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Domestic Demand and Short Run
Export Fluctuations

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DOMESTIC DEMAND AND SHORT RUN EXPORT FLUCTUATIONS

I. Introduction

The postwar period has witnessed an increasing reluctance on the part of policy makers to engage in deflation of the domestic economy. It remains the case, however, that the existing system of fixed parities demands some degree of harmonization of economic policies. Thus it is important to know how policy measures designed to alter effective demand affect the balance of trade.

This study addresses itself to one particularly neglected aspect of the problem, the relationship between exports and domestic demand pressure. The issue is interesting from the technical viewpoint of attempting to explain export fluctuations since relative prices often prove inadequate [25]. It is of much wider importance in clarifying the concept of competitiveness and determining the impact on exports of expansionary monetary and fiscal policies.

* * * * *

This paper is an abridgement of a doctoral dissertation submitted to Yale University in 1969. An essay of very similar form will appear in the Spring, 1970 Yale Economic Essays. All footnotes have been omitted here, and the reader is referred to the dissertation where, at many points, the text is qualified or elaborated upon.

I am greatly indebted to Professor Richard N. Cooper for his guidance and support while serving as chairman of my dissertation committee. I also wish to thank Professors Stephen H. Hymer and Edwin M. Truman as well as the many individuals who were kind enough to read parts or all of this study when it was in the form of preliminary drafts.

An empirical investigation might proceed along two quite different paths. On the one hand, a single industry might be investigated intensively. Institutional factors as well as general theoretical considerations could be incorporated into a detailed econometric model. The alternative procedure, followed in this study, has been to make only limited experiments in specifying the export function -- focusing on obtaining comparable results for many industries and several countries. We are thus able to consider whether high pressure on domestic capacity has a general influence on exports or affects only specific industries (or industries in particular countries). Our results suggest that high levels of pressure on domestic capacity affect exports adversely for most manufacturing industry. The evidence is strongest for the Belgian and United Kingdom industries covered. The existence of substantial underutilization of capacity in the United States for much of the period studied renders our conclusions with regard to American industry more ambiguous. Evidence is advanced, however, that United States exports also suffer when pressure on domestic capacity is high. No attempt has been made to produce any numerical estimates for the impact of a particular level of domestic pressure on exports.

Industries of the United States, the United Kingdom and Belgium have been included so that economies of a wide range of openness are represented in the study. The period of observation was dictated by data availability as was the choice of industry classifications.

Section II surveys the literature on export functions. It is argued that insufficient attention to the mechanisms through which pressure on domestic capacity influences export performance has resulted in improper specification of export functions. Section III is an attempt to fill this gap in the literature. Section IV presents a model incorporating the influence of pressure of domestic demand on export performance. The basic hypothesis is that domestic sales are preferred so that exports are discriminated against at times of pressure on capacity. The remainder of Section IV and all of Section V discuss tests of the hypothesis. Section VI presents a summary of the results and implications of the analysis for policy.

II. Review of the Literature

The international trade sector has been a stepchild of the large econometric models [29], [14], [40]. In particular, exports are typically assumed determined by unspecified "autonomous" factors. This situation has led to a distinct body of trade literature, encompassing the spectrum from simple correlation analysis to relatively sophisticated econometric models of the trade sector [39], [43].

A. Transmission Models

Adler's early article established the essential ingredients of an export function, asserting the dependence of U.S. export performance on "the marginal propensity of the 'outside world' to import American products . . . and the relationship of the prices of American goods to foreign prices"[37]. Adler's analysis, though not his empirical work, is like the more recent "transmission models" of trade flows [45]. These models investigate the relationship between fluctuations in the level of domestic economic activity and fluctuations in international transactions. The structural equation system typically specifies each country's imports as a function of its income. Its exports are a function of others' imports and price relatives. The reduced form of the export equation (for country i) is then:

$$X_i = a_o + a_1(WY) + a_2(P_i/P_f) + u \qquad \text{(II - 1)}$$

where:

X_i = exports

WY = weighted average of foreign incomes

P_i = domestic prices

P_f = weighted average of foreign prices

u = unexplained residual

The constant marginal propensity to import out of income is analogous to the savings rate in the simplest Keynesian model of income determination; i.e., imports are an additional "leakage" from income [31]. The function is homogenous of degree zero in prices. A ratio is typically employed, as shown, independently of any scale variable; i.e., a given change in the relative price index results in the same impact on exports regardless of the current level of world income or trade.

Rhomberg and Boissoneault [44] forego any disaggregation by commodity and consider a three region world in their well known model. In addition to a price and a GNP variable, they include a separate argument for inventory investment. It and "importers' GNP" are expressed in 1954 U.S. dollars.

The primary attractiveness of the model lies in its joint determination of all trade flows and other principal components of the current account. Income is predetermined for industrial countries but is a function of exports for the underdeveloped sector. The model is highly aggregative, however, and implicitly assumes either proportional growth or identical import propensities for countries within a region. In either case, import propensities are assumed constant over time.

B. Share Models

In investigations of relative competitiveness these problems have been circumvented. The level of world trade, net of the exporting country's imports, becomes the scale variable in the export equation. Besides being more generally available and more reliable, the trade variable has two advantages. First, it is not so seriously affected by changes in barriers to trade; the more general are the changes, the more important this consideration becomes. Second, it avoids the assumption of identical marginal propensities to import across countries.

The problem is thus altered towards explaining the distribution of a given total export demand among competing suppliers. As Junz and Rhomberg have put it, "changes in exports may be thought of as having occurred because of four main factors: (1) growth in over-all demand, (2) changes in the geographical distribution of demand, i.e., differential growth of import demand in individual markets, (3) changes in the commodity composition in each market, and (4) changes in relative prices and other competitive factors"[25, p.228-9]. The general procedure is to attempt to purify the dependent variable (X_i, the exports of country i) by adjusting for the influences of (1) - (3) in order to determine export changes attributable to (4). The influence on imports of import prices relative to the prices of domestic import-competing products, the level of economic activity in the importing country, or any other factors possibly influencing the import total are not investigated [48], [6], [42], [37], [45].

A natural extension of the share analysis is the estimation of price elasticities for X_{ij} (the exports of country i to country j). This has been done by Junz and Rhomberg [25] for the exports of eleven industrial countries. Their estimated equation is of the form:

$$\log X_{ijt} = a_{ij} \log P_{ijt} + b_{ij}\, t + c_{ij} + u_{ijt} \qquad \text{(II - 2)}$$

where

X_{ijt} = ratio of exports, deflated by the unit value index, of country i to market j (in period t) to deflated exports of all exporting countries of the study (except i) to market j (in period t)

P_{ijt} = index of price competitiveness of country i's exports to market j (in period t)

t = trend

a_{ij}, b_{ij}, c_{ij} are constants

u_{ijt} is the unexplained residual

a_{ij} is thus an estimate of $\dfrac{\partial \log X_{ij}}{\partial \log P_{ij}}$

C. Exports and Domestic Demand

An important development in the literature has been the recognition that non-price allocative mechanisms may supplement, if not substitute for, price changes. Michaely [34, p.97], Nurske [41, p. 132], and the Department of Commerce [15, p.10], all hold the view that domestic deflation provides" . . . a higher export potential and a spur to meet

foreign competition in foreign as well as domestic markets," [15, p.24] quite apart from any possible price changes.

This group would modify the traditional export function to include a domestic demand variable. That is, instead of

$$X_i = f\ (P_i/P_f,\ WD,\ u) \qquad \text{(II - 3)}$$

we would have

$$X_i = f\ (P_i/P_f,\ WD,\ DD,\ u) \qquad \text{(II - 4)}$$

where

WD = world demand for imports

DD = domestic demand

u = unexplained residual

The variables WD, DD, and X_i are in principle measured in real terms.

Walther Lederer [28] draws a distinction between countries with significant idle resources and those operating closer to capacity. Calling the former marginal suppliers and the latter preferred suppliers, he analyzes the reaction of their current account balance (X-M) to shifts in foreign and domestic demand. Lederer argues that shifts in foreign demand have relatively little impact on (X-M) in preferred supplier countries where plant operation is already at the desired rate. Shifts in domestic demand, by affecting both the demand for imports and the supply of exports, will have considerable impact on net exports. For countries with excess capacity (marginal suppliers), the relative importance of foreign and domestic demand shifts is reversed. An increase in domestic demand will primarily induce an increase in production rather

than in imports; swings in the level of world export demand will largely be absorbed by the marginal country. Lederer's discussion suggests a function like (II - 4) with the difference that the expected magnitude and significance of the coefficients will differ markedly between country types.

A competing (the expansionist) school of thought [8, p.130], [47, p.85], [27] holds that a high level of production promotes exports by reducing unit costs, increasing the availability of products and encouraging innovation and technological advance. While this position is questionable on theoretical grounds, it has its adherents, at least in the United Kingdom. It is surprising that no empirical studies were undertaken until very recently to determine the impact of domestic pressure on export performance [8, p.122].

Ilse Mintz [35] has studied American export cycles of the last 90 years and concludes that while crude materials and (to a lesser extent) food exports reacted inversely to the domestic business cycle, no such relationship was in evidence for finished manufactures [35,p.272] Mintz notes that " . . . export fluctuations which are not caused by foreign demand tend to occur independently in the several classes of a given sector and hence to offset one another. Responses to the pull of world demand, on the other hand, typically occur simultaneously in more than one class, thus reinforcing each other" [35, p.271]. A major difficulty in Mintz's approach is the high level of aggregation, which prevents identification of separate influences.

F.G. Adams, H. Eguchi and F. Meyer-zu-Schlochtern [2], in work for the National Accounts and Economic Forecasting Division of the OECD, have estimated equations for the exports and imports of nine major OECD countries. In their modified "market share" approach, country i's exports are a function of the "market" variable together with relative prices and the relative pressure of demand. The pressure variable is occasionally significant in explaining trade flows.

Ball, Eaton and Steuer [7] have considered the impact of internal pressure on United Kingdom exports of manufactures with a regression analysis for the period 1954-1964. Alternative specifications of an export equation are estimated, testing for the significance of the domestic pressure variable.

It is clear that the attempt has been to estimate a more elaborate demand equation for U.K. exports. The variable for the pressure of demand on U.K. capacity is presumably a proxy for changes in nonprice terms of sale such as delivery lags and credit terms [7,p.502,509]. Little attention is paid to the differing implications of the alternative specifications.

In sum, attempts to incorporate domestic factors in an export function have been tentative and inconclusive. This paper attempts to state more explicitly the relevant analysis as well as to provide a disaggregated empirical study.

III. Methods of Approach

One reason the capacity factor has been ignored in most attempts to explain trade flows is that little theoretical attention has been paid to the importance of market imperfections in international trade [49],[24]. This has been compounded by the fact that prior empirical studies have not lent themselves to such considerations because of their high level of aggregation. It will be necessary to clarify the mechanisms through which pressure on capacity influences export performance in order to specify a suitable form for regression analysis. We can then consider the separate issue of whether a high level of aggregation has obscured important relationships in previous empirical studies.

A. Demand Pressure - A Proxy

Consider an industry for whose output there has been an upward shift in the demand schedule. In the short-run, there exist three mutually exclusive possible results with regard to production and prices:

(1) Production increases, but prices rise, thus reducing the quantity demanded below what it would otherwise have been.

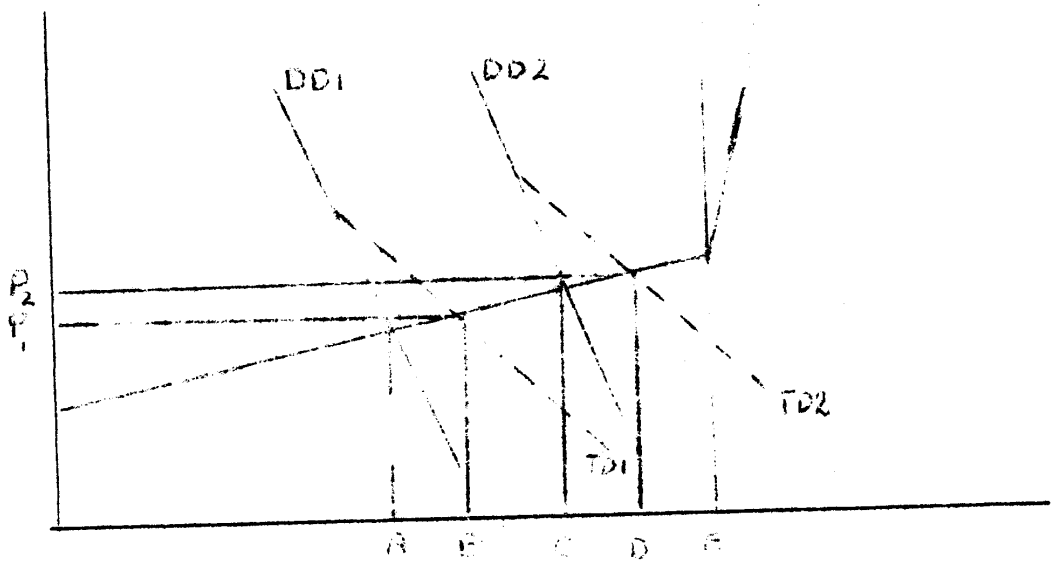
(2) Prices remain constant with sufficient quantities produced to meet demand at current prices. Marginal losses are absorbed for purposes of goodwill.

(3) Prices remain constant, with production increasing only to the point where costs begin to rise sharply. Some non-price allocative mechanism distributes output.

Although (2) probably obtains for small, short-run changes in demand, it is implausible and, in the extreme, impossible for large changes. Options (1) and (3) will be considered further and will be referred to as the "competitive" and "oligopolistic" models respectively. In an oligopolistic situation, suppliers may perceive a common interest in market stability and intentionally minimize price fluctuations.

The contrast is presented graphically in figure 1. Foreign demand is assumed constant for ease of exposition. Where prices are freely flexible in a competitive market (figure 1A), it can be seen that a change in domestic demand does not affect exports except through price movements. Exports have fallen off from $\overline{AB}$ to $\overline{CD}$ after the shift of domestic demand from DD1 to DD2, but all demand for exports at the higher price is being met. The decrease in the amount demanded is simply a consequence of the increase in price (from P1 to P2) resulting from the shift in the aggregate demand curve (TD). An intersection of the aggregate demand curve with the supply curve beyond OE presents no special circumstances. The price would change with such a shift and the market be cleared by this mechanism.

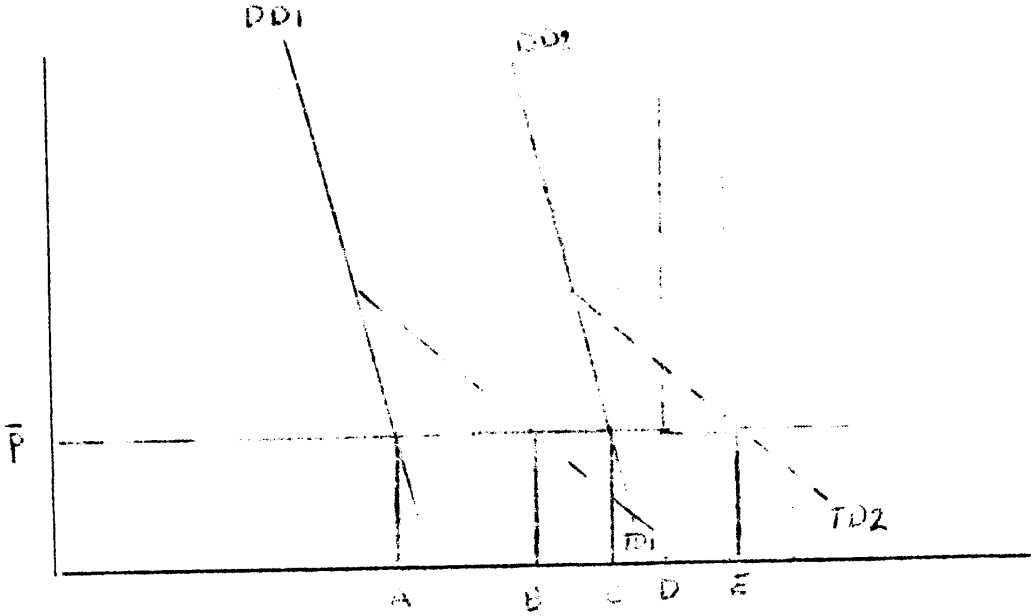
Figure 1A



Where prices are fixed in the short-run, a situation of "excess-demand" can arise (figure 1B), necessitating some alternative means of allocation. At the fixed price $\overline{P}$, and with the shift of domestic demand from DD1 to DD2, aggregate demand has increased to $\overline{OE}$ from $\overline{OB}$ while demand for exports has remained constant (at $\overline{CE}$ equal to $\overline{AB}$). Full capacity is $\overline{OD}$ and some rationing scheme must be employed since price no longer clears the market. Note, however, that there is no allocation problem where under-utilization of capacity exists (i.e., the aggregate demand curve intersects $\overline{P}$ to the left of D).

Thus, pressure on domestic capacity can be an important factor in determining exports in two different ways. On the one hand, the variable may be an argument in the demand equation. Alternatively, high pressure may induce supplier rationing.

Figure 1B



In the first instance, the pressure variable may stand as a proxy for unobserved price changes or for non-price aspects of competitiveness. The shortcomings of even the best price indices are well known [36, p.181-94]; moreover, we are often forced to use wholesale price indices where relative export prices are truly relevant. Junz and Rhomberg have noted that "some of the divergence in movements between the various price indicators may be explained by the fact that in some countries pricing policies for export markets differ from those for the domestic market" [25, p.230-1]. Suppliers who have some degree of market control may distinguish and discriminate between foreign and domestic demand for their output. If this takes the form of a relatively constant domestic price together with more flexible export prices, changes in pressure on capacity may be a better proxy for fluctuations in true export prices than are domestic wholesale price series.

The pressure variable will also act as a proxy for non-price factors in competitiveness. Such factors would include delivery lags, the availability of spare parts and servicing facilities, credit terms, etc. In sum, a variable for pressure on domestic capacity may allow a fuller specification of a demand equation. We can call this the "demand hypothesis."

Alternatively, pressure on capacity may result in an excess demand if price and non-price "terms of sale" are not sufficiently flexible (and/or responses to them not sufficiently elastic) to clear markets. Thus, at times of high pressure on capacity, exports may be determined by the available supply. We can call this the "rationing hypothesis."

We arrive at the possibility and indeed the necessity of two quite different regression formulations to test the two different hypotheses. The remainder of this section is devoted to a discussion of the "demand hypothesis," with consideration of the "rationing hypothesis" deferred to section IV.

B. The Importance of Disaggregation

We have performed some simple tests using the pressure variable as a proxy for competitiveness. These are in the spirit of the Ball, Eaton and Steuer paper [7]. We wish to consider whether the technique of disaggregation, per se, elucidates the relationship between demand pressure and export performance.

The basic equation for the first set of experiments is:

$$X_j^i = a_0 + a_1(RP)_j^i + a_2(WD)_j^i + a_3(DP)_j^i + U_j^i \qquad \text{(III - 1)}$$

where

X_j^i is country i's exports of the jth commodity in thousands of 1958 U.S. dollars. The deflator is the domestic wholesale price index (in country i) for j.

$$(RP)_j^i \text{ is } WPI_j^i \Big/ \sum_{k=1}^{5} \frac{X_k}{\sum_{k=1}^{5} X_k} \cdot WPI_j^k$$

or the ratio of country i's wholesale price index for commodity j to a weighted average of wholesale price indices of other major exporters. The weights used $\frac{X_k}{\sum_{k=1}^{5} X_k}$ are the proportions of total exports of the competitor countries covered which are accounted for by the kth country in the year 1960. All of the wholesale price indices have a base year 1958 = 100.0. The expected sign of the coefficient is negative.

$(WD)_j^i$ is the value of OECD members. The values are expressed in thousands of 1958 U.S. dollars having been deflated by

$$P_j = \sum_{m=1}^{6} \frac{X_j^m}{\sum_{m=1}^{6} X_j^m} \cdot WPI_j^m$$

where m = k + 1 (i.e., "major competitors" + i). The expected sign of the coefficient is positive.

$(DP)^i_j$ is the proxy for domestic pressure in country i, which is the ratio of the actual value of the industrial production index in commodity j over its trended value. The expected sign of the coefficient is negative.

U^i_j is the unexplained residual.

One important result in the Ball, Eaton and Steuer paper was the finding that neither domestic pressure nor relative prices proved significant in (III - 1) for aggregate manufactures. One can question to what extent these results were simply a consequence of the degree of aggregation is the authors' data. Perhaps important relationships and meaningful correlations get "mixed up" [7, p.518] when disparate industries are grouped together and an attempt made to explain their exports [7], [44], [39].

Variants of equation (III - 1) have been estimated for all industries covered by this study. The most striking finding in the Ball, Eaton and Steuer paper was the apparent insignificance of relative prices in much of their empirical work. This is not the case, however, in our sample.

In regressions for the five United Kingdom industry classifications three of five coefficients for the relative price variable had negative coefficients significant at the 90 per cent confidence level.

Of these, two were significant at the 95 per cent level. Additional evidence is provided by the Belgian and United States results. Of thirteen Belgian industry classifications, ten relative price coefficients were of the correct sign and significant at 90 per cent -- nine were significant 95 per cent. For the United States, five of eight industry classifications had negative, significant relative price coefficients, all at the 95 per cent confidence level or better.

Another indication of the possibility of error in aggregation is the very wide variation in coefficient sizes (and in elasticities) between industry groups. Output of manufacturing industry is clearly not homogeneous. Estimation, even on the two-digit SITC level, not only reveals substantial differences in "marginal shares of world exports" between industries but strongly indicates that the frequent insignificance of the relative price variable in export studies is partially the result of over-aggregation. Although it may not be profitable to disaggregate by industry in complicated econometric models, it seems clear that those investigators primarily interested in trade flows will find it valuable to do so.

We can also consider whether disaggregation affects the importance of the pressure variable in explaining exports. Presumably, though it is difficult to distill any theoretical underpinnings for the procedure from the literature, the pressure proxy is believed to supplement a highly imperfect measurement of relative prices. As we have discussed above, the pressure variable may reflect changes in the terms of sale not captured by relative price movements [7],[2].

We have tested this possibility with our sample with equation (III - 1). In not one case out of our twenty-six "country-industries" was the pressure coefficient significant with the correct sign.

One might argue that the influence of the domestic pressure variable is not linear and that the impact of a given change in the per cent of capacity utilized will be greater when the initial rate of utilization is high than when it is low. If this is the case, the linear formulation of Ball, Eaton and Steuer cannot be expected to be very informative. Of the many non-linear variants which might reasonably be estimated, I have used dummy variables. This stays within the general framework of the Ball, Eaton and Steuer analysis but treats capacity utilization as a qualitative variable; the important distinction is between "high" (prices rising and/or non-price competitiveness deteriorating) and "low" (prices and other aspects of competitiveness stable) pressure levels. Our estimated equation is now:

$$X_j^i = b_o + b_1(RP)_j^i + b_2(WD)_j^i + b_3(H)_j^i + b_4(L)_j^i + U_j^i \qquad \text{(III - 2)}$$

where

H = 1.0 when pressure is high and

= 0.0 when pressure is average or low

The expected sign of the coefficient b_3 is negative.

and

L = 1.0 when pressure is low and

= 0.0 when pressure is average or high

The expected sign of the coefficient b_4 is positive.

Once the pressure index has been constructed, an arbitrary procedure assigns an approximately equal number of observations to the high, average and low pressure periods [22]. With the single exception of non-electrical machinery exports of the United Kingdom, no coefficient on H was significant with the correct sign. It appears that neither disaggregation alone nor a high/average/low breakdown lends any explanatory power to the pressure proxy in the export equation.

We can conclude this section with some interpretation of the significant negative coefficient finally derived for the pressure proxy in the Ball, Eaton and Steuer study. The most plausible justification for its inclusion remains the stand-in function described above. Paradoxically the level of aggregation in their work may explain what success they achieve. The price series chose, while probably as good as any other at this level of aggregation, is not a sensitive indicator of changes in U.K. export price competitiveness. Moreover, for all manufacturers, a continuous pressure variable may well be correlated with average price levels.

IV. Domestic Demand and Export Performance

Section III has considered the "demand hypothesis," i.e., the inclusion of a pressure variable in the regression formulation to act as a proxy for changes in competitiveness not detected by the relative price index. The use of the variable has proven to be generally uninformative. The approach was in the traditional mold of attempts to explain trade flows, namely partial equilibrium analysis. With the caveats for empirical work that lag structures may be complex and functional relationships may be non-linear, it is assumed that the various dimensions of "price" adjust to equilibrate markets.

Our alternative, "rationing hypothesis," is a variant of the dumping model. We have already noted the existence of non-price aspects of competitiveness. Here we are considering the case where, even after changes in these factors as well as in prices strictly defined, there remains excess demand.

A. The Model

The demand function remains:

$$X^d = X^d \text{ (Relative Prices, World Demand, u)} \qquad \text{(IV - 1)}$$

with the particular linearized specification:

$$X^d = a_o + a_1(RP) + a_2(WD) + u,\ a_1 < 0 \text{ and } a_2 > 0. \qquad \text{(IV - 2)}$$

The supply (of exports) is a negative function of domestic demand:

$$X^s = X^s \text{ (Domestic Demand, u)} \qquad \text{(IV - 3)}$$

with the particular linearized specification:

$$X^S = b_o + b_1 (DD) + u, \; b_1 < 0 \qquad \text{(IV - 4)}$$

According as pressure on domestic capacity is high (excess demand exists) [low (no excess demand)], exports will be primarily determined by supply demand considerations. When domestic pressure is low, suppliers will fill all export orders. If export sales are subordinate to domestic markets, we expect a negative value for the coefficient b_1 in periods of high pressure on domestic capacity [7, p.501]; changes in the level of world demand will not influence export performance. It can be recognized that this is one rather specific postulation of a rationing "rule."

An alternative suggests itself if capacity is relatively flexible, even at high utilization rates. In such circumstances, the level of world demand will still influence exports. However, at times of high pressure on capacity, the coefficient for the world demand variable will be smaller -- a smaller proportion of the orders (or the orders of a smaller group) of foreign buyers will be met. This alternative formulation (equation IV - 5, below) does not specify so precise a rationing mechanism as (IV - 4) but embodies instead the more general hypothesis that the net result of high pressure on domestic capacity is a reduction in the "export share" of the country in question. Thus we have a supply function:

$$X^S = X^S \text{ (World Demand, Domestic Pressure, u)} \qquad \text{(IV - 5)}$$

or $$X^s = c_0 + c_1(WD)(H) + c_2(WD)(1-H) + u,\ C_2 > C_1 > 0 \qquad (IV - 6)$$

where H = 1.0 when pressure is high

H = 0.0 when pressure is low.

Our hypotheses have been tested with the equation:

$$X = d_0 + d_1(RP) + d_2(WD) + d_3(DD) + u \qquad (IV - 7)$$

Observations have been classified in mutually exclusive categories of high and low pressure [22]. Particular attention is paid to the level and significance of the coefficients d_2 and d_3 in regressions for the two samples.

Estimation was carried out after transformation to first differences. Two points are relevant. First, a more fully specified export equation is:

$$X = e_0 + e_1(RP) + e_2(WD) + e_3(DD) + \phi\ (Z_1, Z_2, \ldots Z_n) + u \qquad (IV - 8)$$

where the Z_i represent such factors as the geographic composition of trade, the institutional conditions (existance of trade barriers, foreign subsidiaries, distribution networks), etc. The exclusion of these variables will likely result in serial correlation of the residuals to the extent that the Z_i change gradually over time (have serially correlated values). The employment of first differences is a common technique for coping with this problem.

Second, the use of first differences yields the additional advantage in this case of coping with the problem of multicollinearity between independent variables (WD and DD or WD and RP). The correlation

between independent variables is substantially reduced by employing first differences.

The equation estimated is thus:

$$\Delta X = a\ (\Delta RP) + b\ (\Delta WD) + c\ (\Delta DD) + u \qquad \text{(IV - 9)}$$

where DD = country i's shipments less exports, expressed in thousands of 1958 U.S. dollars. The deflator is country i's wholesale price index.

The procedure, to repeat, is to segment the total number of observations by pressure levels, run regressions for the sub-samples and evaluate the comparative results. In principle, we would like to observe infinitesimally small changes in domestic (dDD), world demand (dWD), etc. for a given level of pressure on capacity. In practice, we have discrete observations, the quarter-to-quarter changes in our variables. Thus we must choose between the current and lagged values of the pressure index in classifying observations.

The lagged value of pressure is chosen on the pragmatic grounds that its classification groups have less ambiguous implications. Consider the use of current pressure levels. When low pressure accompanies a fall in domestic demand, we are unable to judge whether exports will be stimulated (pressure previously high) or unaffected (pressure previously low). When current pressure is high and domestic demand has risen, we are unsure whether exports will be damped (pressure previously high) or unchanged (pressure previously low).

On the other hand, the group of observations for which pressure on capacity in the previous period was high and domestic demand has increased could conceivably contain instances where no dampening effect on exports is expected; this would be the case if capacity had grown sufficiently to absorb a (small) increase in domestic demand.

The remainder of this chapter focuses particular attention on the regression results for periods of high pressure on capacity. We are interested in the sign and significance of the DD coefficient (is the "dumping" phenomenon operative in periods of high pressure?) and the significance of the WD coefficient (do domestic factors supercede the influence of world demand in periods of high pressure?).

For cases of "full employment of capacity," an increase in domestic consumption must by definition imply a reduction in exports. Conversely, any fall off in domestic demand will release capacity to meet any unfilled foreign orders. In our regression analysis this would be manifested in a significant negative coefficient for the variable "change in domestic demand" in periods of high pressure. In periods of low pressure, the coefficient should not be significant; the world demand variable will be of prime importance here. These criteria constitute the "strong" conditions for the acceptance of our hypothesis.

However, the actual methodology employed makes these conditions too stringent. The segmentation of observations on the basis of high, average and low pressure levels is to some extent arbitrary. Utiliza-

zation of capacity is not always full when we classify it as high; there may still be some room for output increases as opposed to shifts in the allocation of output. What is true is that utilization is relatively high, allowing a somewhat weaker test involving the world demand variable. At relatively low rates of capacity utilization we expect firms to fulfill all demand for their product, which implies a regular relationship between exports and world demand. At relatively high utilization rates exports are believed a function of domestic factors (e.g., delivery lags, market power of potential purchasers and other nonprice considerations) and relatively independent of foreign demand. Thus, during periods of high pressure when domestic influences dominate, foreign demand should have an insignificant coefficient.

Before discussing our results, it will be useful to set forth some of the distinctions between commodity classifications and between countries which may have an important bearing on the export function:

(1) those industries producing goods provided almost exclusively from current production (often to individual order) and those for which manufacturers' inventories play an important role in evening production over cyclical swings. In the latter case, the influence of short-lived periods of demand pressure on export performance cannot be expected to be great.

(2) those industries which lay off employees regularly in time of slack and those which do not. The latter, with minimal variable costs in the short-run, can be expected to be more aggressive in expanding export sales when domestic demand weakens.

(3) large firms with foreign subsidiaries and/or licensing arrangements with foreign producers and strictly domestic firms. It has been argued, for example, that many United States firms, unlike their Western European competitors, are so encumbered with foreign subsidiaries that any possible marginal penetration in foreign markets (that would not impinge upon activities of subsidiaries) will be minor [50, p.84]. Thus, pressure on capacity will not be important in explaining exports.

(4) an open vs. a relatively closed country. The relatively low export to total shipment ratio of (much of) United States industry implies that export swings will be unable to affect significantly the total sales picture; thus, in order not to abort an emerging export market, firms' export policy might be based largely on longer run considerations.

(5) Finally, Lederer has argued that some (preferred) supplier countries will be relatively unaffected by shifts in foreign demand while other (marginal) supplier countries will be very sensitive to such shifts [28].

B. The Empirical Evidence

Table 1 summarizes the results. For no industry were the results of the strong and weak tests both positive. For fifteen (15) of the twenty-six (26) industries considered, one of the two tests is satisfied. The following section will discuss evidence that pressure on capacity affects exports adversely for virtually all manufactures. We now wish to concentrate on the fifteen industries which have met one of the tests described above. As will become clear later, these are probably best viewed as extreme cases of a general phenomenon. Our interest is in determining whether any particular industry characteristics are common to the group.

We will first discuss those industries meeting the weaker test. Since they differ substantially with regard to concentration, homogeneity of product and export: total sales ratio, each industry is discussed separately. The industries meeting the stronger test are discussed at the end of the section.

1. United Kingdom SITC 67 - Iron and Steel --

Analysis of the ferrous metals industry in any country is tenuous in light of the several severe strikes (and threats of strikes) in the United States in the 1953-65 period. However, the results are plausible since the industry is relatively concentrated and has a predominant share of total sales in the home market. We have argued that these industry characteristics will likely lead to discrimination against export sales. Moreover, although the products of the industry

Table 1

Summary of Results

Belgium SITC Classification	Weak Test		Strong Test		Neither	
	H/L	H/A/L	H/L	H/A/L	H/L	H/A/L
62		x			x	
63	x	x				
641					x	x
651					x	x
651-02					x	x
651-03+04					x	x
652		x			x	
653	x	x				
652+653+657					x	x
662		x			x	
67					x	x
71			x	x		
72		x	x			

Table 1

Summary of Results

United States SITC Classification	Weak Test H/L	Weak Test H/A/L	Strong Test H/L	Strong Test H/A/L	Neither H/L	Neither H/A/L
5					x	x
62				x	x	
64	x	x				
65	x	x				
66					x	x
71					x	x
72			x	x		
732					x	x
United Kingdom						
641	x	x				
67	x	x				
71			x	x		
72			x	x		
821					x	x

are relatively homogeneous, short-term shifts in the demand for this basic industrial material are often large, too large to be met from inventories.

2. United Kingdom SITC 641 - Paper and paperboard --

The industry is more concentrated than average. Exports are a very small fraction of total sales, less than 3% in volume terms, making the home market clearly of predominant interest. However, the world demand variable is not significant in the "low" or "lower" regressions either, making it probable that the variable is an inappropriate proxy. The U.K. may be specialized in a few sub-classifications, demand for which moves differently from demand as a whole.

3. Belgium SITC 662 - Clay and refractory construction materials -- This industry is similar in relevant characteristics to British ferrous metals. The industry is concentrated, with exports some 21% of total sales on average. That is, we again have the presumptive requisites for a preference for domestic sales. Similarly, though the product is homogeneous, short-term demand shifts in construction are notoriously large. It is interesting to note, however, that a high/low classification system has not eliminated the effect of world demand on exports in the "high" equation. Presumably many observations are at less than full capacity where firms can react to demand shifts with production increases as well as sales from inventories. When the finer higher/average/lower classification is employed, the world demand coefficient (though significant at 95% for the "lower" regression) is insignificant in the "higher" regression.

4. Belgian SITC 652 -- Cotton fabrics, woven -- Here again the shift to the higher/average/lower classification is revealing. Though the world demand coefficient is significant at the 95% confidence level for both the "high" and "low" regressions, it is insignificant at 90% in the "higher" regression. We again conclude that the high/low classification was not sufficiently discriminating. Domestic shipments are fully 95% of total shipments on average; concentration in the industry is low.

5. Belgian SITC 63 -- Wood and cork manufactures (excluding furniture) -- The results for this industry are less easily explained. The world demand coefficient is a powerful explanatory variable (significant at 95%) for the "low" regression and insignificant for the "high" regression. However, the product is relatively homogeneous and the industry among the least concentrated. Moreover, when the finer higher/average/lower classification is used, the world demand coefficient is not significant (even at the 90% confidence level) for the "higher" or "lower" regressions. This raises the possibility that our world demand proxy for SITC 63 may be inappropriate.

6. United States STIC 64 -- Paper, paperboard and manufactures thereof -- This industry exhibits the expected coefficient pattern yet production is not very concentrated and output is relatively homogeneous. The world demand coefficient is significant in both the "low" and "lower" regressions at the 95% confidence level while insignificant in both the "high" and "higher" regressions at the 90% level.

7. United States SITC 65 -- Textile yarn, fabrics, made-up articles and related products -- The world demand coefficient is insignificant at the 90% confidence level in both the "high" and "low" regressions. With the finer breakdown the "higher" regression has an insignificant coefficient as well, but in the "lower" regression world demand is significant at the 90% confidence level. As with SITC 64, the industry is not concentrated and the output is relatively homogenous.

In none of the industries discussed above was the coefficient on domestic demand (in the "high" or "higher" regression) significant at the 90% confidence level with the expected (negative) sign. Those industries where there is a significant "tradeoff" are discussed immediately below. We do have some evidence, however, that for certain industries, exports do not respond to changes in foreign demand when pressure on domestic capacity is high -- though exports are responsive to changes in foreign demand when pressure is low. We may conclude that for these industries export performance is strongly influenced by domestic conditions when pressure on domestic capacity is high.

The machinery industries fit our hypothesis most closely. The output is heterogeneous, with many machines and components produced to specification. Concentration is very high for electrical machinery though about the average for non-electrical machinery. In all but one instance domestic sales are a substantial majority of total shipments, as can be seen in Table 2.

Table 2

Domestic Shipments/Total Shipments Ratios - 1965

Industry	Domestic Shipment	Total Shipment		Domestic Shipments as a % of Total
United States				
71	31447	36447	=	86
72	31931	33593		95
United Kingdom				
71	3600	6206		58
72	2950	3877		76
Belgium				
71	182680	605380		30
72	308520	567220		54

We can summarize the regression results for machinery as follows:

(A) Electrical Machinery (SITC 72)

(1) The "high" regressions for all three countries have a significant negative coefficient (95%) for the domestic demand variable. The alternative higher/average/lower breakdown left the qualitative results unchanged for the U.S. and the U.K. For Belgium, the higher regression contained no significant variables.

(2) In contrast to (1), the coefficient on domestic demand is insignificant in the "low" regressions for Belgium and the U.S. This is true as well for the alternate breakdown. Moreover, the U.K. "lower" regression does not have a significant coefficient for domestic demand.

(3) The world demand coefficient is significant (95%) in all the "low" regressions. The same is true in all the "lower" regressions.

(4) The world demand coefficient is insignificant at the 90% confidence level in the "higher" regression for Belgium.

(B) Non-electrical Machinery (SITC 71)

(1) The "high" regressions for Belgium (95%) and the U.K. (90%) have a significant negative coefficient for the domestic demand variable. The alternative breakdown left the qualitative results unchanged.

(2) In contrast to (1), the coefficient on domestic demand is insignificant in the "low" regression for Belgium. This is true as well for the alternative breakdown. Moreover, the U.K. "lower" regression does not have a significant coefficient for domestic demand.

(3) The world demand coefficient is significant (95%) in both these "low" regressions. The same is true in all the "lower" regressions.

(4) The world demand coefficient is significant at the 95% confidence level for the "high" and "higher" regressions of all countries.

There remains finally United States SITC 62 -- (rubber manufactures, N.E.S.) -- This industry, while producing more homogenous output than the machinery classifications, is the most concentrated of two-digit industries in the United States. Although the coefficient on domestic demand shipments was negative for the "high" regression, it was insignificant at the 90% confidence level. The alternative

breakdown revealed a significant (95%) negative impact on exports for this variable in the "higher" regression; only world demand was significant in the "lower" regression.

Our regression analysis indicates that the level of domestic pressure does influence short-run export performance directly in addition to any influence through changing relative prices. For several industries a change in domestic consumption in a period of high pressure on capacity has a contra-effect on the exports of that period. As expected, no such relationship is evident in periods of low pressure on capacity. In periods of high pressure, the world demand variable is insignificant in explaining the exports of another group of industries. For most of these industries concentration is somewhat greater than average. However, this is not always the case and other characteristics are dissimilar.

In general there do not appear to be any consistent industry characteristics associated with the group of fifteen as a whole. Indeed, the next chapter will indicate that the adverse impact of pressure on export performance is a quite general phenomenon.

V. Marginal Participation Rates

We have found indications of a negative relationship between the pressure of demand at home and export performance. In a few industries non-price allocative mechanisms seem to distribute production when pressure is high, with exports discriminated against. This is an interesting conclusion; it remains to determine whether the effect of high domestic pressure is limited to these sectors.

Table 3 displays the coefficients of the world demand variable ("marginal participation rates"), together with a measure of average shares in world trade. Several regularities are evident in the results which we shall discuss in turn:

(1) For the large majority of European industries, the coefficient in the "low" ("lower") regression exceeds that in the "high" ("higher") regression.

(2) For the majority of United States industries, the coefficient in the "higher" regression exceeds that in the "lower" regression.

(3) For a majority of United States industries, the marginal share of world exports (world demand coefficient) in the "higher" regression exceeds the average share in world exports for all periods.

(1) In periods with unutilized capacity any additional foreign demand should be met. In the context of our regression formulation,

Table 3

World Demand Coefficients

of Difference Regressions

Belgium SITC Classification	Average Belgian Exports/Average World Demand	Regression for Periods when pressure is: High	Low	Higher	Lower
62	.036	.015*	.025*	.017	.007
63	.033	.012	.026*	.020	.026
641	.021	.015*	.014*	.015*	.022*
651	.134	.100*	.144*	.118*	.150*
651-02	.232	.191*	.216*	.184*	.218*
651-03+04	.143	.043*	.136*	.045*	.139*
652	.057	.034*	.051*	.004	.056*
652+653+657	.095	.050*	.146*	.053*	.156*
653	.094	-.009	.081*	-.003	.073
662	.048	.031*	.045*	.004	.048*
67	.169	.091*	.040	.095*	.044
71	.021	.021*	.028*	.014*	.025*
72	.033	.038*	.037*	-.012	.039*

* = Statistically significant at 90 per cent confidence level or higher.

Table 3

World Demand Coefficients

of Difference Regressions

United States SITC Classification	Average U.S. Exports/Average World Demand	Regressions for Periods when pressure is: High	Low	Higher	Lower
5	.283	.210*	.381*	.305*	.285*
62	.273	.314*	.361*	.437*	.302*
64	.227	.087	.167*	.112	.140*
65	.118	.057	.011	.067	.117*
66	.181	.131*	.216*	.115*	.159*
71	.346	.488*	.268*	.466*	.210*
72	.289	.473*	.312*	.506*	.262*
732	.328	.317*	.317*	.350*	.342*
United Kingdom					
641	.054	.006	.010	.009	.010
67	.116	.038	.026*	.062	.027*
71	.192	.098*	.140*	.091*	.114*
72	.164	.100*	.176*	.151*	.127*
821	.147	.120*	.065*	.146*	.081*

* = Statistically significant at 90 per cent confidence level or higher.

the industry in question should export its "share" of increments in world demand. In periods of pressure on capacity, however, we believe supply constraints to be relevant in determining exports. High pressure may induce any of several non-price allocation schemes, for example, a lengthening of lags for deliveries, a reduction of the sales force, an alteration of terms and availability of credit on sales, etc. Such actions, when pursued regularly in periods of high pressure, would result in a reduced marginal share for the industry's exports in total world trade. The phenomenon would constitute a depressing effect on exports of high domestic pressure in addition to any indirect impact through price changes

For both classification systems, the world demand coefficient in the "low" regression was greater than that in the "high" regression for thirteen of eighteen European industries. The differences between coefficients are substantial, implying that there is an important impact of domestic demand conditions on short-run export performance; moreover, it is pervasive throughout our sample of manufacturing industries. We cannot yet conclude from this evidence that the significant impact of domestic pressure levels on export performance derives from non-price allocation of output. There may be regular price changes in periods of pressure on capacity which are not detected by our index.

Thus there exist three alternative mechanisms which can explain the existence of the significant regularities in export performance between periods of differing pressure on capacity:

(a) Firms may alter prices in a way which is not revealed in our relative price index.

(b) Firms may alter the non-price terms of sale.

(c) Firms may give preferential treatment to particular purchasers in the queue.

Alternatives (a) and (b) may be employed in different ways when the pressure of demand is high. On the one hand, producers may institute identical changes in the terms of sale for domestic and foreign buyers alike. Or, producers may manipulate the terms of sale for exports, the latter determined essentially as a residual. It would not be possible for us to distinguish betwen these actions and they are treated as equivalent below.

The issue is whether or not the terms of sale are altered regularly -- whether in a discriminatory fashion or not -- in order to clear the market in each period. A large number of studies, stimulated by the early work of Gardiner C. Means [33], have considered this question. Subsequent papers [38], [32], [16], continued the debate with major controversy surrounding the contentions (1) that the price structure has grown increasingly rigid over time and (2) that price rigidity is due primarily to the concentration of economic power. The issue remains alive [9], [46], [30] but is more or less confined to the determination of the relative price flexibility between industries of varying concentration. Without considering the particular merits of this case, we can turn to the literature for an

indication of the average frequency of price changes. Wesley J. Yordon has estimated price responsiveness to changes in cost and demand factors in fourteen U.S. industries. His findings suggest " . . . that insensitivity of prices to demand change is not confined to highly oligopolistic industries." [51, p.278] Hall and Hitch, in their well known paper [19], present the results of a questionnaire given to (U.K.) businessmen. Their findings were that prices have a strong tendency to be stable and that " . . . they will be changed if there is a significant change in wage or raw material costs, but not in response to moderate or temporary shifts in demand [19, p.125]."

Indeed, it is difficult to believe that firms have sufficient knowledge of the demand curves which they face to set market equilibrating prices (and non-price terms of sale) for each period (quarter). There is evidence that prices do not react to demand shifts so that rationing amongst potential buyers must be an important aspect of output allocation in the short-run. But what is the nature of preferred purchasers? That is, are <u>exports</u> discriminated against?

Evidence is provided by the relative explanatory power of our regressions (values of $\bar{R}^2$) for which a regular pattern exists. Table 4 lists the values of $\bar{R}^2$ for the European regressions. The very clear pattern is for the "Low" regression to have more (and typically substantially more) explanatory power than the corresponding "High" regression. In only two of the eighteen cases was the reverse true. In one additional instance the Higher/Average/Lower classification reversed the relationship for an industry.

Table 4

Values of $\bar{R}^2$

Industry Pressure is:	High	Low	Higher	Lower
Belgium SITC				
62	.64	.66	.61	.78
63	.33	.66	.19	.16
641	.48	.54	.41	.62
651	.73	.92	.86	.94
651-02	.74	.87	.76	.86
651-03+04	.07	.68	.19	.69
652	.01	.42	.00	.39
653	.00	.00	.00	.00
662	.43	.77	.30	.74
652+653+657	.38	.86	.48	.93
67	.45	.22	.53	.30
71	.40	.72	.18	.60
72	.25	.57	.02	.51
United Kingdom SITC				
641	.13	.66	.00	.63
67	.27	.56	.23	.51
71	.34	.58	.38	.56
72	.27	.60	.48	.71
821	.53	.38	.40	.22

A regression fit explains less of the total variance in the dependent variable, the less realistic is the postulated form of the relationship. If high pressure on capacity results in rationing to all customers, domestic and foreign alike, we might expect a lower coefficient for the world demand variable at such times than in periods of low pressure, but would not expect any diminishing of the explanatory power of the regression. If, however, exports are a residual item at times of high pressure on capacity, we will have erred by postulating a simple linear relationship between world demand and exports. It would then be expected that more of the fluctuations of exports would be "explained" in periods of low pressure than in periods of high pressure.

The evidence of this summary statistic should not be overemphasized. It is reasonable to conclude, however, that the regularity with which the coefficient on world demand is smaller in periods of high pressure can be attributed in part to a preference by domestic suppliers for home markets.

What of the distinctions drawn in Section IV between industries? We conclude that while relevant in principle, they are not essential to an explanation of export fluctuations at our level of aggregation and with the data at hand. The theory of monopolistic competition [11] has formalized the familiar and obvious significance in the relatively short run of particular business relationships. Purchasers have their traditional sources of supply and suppliers

their "good" customers. These relationships assume importance in times of especially high demand. At the head of the queue we will find a disproportionate number of domestic buyers -- the older customers, the business friends, etc.

(2) The United States apparently presents a special case. For the Higher/Average/Lower classification system, five of eight industries have a greater coefficient for the world demand variable in the "higher" regression. The expectation must be that either exports will be retarded in periods of high pressure on capacity or that they will remain unaffected. The expansionist hypothesis is theoretically untenable for shorter run analysis.

This seemingly perverse result stems from the use of world trade as the proxy for the demand for U.S. exports. Use of such a proxy implicitly assumes that, ceteris paribus, changes in the level of world exports will not affect the United States share. That is not the case for all industries.

Total world exports can be thought of as composed in the short-run of a relatively stable component and a cyclical component. The former would include intermediate goods, more or less necessary to production given the current state of international specialization, as well as basic consumption goods. The cyclical component would be dominated by investment goods and deferrable consumption items, for the most part more technologically advanced goods. [20, p.595] The point is not to argue that there is a strict dichotomy but rather to

suggest that a relatively higher proportion of technologically advanced goods are traded in periods of high volume than in periods of low volume.

It is often held [26], [23], [12], that the United States is a dominant supplier of technologically advanced goods. "... [T]he United States has, for one reason or another, a relative abundance of high-quality entrepreneurial leadership and therefore enjoys a comparative advantage in those products that require a high proportion of entrepreneurial ability -- that is, new goods". [26, p.154] The U.S. share in the trade of these goods will be high and thus her share in world trade will vary directly, in the short-run, with the level of world trade. It is also true that the movement of world demand has been highly correlated with the level of domestic demand in the United States as indicated in Table 5. The result of these interrelationships is that, in periods of high U.S. domestic demand (for the U.S., periods of high pressure on capacity), the demand for technologically advanced goods relative to total world demand will be high; so that we can expect a high share in total trade for U.S. exports at these times.

The five classifications groups in question (SITC 5, 62, 71, 72 and 732) are all technology intensive. Gruber, Mehta and Vernon [18], have ranked SIC two-digit industries by "total R & D expenditures as a percentage of sales in 1962." Excluding the rather unique aircraft industry, the U.S. industries rank 1 (SITC 72), 3 (SITC 5), 4 (SITC 71), 5 (SITC 732), and 6 (SITC 62) by their measure.

Table 5

Correlations Between World Demand and

Domestic Demand for U.S. Industries

U.S. Industry		Correlation
SITC	5	.966
	62	.955
	64	.959
	65	.898
	66	.749
	71	.915
	72	.965
	732	.864

The evidence is consistent for the remaining three U.S. industries (SITC 64, 65, and 66). Their research effort is relatively slight. These latter categories cover basic goods with little room for major technological advance. In the absence of such an advantage, the pattern of U.S. exports conforms to that for the United Kingdom and Belgium.

(3) We can now turn to the very interesting result that for a majority of U.S. industries the marginal share of world demand in the "higher" regression exceeds the overall average share. Consider, reading United States for marginal supplier and Western Europe for preferred supplier countries, the following analysis from Lederer [28, p.409-10]:

> Changes in demand, either domestic or foreign, will have a relatively larger effect on the marginal than on the preferred producers. The preferred producers will tend to operate closer to their optimum level of capacity at which their average costs are at the lowest point while the marginal producer will have to absorb the major part of the swings in aggregate demand.
>
> Within any one country, viewed in the context of international trade and competition, both preferred and marginal producers are likely to be found. It is entirely possible, however, that enough of the output of a country is produced or sold under conditions which make it relatively marginal or preferred in international markets so that the country as a whole may be considered a marginal or preferred supplier country. ...
>
> For the marginal supplier, if the change occurs in foreign demand it will have a relatively large and parallel effect on X-M; a rise in foreign demand will result in steeply rising exports and in declining imports; a fall in foreign demand will result in steeply falling exports and in

> rising imports.... The trade balance of the countries which are to a relatively large extent marginal suppliers thus will be more sensitive to cyclical movements abroad than to those within their own economies. ...
>
> For the preferred supplier, changes of demand both domestic and foreign will have relatively little effect on domestic production (since it is likely to be relatively close to optimum capacity). ..... The trade balance of the countries which are to a relatively large extent preferred suppliers will be more sensitive to cyclical movements in domestic demand than to those in foreign countries.

The empirical evidence is consistent with this analysis. Both a high level of Western European capacity utilization and a low level of U.S. utilization should be persistent. The United States should consistently have a marginal share in world exports in excess of its average share. The "bias" towards incremental imports being from the U.S. will be less for fluctuations around cyclically low levels of world trade since presumably not all preferred suppliers will be literally operating at full capacity and could provide additional output. The effect will be much stronger for fluctuations around a relatively large volume of world trade with the U.S. increasingly resorted to as the residual supplier. Thus this preferred/marginal supplier dichotomy is sufficient as well to explain the relationship between U.S. world demand coefficients in the "higher" and "lower" regressions for the period studied.

It is clear that the U.S. is unique. The U.S. has had slack in its economy for most of the period under discussion. This had led

to high marginal shares for U.S. exports and the seeming paradox that high pressure enhances export performance. The European results have demonstrated, however, that high pressure does dampen exports. Undoubtedly to some extent by undetected price changes, but almost certainly as well by non-price allocative mechanisms, high pressure on capacity tends to reduce exports.

It would be interesting therefore to have a sufficient number of quarterly observations when pressure on capacity was truly high in the United States to establish the result conclusively for all the U.S. industries as well. At this point, the best that can be done is to consider a few more recent years, when the U.S. economy was running somewhat closer to full capacity [1, p.29-31] . The necessary data for the divergent United States SITC categories have been compiled for the eight quarters of 1966-67. Residuals from the respective "higher" regressions (fitted for the period 1953-65) have been calculated.

The results are summarized in Table 6. Recall that the base observation period (1953-1965) has witnessed considerable excess capacity. The United States was running closer to full capacity in 1966-67. The large negative residuals for the quarters of 1966-67 (from the fitted regression) are therefore expected on the basis of our hypothesis that high domestic pressure affects exports adversely. Exports are being predicted on the basis of relatively low utilization rates. They will tend to be overstated for periods of high pressure on capacity.

Table 6

Residuals for U.S. Industries

U.S. SITC Category	Number of negative Residuals	Average Value of Negative Residuals (1966-67)	Average Value of Negative Residuals (1953-65)
5	6	-33,546	-17,063
62	4	- 8,351	- 1,745
71	6	-58,162	-40,904
72	4	-33,181	-16,209
732	4	-58,298	-48,823

For two industries, six of the eight observations generated negative residuals while for the remainder half the residuals were negative. In all cases, however, the average magnitude of the negative residuals was substantially greater than the average negative residual for the "base" (1953-1965) observations. The results should be interpreted as providing one additional indication that pressure on capacity affects exports adversely.

VI. Summary and Conclusions

In recent years the international payments mechanism has been subject to recurrent and increasingly severe shocks. Individual deficit countries have been faced with the prospect of devaluation or domestic deflation to "cure" fundamental deficits in their balance of payments. Apart from the impact on capital flows, such moves are always envisioned as yielding an incremental surplus in the balance of trade. The mechanism is clear in the case of devaluation when increased (domestic) prices for imports and decreased (foreign) prices for exports combine to stimulate the latter and dampen the former.

It is somewhat less clear in the case of domestic deflation just how the improvement in the balance of trade is to be achieved. The traditional analysis relies upon the positive relationship between income and imports to reduce imports. An additional argument of late is that the level of capacity utilization exerts an influence on imports separate from changes in income and price levels [4], [10].

Attempts to determine the impact of domestic deflation on exports have been less frequent, less rigorous and less conclusive. This study has attempted two principal tasks: first, to set forth the alternative mechanisms through which pressure on domestic capacity might influence exports; second, to present regression formulations testing these possibilities. Throughout the text a number of conclusions have been drawn; the major ones are summarized here.

(1) The employment of a variable for pressure on domestic capacity as an argument in an export equation implicitly assumes that the measure is a good proxy for otherwise unrevealed changes in the "true" price of exports. Though the rational has not been stated clearly, several previous studies have incorporated a demand pressure proxy in an equation explaining aggregate exports; these attempts were no doubt stimulated, at least in part, by the failure of the relative price variable to perform according to expectations.

The empirical portion of this paper is based on disaggregated data for individual industries. Nonetheless, our proxy for domestic demand pressure was not statistically significant in explaining exports. However, relative prices were significant in explaining the exports of individual U.K. industries as well as exports of U.S. and Belgian industries. Additional evidence that aggregation over commodities involves a substantial possibility of error was provided by the large variations in coefficient (and elasticity) magnitudes between industry classifications.

(2) Our tests of what we have called the "rationing hypothesis" have proved instructive. For a small group of industries, the domestic demand variable is significant (with a negative coefficient) in explaining exports for periods of high pressure on capacity. It was not significant (for these or any other industries) in periods of low pressure on capacity. The implication is that, at least for these, relatively concentrated, industries, domestic sales are preferred and exports discriminated against at times of high pressure on capacity.

Moreover, high pressure on domestic capacity seems to alter suppliers' reactions to changes in foreign demand in a broad spectrum of industries. Thus a distinct pattern exists in the relative magnitude of world demand coefficients between the regressions run for high and low pressure observations. For United Kingdom and Belgian industries, the coefficient is invariably higher in the "low" regression than in the "high" regression. There exists an adverse impact of high domestic pressure on export performance not captured by changes in relative prices and not simply related to changes in domestic demand.

This could be the result of undetected (discriminatory or not) changes in the "true" export price or of rationing of output with discrimination against exports. We also observe, however, a consistently greater explanatory power in the regressions for low pressure observations than in regressions for high pressure observations. This lends credence to the notion that domestic sales are preferred to some extent since, at times of high pressure on domestic resources, there is a relatively weak link between foreign demand and exports.

Results for the United States industries are somewhat anomalous. For them, the marginal share in world exports has been greater in regressions on relatively high pressure observations than it has been in regressions on relatively low pressure observations. However, the United States has experienced under utilization of capacity for most of the period investigated and seems to have been the incremental supplier in times of generally high world demand. In the

period 1966-1967, there has been somewhat higher pressure on United States capacity. We have employed the regressions fitted for the period 1953-1965 to generate predicted exports by quarter for 1966-1967. As expected, in these periods of high pressure, relatively high negative residuals resulted.

Though of a general and tentative nature, our results suggest at least three interesting points with regard to policy measures affecting the balance of trade. Of foremost importance is the general conclusion that high pressure on domestic capacity does discourage exports as well as stimulating imports, indicating a larger impact on the balance of trade than may have been realized. Thus the consequences of overly expansionary domestic policies for the balance of payments are greater than have been recognized by some. Simple measures of competitiveness (based on price movements alone) will underestimate export fluctuations especially when rationing is a general phenomenon.

Moreover, we have found that exports can be less reliably forecast for periods of high pressure, which is perhaps just one more indication of the difficulties involved in "fine-tuning" an economy. The economy running close to full capacity will experience more frequent "surprises" in its balance of trade position, presumably one target in the overall management of the economy.

There is a more positive implication, from the standpoint of the United States. Steps towards trade liberalization may contain a hidden aid for the United States balance of payments, at least in the

short-run. That is, agreements which allow substantial increases in the volume of world trade may result in relatively large increases in some categories of U.S. exports. This conclusion rests on the continued position of the United States as "marginal supplier."

The attempt of this paper has been to investigate the direct effects of high domestic pressure on export performance. The most important implication of the results is that the competitiveness of a nation's goods in international trade is not adequately measured by changes in price levels. The results are not suited, however, to the formulation of quantitative estimates of the importance of non-price allocative mechanisms. One important goal of subsequent research should be to provide such estimates. Since the level of domestic pressure is undoubtedly important in the behavioral functions of both demanders and suppliers of goods, the pursuit of this goal will require specific attention to both. Such an approach will hopefully allow more precise estimates of the impact of high domestic pressure as well as provide further insight into the operation of the system.

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