar was allowed to float after having been pegged at C$1 = US$0.925. To calculate an adjustment factor, the exchange rate at the end of the quarter (OECD, Main Economic Indicators) is treated as though it were the exchange rate all through the quarter. This method treats the Canadian dollar as though it were fixed but undergoing a devaluation or revaluation at the end of each quarter. For the six quarters from 1970.3 through 1971.4, the adjustments are -1.29182, -1.45104, -1.7016, -1.32287, -1.6759, and -1.8486. In this case the revaluation of a foreign currency causes a negative adjustment in the

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index because the revaluation occurs after the base period (May 1970 = 100) for the index. The revaluation reduces the index from 100. In the previous cases, revaluations occurred prior to the base period and the adjustments had to occur backwards. That meant that entries prior to the revaluation had to be increased so that at the time of the revaluation the index number declined towards 100. The Canadian case is the last adjustment to be made. The resulting index of effective exchange rate is assigned the name XRIMF.

APPENDIX 2

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Calculation of PL and PK

For measuring the prices of the factors of production, eight different series (1967 = 100) from the Bureau of Labor Statistics, Employment and Earnings, were tried: (1) W1, unit labor cost, manufacturing; (2) W2, compensation per manhour, manufacturing; (3) W3, real compensation per manhour, manufacturing; (4) W4, unit labor cost, private sector, non-farm; (5) W5, compensation per manhour, private sector, non-farm; (6) W6, real compensation per manhour, private sector, non-farm; (7) W7, unit non-labor payments, private sector; and (8) W8, unit non-labor payments, private sector, non-farm. Non-labor payments include profits, depreciation, interest, rental income, and indirect taxes. Real compensation per manhour, manufacturing, is merely compensation per manhour, manufacturing, divided by the Consumer Price Index (W3 = W2/CPI). Real compensation per manhour, private sector, non-farm, is obtained in a similar fashion: W6 = W5/CPI.

W1, W2, and W3 are available for the entire sample period (1965.1 - 1979.4). For W4, W5, and W6 the published data begin in 1966; and for W7 and W8 the data begin in 1967. Values for the missing data were extrapolated in the following manner: W4 through W8 were each regressed against W1, W2, and W3 using OLS, and for each the resulting linear estimation was used to find estimates of the missing observations. The estimated equations are presented below.

$$W4 = \underset{(1.41)}{12.3} + \underset{(6.36)}{0.413}\, W1 + \underset{(0.943)}{0.488}\, W2 - \underset{(-0.603)}{0.0812}\, W3,$$

R-Squared = 0.997, F = 6983.

$$W5 = \underset{(-1.92)}{-\,16.9} - \underset{(-1.54)}{0.0602}\, W1 + \underset{(29.6)}{0.985}\, W2 + \underset{(2.91)}{0.252}\, W3,$$

R-Squared = 0.99, F = 29137.

$$W6 = \underset{(-1.22)}{-\,8.53} - \underset{(-1.82)}{0.0602}\, W1 + \underset{(0.28)}{0.00751}\, W2 + \underset{(16.6)}{1.14}\, W3,$$

R-Squared = 0.97, F = 648.

$$W7 = \underset{(1.20)}{41.6} + \underset{(0.890)}{0.135}\, W1 + \underset{(4.39)}{0.538}\, W2 - \underset{(-0.36)}{0.124}\, W3,$$

R-Squared = 0.98, F = 781.

$$W8 = \underset{(1.29)}{47.1} + \underset{(0.0593)}{0.0947}\, W1 + \underset{(4.13)}{0.531}\, W2 - \underset{(-0.379)}{0.136}\, W3,$$

R-Squared = 0.97, F = 629.

The measures of factor prices finally settled upon are variants of W4 (unit labor cost, private sector, non-farm) and W8 (unit non-labor payments, private sector, non-farm). Both series entail unit costs and both refer to the private, non-farm sector. Because the commodities tested are products of the manufacturing sector, a case can be made for using W1 (unit labor cost, manufacturing) rather than W4. There is no comparable series available for non-labor payments, however, and thus W4 was chosen for its symmetry with

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with W8. Furthermore, W4 and W1 are highly correlated with each other: variations in W1 "explain" more than 98% of the variations in W4. Regressing W4 on W1 yields the following estimated equation:

$$W4 = \underset{(-5.12)}{-11.8} + \underset{(68.2)}{1.15}\ W1,$$

$$R\text{-Squared} = 0.988, \quad F = 4655.$$

A time series called PL was constructed by converting W4 into real terms through the use of the GNP deflator. Likewise, W8, which is expressed in "nominal" terms, was converted into real terms by dividing by the GNP deflator; the resulting variable is given the name PK.

APPENDIX 3

Table A-1

Iron oxides and hydroxides, pigment grade.

Commodity No.: 525 6030

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	34300	-1840	18600	-78.9	32800	-1960
	(2.25)	(-1.60)	(1.24)	(-.0777)	(2.03)	(-1.66)
VAROW	.0522	-.0966	-1.95	.0877	0.974	-0.119
	(.0265)	(-0.793)	(-1.42)	(0.791)	(0.455)	(-0.921)
XRIMF	-148	3.45	-105	.0814	-140	3.47
	(-3.71)	(1.18)	(-2.63)	(.0286)	(-3.33)	(1.18)
GNP72$	-6.41	0.846			-8.43	0.967
	(-1.52)*	(2.66)***			(-1.74)*	(2.67)***
PL	-34.6	6.85	15.8	1.94	-22.3	6.68
	(-0.426)	(1.24)	(0.189)	(0.349)	(-0.267)	(1.20)
PK	-52.6	0.141	-50.7	-0.422	-53.0	0.454
	(-1.14)	(.0441)	(-1.01)	(-0.124)	(-1.11)	(0.140)
YHCAP83			0.324	.00421	0.435	-.0123
			(1.42)	(0.279)	(1.76)*	(-0.777)
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.586	0.840	0.741	0.886	0.670	0.860
	(5.55)	(11.9)	(8.48)	(14.7)	(6.93)	(13.0)
R-Squared =	.30	.15	.20	.02	.28	.15
F=	4.58	1.82	2.72	0.218	3.30	1.48
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.19	2.36	2.33	2.42	2.21	2.38

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Table A-2

Iron oxides and hyroxides, pigment grade.

Commodity No.: 525 6030

Equation No.	7	8	9	10
Model	C	C	C	C
Capac. Util.	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-22130	1220	52500	-4350
	(-0.993)	(1.16)	(4.34)	(-4.91)
VAROW	1.80	-0.364	6.17	-0.535
	(0.509)	(-2.18)	(1.38)	(-1.64)
XRIMF	-151	5.86	-116	-0.648
	(-4.48)	(3.70)	(-2.46)	(-0.187)
GNP72$	-5.53	1.04	-17.7	1.54
	(-0.933)	(3.73)***	(-2.53)***	(3.00)***
PL	267	-9.57	-120	20.6
	(2.24)	(-1.71)	(-1.63)	(3.82)
PK	74.6	-8.99	-96.4	8.00
	(1.23)	(-3.16)	(-1.59)	(1.80)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.79	.79	.65	.65
F=	12.6	12.8	11.7	11.8
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

Table A-3

Iron oxides and hydroxides, pigment grade.

Commodity No.: 525 6030

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	23200	37.9	34500	-1760
	(1.54)	(.0375)	(2.21)	(-1.51)
VAROW	-2.23	.0775	.0195	-.0944
	(-1.67)	(0.691)	(.00951)	(-0.773)
XRIMF	-119	-.0935	-149	3.18
	(-3.06)	(-.0326)	(-3.64)	(1.08)
GNP72$			-6.39	0.873
			(-1.49)	(2.66)***
PL	-5.24	1.16	-35.6	6.16
	(-.0623)	(0.210)	(-0.430)	(1.10)
PK	-49.7	-0.210	-52.7	0.193
	(-1.00)	(-.0624)	(-1.13)	(.0602)
YHCAP83				
YHCAP85	-.0253	-.0110	-.0192	-.0138
	(-0.103)	(-0.696)	(-.0795)	(-0.912)
YHCAP86				
YHCAP87				
Rho =	0.677	0.897	0.585	0.860
	(7.07)	(15.6)	(5.54)	(12.9)
R-Squared =	.21	.02	.30	.15
F=	2.84	0.267	3.76	1.53
df(num,den)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.32	2.39	2.19	2.37

Table A-4

Iron oxides and hydroxides, pigment grade.

Commodity No.: 525 6030

Equation No.	15	16	17	18
Model	C	C	C	C
Capac.Util.	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-32000	1050	67700	-4700
	(-1.48)	(0.682)	(6.08)	(-5.95)
VAROW	3.02	-0.525	-1.47	-.0376
	(1.05)	(-2.57)	(-0.358)	(-0.129)
XRIMF	-133	4.63	-177	3.03
	(-3.65)	(1.79)	(-4.07)	(0.982)
GNP72$	7.79	1.45	-9.80	0.943
	(-1.71)*	(4.49)***	(-1.58)*	(2.14)**
PL	275	-4.83	-101	15.9
	(2.37)	(-0.588)	(-1.56)	(3.45)
PK	146	-14.0	-194	13.7
	(2.28)	(-3.09)	(-3.48)	(3.47)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.62	.76	.81	.71
F=	7.36	14.8	21.7	12.3
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-5

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Commodity No.: 533 2000

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-16200	402	-6020	527	-16400	17.9
	(-3.02)	(0.252)	(-1.06)	(0.385)	(-2.73)	(-.0101)
VAROW	-1.85	-0.479	0.867	-0.293	-1.84	-0.433
	(-1.77)	(-1.52)	(1.71)	(-2.34)	(-1.68)	(-1.31)
XRIMF	9.00	-16.0	13.1	-14.9	9.25	-15.1
	(0.848)	(-5.12)	(0.894)	(-4.31)	(0.772)	(-4.29)
GNP72$	6.24	0.326			6.24	0.316
	(2.75)***	(0.478)			(2.72)***	(0.459)
PL	94.0	16.8	38.5	15.6	94.6	18.4
	(3.07)	(1.85)	(1.20)	(2.09)	(2.90)	(1.90)
PK	10.9	3.38	11.1	3.81	11.1	3.85
	(0.860)	(0.913)	(0.667)	(1.01)	(0.842)	(1.01)
D781794	-351	-134	24.4	-104	-352	-134
	(-1.37)	(-1.74)	(1.28)	(-2.50)	(-1.36)	(-1.74)
DUM773	417	-253	912	-232	415	-256
	(1.10)	(-2.15)	(2.64)	(-2.20)	(1.09)	(-2.16)
DUM774	-1530	644	-1230	651	-1540	638
	(-4.41)	(6.04)	(-3.46)	(6.32)	(-4.35)	(5.93)
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-.0439	.0185	.00585	.0180
			(-0.332)	(0.529)	(.0495)	(0.510)
Rho =	-0.183	-0.272	0.106	-0.280	-0.184	-0.278
	(-1.43)	(-2.17)	(0.820)	(-2.24)	(-1.44)	(-2.22)
R-Squared =	.53	.58	.46	.58	.53	.59
F=	7.14	8.77	5.36	8.80	6.23	7.72
df(num,den)	(8,50)	(8,50)	(8,50)	(8,50)	(9,49)	(9,49)
DW=	1.91	1.94	2.00	1.95	1.91	1.94

Table A-6

Printing inks.

Commodity No.: 533 2000

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-17400	-3370	-9650	5830
	(-1.93)	(-1.28)	(-1.00)	(1.45)
VAROW	-1.75	-0.530	-.0507	-0.212
	(-1.37)	(-1.43)	(-.0164)	(-0.164)
XRIMF	9.93	-16.6	-36.1	5.99
	(0.655)	(-3.76)	(-0.916)	(0.363)
GNP72$	6.21	0.716	3.49	-0.723
	(2.18)**	(0.861)	(0.626)	(-0.310)
PL	106	38.0	-24.9	-1.08
	(2.14)	(2.64)	(-0.484)	(-.0501)
PX	6.43	9.78	124	-33.4
	(0.332)	(1.73)	(2.46)	(-1.58)
D781794	-410	-202		
	(-1.20)	(-2.04)		
DUM 773	465	-332		
	(1.13)	(-2.75)		
DUM 774	-1590	596		
	(-4.01)	(5.14)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.52	.68	.49	.28
F=	4.76	9.55	1.96	0.783
df(num,den)	(8,35)	(8,35)	(5,10)	(5,10)

Table A-7

Rubber cement.

Commodity No.: 588 3060

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	3510	-12600	3820	-9280	4770	-12000
	(1.41)	(-1.13)	(1.67)	(-0.944)	(1.79)	(-1.05)
VAROW	0.372	0.949	-0.133	1.37	0.211	0.957
	(0.806)	(0.744)	(-0.663)	(1.52)	(0.447)	(0.744)
XRIMF	-14.5	26.0	-17.8	18.5	-17.4	24.7
	(-2.46)	(0.900)	(-2.93)	(0.700)	(-2.83)	(0.829)
GNP72$	-0.768	1.50			-0.732	1.42
	(-0.811)	(0.483)			(-0.783)	(0.448)
PL	-10.8	44.4	-10.0	33.4	-15.5	42.3
	(-0.733)	(0.791)	(-0.765)	(0.619)	(-1.03)	(0.735)
PK	0.188	41.4	-2.41	41.0	-1.50	40.8
	(.0269)	(1.25)	(-0.367)	(1.24)	(-0.221)	(1.22)
D781794	1650	-2920	1590	-2880	1650	-2920
	(15.1)	(-6.75)	(21.4)	(-6.87)	(15.4)	(-6.69)
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-.0655	-.0390	-.0634	-.0287
			(-1.17)	(-0.248)	(-1.13)	(-1.79)*
Rho =	0.119	0.751	0.0525	0.759	0.0714	0.754
	(0.920)	(8.73)	(0.404)	(8.95)	(0.550)	(8.82)
R-Squared =	.95	.58	.95	.57	.95	.58
F=	158	11.9	181	11.7	149	9.97
df(num,den)	(6,52)	(6,52)	(6,52)	(6,52)	(7,51)	(7,51)
DW=	1.93	2.46	1.94	2.42	1.93	2.46

Table A-8

Rubber cement.

Commodity No.: 588 3060

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	5270	-48000	2290	24400
	(1.41)	(-4.80)	(1.44)	(2.74)
VAROW	.0660	-0.904	1.26	2.46
	(0.120)	(-0.613)	(2.47)	(0.860)
XRIMF	-22.1	36.8	11.4	-44.7
	(-3.07)	(1.92)	(1.75)	(-1.22)
GNP72$	-0.830	9.54	-1.40	-14.9
	(-0.755)	(3.25)***	(-1.52)*	(-2.88)**
PL	-14.0	197	-10.4	-25.1
	(-0.656)	(3.46)	(-1.22)	(-0.526)
PX	-1.09	-110	-13.3	-3.82
	(-0.121)	(4.60)	(-1.59)	(-.0815)
D781794	1670	-3470		
	(13.0)	(-10.1)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.96	.88	.93	.94
F=	144	46.0	28.5	34.4
df(num,den)	(6,37)	(6,37)	(5,10)	(5,10)

Table A-9

Newsprint paper.

Commodity No.: 641 1000

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	138000	-230	95200	237	319000	-212
	(1.03)	(-0.422)	(0.541)	(0.534)	(2.29)	(-0.380)
VAROW	79.3	-.0415	1.59	-.0719	61.5	-.0404
	(3.53)	(-0.728)	(0.104)	(-1.26)	(2.79)	(-0.702)
XRIMF	517	-1.58	572	-1.02	128	-1.67
	(1.46)	(-1.15)	(1.25)	(-0.723)	(0.358)	(-1.18)
GNP72$	-147	0.200			-148	0.198
	(-3.47)***	(1.30)*			(-3.78)***	(1.27)
PL	-359	3.85	-429	2.80	-1120	3.76
	(-0.462)	(1.48)	(-0.430)	(1.17)	(-1.46)	(1.42)
PK	-397	-0.722	-551	-1.05	-574	-0.701
	(-0.924)	(-0.481)	(-1.01)	(-0.718)	(-1.42)	(-0.463)
D781794						
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-8.53	.000575	-9.13	-.00188
			(-2.36)***	(.0832)	(-2.78)***	(-0.264)
Rho =	0.126	0.866	0.400	0.968	0.106	0.863
	(0.975)	(13.3)	(3.35)	(29.7)	(0.820)	(13.1)
R-Squared =	.28	.16	.16	.09	.38	.16
F=	4.14	1.96	2.08	1.05	5.39	1.66
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	1.93	2.45	2.00	2.61	1.91	2.45

Table A-10

Newsprint paper.

Commodity No.: 641 1000

Equation No.	7	8
Model	E	E
Dependent	QX	PX
Constant:	111000	-427
	(0.791)	(-0.797)
VAROW	108	-.0830
	(3.27)	(-1.42)
XRIMF	704	-1.35
	(1.79)	(-1.01)
GNP72$	-191	0.350
	(-3.32)***	(2.13)**
PL	-347	3.88
	(-0.431)	(1.54)
PK	-240	-0.206
	(-0.522)	(-0.140)
D781794		
YHCAP83	4.42	-.0154
	(1.34)	(-2.15)**
YHCAP85		
YHCAP86		
YHCAP87		
Rho =	0.177	0.864
	(1.38)	(13.2)
R-Squared =	.28	.23
F=	3.34	2.54
df(num,den)	(6,52)	(6,52)
DW=	1.92	2.42

Table A-11

Newsprint paper.

Commodity No.: 641 1000

Equation No.	9	10	11	12
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	212000	-1460	113000	-1380
	(0.646)	(-1.49)	(0.855)	(-3.76)
VAROW	100	0.305	101	-0.129
	(1.91)	(1.95)	(2.06)	(-0.950)
XRIMF	-57.4	-4.28	1670	-4.97
	(-0.116)	(-2.89)	(3.21)	(-3.45)
GNP72$	-226	-0.198	-130	0.288
	(-2.59)***	(-0.760)	(-1.68)**	(1.35)*
PL	-251	10.2	-1130	12.0
	(-0.143)	(1.96)	(-1.39)	(5.35)
PK	-151	4.77	-658	2.98
	(-0.170)	(1.79)	(-0.988)	(1.62)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.43	.89	.34	.80
F=	2.58	26.9	3.18	24.2
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

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Table A-12

Newsprint paper.

Commodity No.: 641 1000

Equation No.	13	14	15	16
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	355000	-1870	28000	418
	(1.24)	(-3.76)	(0.136)	(0.748)
VAROW	65.0	0.164	-35.7	.00763
	(2.77)	(2.71)	(-0.541)	(.0424)
XRIMF	85.3	-5.57	-1140	-0.915
	(0.220)	(-5.57)	(-1.35)	(-0.398)
GNP72$	-162	-.0954	63.4	-0.120
	(-3.99)***	(-0.912)	(0.531)	(-0.370)
PL	-1170	13.0	-804	0.298
	(-1.09)	(4.70)	(-0.729)	(.0991)
PK	-695	7.02	1460	0.562
	(-1.39)	(5.46)	(1.35)	(-0.191)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.40	.88	.27	.16
F=	5.12	54.0	0.738	0.394
df(num,den)	(5,38)	(5,38)	(5,10)	(5,10)

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DUM702

DUM782

YHCAP85

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DW=

Table A-13

Pig iron, including cast iron.

Commodity No.: 671 2000

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-192000	-48.9	-313000	21.4	-186000	12.1
	(-0.725)	(-0.367)	(-1.27)	(0.168)	(-0.682)	(.0924)
VAROW	44.4	-.00191	5.86	-.0186	43.3	-.0279
	(1.21)	(-.0883)	(0.270)	(-1.62)	(1.12)	(-1.14)
XRIMF	177	0.143	532	-0.150	157	-0.136
	(0.251)	(0.402)	(0.800)	(-0.418)	(0.217)	(-0.371)
GNP72$	-96.1	-.0120			-95.2	.0184
	(-1.28)**	(0.290)			(-1.23)	(0.433)
PL	2640	.0777	3000	-0.121	2610	-.0907
	(1.84)	(0.102)	(2.15)	(-0.169)	(1.77)	(-0.123)
PX	-816	1.01	-966	0.949	-816	0.908
	(-0.995)	(2.35)	(-1.22)	(2.37)	(-0.984)	(2.19)
D781794						
DUM673	5830	-50.9	4410	50.6	5800	-51.1
	(0.548)	(-6.43)	(0.402)	(-6.66)	(0.540)	(-6.63)
DUM702	43400	-2.79	46100	-3.25	43300	-2.98
	(4.08)	(-0.354)	(4.20)	(-0.426)	(4.04)	(-0.387)
DUM782	-6310	100	-7830	97.8	-6600	97.4
	(-0.590)	(12.8)	(-0.692)	(12.9)	(-0.593)	(12.6)
YHCAP85			-1.27	-.00498	-0.524	-.00540
			(-0.288)	(-2.05)**	(-0.116)	(-2.05)**
Rho =	0.518	0.223	0.463	0.200	0.520	0.207
	(4.65)	(1.76)	(4.01)	(1.57)	(4.67)	(1.62)
R-Squared =	.40	.82	.41	.83	.40	.83
F=	4.21	28.6	4.27	31.1	3.66	27.3
df(num,den)	(8,50)	(8,50)	(8,50)	(8,50)	(9,49)	(9,49)
DW=	1.78	1.92	1.79	1.91	1.78	1.90

Table A-14

Pig iron, including cast iron.

Commodity No.: 671 2000

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-1180000	689	-291000	-193
	(-2.47)	(2.95)	(-2.24)	(-1.53)
VAROW	-26.7	-.00163	63.5	-.0117
	(-0.416)	(-5.20)	(1.33)	(-0.252)
XRIMF	820	-.0426	-261	-0.171
	(0.999)	(-0.106)	(-0.513)	(-0.345)
GNP72$	51.9	-.0435	-78.3	-.00535
	(0.506)	(-0.872)	(-1.01)	(-.0760)
PL	7360	-3.58	2202	1.09
	(2.87)	(-2.86)	(2.92)	(1.49)
PK	1400	-0.857	460	1.41
	(0.989)	(-1.24)	(0.700)	(2.21)
D781794				
DUM673			3700	-48.6
			(0.461)	(-6.22)
DUM702	58800	-4.53		
	(3.77)	(-0.597)		
DUM782	-6000	95.9		
	(-0.386)	(12.7)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.70	.89	.64	.81
F=	6.98	25.4	7.21	16.9
df(num,den)	(7,21)	(7,21)	(6,24)	(6,24)

Table A-15

Pig iron, including cast iron.

Commodity No.: 671 2000

Equation No.	11	12	13	14
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-472000	53.0	15600	188
	(-1.42)	(0.275)	(0.368)	(1.02)
VAROW	30.2	-.00391	13.4	.0268
	(0.733)	(-0.164)	(0.984)	(0.453)
XRIMF	704	-0.119	-134	0.159
	(1.02)	(-0.297)	(-0.773)	(0.210)
GNP72$	-32.8	-.0251	-43.0	-0.115
	(-0.465)	(-0.616)	(1.75)*	(-1.07)
PL	3940	-0.300	424	-1.01
	(2.13)	(-0.281)	(1.87)	(-1.02)
PK	-715	0.914	-186	0.789
	(-0.814)	(1.80)	(-0.835)	(0.814)
D781794				
DUM673	3810	-48.3		
	(0.224)	(-4.90)		
DUM702	66200	-4.65		
	(4.16)	(-0.505)		
DUM782	-13000	98.4		
	(-0.834)	(10.9)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.56	.81	.75	.88
F=	5.58	18.7	6.10	14.4
df(num,den)	(8,35)	(8,35)	(5,10)	(5,10)

Table A-16

Concrete reinforcing bars.

Commodity No.: 673 2005

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	640000	194	221000	7.63	510000	143
	(0.894)	(0.761)	(0.339)	(.0324)	(0.870)	(0.611)
VAROW	169	-.00373	59.4	-.0336	245	.0285
	(1.77)	(-0.114)	(1.06)	(-1.66)	(2.16)	(0.774)
XRIMF	802	-1.79	1610	-1.28	340	-1.80
	(0.427)	(-2.68)	(0.915)	(-2.04)	(0.214)	(-2.92)
GNP72$	-257	-.0898			-446	-0.156
	(-1.28)*	(-1.28)			(-2.12)**	(-2.09)**
PL	-696	2.01	1130	2.67	1150	2.51
	(0.180)	(1.48)	(0.305)	(2.00)	(0.347)	(1.97)
PK	-4330	-0.777	-4740	-0.880	-4000	-0.626
	(-1.97)	(-1.00)	(-2.24)	(-1.14)	(-2.14)	(-0.868)
D781794						
DUM682	-2980	59.1	-900	59.5	-57.3	58.8
	(-0.109)	(6.38)	(-.0316)	(6.38)	(-.00196)	(6.34)
YHCAP83			6.46	.00392	23.7	.00791
			(0.608)	(1.05)	(2.02)**)	(1.96)**
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.548	0.587	0.492	0.578	0.354	0.522
	(5.03)	(5.57)	(4.34)	(5.45)	(2.90)	(4.70)
R-Squared =	.27	.51	.27	.50	.39	.55
F=	3.14	8.92	3.19	8.78	4.73	8.83
df(num,den)	(6,52)	(6,52)	(6,52)	(6,52)	(7,51)	(7,51)
DW=	2.06	1.83	2.13	1.86	2.01	1.83

Table A-17

Concrete reinforcing bars.

Commodity No.: 673 2005

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-145000	496	510000	-136
	(-0.120)	(1.35)	(1.18)	(-0.757)
VAROW	-47.2	0.190	516	-.0612
	(-0.244)	(3.24)	(3.24)	(-0.920)
XRIMF	-234	-1.74	243	-1.70
	(-0.128)	(-3.12)	(0.143)	(-2.40)
GNP72$	222	-0.475	-948	.0510
	(0.690)	(-4.86)***	(-3.79)***	(0.487)
PL	4160	1.48	2630	3.44
	(0.642)	(0.753)	(0.995)	(3.11)
PK	-4520	-1.34	3290	-0.320
	(-1.37)	(-1.34)	(-1.51)	(-0.351)
D781794				
DUM682			13600	55.8
			(0.447)	(4.39)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.44	.85	.74	.55
F=	2.64	19.2	14.0	6.13
df(num,den)	(5,17)	(5,17)	(6,30)	(6,30)

Table A-18

Copper alloy wire, bare.

Commodity No.: 682 2160

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-5220	-3280	-1470	-3600	-1840	-3910
	(-0.869)	(-1.40)	(-0.240)	(-1.36)	(-0.280)	(-1.44)
VAROW	0.204	-0.560	0.114	-0.283	-.00632	-0.485
	(0.223)	(-1.38)	(0.214)	(-1.20)	(-.00677)	(-1.11)
XRIMF	-21.5	-16.8	-28.8	-16.0	-28.0	-15.4
	(-1.35)	(-2.71)	(-1.81)	(-2.35)	(-1.65)	(-2.23)
GNP72$	0.478	0.427			0.284	0.412
	(0.266)	(0.564)			(0.156)	(0.539)
PL	82.1	36.5	65.6	37.8	67.0	39.1
	(2.42)	(2.66)	(1.89)	(2.58)	(1.87)	(2.63)
PK	-26.4	15.4	-28.7	17.0	-29.1	16.1
	(-1.39)	(2.04)	(-1.51)	(2.25)	(-1.51)	(2.07)
D781794						
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-0.175	.0332	-0.173	.0317
			(-1.36)*	(0.502)	(-1.33)*	(0.476)
Rho =	0.343	.00728	0.369	.0204	0.367	.0115
	(2.81)	(.0560)	(3.05)	(0.157)	(3.03)	(.0883)
R-Squared =	.55	.23	.55	.22	.55	.23
F=	13.1	3.13	12.9	3.02	10.6	2.58
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	1.84	2.04	1.82	2.03	1.82	2.03

Table A-19

Copper alloy wire, bare.

Commodity No.: 682 2160

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-16400	-2920	5470	-4360
	(-2.66)	(-0.956)	(0.769)	(-0.505)
VAROW	-.0469	-0.595	0.751	0.936
	(-.0665)	(-1.70)	(0.342)	(0.351)
XRIMF	-27.3	-12.4	-7.07	-49.5
	(-2.31)	(-2.12)	(-0.229)	(-1.32)
GNP72$	1.40	0.623	-0.754	-2.70
	(1.13)	(1.02)	(-0.190)	(-0.561)
PL	140	33.1	-32.8	44.8
	(4.24)	(2.02)	(-0.896)	(1.01)
PK	3.82	10.9	-0.554	55.4
	(0.238)	(1.38)	(-.0124)	(1.02)
D781794				
DUM671			-226	517
			(-0.886)	(1.67)
D741742	1150	15.5		
	(5.36)	(0.147)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.83	.22	.65	.64
F=	30.8	1.74	2.76	2.72
df(num,den)	(6,37)	(6,37)	(6, 9)	(6, 9)

Table A-20

Copper alloy wire, bare.

Commodity No.: 682 2160

Equation No.	11	12	13	14	15	16
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-10000	-2580	-7500	-1840	-9300	-2280
	(-2.12)	(-1.20)	(-1.45)	(-0.752)	(-1.73)	(-0.902)
VAROW	-.0482	-0.524	0.495	-0.342	-0.101	-0.552
	(-.0657)	(-1.45)	(1.13)	(-1.59)	(-0.133)	(-1.42)
XRIMF	-20.9	-14.2	-26.0	-15.5	-22.3	-14.8
	(-1.70)	(-2.54)	(-2.02)	(-2.53)	(-1.68)	(-2.37)
GNP72$	1.42	0.445			1.38	0.445
	(0.994)	(0.653)			(0.962)	(0.645)
PL	95.6	33.2	86.0	30.3	92.6	32.0
	(3.59)	(2.70)	(3.02)	(2.28)	(3.22)	(2.37)
PK	-7.15	10.2	-6.47	10.5	-8.10	9.77
	(-0.465)	(1.43)	(-0.405)	(1.44)	(-0.511)	(1.32)
DUM671	-202	665	-186	671	-183	672
	(-0.779)	(4.36)	(-0.694)	(4.32)	(-0.678)	(4.29)
D741794	1140	-4.23	1090	-20.0	1120	-8.89
	(5.24)	(-.0369)	(4.90)	(-0.172)	(5.01)	(-.0756)
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-.0426	-.0140	-.0342	-.0136
			(-0.374)	(-0.232)	(-0.301)	(-0.226)
Rho =	0.278	.0432	0.299	.0572	0.278	.0458
	(2.22)	(0.332)	(2.41)	(0.440)	(2.22)	(0.352)
R-Squared =	.74	.43	.72	.42	.74	.43
F=	20.3	5.44	19.0	5.22	17.5	4.67
df(num,den)	(7,51)	(7,51)	(7,51)	(7,51)	(8,50)	(8,50)
DW=	1.96	2.08	1.96	2.07	1.95	2.09

Table A-21

Copper and copper alloy powder and flakes.

Commodity No.: 682 2400

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	5920	1110	7290	1550	4150	1550
	(1.42)	(0.592)	(2.03)	(0.846)	(0.978)	(0.791)
VAROW	-0.292	-0.319	0.356	-0.384	-0.152	-0.385
	(-0.521)	(-1.16)	(1.14)	(-2.40)	(-0.272)	(-1.34)
XRIMF	13.2	-4.73	13.0	-5.77	18.2	-5.76
	(1.20)	(-0.955)	(1.36)	(-1.17)	(1.62)	(-1.10)
GNP72$	1.28	-.0425			1.37	.000739
	(1.09)	(-.0775)			(1.18)	(.00132)
PL	-26.1	13.8	-29.3	11.4	-18.1	11.4
	(-1.16)	(1.31)	(-1.42)	(1.08)	(-0.797)	(1.06)
PK	-34.8	-8.72	-37.9	-8.66	-35.2	-8.66
	(-2.71)	(-1.48)	(-3.28)	(-1.47)	(-2.76)	(-1.44)
D781794						
DUM681	-310	141	-321	143	-318	143
	(-1.92)	(1.64)	(-1.95)	(1.69)	(-2.02)	(1.68)
YHCAP83						
YHCAP85						
YHCAP86			0.117	-.0303	0.112	-.0303
			(1.82)*	(-0.920)	(1.74)*	(-0.908)
YHCAP87						
Rho =	0.537	0.414	0.440	0.435	0.554	0.435
	(4.89)	(3.49)	(3.76)	(3.71)	(5.11)	(3.71)
R-Squared =	.27	.19	.37	.20	.31	.20
F=	3.27	2.04	5.01	2.12	3.21	1.78
df(num,den)	(6,52)	(6,52)	(6,52)	(6,52)	(7,51)	(7,51)
DW=	1.82	2.17	1.86	2.21	1.88	2.21

Table A-22

Copper and copper alloy powders and flakes.

Commodity No.: 682 2400

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	17100	-2830	3820	3810
	(3.57)	(-1.16)	(1.33)	(2.46)
VAROW	0.643	-0.216	0.863	-1.70
	(0.969)	(-0.637)	(0.668)	(-2.43)
XRIMF	12.6	-4.60	17.9	-10.6
	(1.29)	(-0.920)	(1.46)	(-1.60)
GNP72$	-1.03	.0191	-0.331	1.98
	(-0.924)	(.0336)	(-0.166)	(1.83)**
PL	-83.7	38.4	0.334	-3.47
	(-3.15)	(2.83)	(.0188)	(-0.361)
PK	-55.5	-3.85	-45.0	-13.7
	(-4.23)	(-0.576)	(-3.10)	(-1.74)
D781794				
DUM681			-301	175
			(-1.92)	(2.07)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.42	.42	.86	.47
F=	4.31	4.29	17.5	2.55
df(num,den)	(5,30)	(5,30)	(6,17)	(6,17)

Table A-23

Aluminum and aluminum alloy wire, not insulated.

Commodity No.: 684 2140

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-77700 (-1.88)	-512 (-0.360)	-76400 (-1.79)	-380 (-0.259)	-74800 (-1.72)	-472 (-0.316)
VAROW	14.4 (1.99)	-0.282 (-1.13)	10.6 (2.68)	-0.169 (-1.23)	13.0 (1.38)	-0.302 (-0.935)
XRIMF	167 (1.55)	-6.77 (-1.82)	150 (1.23)	-6.83 (-1.62)	153 (1.24)	-6.97 (-1.64)
GNP72$	-5.91 (-0.443)	0.215 (0.467)			-4.23 (-0.278)	0.238 (0.455)
PL	296 (1.24)	12.2 (1.49)	300 (1.27)	11.5 (1.41)	289 (1.20)	12.1 (1.46)
PK	142 (1.07)	2.56 (0.561)	125 (0.960)	3.05 (0.678)	136 (0.992)	2.46 (0.524)
D781794						
YHCAP83						
YHCAP85			-0.359 (-0.420)	.00375 (0.127)	-0.234 (-0.241)	-.00328 (-.00328)
YHCAP86						
YHCAP87						
R-Squared =	.29	.10	.29	.09	.29	.10
F= df(num,den)	4.44 (5,54)	1.14 (5,54)	4.43 (5,54)	1.10 (5,54)	3.64 (6,53)	0.938 (6,53)
DW=	1.90	1.86	1.92	1.86	1.91	1.86

Table A-24

Aluminum and aluminum alloy wire, not insulated.

Commodity No.: 684 2140

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-224000	3430	-16400	-601
	(-1.60)	(1.19)	(-0.816)	(-0.285)
VAROW	17.3	.0906	5.12	-0.409
	(0.928)	(0.236)	(0.694)	(-0.527)
XRIMF	199	-1.07	103	-12.0
	(0.844)	(-0.2220)	(1.32)	(-1.46)
GNP72$	-2.35	-0.235	2.48	0.203
	(-.0799)	(-0.388)	(0.222)	(0.172)
PL	1110	-10.6	-1.17	16.3
	(1.448)	(-0.690)	(-.0150)	(1.33)
PK	418	-10.8	8.37	4.32
	(1.01)	(-1.27)	(.0834)	(0.409)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.23	.12	.51	.14
F=	1.36	0.601	5.14	0.804
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-25

Aluminum and aluminum alloy powder and flakes.

Commodity No.: 684 2420

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	2420 (0.127)	-839 (-0.280)	3100 (0.178)	-2770 (-1.02)	-3570 (-0.191)	-1110 (-0.362)
VAROW	-1.90 (-0.684)	0.253 (0.579)	2.83 (1.83)	-0.137 (-0.566)	-0.640 (-0.225)	0.299 (0.657)
XRIMF	-53.8 (-1.07)	-0.931 (-0.118)	-48.0 (-1.01)	-0.375 (-.0506)	-33.5 (-0.670)	-0.127 (-.0155)
GNP72$	8.26 (1.49)	-0.842 (-0.968)			7.41 (1.37)	-0.869 (-0.988)
PL	-1.66 (-.0157)	2.16 (0.130)	-1.04 (-.0104)	12.5 (0.792)	23.3 (0.224)	3.48 (0.204)
PK	-22.2 (-0.374)	16.6 (1.78)	-6.88 (-0.123)	17.4 (2.00)	-21.7 (-0.378)	16.5 (1.76)
D781794						
DUM762	3840 (4.48)	-203 (-1.51)	3700 (4.25)	-172 (-1.24)	3840 (4.46)	-203 (-1.50)
YHCAP83						
YHCAP85						
YHCAP86			0.527 (1.62)	.0150 (2.93)***	0.460 (1.42)	.0219 (0.422)
YHCAP87						
Rho =	0.439 (3.76)	0.443 (3.79)	0.381 (3.16)	0.364 (3.00)	0.410 (3.45)	0.441 (3.78)
R-Squared =	.51	.25	.54	.29	.54	.25
F= df(num,den)	8.94 (6,52)	2.89 (6,52)	10.1 (6,52)	3.60 (6,52)	8.55 (7,51)	2.47 (7,51)
DW=	1.79	2.02	1.92	1.99	1.87	2.00

Table A-26

Aluminum and aluminum alloy powder and flakes.

Commodity No.: 684 2420

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	-28800	-2290	-9490	-2000
	(-1.12)	(-0.964)	(-1.05)	(-0.603)
VAROW	2.72	0.356	-2.78	-1.52
	(0.747)	(1.06)	(-0.683)	(-1.02)
XRIMF	44.0	-5.98	-170	-9.52
	(0.836)	(-1.23)	(-4.44)	(-0.673)
GNP72$	5.27	-0.733	9.96	1.37
	(0.876)	(-1.32)	(1.58)	(0.590)
PL	104	16.4	62.6	19.9
	(0.722)	(1.23)	(1.12)	(0.966)
PK	28.7	14.5	95.2	11.5
	(0.411)	(2.25)	(2.12)	(0.696)
D781794				
DUM762	3990	-140		
	(3.34)	(-1.27)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.56	.23	.94	.69
F=	6.28	1.45	56.3	8.00
df(num,den)	(6,29)	(6,29)	(5,18)	(5,18)

Table A-27

Zinc and zinc alloy sheets, plates, and strip.

Commodity No.: 686 3220

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	6690	-884	6720	-708	9350	414
	(0.585)	(-0.970)	(0.658)	(-0.771)	(0.770)	(-0.439)
VAROW	0.215	.0838	0.266	-.0151	0.541	.0705
	(0.158)	(0.591)	(0.275)	(-0.188)	(0.411)	(0.497)
XRIMF	26.8	-3.27	33.7	-3.51	27.1	-4.06
	(0.903)	(-1.36)	(1.25)	(-1.47)	(0.865)	(-1.68)
GNP72$	-0.829	-0.154			-1.24	-0.200
	(-0.269)	(-0.560)			(-0.384)	(-0.759)
PL	-39.5	9.46	-48.2	8.48	-55.6	7.25
	(-0.674)	(1.83)	(-0.857)	(1.63)	(-0.932)	(1.40)
PK	-17.8	4.27	-22.7	3.66	-22.4	3.92
	(-0.527)	(1.48)	(-0.672)	(1.31)	(-0.659)	(1.42)
D781794						
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-0.326	-.0175	-0.328	-.0209
			(-2.01)**	(-0.857)	(-1.98)**	(-1.02)
Rho =	0.688	0.310	0.791	0.281	0.780	0.242
	(7.27)	(2.50)	(9.94)	(2.25)	(9.58)	(1.92)
R-Squared =	.05	.12	.12	.13	.12	.14
F=	0.534	1.39	1.41	1.54	1.14	1.48
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.40	2.02	2.42	2.02	2.40	2.02

Table A-28

Zinc and zinc alloy sheets, plates, and strip.

Commodity No.: 686 3220

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	12700	338	31700	-1160
	(1.25)	(0.288)	(2.97)	(-1.33)
VAROW	-1.88	.0694	-0.705	-0.149
	(-1.53)	(0.488)	(-0.206)	(-0.535)
XRIMF	-11.0	-6.72	-97.3	3.68
	(-0.544)	(-2.86)	(-2.22)	(1.03)
GNP72$	2.36	-0.379	-9.53	0.692
	(1.11)	(-1.54)	(-1.54)*	(1.38)*
PL	-65.6	5.70	-79.6	0.566
	(-1.16)	(0.874)	(-1.39)	(0.122)
PK	-19.7	3.09	2.67	4.91
	(-0.752)	(1.02)	(0.476)	(1.08)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.10	.24	.86	.62
F=	0.838	2.38	12.4	3.15
df(num,den)	(5,38)	(5,38)	(5,10)	(5,10)

Table A-29

Door and window sash, frames, moulding, and trim of iron and steel.

Commodity No.: 691 1020

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-15600 (-0.707)	-1680 (-0.725)	-14600 (-0.750)	-2610 (-1.41)	-1350 (-.0681)	-3030 (-1.40)
VAROW	10.5 (3.69)	-0.115 (-0.450)	7.15 (4.20)	-.0783 (-0.460)	10.0 (3.72)	-0.141 (-0.584)
XRIMF	-31.2 (-0.540)	-2.80 (-0.471)	-41.1 (-0.804)	.0302 (.00616)	-69.1 (-1.31)	0.888 (0.158)
GNP72$	-5.87 (-0.964)	-.0244 (-.0392)			-7.50 (-1.36)	0.203 (0.355)
PL	-10.7 (-.0912)	21.9 (1.92)	-32.2 (-0.293)	26.7 (2.60)	-78.1 (-0.728)	27.9 (2.58)
PK	141 (2.11)	-0.805 (-1.22)	146 (2.30)	-1.17 (-0.191)	148 (2.46)	-0.895 (-0.145)
D781794						
YHCAP83						
YHCAP85						
YHCAP86			-0.872 (-2.81)***	.0772 (2.84)***	-0.914 (-2.94)***	.0787 (2.85)***
YHCAP87						
Rho =	0.586 (5.56)	0.780 (9.57)	0.608 (5.88)	0.757 (8.90)	0.526 (4.76)	0.744 (8.54)
R-Squared =	.49	.10	.53	.22	.62	.22
F= df(num,den)	10.4 (5,53)	1.14 (5,53)	12.0 (5,53)	2.91 (5,53)	14.2 (6,52)	2.41 (6,52)
DW=	2.00	2.52	2.18	2.58	2.08	2.58

Table A-30

Door and window sash, frames, moulding, and trim of iron and steel.

Commodity No.: 691 1020

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	3700	-4660	31300	-4820
	(0.148)	(-2.84)	(3.51)	(-2.20)
VAROW	16.2	-0.866	16.6	-1.69
	(4.66)	(-3.82)	(4.13)	(-1.72)
XRIMF	-51.9	-0.938	36.8	-23.4
	(-1.01)	(-0.280)	(0.971)	(-2.52)
GNP72$	-15.5	1.70	-23.7	2.51
	(-2.67)***	(4.49)***	(-3.80)***	(1.64)*
PL	-134	31.6	-161	34.9
	(-0.961)	(3.48)	(-2.92)	(25.7)
PK	160	3.74	-45.4	20.8
	(2.33)	(0.837)	(-1.02)	(1.90)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.77	.49	.92	.50
F=	19.9	5.77	38.7	3.54
df(num,den)	(5,30)	(5,30)	(5,18)	(5,18)

Table A-31

Door and window sash, frames, moulding, and trim of aluminum.

Commodity No.: 691 2020

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-16700 (-1.05)	-2210 (-0.692)	6540 (0.429)	-508 (-0.190)	5880 (-0.347)	-2420 (-0.746)
VAROW	1.20 (0.596)	.0829 (0.250)	2.62 (1.87)	0.259 (0.941)	1.23 (0.617)	.0665 (0.199)
XRIMF	-12.4 (-0.299)	3.44 (0.430)	-48.7 (-1.21)	0.690 (.0925)	-28.0 (-0.629)	4.44 (0.534)
GNP72$	6.56 (1.51)	0.940 (1.03)			4.88 (1.08)	0.944 (1.04)
PL	73.2 (0.875)	10.8 (0.712)	-5.31 (-.0628)	6.65 (0.456)	31.8 (0.366)	12.0 (0.774)
PK	20.6 (0.431)	3.28 (0.376)	-13.2 (-0.261)	2.91 (0.330)	3.53 (.0717)	3.13 (0.355)
D781794						
YHCAP83						
YHCAP85						
YHCAP86			-0.436 (-1.94)**	.0138 (0.361)	-0.391 (-1.72)**	.0160 (0.418)
YHCAP87						
Rho =	0.606 (5.85)	0.875 (13.9)	0.750 (8.72)	0.863 (13.1)	0.685 (7.22)	0.867 (13.4)
R-Squared =	.43	.04	.28	.02	.36	.04
F= df(num,den)	7.97 (5,53)	0.442 (5,53)	4.09 (5,53)	0.253 (5,53)	4.95 (6,52)	0.390 (6,52)
DW=	1.86	1.73	1.91	1.71	1.92	1.70

Table A-32

Door and window sash, frames, moulding, and trim of aluminum.

Commodity No.: 691 2020

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	-40400	-7430	-12900	-527
	(-2.13)	(-2.16)	(-1.84)	(-0.308)
VAROW	-0.482	-0.698	-4.10	-1.17
	(-0.183)	(-1.47)	(-1.30)	(-1.53)
XRIMF	-21.6	4.26	-79.0	-15.3
	(-0.558)	(0.608)	(-2.65)	(-2.11)
GNP72$	13.4	1.93	12.2	1.25
	(3.05)****	(2.42)**	(2.50)**	(1.05)
PL	161	47.2	38.7	12.2
	(1.53)	(2.48)	(0.894)	(1.15)
PK	84.6	6.32	77.8	12.8
	(1.63)	(0.674)	(2.23)	(1.50)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.79	.29	.89	.65
F=	23.1	2.50	28.9	6.61
df(num,den)	(5,30)	(5,30)	(5,18)	(5,18)

Table A-33

Hacksaw blades, hand and power.

Commodity No.: 695 3140

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	3090	-1750	-3880	-1410	-3280	1560
	(0.200)	(-2.56)	(-0.257)	(-1.99)	(-0.208)	(-2.18)
VAROW	-2.10	.0261	-0.338	.0505	0.214	-.0319
	(-0.855)	(0.239)	(-0.250)	(0.801)	(.0768)	(-0.254)
XRIMF	-71.5	-0.990	-45.8	-1.82	-46.9	-1.60
	(-1.75)	(-0.545)	(-1.10)	(-0.934)	(-1.09)	(-0.821)
GNP72$	1.53	0.105			-1.09	0.170
	(0.324)	(0.502)			(-0.222)	(0.762)
PL	116	8.06	138	6.75	135	7.38
	(1.31)	(2.05)	(1.61)	(1.68)	(1.54)	(1.84)
PK	-55.0	7.69	-46.7	7.64	-44.0	7.36
	(-1.12)	(3.52)	(-0.994)	(3.46)	(-0.897)	(3.30)
D781794						
YHCAP83						
YHCAP85			0.482	-.0106	0.503	-.0133
			(1.71)*	(-0.812)	(1.67)*	(-0.976)
YHCAP86						
YHCAP87						
Rho =	0.259	0.262	0.253	0.294	0.263	0.276
	(2.06)	(2.08)	(2.01)	(2.36)	(2.09)	(2.21)
R-Squared =	.24	.21	.28	.20	.28	.22
F=	3.38	2.81	4.17	2.65	3.34	2.40
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	1.96	2.06	1.92	2.07	1.92	2.07

Table A-34

Hacksaw blades, hand and power.

Commodity No.: 695 3140

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-109	-3170	1990	-1300
	(-.00331)	(-2.61)	(0.138)	(-1.72)
VAROW	1.18	-.0460	-3.96	.0295
	(0.269)	(-0.285)	(-0.750)	(0.106)
XRIMF	-38.6	-0.149	-36.3	-5.07
	(-0.697)	(-.0729)	(-0.647)	(-1.72)
GNP72$	-2.85	0.356	8.92	-0.145
	(-0.413)	(1.40)	(1.11)	(-0.343)
PL	160	14.9	41.1	8.61
	(0.910)	(2.30)	(0.492)	(1.95)
PK	-99.5	9.98	-43.0	8.77
	(-1.02)	(2.78)	(-0.598)	(2.32)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.36	.40	.51	.42
F=	2.60	3.10	5.16	3.64
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-35

Twist drills, metal-cutting.

Commodity No.: 695 4145

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-6610	29800	1180	17900	-5380	20800
	(-1.65)	(2.30)	(0.316)	(1.39)	(-1.30)	(1.59)
VAROW	.0833	-2.02	0.819	-3.34	0.119	-1.44
	(0.181)	(-1.07)	(2.13)	(-3.01)	(0.260)	(-0.766)
XRIMF	-2.22	-14.4	-16.9	13.9	-4.68	-4.63
	(-0.214)	(-0.423)	(1.64)	(0.417)	(-0.436)	(-0.137)
GNP72$	3.02	-4.67			2.81	-4.63
	(2.81)***	(-1.24)			(2.55)***	(-1.28)
PL	28.6	-114	1.68	-68.4	23.0	-70.3
	(1.42)	(-1.58)	(.0822)	(-0.938)	(1.12)	(-0.983)
PK	0.409	-27.9	-2.91	30.3	-0.198	-14.7
	(.0351)	(-0.687)	(-0.235)	(-0.756)	(-.0169)	(-0.381)
D781794						
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-.0798	0.390	-.0621	0.399
			(-1.37)*	(1.49)*	(-1.07)	(1.52)*
Rho =	0.727	0.408	0.858	0.409	0.751	0.354
	(8.14)	(3.43)	(12.8)	(3.44)	(8.75)	(2.90)
R-Squared =	.50	.53	.21	.54	.47	.60
F=	10.4	12.1	2.78	12.4	7.64	12.8
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.18	1.90	2.25	1.89	2.25	1.88

Table A-36

Twist drills, metal-cutting.

Commodity No.: 695 4145

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-8510	-9780	559	82200
	(-2.33)	(-0.814)	(0.236)	(2.97)
VAROW	-0.887	1.69	1.04	1.80
	(-2.00)	(1.16)	(1.38)	(0.202)
XRIMF	-13.1	23.6	2.61	-144
	(-1.79)	(0.980)	(0.269)	(-1.26)
GNP72$	4.43	-6.47	-1.19	-30.7
	(5.79)***	(-2.56)**	(-0.868)	(-1.91)*
PL	47.4	64.9	0.195	-118
	(2.34)	(0.972)	(.0154)	(-0.798)
PK	1.60	59.3	-4.46	-159
	(0.170)	(1.91)	(-0.360)	(-1.09)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.90	.72	.82	.84
F=	70.9	19.4	9.18	11.0
df(num,den)	(5,38)	(5,38)	(5,10)	(5,10)

Table A-37

Safety-razor blades.

Commodity No.: 696 0340

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-410000 (-1.11)	-33700 (-0.202)	-234000 (-0.544)	-160000 (-1.16)	-374000 (-0.960)	-115000 (-0.714)
VAROW	-108 (-1.60)	-11.2 (-0.558)	22.2 (0.559)	-20.2 (-1.64)	-123 (-1.45)	-12.6 (-0.658)
XRIMF	-1410 (-1.45)	-802 (-1.85)	-1310 (-1.10)	-350 (-0.964)	-1540 (-1.44)	-518 (-1.23)
GNP72$	243 (1.94)*	-43.8 (-0.962)			260 (1.88)*	-25.8 (-0.591)
PL	3840 (1.77)	1170 (1.38)	2900 (1.16)	1700 (2.18)	3690 (1.64)	1570 (1.91)
PK	-322 (-0.273)	431 (0.866)	46.5 (.0356)	238 (0.513)	-348 (-0.291)	284 (0.598)
D781794						
DUM791	271000 (8.20)	-22600 (-4.23)	287000 (7.91)	-27900 (-5.20)	275000 (7.66)	-27300 (-5.01)
YHCAP83						
YHCAP85						
YHCAP86			3.32 (0.314)	5.93 (2.64)***	-3.21 (-0.297)	5.75 (2.52)***
YHCAP87						
Rho =	-0.193 (-1.51)	0.702 (7.56)	-0.0661 (-0.508)	0.664 (6.81)	-0.192 (-1.51)	0.692 (7.35)
R-Squared =	.74	.36	.70	.42	.74	.43
F= df(num,den)	24.3 (6,52)	4.84 (6,52)	20.7 (6,52)	6.33 (6,52)	20.5 (7,51)	5.46 (7,51)
DW=	1.60	2.12	1.55	2.10	1.60	2.14

Table A-38

Safety-razor blades.

Commodity No.: 696 0340

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	153000	-41300	306000	-390000
	(0.198)	(-0.286)	(0.949)	(-3.39)
VAROW	11.3	-43.2	-274	31.6
	(0.106)	(-2.17)	(-1.93)	(0.622)
XRIMF	-513	-55.4	-982	1700
	(-0.326)	(-0.188)	(-0.762)	(3.71)
GNP72$	119	27.0	454	64.0
	(0.664)	(0.810)	(1.99)***	(0.787)
PL	844	1150	-2050	521
	(0.197)	(1.44)	(-0.995)	(0.710)
PK	-2790	-405	-759	738
	(-1.32)	(-1.03)	(-0.512)	(1.40)
D781794				
DUM791			330000	-29800
			(15.8)	(-3.99)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.45	.50	.96	.77
F=	4.95	5.91	78.7	9.41
df(num,den)	(5,30)	(5,30)	(6,17)	(6,17)

Table A-39

Motors, AC, polyphase--induction, not over 20 hp.

Commodity No.: 716 4042

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-78600	-479	-15000	-732	-39100	-657
	(-0.751)	(-0.990)	(-0.166)	(-1.52)	(-0.389)	(-1.13)
VAROW	14.3	-0.133	12.6	-0.131	7.23	-.0579
	(1.10)	(-1.64)	(1.58)	(-2.97)	(0.575)	(-0.586)
XRIMF	-270	-0.776	-428	-.0526	-366	-.0171
	(-0.986)	(-0.606)	(-1.82)	(-.0384)	(-1.40)	(-.0123)
GNP72$	8.76	-.0467			15.2	-.0135
	(0.306)	(-0.305)			(0.558)	(-0.816)
PL	332	5.52	65.1	6.41	133	5.99
	(0.605)	(1.97)	(0.128)	(2.35)	(0.254)	(2.14)
PK	372	1.84	369	1.93	362	2.22
	(1.18)	(1.19)	(1.25)	(1.31)	(1.22)	(1.41)
D781794						
YHCAP83						
YHCAP85			-404	.0104	-4.11	.0138
			(-2.71)***	(1.10)	(-2.73)***	(1.33)*
YHCAP86						
YHCAP87						
Rho =	0.629	0.119	0.642	0.0962	0.636	0.118
	(6.22)	(0.920)	(6.43)	(0.742)	(6.34)	(0.911)
R-Squared =	.27	.66	.34	.68	.35	.67
F=	3.85	20.3	5.51	22.2	4.70	17.5
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(5,52)
DW=	2.08	2.00	2.04	2.00	2.02	1.98

Table A-40

Motors, AC, polyphase--induction, not over 20 hp.

Commodity No.: 716 4042

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-162000	-1150	1360	-399
	(-0.721)	(-1.40)	(.0329)	(-0.635)
VAROW	8.04	-.0210	7.27	-.0358
	(0.270)	(-0.191)	(0.476)	(-0.155)
XRIMF	-425	1.80	-185	-3.44
	(-1.12)	(1.29)	(-1.14)	(-1.40)
GNP72$	31.8	-.0766	8.84	-0.320
	(0.675)	(-0.442)	(0.383)	(-0.913)
PL	654	7.79	-9.20	6.50
	(0.545)	(1.76)	(-.0381)	(1.78)
PK	710	2.02	55.2	3.81
	(1.07)	(0.826)	(0.266)	(1.21)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.58	.65	.84	.74
F=	6.42	8.40	26.4	14.2
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-41

Motors, AC, polyphase--induction, not over 20 hp.

Commodity No.: 716 4042

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	-43500	-1300	-51600	-1260
	(-0.456)	(-2.83)	(-0.477)	(-2.64)
VAROW	15.4	-.0843	13.8	-.0665
	(1.85)	(-2.06)	(1.05)	(-0.867)
XRIMF	-356	0.696	-335	0.649
	(-1.44)	(0.587)	(-1.19)	(0.531)
GNP72$			4.79	-.0367
			(0.166)	(-0.271)
PL	192	9.20	217	9.02
	(0.359)	(3.59)	(0.387)	(3.42)
PK	370	2.60	367	2.67
	(1.19)	(1.96)	(1.17)	(1.94)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87	-1.70	.0367	-1.67	.0368
	(-1.03)	(3.21)***	(-0.985)	(3.18)***
Rho =	0.629	.0460	0.629	0.742
	(6.22)	(0.354)	(6.22)	(0.406)
R-Squared =	.28	.74	.28	.74
F=	4.11	30.9	3.37	25.0
df(num,den)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.10	2.00	2.09	2.00

Table A-42

Motors, AC, polyphase--induction, not over 20 hp.

Commodity No.: 716 4042

Equation No.	15	16	17	18
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-133000	-991	73400	-1010
	(-1.00)	(-1.63)	(1.32)	(-0.773)
VAROW	30.1	-.0645	30.0	-.00911
	(1.87)	(-0.875)	(1.68)	(-.0218)
XRIMF	-196	0.704	-125	1.88
	(-0.737)	(0.578)	(-0.546)	(0.351)
GNP72$	-5.83	-.0346	-37.3	-0.205
	(-0.209)	(-0.272)	(-1.16)	(-0.271)
PL	409	7.36	-443	9.71
	(0.554)	(2.18)	(-1.48)	(1.39)
PK	666	2.06	57.5	0.129
	(1.94)	(1.31)	(0.197)	(.0188)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.57	.62	.90	.77
F=	9.92	12.5	19.2	6.58
df(num,den)	(5,38)	(5,38)	(5,10)	(5,10)

Table A-43

Combines, self-propelled.

Commodity No.: 721 2220

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-16500	-65900	-14400	-69800	-16100	-70400
	(-2.14)	(-3.19)	(-1.89)	(-3.34)	(2.07)	(-3.34)
VAROW	-2.88	-6.23	-0.366	6.12	-3.57	5.15
	(-2.29)	(-1.73)	(-0.545)	(3.29)	(-2.01)	(0.895)
XRIMF	-61.9	-139	-64.8	-66.5	-65.8	-69.2
	(-3.04)	(-2.56)	(-2.98)	(-1.10)	(-3.03)	(-1.13)
GNP72$	4.90	19.3			6.00	1.70
	(2.05)**	(2.89)***			(1.92)*	(0.175)
PL	94.0	408	85.4	378	94.2	383
	(2.12)	(3.38)	(1.95)	(3.15)	(2.11)	(3.14)
PK	80.3	187	93.4	240	77.0	236
	(3.26)	(2.80)	(3.86)	(3.65)	(3.04)	(2.35)
D781794						
YHCAP83			0.123	1.39	-.0983	1.32
			(0.896)	(3.58)***	(-0.551)	(2.35)***
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.206	-.0350	0.172	.0354	0.207	.0261
	(1.62)	(-0.269)	(1.34)	(0.272)	(1.63)	(0.201)
R-Squared =	.34	.57	.31	.58	.34	.58
F=	5.36	14.2	4.77	14.6	4.45	12.1
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	1.82	1.96	1.85	1.97	1.81	1.98

Table A-44

Combines, self-propelled.

Commodity No.: 721 2220

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-10700	-72200	-18100	-66500
	(-0.667)	(-1.05)	(-2.35)	(-3.65)
VAROW	-2.99	10.4	-4.54	7.87
	(-1.17)	(0.949)	(-1.61)	(1.17)
XRIMF	-56.9	-55.4	-83.6	-7.68
	(-2.34)	(-0.534)	(-2.78)	(-0.108)
GNP72$	6.07	-2.72	5.88	2.18
	(1.42)	(-0.149)	(1.32)	(0.207)
PL	40.9	522	150	246
	(0.476)	(1.42)	(3.21)	(2.22)
PK	74.6	66.4	57.9	283
	(1.71)	(0.356)	(1.50)	(3.09)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.58	.62	.39	.70
F=	4.62	5.46	3.92	14.1
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

Table A-45

Combines, self-propelled.

Commodity No.: 721 2220

Equation No.	11	12	13	14
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.85	.LT.86	.LT.87
Dependent	PX	PX	PX	PX
Constant:	-72200	-57000	-48600	-65400
	(-1.05)	(-1.12)	(-1.35)	(-1.79)
VAROW	10.4	2.93	-0.786	-5.00
	(0.949)	(0.433)	(-0.158)	(-1.13)
XRIMF	-55.4	-90.2	-102	-146
	(-0.534)	(-1.05)	(-1.38)	(-2.00)
GNP72$	-2.72	7.58	11.8	17.7
	(-0.149)	(0.709)	(1.41)*	(2.31)**
PL	522	446	352	433
	(1.42)	(1.64)	(1.76)	(2.14)
PK	66.4	34.5	78.2	162
	(0.356)	(0.230)	(0.796)	(1.72)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.62	.69	.62	.60
F=	5.46	10.3	9.73	11.4
df(num,den)	(5,17)	(5,23)	(5,30)	(5,38)

Table A-46

Dozers, for mounting on tractors.

Commodity No.: 723 4052

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	2700 (0.444)	12.2 (.000663)	-771 (-0.105)	1560 (.0954)	4900 (0.702)	-988 (-.0503)
VAROW	1.43 (1.40)	-0.377 (-0.169)	-1.51 (-2.34)	2.14 (1.50)	1.24 (1.14)	-0.867 (-0.387)
XRIMF	-25.4 (-1.58)	2.92 (.0608)	-18.6 (-0.985)	-10.5 (-0.248)	-30.7 (-1.12)	10.8 (0.213)
GNP72$	-5.88 (-3.00)***	4.92 (0.986)			-5.95 (-3.03)***	5.83 (1.12)
PL	54.2 (1.54)	-28.8 (-0.302)	65.9 (1.60)	-38.0 (-0.413)	44.7 (1.16)	-17.5 (-0.177)
PK	-5.98 (-0.306)	18.8 (0.343)	-19.0 (-0.878)	46.3 (0.876)	-7.14 (-0.353)	4.89 (.0870)
D781794						
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-0.117 (-0.672)	.0994 (0.342)	-0.116 (-0.718)	0.204 (0.713)
Rho =	0.118 (0.912)	0.663 (6.80)	0.158 (1.23)	0.594 (5.67)	0.142 (1.10)	0.705 (7.64)
R-Squared =	.34	.07	.21	.10	.34	.06
F= df(num,den)	5.48 (5,53)	0.817 (5,53)	2.87 (5,53)	1.20 (5,53)	4.41 (6,52)	0.582 (5,52)
DW=	1.84	2.12	1.90	2.16	1.84	2.14

Table A-47

Dozers, for mounting on tractors.

Commodity No.: 723 4052

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-122	-16600	22100	-22400
	(-.0132)	(-0.935)	(1.91)	(-1.68)
VAROW	0.973	9.38	4.20	-4.75
	(0.868)	(4.34)	(1.13)	(-1.11)
XRIMF	-15.2	-2.53	-37.2	73.4
	(-0.818)	(-.0710)	(-0.784)	(1.34)
GNP72$	-4.47	-8.98	-14.4	16.7
	(-2.30)**	(-2.40)**	(-2.14)**	(2.16)**
PL	58.8	-13.9	1.10	17.6
	(1.15)	(-0.140)	(.0177)	(0.246)
PX	-3.52	176	-53.5	35.2
	(-0.148)	(3.84)	(-0.880)	(0.502)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.34	.58	.68	.68
F=	3.94	10.6	4.27	4.22
df(num,den)	(5,38)	(5,38)	(5,10)	(5,10)

Table A-48

Needles, sewing machine.

Commodity No.: 724 3920

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	168000	-452	191000	-252	226000	-466
	(1.22)	(-3.22)	(1.35)	(-1.41)	(1.58)	(-3.10)
VAROW	40.9	-.0752	-2.35	-.00729	18.7	-.0577
	(1.83)	(-3.18)	(-0.187)	(-0.467)	(0.740)	(-2.04)
XRIMF	239	-0.643	95.6	-0.291	28.0	-0.452
	(0.661)	(-1.75)	(0.244)	(-0.602)	(.0720)	(-1.09)
GNP72$	-696	0.115			-44.0	.0941
	(-1.60)*	(2.53)***			(-0.970)	(1.89)*
PL	-711	3.33	-739	2.09	-877	3.29
	(-0.906)	(4.13)	(-0.920)	(2.06)	(-1.10)	(3.90)
PK	-554	0.865	-784	0.592	-685	0.888
	(-1.28)	(1.95)	(-1.76)	(1.04)	(-1.55)	(1.90)
D781794	40500	-30.4	39600	-32.5	40700	-30.7
	(7.41)	(-5.27)	(7.40)	(-5.01)	(7.48)	(-5.19)
YHCAP83						
YHCAP85			-5.54	.00367	-4.74	.00268
			(-2.12)**	(1.16)	(-1.76)**	(0.905)
YHCAP86						
YHCAP87						
Rho =	0.240	0.158	0.302	0.442	0.276	0.202
	(1.90)	(1.23)	(2.43)	(3.79)	(2.20)	(1.58)
R-Squared =	.60	.54	.60	.40	.61	.53
F=	12.8	10.3	12.7	5.81	11.4	8.12
df(num,den)	(6,52)	(6,52)	(6,52)	(6,52)	(7,51)	(7,51)
DW=	1.77	2.10	1.71	2.35	1.73	2.12

Table A-49

Needles, sewing machine.

Commodity No.: 724 3920

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85.	.GE.85
Dependent	QX	PX	QX	PX
Constant:	176000	-488	132000	-379
	(1.88)	(-1.77)	(4.47)	(-2.12)
VAROW	20.1	-.0140	50.2	-0.115
	(1.60)	(-0.377)	(4.70)	(-1.78)
XRIMF	-282	-.0523	146	-1.27
	(-1.78)	(0.112)	(1.22)	(-1.77)
GNP72$	-43.9	.0576	-77.3	0.114
	(-2.18)**	(0.973)	(-4.63)***	(1.13)
PL	-863	3.47	-661	4.14
	(-1.71)	(2.34)	(-3.93)	(4.07)
PX	-68.4	0.389	-249	0.303
	(-0.244)	(0.474)	(-1.68)	(0.337)
D781794	67000	-34.6	9730	-20.5
	(29.0)	(-5.11)	(5.63)	(-1.96)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.98	.60	.93	.69
F=	176	5.5	54.4	8.82
df(num,den)	(6,22)	(6,22)	(6,24)	(6,24)

Table A-50

Centrifugal pumps for liquids, single-stage, single-suction, close-coupled, under 2-inch.

Commodity No.: 742 4026

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	271000 (0.724)	-3040 (-2.20)	93800 (0.270)	-2380 (-1.86)	270000 (0.711)	-3060 (-2.20)
VAROW	104 (2.17)	-0.363 (-2.05)	21.3 (0.541)	-0.137 (-0.946)	98.3 (1.26)	-0.435 (-1.52)
XRIMF	297 (0.410)	-.0398 (-.0150)	107 (0.132)	0.121 (.0408)	260 (0.317)	-0.470 (-0.156)
GNP72$	-178 (-1.76)**	0.523 (1.41)*			-167 (-1.15)	0.645 (1.21)
PL	-2160 (-1.26)	14.8 (2.35)	-1380 (-0.845)	12.2 (2.04)	-2130 (-1.22)	15.1 (2.35)
PK	436 (0.371)	12.4 (2.87)	495 (0.414)	12.0 (2.72)	420 (0.354)	12.2 (2.80)
D754794	105000 (7.70)	-322 (-6.41)	97500 (7.83)	-296 (-6.47)	105000 (7.48)	-325 (-6.31)
YHCAP83			-7.09 (-1.32)*	.0154 (0.778)	-0.779 (-0.101)	-.00900 (-0.319)
YHCAP85						
YHCAP86						
YHCAP87						
R-Squared =	.87	.90	.86	.90	.87	.90
F= df(num,den)	57.5 (6,53)	80.0 (6,53)	55.8 (6,53)	77.7 (6,53)	48.3 (7,52)	67.4 (7,52)
DW=	1.97	1.95	1.98	1.83	1.96	1.97

Table A-51

Centrifugal pumps for liquids, single-stage, single-suction, close-coupled, under 2-inch.

Commodity No.: 742 4026

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-311000 (-0.347)	-1720 (-0.509)	4460 (.00862)	-2230 (-1.20)
VAROW	188 (1.34)	-.0353 (-.0669)	11.8 (0.102)	-0.421 (-1.01)
XRIMF	2050 (1.34)	-0.661 (-0.14)	-1080 (-0.876)	2.36 (0.528)
GNP72$	-137 (-0.581)	-0.240 (-0.270)	-18.5 (-.0857)	0.634 (0.814)
PL	-884 (-0.197)	12.5 (0.739)	131 (.0523)	7.20 (0.796)
PK	1270 (0.545)	7.82 (0.890)	799 (0.421)	11.4 (1.66)
D754794	92200 (3.83)	-321 (-3.54)	80100 (3.20)	-260 (-2.89)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.92	.90	.81	.91
F=	30.4	23.6	21.8	49.2
df(num,den)	(6,16)	(6,16)	(6,30)	(6,30)

Table A-52

Centrifugal pumps for liquids, single-stage, single-suction, close-coupled, under 2-inch.

Commodity No.: 742 4026

Equation No.	11	12	13	14
Model	D	E	D	E
Dependent	QX	QX	QX	QX
Constant:	-272000	162000	-436000	43600
	(-0.785)	(0.457)	(-1.34)	(0.131)
VAROW	71.3	203	96.0	220
	(1.82)	(3.52)	(2.58)	(4.36)
XRIMF	1230	1250	1580	1370
	(1.50)	(1.63)	(2.12)	(2.00)
GNP72$		-317		-313
		(-2.95)***		(-3.33)***
PL	-436	-1990	286	-1300
	(-0.267)	(-1.23)	(0.182)	(-0.856)
PK	1090	616	1140	548
	(0.925)	(0.555)	(1.03)	(0.533)
D754794	91500	110000	8710	105000
	(7.56)	(8.49)	(7.52)	(8.82)
YHCAP83				
YHCAP85	8.42	16.8		
	(1.47)	(2.77)***		
YHCAP86			17.7	24.6
			(2.94)***	(4.16)***
YHCAP87				
R-Squared =	.86	.88	.88	.90
F=	56.4	56.6	64.0	66.9
df(num,den)	(6,53)	(7,52)	(6,53)	(7,52)
DW=	2.00	2.25	1.88	2.15

Table A-53

Air compressors, stationary, over 100 hp.

Commodity No.: 743 1035

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-3360 (-1.65)	67900 (0.749)	-2900 (-1.75)	25800 (0.285)	-3180 (-1.60)	18800 (0.195)
VAROW	-0.290 (-1.20)	-10.4 (-0.730)	0.369 (2.55)	-2.07 (-0.260)	-26.0 (-1.07)	-4.12 (-0.272)
XRIMF	-2.05 (-0.386)	34.1 (0.142)	-9.08 (-2.05)	145 (0.593)	-3.91 (-0.746)	154 (0.594)
GNP72$	1.47 (2.67)***	7.34 (0.267)			1.36 (2.54)**	4.32 (0.152)
PL	13.5 (1.29)	-333 (-0.645)	12.9 (1.36)	-107 (-0.205)	12.4 (1.20)	-69.6 (-0.129)
PK	6.52 (1.08)	-46.1 (-0.160)	16.1 (30.1)	-51.5 (-0.178)	8.52 (1.45)	-58.4 (-0.196)
D781794						
YHCAP83						
YHCAP85						
YHCAP86			-.0395 (-1.35)*	3.08 (1.79)**	-.0341 (-.0122)	3.09 (1.75)**
YHCAP87						
Rho =	0.688 (7.29)	0.296 (2.38)	0.448 (3.95)	0.343 (2.81)	0.640 (6.39)	0.356 (2.93)
R-Squared =	.27	.10	.48	.14	.34	.14
F=	3.96	1.25	9.88	1.79	4.50	1.45
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.18	1.99	2.11	2.03	2.19	2.04

Table A-54

Air compressors, stationary, over 100 hp.

Commodity No.: 743 1035

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	-7120	259000	-3570	-27700
	(-3.21)	(2.71)	(-3.57)	(-2.80)
VAROW	0.578	22.6	-1.02	-52.5
	(1.89)	(1.72)	(-2.27)	(-1.18)
XRIMF	-4.25	-155	-1.56	616
	(-0.940)	(-0.795)	(-3.67)	(1.46)
GNP72$	0.319	-63.1	1.90	122
	(0.621)	(-2.86)***	(2.73)**	(1.76)**
PL	28.1	-1220	26.6	-488
	(2.29)	(-2.30)	(4.29)	(-0.796)
PK	26.2	-258	7.91	-174
	(4.32)	(-0.989)	(1.59)	(-0.353)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.75	.31	.80	.41
F=	17.6	2.67	14.0	2.48
df(num,den)	(5,30)	(5,30)	(5,18)	(5,18)

Table A-55

Air compressors, stationary, over 100 hp.

Commodity No.: 743 1035

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	-2920	36900	-3880	50000
	(-1.78)	(0.398)	(-2.12)	(0.529)
VAROW	0.380	-4.49	-0.575	1.85
	(2.69)	(-0.561)	(-2.31)	(.0995)
XRIMF	-9.52	117	-2.79	107
	(-2.14)	(0.457)	(-0.585)	(0.416)
GNP72$			2.15	-12.7
			(3.90)***	(-0.371)
PL	13.5	-177	13.4	-247
	(1.45)	(-0.334)	(1.40)	(-0.464)
PK	15.9	-20.5	8.72	3.69
	(3.00)	(-.0689)	(1.60)	(.0122)
D781794				
YHCAP83	-.0401	1.99	-.0892	2.28
	(-1.48)*	(1.26)	(-3.13)***	(1.19)
YHCAP85				
YHCAP86				
YHCAP87				
Rho =	0.453	0.360	0.644	0.339
	(3.90)	(2.96)	(6.46)	(2.76)
R-Squared =	.49	.12	.43	.12
F=	10.2	1.39	6.46	1.19
df(num,den)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.05	2.00	2.07	1.99

Table A-56

Typewriters, standard, non-portable, electric, new.

Commodity No.: 751 1040

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-69900	1060	-122000	1100	-90700	1120
	(-0.858)	(2.36)	(-1.75)	(2.66)	(-1.34)	(2.60)
VAROW	8.99	-.00657	2.00	-0.114	24.6	-0.103
	(0.800)	(-.0963)	(0.335)	(-3.18)	(1.88)	(-1.19)
XRIMF	-208	1.78	-145	1.32	-218	1.31
	(-0.973)	(1.51)	(-0.759)	(1.14)	(-1.19)	(1.12)
GNP72$	-17.8	-0.184			-47.9	-.0233
	(-0.771)	(-1.38)			(-1.98)***	(-0.148)
PL	842	-6.20	1080	-6.31	993	-6.37
	(1.90)	(-2.46)	(2.74)	(-2.65)	(2.62)	(-2.62)
PK	5.98	0.264	23.2	-0.174	126	-0.128
	(.0237)	(0.187)	(0.104)	(-0.131)	(0.588)	(-.0932)
D781794						
YHCAP83			2.11	-.0167	3.63	-.0160
			(1.80)*	(-2.33)***	(2.68)****	(-1.80)*
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.498	0.342	0.389	0.323	0.353	0.323
	(4.41)	(2.80)	(3.24)	(2.62)	(2.90)	(2.62)
R-Squared =	.18	.66	.26	.69	.33	.69
F=	2.36	20.8	3.80	24.0	4.32	19.6
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.12	1.98	2.10	1.97	2.02	1.96

Table A-57

Typewriters, standard, non-portable, electric, new.

Commodity No.: 751 1040

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	68400	107	-122000	1480
	(0.497)	(0.115)	(-2.06)	(4.24)
VAROW	29.4	-0.170	33.4	.00592
	(1.34)	(-1.15)	(1.53)	(.0460)
XRIMF	-314	2.90	-67.2	.000359
	(-1.51)	(2.07)	(-0.290)	(.00263)
GNP72$	-57.0	0.300	-46.6	-0.331
	(-1.56)	(1.22)	(-1.36)*	(-1.63)
PL	381	-1.98	890	-7.07
	(0.518)	(-0.399)	(2.47)	(-3.32)
PX	-471	.0349	316	0.254
	(-1.26)	(.0138)	(1.07)	(0.145)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.62	.61	.42	.88
F=	5.65	5.29	4.54	47.6
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

Table A-58

Radios, household type, without phonograph.

Commodity No.: 762 0040

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-1400000	-33.9	-208000	-40.5	-1270000	-79.4
	(-5.12)	(-0.319)	(-0.361)	(-0.372)	(-3.95)	(-0.712)
VAROW	-226	-.0184	93.7	-.00475	-242	-.0177
	(-4.65)	(-1.17)	(1.82)	(-0.501)	(-4.56)	(-1.11)
XRIMF	-1150	-0.178	154	-0.120	-1440	-.0948
	(-1.60)	(-0.633)	(0.103)	(-0.426)	(-1.77)	(-0.328)
GNP72$	590	.0196			595	.0253
	(6.56)***	(0.626)			(6.57)***	(0.815)
PL	8470	0.481	826	0.474	7950	0.693
	(5.23)	(0.806)	(0.256)	(0.767)	(4.51)	(1.13)
PK	1070	.0677	503	0.121	921	.0913
	(1.21)	(0.199)	(0.258)	(0.344)	(1.01)	(0.272)
D781794						
DUM743	-7190	-18.0	6270	-17.3	-8710	-17.9
	(-0.300)	(-3.65)	(0.298)	(-3.66)	(-0.361)	(-3.62)
DUM781	205000	-4.00	198000	-3.76	206000	-4.10
	(8.88)	(-0.806)	(8.90)	(-0.775)	(8.88)	(-0.822)
YHCAP83						
YHCAP85						
YHCAP86						
YHCAP87			-22.6	.00208	-6.40	.00228
			(-2.29)**	(0.983)	(0.768)	(1.06)
Rho =	-0.173	0.418	0.647	0.470	-0.173	0.400
	(-1.35)	(3.54)	(6.51)	(4.09)	(-1.35)	(3.36)
R-Squared =	.85	.24	.68	.25	.85	.26
F=	42.1	2.35	15.2	2.38	36.6	2.26
df(num,den)	(7,51)	(7,51)	(7,51)	(7,51)	(8,50)	(8,50)
DW=	1.98	1.54	2.16	1.50	1.95	1.52

Table A-59

Radios, household type, without phonograph.

Commodity No.: 762 0040

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.87	.LT.87	.GE.87	.GE.87
Dependent	QX	PX	QX	PX
Constant:	-1410000	-82.9	-530000	341
	(-2.53)	(-0.814)	(-0.939)	(1.56)
VAROW	-2.08	-.0478	-200	0.130
	(-3.07)	(-3.86)	(-1.10)	(1.84)
XRIMF	-1100	0.266	845	-0.130
	(-0.982)	(-1.29)	(0.364)	(-0.144)
GNP72$	561	.0726	436	-0.324
	(4.80)***	(3.39)***	(1.33)	(-2.55)**
PL	8330	1.02	5321	-1.41
	(2.69)	(1.80)	(1.76)	(-1.20)
PX	1370	-0.237	-3330	0.599
	(0.948)	(-0.896)	(-1.12)	(0.520)
D781794				
DUM743	-8350	-19.2		
	(-0.310)	(-3.89)		
DUM781	202000	-7.21		
	(7.73)	(-1.50)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.82	.47	.46	.75
F=	22.7	4.54	1.73	6.12
df(num,den)	(7,36)	(7,36)	(5,10)	(5,10)

Table A-60

Shavers, electric.

Commodity No.: 775 4030

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	1250 (0.438)	-2440 (-0.705)	2850 (1.07)	.0839 (1.29)	2490 (0.941)	-3670 (-1.10)
VAROW	.0226 (.0469)	-0.184 (-0.347)	-.00877 (-.0362)	-0.472 (-1.56)	-0.479 (-0.901)	0.136 (0.246)
XRIMF	-11.3 (-1.49)	-13.9 (-1.52)	-17.2 (-2.30)	-6.44 (-0.693)	-17.3 (-2.37)	-11.4 (-1.27)
GNP72$	0.341 (0.377)	-1.03 (-0.997)			0.861 (0.959)	-1.37 (-1.36)
PL	-2.12 (-0.127)	24.2 (1.24)	-8.09 (-0.523)	32.2 (1.62)	-6.48 (-0.426)	30.2 (1.60)
PK	-0.148 (-.0161)	26.5 (2.42)	1.36 (0.164)	23.4 (2.12)	-0.299 (-.0360)	27.9 (2.69)
D781794						
YHCAP83						
YHCAP85						
YHCAP86			-.0852 (-1.45)*	.0839 (1.29)*	-0.112 (-1.78)**	0.101 (1.56)*
YHCAP87						
Rho =	0.122 (0.945)	0.340 (2.77)	0.046 (0.354)	0.365 (3.01)	0.0173 (0.173)	0.290 (2.33)
R-Squared =	.35	.42	.41	.41	.44	.48
F= df(num,den)	5.79 (5,53)	7.74 (5,53)	7.49 (5,53)	7.32 (5,53)	6.79 (6,52)	8.16 (6,52)
DW=	1.98	1.95	2.00	1.99	2.02	1.96

Table A-61

Shavers, electric.

Commodity No.: 775 4030

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	5520	116	2310	-3370
	(1.30)	(.0275)	(0.667)	(-1.02)
VAROW	-0.333	0.968	0.195	-1.62
	(-0.566)	(1.66)	(0.125)	(-1.09)
XRIMF	-11.9	-10.2	-23.9	-18.0
	(-1.38)	(-1.20)	(-1.62)	(-1.29)
GNP72$	0.959	-2.38	-1.16	0.761
	(0.972)	(-2.44)***	(-0.482)	(0.331)
PL	-28.0	4.50	11.0	50.3
	(-1.18)	(0.193)	(0.513)	(2.47)
PK	-9.84	22.6	-1.12	7.71
	(-0.846)	(1.96)	(-.0652)	(0.471)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.44	.30	.38	.77
F=	4.80	2.51	2.18	11.8
df(num,den)	(5,30)	(5,30)	(5,18)	(5,18)

Table A-62

Vacuum cleaners, electric, household type.

Commodity No.: 775 7520

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-12000	7740	-1880	5030	-11000	7960
	(-2.14)	(0.838)	(-0.334)	(0.647)	(-2.02)	(0.852)
VAROW	0.482	1.28	1.13	0.916	0.154	1.25
	(0.657)	(1.30)	(2.24)	(1.17)	(0.206)	(1.26)
XRIMF	-3.10	21.7	-16.7	28.0	-8.04	21.5
	(-0.210)	(0.925)	(-1.14)	(1.33)	(-0.558)	(0.904)
GNP72$	290	-1.61			3.24	-1.53
	(1.86)*	(-0.634)			(2.13)**	(-0.592)
PL	65.5	-50.4	29.7	-44.7	60.7	-52.4
	(2.18)	(-1.13)	(0.947)	(-1.04)	(2.07)	(-1.16)
PK	7.93	1.78	-7.10	-.0534	9.61	1.93
	(0.463)	(.0690)	(-0.383)	(-0.437)	(0.580)	(.0740)
D781794						
YHCAP83						
YHCAP85			-0.138	-.0534	-0.149	-.0464
			(-1.52)*	(-0.437)	(-1.71)**	(-0.376)
YHCAP86						
YHCAP87						
Rho =	0.572	0.833	0.709	0.843	0.548	0.836
	(5.35)	(11.6)	(7.72)	(12.0)	(5.03)	(11.7)
R-Squared =	.56	.07	.38	.07	.61	.08
F=	13.7	0.836	6.64	0.812	13.6	0.713
df(num,den)	(5,53)	(5,53)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.29	2.06	2.56	2.02	2.36	2.02

Table A-63

Vacuum cleaners, electric, household type.

Commodity No.: 775 7520

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-14200	-187	-13000	-6780
	(-1.70)	(-.0166)	(-4.89)	(-0.858)
VAROW	1.96	3.47	-1.59	-2.56
	(1.76)	(2.32)	(-1.63)	(-0.882)
XRIMF	-11.2	17.3	-6.95	-143
	(-0.798)	(0.912)	(-0.670)	(-4.65)
GNP72$	1.64	-4.43	5.61	-1.76
	(0.935)	(-1.87)*	(3.79)***	(-0.400)
PL	82.5	-3.52	75.3	130
	(1.84)	(-.0585)	(4.87)	(2.83)
PK	9.10	23.0	3.91	103
	(0.368)	(0.690)	(0.294)	(2.61)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.89	.26	.91	.69
F=	37.2	1.58	53.5	11.4
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-64

Vacuum cleaners, electric, household type.

Commodity No.: 775 7520

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	-3160	6360	-9870	4980
	(-0.557)	(0.846)	(-1.65)	(0.538)
VAROW	1.20	0.828	0.729	0.667
	(2.30)	(1.07)	(0.887)	(0.655)
XRIMF	-8.47	23.3	-1.79	26.1
	(-0.565)	(1.14)	(-0.115)	(1.12)
GNP72$			2.16	0.746
			(1.19)	(0.264)
PL	40.1	-54.7	59.0	-51.5
	(1.27)	(-1.32)	(1.89)	(-1.18)
PK	-16.1	7.26	-0.520	7.71
	(-0.853)	(0.288)	(-.0290)	(0.302)
D781794				
YHCAP83	0.137	-0.222	.0734	-0.237
	(1.60)	(-1.99)**	(0.782)	(-1.90)*
YHCAP85				
YHCAP86				
YHCAP87				
Rho =	0.754	0.852	0.639	0.856
	(8.82)	(12.5)	(6.38)	(12.7)
R-Squared =	.32	.13	.49	.14
F=	5.10	1.64	8.29	1.37
df(num,den)	(5,53)	(5,53)	(6,52)	(6,52)
DW=	2.43	2.02	2.32	2.02

Table A-65

Vacuum cleaners, electric, household type.

Commodity No.: 775 7520

Equation No.	15	16	17	18
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-8630	-433	-19400	-10200
	(-0.845)	(-.0306)	(-6.48)	(-1.59)
VAROW	3.08	4.19	-1.02	-1.94
	(1.90)	(1.86)	(-0.921)	(-0.824)
XRIMF	-8.24	25.2	6.96	-142
	(-0.534)	(1.18)	(0.595)	(-5.67)
GNP72$	.0425	-6.08	6.06	-2.28
	(.0157)	(-1.61)	(3.50)***	(-0.613)
PL	57.5	-15.2	95.6	144
	(1.05)	(-0.201)	(5.25)	(3.69)
PK	-11.9	40.0	15.2	115
	(-0.429)	(1.04)	(1.01)	(3.58)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.88	.28	.92	.71
F=	25.8	1.30	67.8	15.2
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

Table A-66

Toasters, automatic, electric, household type.

Commodity No.: 775 8625

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-2560 (-2.89)	8560 (0.417)	-1370 (-1.44)	13400 (0.679)	-2570 (-2.83)	16600 (0.809)
VAROW	.0486 (0.398)	-3.56 (-1.08)	0.300 (3.60)	-9.34 (-5.22)	.0519 (0.400)	-6.77 (-1.79)
XRIMF	-2.45 (-1.05)	-101 (-1.87)	-3.81 (-1.53)	-130 (-2.35)	-2.40 (-1.00)	-134 (-2.38)
GNP72$	0.616 (2.45)**	-8.86 (-1.40)			0.613 (2.39)**	-5.10 (-0.781)
PL	11.0 (2.27)	174 (1.48)	6.13 (1.14)	162 (1.44)	11.0 (2.24)	150 (1.30)
PK	6.05 (2.21)	18.9 (0.289)	5.53 (1.78)	-5.25 (-.0858)	6.06 (2.19)	5.21 (.0813)
D781794						
YHCAP83						
YHCAP85			.0371 (0.235)	-0.778 (-2.07)**	.00124 (.0828)	-0.668 (-1.65)*
YHCAP86						
YHCAP87						
Rho =	0.498 (4.42)	0.236 (1.86)	0.619 (6.06)	0.200 (1.57)	0.498 (4.41)	0.216 (1.70)
R-Squared =	.65	.55	.49	.58	.65	.58
F= df(num,den)	19.9 (5,53)	12.8 (5,53)	10.2 (5,53)	14.9 (5,53)	16.3 (6,52)	12.0 (6,52)
DW=	1.89	1.95	1.88	1.97	1.89	1.97

Table A-67

Toasters, automatic, electric, household type.

Commodity No.: 775 8625

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-4140	19100	-2570	1160
	(-2.43)	(0.518)	(-4.49)	(.0649)
VAROW	-.0855	-7.40	-.0896	0.546
	(-0.378)	(-1.51)	(-0.425)	(.0828)
XRIMF	-5.53	-198	-4.58	-14.6
	(-1.93)	(-3.19)	(-2.05)	(-0.209)
GNP72$	0.850	-8.75	0.642	-6.31
	(2.38)***	(-1.13)	(2.01)*	(-0.632)
PL	21.4	257	14.7	-36.2
	(2.35)	(1.30)	(4.40)	(-0.347)
PK	9.84	-39.4	5.08	171
	(1.96)	(-0.361)	(1.77)	(1.91)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.83	.72	.90	.78
F=	22.8	11.8	45.1	18.0
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)

Table A-68

Sun or glare glasses, and sun goggles.

Commodity No.: 884 2220

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-11100	11800	-14400	9360	-13600	14200
	(-1.12)	(1.01)	(-1.61)	(1.38)	(-1.39)	(1.24)
VAROW	4.46	-0.249	4.40	-0.301	4.70	-0.268
	(3.05)	(-0.361)	(5.45)	(-0.444)	(3.05)	(-0.391)
XRIMF	27.4	-24.5	30.4	-21.6	28.3	-24.2
	(0.978)	(-1.41)	(1.16)	(-1.31)	(1.01)	(-1.40)
GNP72$	-0.616	-0.592			-0.734	-1.62
	(-0.188)	(-0.206)			(-0.223)	(-0.550)
PL	-4.23	8.41	9.81	15.7	7.12	8.72
	(-.0763)	(0.276)	(0.184)	(0.577)	(0.129)	(0.289)
PK	49.4	11.8	54.7	10.6	56.2	9.85
	(1.65)	(0.671)	(1.94)	(0.611)	(1.93)	(0.563)
D781794	-1490	808	-1560	802	-1520	790
	(-3.79)	(3.38)	(-4.56)	(3.42)	(-3.92)	(3.33)
DUM751	998	-1010	1020	-994	998	-1040
	(2.14)	(-4.80)	(2.21)	(-5.30)	(2.10)	(-4.98)
DUM752	969	464	991	482	954	434
	(2.05)	(2.25)	(2.20)	(2.61)	(1.98)	(2.11)
DUM764	3050	-241	3080	-240	3060	-252
	(7.81)	(-1.52)	(7.83)	(-1.55)	(7.63)	(-1.60)
YHCAP85			.0944	.0991	.0976	0.111
			(0.604)	(1.30)*	(0.617)	(1.39)*
Rho =	0.510	0.994	0.463	0.994	0.462	0.993
	(4.56)	(68.8)	(4.02)	(67.4)	(4.00)	(66.7)
R-Squared =	.74	.65	.76	.66	.76	.66
F=	15.8	10.0	16.8	10.6	14.8	9.39
df(num,den)	(9,49)	(9,49)	(9,49)	(9,49)	(10,48)	(10,48)
DW=	2.01	1.47	2.01	1.37	2.02	1.36

Table A-69

Sun or glare glasses, and sun goggles.

Commodity No.: 884 2220

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-25600	-17300	-3570	3890
	(-1.88)	(-0.960)	(-0.322)	(0.934)
VAROW	6.66	-1.53	6.23	1.28
	(3.24)	(-0.562)	(2.08)	(1.14)
XRIMF	47.3	-79.8	54.1	-6.97
	(1.49)	(-1.89)	(1.69)	(-0.578)
GNP72$	0.216	2.22	-6.02	-2.61
	(-.0595)	(0.462)	(-1.13)	(-1.30)
PL	45.3	158	-9.15	286
	(0.563)	(1.48)	(0.159)	(0.132)
PK	72.4	42.8	3.33	-12.4
	(1.65)	(0.733)	(-.0783)	(-0.775)
D781794	-1830	1580	-744	2840
	(-4.45)	(2.90)	(-1.23)	(12.5)
DUM751	1130	-1500		
	(1.99)	(-1.98)		
DUM752	981	252		
	(1.75)	(0.338)		
DUM764	3220	-486		
	(7.30)	(-0.830)		
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.93	.83	.60	.98
F=	30.0	10.5	5.96	203
df(num,den)	(9,19)	(9,19)	(6,24)	(6,24)

Table A-70

Sun or glare glasses, and sun goggles.

Commodity No.: 884 2220

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	-13300	9860	-12600	8010
	(-1.46)	(1.46)	(-1.25)	(0.678)
VAROW	4.39	.0264	4.58	.0166
	(5.38)	(.0386)	(3.08)	(.0241)
XRIMF	32.9	-35.6	31.1	-34.8
	(1.25)	(-2.05)	(1.08)	(-1.95)
GNP72$			-0.521	0.660
			(-0.158)	(0.228)
PL	5.06	2.36	2.97	5.16
	(.0932)	(.0881)	(.0525)	(0.174)
PK	48.4	13.4	49.5	13.7
	(1.66)	(0.792)	(1.65)	(0.798)
D781794	-1540	808	-1520	812
	(-4.38)	(3.52)	(-3.83)	(3.49)
DUM751	1030	-999	1020	-979
	(2.27)	(-5.43)	(2.16)	(-4.77)
DUM752	1010	448	985	467
	(2.28)	(2.46)	(2.06)	(2.32)
DUM764	3050	-239	3040	-234
	(7.90)	(-1.57)	(7.71)	(-1.51)
YHCAP83				
YHCAP85				
YHCAP86	.0971	-0.136	.0961	-0.140
	(0.630)	(-1.89)*	(0.617)	(-1.87)*
YHCAP87				
Rho =	0.502	0.994	0.502	0.994
	(4.46)	(68.9)	(4.46)	(70.3)
R-Squared =	.75	.67	.75	.67
F=	16.1	11.2	14.2	9.86
df(num,den)	(9,49)	(9,49)	(10,48)	(10,48)
DW=	1.98	1.26	1.98	1.26

Table A-71

Sun or glare glasses, and sun goggles.

Commodity No.: 884 2220

Equation No.	15	16	17	18
Model	E	E	E	E
Dependent	QX	PX	QX	PX
Constant:	-10000	24300	-10800	-3320
	(-0.949)	(1.61)	(-1.03)	(-0.582)
VAROW	5.68	-0.360	4.73	0.162
	(3.51)	(-0.683)	(3.12)	(0.344)
XRIMF	50.1	-16.2	3.82	-26.9
	(1.66)	(-1.00)	(1.26)	(-1.68)
GNP72$	-1.95	-2.17	-0.584	4.16
	(-0.552)	(-0.741)	(-0.171)	(1.89)*
PL	-22.1	6.90	-10.7	13.9
	(-0.381)	(2.63)	(-0.181)	(0.567)
PK	40.3	4.06	42.2	2.08
	(1.27)	(0.249)	(1.34)	(1.32)
D781794	-1400	610	-1490	752
	(-3.48)	(2.78)	(-3.66)	(2.67)
DUM751	1160	-1080	1070	-914
	(2.49)	(-6.07)	(2.27)	(-5.66)
DUM752	1040	398	1030	491
	(2.22)	(2.28)	(2.14)	(3.03)
DUM764	3100	-205	3050	-169
	(7.71)	(-1.66)	(7.69)	(-1.48)
YHCAP85	0.144	0.141		
	(0.914)	(2.04)**		
YHCAP86			.0827	-0.214
			(0.530)	(-3.68)****
Rho 1 =	0.416	1.36	0.505	1.41
	(3.22)	(11.2)	(3.85)	(12.2)
Rho 2 =	0.179	-0.366	.0413	-0.471
	(1.38)	(-3.00)	(0.314)	(-4.06)
R-Squared =	.73	.76	.74	.80
F=	13.0	14.5	13.3	18.3
df(num,den)	(10,47)	(10,47)	(10,47)	(10,47)
DW=	2.03	2.09	2.00	2.03

Table A-72

Clocks, electric.

Commodity No.: 885 2020

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-1000000 (-0.970)	-44300 (-2.99)	-1430000 (-1.46)	-38500 (-2.62)	-960000 (-0.965)	-44600 (-2.98)
VAROW	394 (2.99)	-3.82 (-1.74)	322 (3.74)	1.10 (0.869)	424 (2.81)	-2.31 (-0.850)
XRIMF	836 (0.309)	19.5 (.0499)	2760 (1.06)	16.4 (0.407)	179 (.0679)	27.1 (0.673)
GNP72$	-248 (-0.874)	9.95 (2.29)**			-334 (-1.07)	7.36 (1.42)
PL	1650 (0.302)	2.40 (2.90)	2580 (0.468)	220 (2.62)	1940 (0.362)	240 (2.87)
PK	5600 (1.79)	99.6 (2.14)	5120 (1.58)	114 (2.40)	5940 (1.94)	103 (2.18)
D781794						
YHCAP83			-1.34 (-.0883)	0.487 (1.98)**	8.75 (0.524)	0.272 (0.949)
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.600 (5.77)	0.396 (3.31)	0.653 (6.63)	0.416 (3.52)	0.556 (5.14)	0.407 (3.43)
R-Squared =	.28	.24	.25	.21	.32	.24
F= df(num,den)	4.21 (5,53)	3.28 (5,53)	3.50 (5,53)	2.80 (5,53)	3.99 (6,52)	2.79 (5,52)
DW=	1.90	2.11	1.95	2.08	1.88	2.09

Table A-73

Clocks, electric.

Commodity No.: 885 2020

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-634000	-57200	-772000	-51400
	(-0.361)	(-1.69)	(-1.14)	(-4.38)
VAROW	884	5.58	96.0	-3.63
	(3.16)	(1.04)	(0.384)	(-0.839)
XRIMF	-1430	137	-775	-112
	(-0.540)	(2.69)	(-0.292)	(-2.45)
GNP72$	-969	0.264	206	2.85
	(-2.08)**	(.0294)	(0.522)	(0.419)
PL	3700	228	1640	404
	(0.394)	(1.27)	(0.397)	(5.65)
PK	3062	114	3800	154
	(0.642)	(1.24)	(1.12)	(2.62)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.82	.41	.62	.64
F=	15.4	2.39	10.0	10.8
df(num,den)	(5,17)	(5,17)	(5,31)	(5,31)

Table A-74

Clocks, electric.

Commodity No.: 885 2020

Equation No.	11	12	13	14	15	16
Model	C	C	C	C	E	E
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85		
Dependent	QX	PX	QX	PX	QX	PX
Constant:	268000	-57000	-1840000	-40500	-1400000	-43800
	(0.176)	(-2.29)	(-2.78)	(-2.90)	(-1.68)	(-2.86)
VAROW	762	1.08	125	-4.80	469	-3.94
	(3.75)	(0.327)	(0.514)	(-0.934)	(3.54)	(-1.64)
XRIMF	-2650	105	2410	-118	-838	18.2
	(-1.03)	(2.50)	(0.934)	(-2.16)	(-0.375)	(0.442)
GNP72$	-955	7.87	395	2.45	-389	10.1
	(-2.98)***	(1.50)	(1.07)	(0.315)	(-1.58)	(2.24)**
PL	-2090	249	5880	377	4560	238
	(-0.256)	(1.87)	(1.53)	(4.63)	(0.988)	(2.81)
PK	4010	93.2	3740	110	7520	98.8
	(0.888)	(1.27)	(1.13)	(1.58)	(2.92)	(2.09)
D781794						
YHCAP83						
YHCAP85					35.9	-.0353
					(2.42)**	(-0.130)
YHCAP86						
YHCAP87						
Rho =					0.382	0.399
					(3.18)	(3.34)
R-Squared =	.73	.45	.76	.66	.49	.24
F=	12.5	3.71	15.5	9.87	8.35	2.67
df(num,den)	(5,23)	(5,23)	(5,25)	(5,25)	(6,52)	(6,52)
DW=					1.89	2.11

Table A-75

Tape, pressure-sensitive, plastic.

Commodity No.: 891 0945

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	-69800 (-0.781)	4870 (1.08)	15500 (0.203)	881 (0.208)	-90200 (-1.10)	3150 (0.695)
VAROW	18.6 (1.99)	-1.14 (-1.88)	27.9 (3.46)	-1.42 (-3.83)	17.4 (1.85)	-0.907 (-1.51)
XRIMF	-109 (-0.482)	-6.82 (-0.578)	-249 (-1.15)	5.72 (0.511)	-33.7 (-0.145)	-0.881 (-.0732)
GNP72$	45.9 (1.82)*	-1.44 (-1.14)			47.6 (1.94)*	-1.46 (-1.17)
PL	3.90 (.00915)	4.60 (0.189)	-207 (0.498)	18.7 (0.776)	106 (0.246)	12.2 (0.501)
PK	74.7 (0.304)	-4.18 (-0.303)	44.6 (0.177)	-6.89 (-0.498)	74.7 (0.303)	-5.39 (-0.394)
D781794						
YHCAP83						
YHCAP85						
YHCAP86			0.898 (0.824)	0.134 (1.92)**	1.10 (1.03)	0.132 (1.90)**
YHCAP87						
Rho =	0.863 (13.1)	0.531 (4.82)	0.877 (14.0)	0.569 (5.31)	0.842 (12.0)	0.549 (5.05)
R-Squared =	.32	.58	.26	.56	.36	.59
F= df(num,den)	4.96 (5,53)	15.0 (5,53)	3.83 (5,53)	13.2 (5,53)	4.90 (6,52)	12.5 (6,52)
DW=	2.10	2.02	1.97	1.98	2.05	1.97

Table A-76

Tape, pressure-sensitive, plastic.

Commodity No.: 891 0945

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.86	.LT.86	.GE.86	.GE.86
Dependent	QX	PX	QX	PX
Constant:	-308000	6040	-309000	6320
	(-3.65)	(1.70)	(-3.93)	(1.43)
VAROW	-11.5	-1.68	-42.1	-0.625
	(-0.986)	(-3.42)	(-1.19)	(-0.314)
XRIMF	82.2	0.555	-740	-57.6
	(0.478)	(.0764)	(-2.21)**	(-3.06)***
GNP72$	104	0.127	129	-5.91
	(5.34)	(0.154)	(2.34)	(-1.91)
PL	1250	-8.24	1390	66.7
	(2.67)	(-0.418)	(2.85)	(2.43)
PK	363	-15.9	973	-5.23
	(1.58)	(-1.64)	(2.48)	(-0.238)
D781794				
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.88	.83	.84	.90
F=	42.6	30.1	19.6	33.9
df(num,den)	(5,30)	(5,30)	(5,18)	(5,18)

Table A-77

Pens, ball-point type.

Commodity No.: 895 2115

Equation No.	1	2	3	4	5	6
Model	B	B	D	D	E	E
Dependent	QX	PX	QX	PX	QX	PX
Constant:	4410 (0.595)	-7480 (-0.591)	5020 (0.800)	-10100 (-0.817)	2350 (0.314)	-11100 (-0.836)
VAROW	2.60 (3.16)	0.581 (0.268)	2.49 (4.01)	2.57 (2.43)	2.13 (0.397)	1.95 (0.733)
XRIMF	3.82 (0.195)	38.1 (1.22)	1.92 (0.111)	39.0 (1.16)	7.76 (0.397)	39.8 (1.18)
GNP72$	-0.316 (-0.149)	3.51 (0.777)			1.60 (0.686)	1.32 (0.254)
PL	-25.2 (-0.692)	21.2 (0.287)	-33.2 (-0.970)	35.9 (0.492)	-26.8 (-0.754)	40.4 (0.527)
PX	-29.8 (-1.35)	-2.11 (-.0579)	-25.9 (-1.19)	14.4 (0.378)	-26.5 (-1.21)	11.7 (0.300)
D781794	-1890 (-6.63)	6940 (12.9)	-1860 (-6.69)	6900 (14.0)	-1900 (-6.71)	6840 (12.3)
DUM742	2090 (9.67)	-1600 (-2.43)	2100 (10.2)	-1720 (-2.68)	2130 (10.1)	-1690 (-2.55)
YHCAP83			-0.157 (-1.71)**	0.273 (1.21)	-0.188 (-1.85)**	0.240 (0.930)
YHCAP85						
YHCAP86						
YHCAP87						
Rho =	0.820 (11.0)	0.263 (2.09)	0.842 (12.0)	0.325 (2.64)	0.851 (12.4)	0.321 (2.61)
R-Squared =	.78	.92	.79	.91	.80	.91
F= df(num,den)	25.7 (7,51)	84.5 (7,51)	28.0 (7,51)	74.2 (7,51)	24.5 (8,50)	64.3 (8,50)
DW=	2.42	2.00	2.34	2.04	2.35	2.04

Table A-78

Pens, ball-point type.

Commodity No.: 895 2115

Equation No.	7	8	9	10
Model	C	C	C	C
Capac.Util.:	.LT.83	.LT.83	.GE.83	.GE.83
Dependent	QX	PX	QX	PX
Constant:	-31600	32100	7960	-13800
	(-5.05)	(1.38)	(1.30)	(-1.11)
VAROW	1.30	-0.301	4.05	-1.03
	(1.19)	(-.0742)	(2.13)	(-0.267)
XRIMF	-15.9	5.17	-49.1	72.9
	(-1.66)	(0.145)	(-2.50)	(1.84)
GNP72$	4.34	-1.92	-8.54	9.23
	(2.28)**	(-0.271)	(-2.59)***	(1.38)*
PL	177	-196	7.41	25.8
	(5.22)	(-1.55)	(0.205)	(0.352)
PK	40.5	-12.1	11.5	-18.9
	(2.35)	(-0.189)	(0.474)	(-0.384)
D781794	-1820	6720	-716	6760
	(-9.07)	(9.01)	(-2.36)	(11.0)
DUM742			2150	-1690
			(5.95)	(-2.31)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.96	.88	.83	.97
F=	62.2	20.2	20.7	146
df(num,den)	(6,16)	(6,16)	(7,29)	(7,29)

Table A-79

Pens, ball-point type.

Commodity No.: 895 2115

Equation No.	11	12	13	14
Model	D	D	E	E
Dependent	QX	PX	QX	PX
Constant:	4290	-14000	4660	-17300
	(0.666)	(-1.09)	(0.620)	(-1.23)
VAROW	2.53	2.77	2.58	1.67
	(4.06)	(2.49)	(3.11)	(0.727)
XRIMF	4.46	37.8	3.55	40.6
	(0.254)	(1.09)	(0.178)	(1.14)
GNP72$			-0.222	2.56
			(-0.103)	(0.550)
PL	-26.1	56.6	-27.2	71.5
	(-0.746)	(0.754)	(-0.735)	(0.898)
PK	-30.5	24.0	-30.2	21.0
	(-1.38)	(0.606)	(-1.35)	(0.516)
D781794	-1910	6940	-1900	6770
	(-6.82)	(14.5)	(-6.59)	(12.0)
DUM742	2100	-1740	2090	-1680
	(9.96)	(-2.77)	(9.63)	(-2.64)
YHCAP83				
YHCAP85	-.0438	0.367	-.0426	0.350
	(-0.444)	(1.59)*	(-0.427)	(1.48)*
YHCAP86				
YHCAP87				
Rho =	0.829	0.378	0.828	0.383
	(11.4)	(3.14)	(11.3)	(3.19)
R-Squared =	.78	.90	.78	.90
F=	26.0	66.3	22.3	56.6
df(num,den)	(7,51)	(7,51)	(8,50)	(8,50)
DW=	2.39	2.03	2.39	2.02

Table A-80

Pens, ball-point type.

Commodity No.: 895 2115

Equation No.	15	16	17	18
Model	C	C	C	C
Capac.Util.:	.LT.85	.LT.85	.GE.85	.GE.85
Dependent	QX	PX	QX	PX
Constant:	-21000	17400	22600	-36600
	(-3.52)	(0.910)	(3.20)	(-2.71)
VAROW	2.58	-0.516	4.40	-3.02
	(2.95)	(-0.184)	(2.24)	(-0.807)
XRIMF	-12.8	14.8	-31.9	46.6
	(-1.27)	(0.457)	(-1.57)	(1.21)
GNP72$	1.21	-0.254	-11.8	16.4
	(0.794)	(-.0520)	(-3.42)***	(2.49)**
PL	117	-114	-43.2	118
	(3.58)	(-1.09)	(-1.16)	(1.67)
PK	28.9	3.43	-45.0	48.9
	(1.58)	(.0585)	(-1.65)	(0.942)
D781794	-1780	7410	52.1	5970
	(-9.95)	(12.9)	(0.135)	(8.10)
DUM742			2230	-1770
			(6.84)	(-2.85)
YHCAP83				
YHCAP85				
YHCAP86				
YHCAP87				
R-Squared =	.93	.96	.89	.98
F=	48.0	81.8	26.7	146
df(num,den)	(6,22)	(6,22)	(7,23)	(7,23)

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