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TRADE AND SCALE ECONOMIES
A Casuality Test for the US, Japan, Germany and the UK.

by
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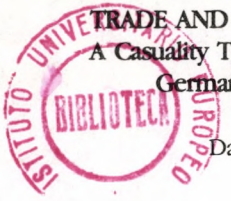

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1. INTRODUCTION

In the last twenty years the productivity and trade performance among the western industrialized countries have shown a nonuniform picture. Japan and West Germany have experienced above average productivity growth rates compared to those of other western industralized countries; and at the same time, they have achieved a favourable trade performance. In contrast, the US and the UK went through an unfavourable productivity as well as an inferior trade development. The experience of these four countries seems to suggest a direct link between trade and productivity. Countries which do well in their productivity performance seem also to do well in their trade performance and vice versa.

The observed positive association between trade and productivity seems to be consistent with recent trade theory incorporating economies of scale and imperfect competition. It considers trade to lead to extra welfare gains through its effect on static economies of scale on the one hand and sees economies of scale as the cause of trade between countries with similar factor endowment on the other. Though economies of scale greatly expand the gains from trade, they also give rise to incentives for interventionist unilateral trade policy. The direction of causality between trade and productivity on the one hand and between the terms of trade and productivity on the other might, therefore, have important implications for the way trade policy can influence industrial performance.

The paper attempts to answer the following two questions. First, have the increases in foreign market shares experienced by Japan and Germany and the loss in market shares of the US and the UK been caused by their productivity performance or has, on the contrary, productivity growth of these countries caused their performance in foreign markets. Second, can one observe in these countries any causal influence of the terms of trade on productivity which might explain policy-induced divergences in productivity growth between these countries.

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In order to answer the above questions vector autoregressive representations of trade, productivity, the terms of trade and world output for these four countries are shown and various causality tests are performed on the basis of Granger's concept of causality.

The paper is in four sections. Section 2 derives the causal implications for trade, productivity, the terms of trade and world output from models incorporating many of the features in the recent theoretical literature. Section 3 describes the methodology and data and looks at whether the data for the US, Japan, Great Britain and Germany are compatible with the causal implications derived in Section 2. Finally, Section 4 summarizes the results and suggests some policy conclusions. The Appendix shows the same exercise as in section 3 with an alternative trade variable.

2. CAUSAL IMPLICATIONS OF ALTERNATIVE MODELS

In recent trade models with economies of scale, imperfect competition and product differentiation (Helpman/Krugman (1985)) it is suggested that productivity increases through the exploitation of static economies of scale are the cause of trade between countries with similar factor endowments. Even if countries have no Heckscher-Ohlin type of comparative advantage vis-a-vis each other, they will engage in trade because of increasing returns to scale. Besides, economies of scale being the cause of intra-industry trade, trade is also assumed to effect economies of scale. Three potential gains from trade are considered. First, there may be gains from the exploitation of economies of scale as international trade enlarges the market served by individual firms. By expanding the total market, trade makes room for more efficient size in the domestic market thereby lowering average costs. Second, there might be a procompetitive effect as the monopoly power of domestic firms is reduced when foreign producers enter their markets. Thus, trade reduces the monopolistic distortion of imperfect domestic markets. Third, there might be a gain to consumers of differentiated products as trade widens the range of products available.

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The purpose of this paper is to explore the first of these channels; whether trade leads to higher productivity through the realization of economies of scale. Though recent trade theory suggests that there are efficiency gains from trade, in an imperfeclty competitive environment with increasing returns to scale policy intervention in the form of trade restrictions and/or trade subsidies might lead to non trivial productivity gains as well.

In order to see the productivity consequences of trade policy, consider the model developed by Venables/Smith (1986) in which the welfare effects of trade and industrial policy on the UK refrigerator and footwear industry are studied. Since they use a partial equilibrium model focussing on one industry, intersectoral interactions are not taken into account which might alter the results (see Dixit and Grossman (1984)).[1] Despite this disadvantage of being a partial equilibrium model, the model captures many of the features in the theoretical literature so that it seems useful as a reference point for the following analysis. The model allows for study adjustment when the number of firms is fixed as well as when there is free entry. Furthermore, firms' market power is derived from oligopolistic interaction as well as from product differentiation.

Firms are assumed to make two choices, the number of brands they produce and the quantity of each brand of which x^d is sold on the home and x^f on the foreign market, respectively. The cost function of the domestic firms have the form

$$TC = m.c(x^d + x^f) + g(m) \qquad (1)$$

where m denotes the number of brands, c marginal cost and TC are total cost. The production of a constant number of brands incurs fixed cost g(m) and output of a single one of the m brands are produced with constant marginal cost, c. There are increasing returns to scale, since average cost declines as output of each brand is increased. Adding an additional brand (at the same level of existing brands) raises the operating cost by $c(x^d + x^f)$ and

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the fixed cost by g'(m). The shape of g(m) captures returns to scale associated with an expansion of brands.

The revenue, R, of the firm is given by the sum of the sales revenue per brand in the home and foreign markets multiplied by the number of brands

$$R = m[p^d(1-t^d)x^d+p^f(1-t^f)x^f] \qquad (2)$$

where p^d and p^f denote price in the domestic and foreign markets, and t^d and t^f denote tax rates. By equating marginal revenue to marginal cost, each firm chooses sales of each brand in home and foreign markets which gives the conditions

$$p^d(1-t^d)(1-1/\varepsilon)=c$$
$$p^f(1-t^f)(1-1/\varepsilon)=c \qquad (3)$$

where the elasticity ε is derived from a demand function for a separate brand of differentiated product which depends on its own price and on the industry price index. ε gives the resulting change in demand if the price of a single brand is changed, holding the industry price index constant. There exists also an aggregate industry demand function which depends on an associated price index. The aggregate demand function is assumed to have a constant elasticity η which describes the resulting changes in demand when all firms change their prices in the same proportion. Equations (3) describe mark-up pricing of differentiated products where quantities sold are determined from demand functions for each separate brand. Market power is derived solely from product differentiation as firms are assumed not to have an influence on the industry aggregate price or quantity.

In their choice of number of brands firms follow the following profit maximizing condition

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$$x^d\{p^d(1-t^d)-c\}[1+(dx^d/dm).m/x^d]+$$
$$x^f\{p^f(1-t^f)-c\}[1+(dx^f/dm).m/x^f]=g'(m) \quad (4)$$

which states that firms will introduce new brands up to the point where the perceived gains from one new brand are equal to the cost of introducing it. The first term of equation (4) gives the increment to revenue of adding a brand taking into account that sales of existing m brands will be reduced by this expansion. $(dx^d/dm)(m/x^d)$ captures the conjecture that the firm makes about the effect of adding an extra brand on the industry aggregate sales and price in the domestic economy and thus on sales per brand in the domestic economy. In this case the aggregate industry demand function is relevant to obtain marginal revenue. The second term on the left hand side gives the same effect on export revenue while the right hand side gives the extra cost of introducing a new brand. In their choice of number of brands firm's market power comes from their influence on industry aggregates, and not from product differentiation thereby allowing for oligopolistic interaction.

Under free entry and exit the number of domestic firms will adjust so that in industry equilibrium profits are driven down to zero.

$$R = TC \quad (5)$$

Foreign firms set prices in the same way as domestic firms, while the number of foreign firms and brands is assumed to be fixed. The supply price of foreign output of each brand is therefore constant and sales are demand determined.

There are three types of industry adjustment in response to a disturbance. First, output per brand is allowed to adjust in response to a policy change with the number of brands and firms constant allowing for monopolistic competition with differentiated products in which firms make positive

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profits as described by Krugman (1979). Second, the number of brands each firm produces is allowed to change, taking oligopolistic interaction into account, similar to Brander (1981) and Dixit (1984). Third, the number of firms is allowed to adjust resulting in a market structure which is monopolistically competitive in the sense that firms make zero profits (see Helpman and Krugman (1985).

In the model described so far, trade policy in the form of an import tariff will have the following effect on productivity. The tariff reduces imports and causes an increase in domestic production. The increase in sales per brand of domestic firms means that activities which are operating at an inefficiently small scale have been expanded thus increasing average productivity.

If firms can change their product range then an additional source for productivity gains is available. The tariff makes the introduction of additional brands profitable which allows firms to realize economies of scale through the fixed cost function g(m). Thus in the case of a fixed number of firms with endogenous number of brands there are two sources of efficiency gains. One is the productivity gain due to the tariff induced expansion of output of existing brands increasing the rate of capacity utilization. The second is the productivity gain resulting from the expansion of new brands produced with decreasing fixed cost as captured by the g(m) function. Whether there will be a net productivity gain compared to the case of a fixed product range, however, will depend on the relative magnitude of scale economies obtained through the expansion of output of existing brands as compared to that obtained through replicating brands, since the sales of new brands will lead to some contraction of existing brands. As newly introduced brands are sold on export markets as well, the import tariff induces additional exports, which is similar to the mechanism described by Krugman (1984) on import protection as export promotion. Protection of the home market from foreign rivals helps domestic firms not only in the protected market but in export markets as well.

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If entry is endogenous, the tariff induced higher profitability of the home market induces entry until profits are reduced to zero. The increased number of firms means that existing firms output contract thereby lowering average productivity. Hence, the productivity effect of the tariff will depend on whether there is free entry to the market or not.(2)

The effect of an export subsidy on productivity is similar to that of the tariff. The subsidy increases exports, domestic production and the number of brands leading to an increase in productivity due to longer production runs as well as lower cost in the production of new brands. This productivity accelerating effect of higher exports might, however, again be compensated, if new firms are allowed to enter the market.

In a general equilibrium two sector model taking sectoral interactions through factor markets into account Flam and Helpman (1987) get similar results regarding the allocative consequences of trade policy. One sector is assumed to produce homogeneous products with constant returns to scale, while the other sector produces differentiated products with increasing returns to scale. Increasing returns to scale result from the existence of fixed costs for product development. The cost function of firms in the sector with differentiated goods looks similar to equation (1) and firms in this sector use mark-up pricing over marginal costs similar to equation (3), while homogeneous products are priced by marginal cost. Firms in the differentiated sector engage in monopolistic competition under free entry so that profits are driven down to zero. In contrast to the Venables/Smith model, however, each firm produces only one variety so that the number of varieties equals the number of firms with no oligopolistic interation between firms.

Whether an export subsidy or an import tariff will increase productivity will depend on the following factors. The tariff shifts home demand from foreign to domestic differentiated products which allows domestic firms to sell larger quantities at the initial price, making in turn an increase in

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prices and an expansion of production profitable. The increased profitability of the home production increases the returns to product development thereby inducing entry into the industry. The newly entered firms producing additional varieties will, however, reduce the demand of the incumbent firms thereby forcing them to contract output. Whether output per firm and thus productivity rises or declines will depend on whether or not the tariff induced demand increase will be taken away by new entrants producing additional varieties. The tariff will increase productivity, if the homogenous and differentiated sector use common input factors which are substitutable so that output expansion of existing varieties takes place by drawing on resources of the homogeneous sector, while product development for new varieties requires highly specific resources not available in the homogeneous sector. In this case, potential new entrants are resource constraint while incumbant firms are not, bringing about larger output per firm and hence higher productivity.(3)

The influence of an export subsidy on productivity depends on exactly the same factors as that of the import tariff. The export subsidy increases foreign demand for home varieties that makes domestic firms willing to expand output. Induced entry and additional varieties on the other hand, forces firms to reduce output, the net effect on productivity depending on which of the opposing forces dominate.

Although numerical simulations on the effects of trade policy on a high-technology industry (see Baldwin and Krugman 1986) and on the US car market (Dixit 1985) find productivity accelerating effects in response to tariff protection, Cox and Harris (1985) adopting a general equilibrium model with imperfect competition and economies of scale for the Canadian economy come to quite different results. A unilateral removal of domestic tariffs (unweighted average of 11 per cent) leads, according to their estimates, to a rationalization of industries with a lengthening of production runs and thus to increases in labour productivity of 20 per cent. The reason for this opposite result - not the imposition but the removal of the tariff increases

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productivity - is based on different assumptions about price behavior. In the market for imports domestic producers take as a collusive strategy the price of imported goods as given, while in export markets firms are assumed to choose mark-up pricing over unit cost. Domestic pricing behavior is, therefore, some combination of mark-up pricing and collusive pricing in which import prices inclusive of the domestic tariff are taken as a reference point. Thus, the pricing strategy of domestic firms is sufficiently collusive that a domestic tariff cut induces firms to cut prices so that they will make losses. In order to remain profitable, firms will increase output to lower average costs. Furthermore, lower profitability will induce some firms to exit from the market leaving a larger output for remaining firms. Productivity increases as a result of larger aggregate output as well as larger output per firm.

Moreover, in the Cox and Harris model it is not import protection but import liberalization which acts as export promotion. Protection of the home market allows for too many firms operating at an inefficiently small size indicating unexploited economies of scale which can be exhausted by the removal of the tariff. Trade liberalization leads to substantial rationalization with larger output per firm resulting in significant decreases in average costs which translates in lower export prices and thus higher exports. The magnitude of the export promoting effect of trade liberalization will depend on the ratio of fixed costs to variable costs (indicating the size of unexploited economies of scale) and on the size of the elasticity of export demand (indicating the increase in foreign market shares due to lower export prices).[4]

To sum up, according to the models described above one would expect the following causal relationship between exports, productivity and the terms of trade. Exports are supposed to have a positive causal impact on productivity the smaller the country is and the less entry occurs. In small countries it is more likely that minimum efficient scale is large relative to the home market size, indicating that the export induced own production effect will

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be large relative to the export induced prevention of the rationalization effect to work due to increased number of firms. Higher import tariffs as measured by a deterioration in the term of trade may have a positive or a negative causal impact on productivity depending on whether the tariff increases/decreases aggregate output and the number of firms. Productivity is supposed to have a negative causal influence on the terms of trade if average cost pricing prevails and the productivity increase is not offset by a proportional wage increase. A deterioration in the terms of trade (as proxy for an increase in price competitiveness) has a positive causal impact on exports, as has productivity indicating economies of scope of firms producing more than one variety. Thus, the theories predict a feedback (mutual causality) between exports and productivity on the one hand and between the terms of trade and productivity on the other, with only a one-way direction in causality between exports and the terms of trade.

The analysis which follows is meant to be a statistical test of the causal relationships just described. The results indicate whether the data contradict or are compatible with the causal hypotheses implied by the models of this section. While empirical studies available assume a specific causal structure without testing it, the present paper performs a statistical test on the causal structure without claiming to test the theories.

3. TIME SERIES REPRESENTATION OF EXPORTS, PRODUCTIVITY, THE TERMS OF TRADE AND WORLD OUTPUT FOR USA, JAPAN, WEST GERMANY AND UK

3.1. Test Procedure

In order to investigate whether the data for the US, Japan, UK and Germany are consistent with the models described in the previous section, an unconstrained vector autoregressive model for exports, productivity, the terms of trade and world output is estimated treating all variables as

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endogeneous in a first stage. Then the formal causality tests are performed based on Granger's (1969) concept of causality.[5] According to Granger's definition of causality x is said to cause y if the forecast for y is improved (has a smaller mean square error) by using additionally the history of x than by using just the history of y alone. This means that the hypothesis that x causes y can be examined by estimating (using lag operator notation $L^p y_t = y_{t-p}$)

$$y_t = (\sum_{i=1}^{p} \theta_i L^i) y_t + (\sum_{j=1}^{z} \psi_j L^j) x_t + v_t \qquad (3.1)$$

and testing whether the $(\sum_{j=1}^{z} \psi_j L^j)$ are jointly significantly different from zero based on a F-test of the OLS regression. The test requires that the disturbance term v_t is close to being white noise which involves a careful choice of suitable values of p and z. The value of p is particularly important since the omission of relevant lagged values of y could inflate the coefficients of the lagged x's generating spurious causality. I have used the Bayesian information criterion (BIC) to estimate the order of the univariate autoregressive process which is given by

$$\log \sigma^2_{pq} + (p+q)\frac{\log T}{T} \qquad (3.2)$$

σ^2_{pq} is the estimated variance of the innovations in the ARMA process of order (p,q) and T is the sample size. The procedure searches over different values of p and q within a specified range until the above criterion function is minimized. The idea behind this criterion is that higher order models get penalized by the second term of equation (3.2) which is supposed to compensate for the reduction in variance of the innovations always brought about by an increase in the order of the model.

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The value of z for each of the variables included in the regressions was set to four in accordance with the quarterly data. The four-lags model assume the causal linkages to work in between a year, so that longer-run influences are not detected by the model.[6)] Besides the correct treatment of the lag structure the procedure relies on the assumption that the time series exhibit stationary features. Before estimating the vector autoregressive model all data were transformed into fourth logarithmic differences in order to eliminate the trend and seasonality from the time series. The detrended and deseasonalized series seemed not to incorporate non-stationary elements, since their autocorrelation functions quickly dropped to zero.

3.2. Data

Definitions and sources of the variables are as follows:

X = exports of manufacturing goods at constant prices
source: International Financial Statistics

TOT = terms of trade, export unit values divided by import unit values for manufacturing goods in local currency
source: International Financial Statistics

PR = labour productivity, manufacturing output per employee
source: OECD Main Economic Indicators
As the procedure requires the removal of the trend in the series, movements in labour productivity do not reflect technical change.

Q = OECD Output at constant prices
source: OECD Main Econmic Indicators

IIT = Intra-Industry Trade, ratio of net trade to gross trade of manufacturing goods, $\frac{|X-M|}{X+M}$ with X and M as the value of manufacturing exports and imports, respectively
source: International Financial Statistics

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3.3. Vector Autoregression and Causal Ordering

In Tables 1 to 1C the four variable vector autoregressions fitten by least squares over the sample period indicated are reported for Germany, Japan, the US and the UK using the BIC criterion to determine the order of the univariate autoregressive representation for each of the variables and including four lags for all the other regressors.The percent reduction in variance in the univariate autoregressive representation of the four countries for exports, productivity and the terms of trade (not reported here) did not exceed 70 per cent in most cases indicating that the inclusion of additional information on past realizations of other variables is likely to improve the forecasting performance. All series were detrended and seasonally adjusted by fourth logarithmic differences. Tables 2 to 2C contain the more formal causality tests for exports (X), productivity (PR), the terms of trade (TOT), and world output (Q) for the four countries, while the Appendix provides the same estimates with an alternative trade variable.[7)]

Germany

In the vector autoregressive representation for Germany in Table 1 it can be seen that German exports and productivity follow an AR 4 process, respectively and the terms of trade an AR 3 process as obtained by the BIC criterion.

The first column of Table 1 shows that there is no indication of effects of lagged productivity and some indication of effects of the lagged terms of trade and lagged world output on German exports. Only the coefficient of the first quarter lagged terms of trade and the coefficient of the first quarter lagged world output are significant at the 5 per cent level. This result is also supported by the F-test for the null hypothesis that the coefficients of the four lagged values of each of the variables are jointly equal to zero given in Table 2. The F-ratios and prob-values to test whether German

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TABLE 1

VECTOR AUTOREGRESSIVE REPRESENTATION OF EXPORTS (X), PRODUCTIVYT (PR), THE TERMS OF TRADE (TOT), AND WORLD OUTPUT (Q), GERMANY

Regressors	Dependent variables (t-values in parenthesis)		
	X	PR	TOT
X-1	.35	-.14	.04
	(3.0)	(2.28)	(.49)
X-2	.27	.06	-.07
	(2.0)	(.87)	(.75)
X-3	.19	-.08	.15
	(1.44)	(1.26)	(1.62)
X-4	-.32	.19	-.001
	(2.62)	(2.97)	(.09)
PR-1	-.001	.48	.09
	(.01)	(4.04)	(.56)
PR-2	.41	.16	-.14
	(1.57)	(1.21)	(.74)
PR-3	.07	.14	.12
	(.25)	(1.04)	(.64)
PR-4	.02	-.40	-.06
	(.08)	(3.48)	(.36)
TOT-1	-.54	-.21	1.13
	(3.41)	(2.52)	(9.97)
TOT-2	.14	.14	-.28
	(.64)	(1.22)	(1.72)
TOT-3	.27	.03	-.03
	(1.20)	(.30)	(.23)
TOT-4	-.16	-.02	
	(.92)	(.24)	
Q-1	1.19	.79	-.42
	(2.56)	(3.32)	(1.27)
Q-2	-.64	-.78	.68
	(.90)	(2.14)	(1.34)
Q-3	-.34	.35	-.21
	(.48)	(.98)	(.44)
Q-4	.35	-.15	-.12
	(.85)	(.71)	(.42)
R^2	.739	.727	.781
SE	.04050	.0201	.02886

Note: All regressions cover 1962.2-1987.2. The series were detrended and seasonally adjusted by fourth logarithmic differences. The number of lagged values of the dependent variable included in the regression equals that obtained by the BIC criterion. X and PR follow an AR4 and TOT follows an AR3 process, respectively.

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TABLE 2

CAUSALITY TESTS FOR EXPORTS, PRODUCTIVITY, AND THE TERMS OF TRADE, GERMANY

Test for Causality of	by	Test Statistic[1)]	Prob Value[2)]
X	PR	.97	43.02
	TOT	4.31	.32
	Q	2.62	4.08
PR	X	3.25	1.58
	TOT	1.72	15.35
	Q	3.09	2.02
TOT	PR	.22	92.6
	X	.91	46.13
	Q	.64	63.49

(1) The Causality Test Statistic is an F-ratio for the null hypothesis that the coefficients of four lagged values of each of the variables in the second column are jointly equal to zero.

(2) Probability of obtaining an F-ratio at least as large as the test statistic under the null hypothesis. A prob value smaller than 5 indicates rejection of the null hypothesis at the 5 per cent significance level.

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exports are jointly Granger-caused by productivity, the terms of trade (as proxy for price competitiveness) and world output indicate that price competitiveness and world output cause exports while the causal effect of productivity on exports is a great deal short of statistical significance.

In the second column of Table 1, current productivity is significantly influenced by exports at one and four quarter lags, respectively. The overall impact of exports on productivity as obtained by the sum of the coefficients, appears to be slightly positive suggesting that the scale effect of higher exports has dominated possible losses in productivity due to increased number of firms.[8)] The evidence that the terms of trade influences German productivity is weak as only the terms of trade at one quarter lag is statistically significant. As the signs of the estimated coefficients of the lagged terms of trade show, an imposition of an import tariff (or an exchange rate devaluation) as reflected in a deterioration in the terms of trade seems to favour productivity. It seems, therefore, that the tariff induced capacity and scale effect has - similar to the effect of higher exports - outweighted the possible effect of the tariff induced prevention of the rationalization effect to work. However, the causal impact of the terms of trade on productivity is only significant at the 20 per cent level as the marginal significance level given by the prob-value in Table 2 indicates. Lagged world output seems also to have a significant influence on current productivity as is given by the significance of the first and second quarter lags. The F-statistic for the test of causality in Table 2 suggest a strong causal link of exports and world ouput on productivity, while causality of the terms of trade on productivity is not significant at conventional levels.

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The third column of Table 1 provides estimates of the coefficients of lagged export, productivity and world output in the regression for the terms of trade. Except for 'own' lags, none of the other lagged variables seem to have a significant influence on the terms of trade which is confirmed by the causality tests in Table 2. This means that the terms of trade can be considered to be a truly exogenous variable to the system. The reason for this might be that average cost pricing is not a dominant price behavior in German manufacturing and/or increases in labour productivity are offset by wage increases with no change in unit labour costs.

To sum up, the causal orderings of the time series suggest that the German data are compatible only with some of the features in the theoretical literature. Exports have a significant positive impact on productivity, while the evidence that the terms of trade causes productivity is weak. Furthermore, the test that productivity Granger-cause exports finds no statistical support (see also Fig. 1).

Japan

Table 1A gives the estimated vector autoregressive representation of exports, productivity, the terms of trade, and world output for Japan. Table 2A summarizes the causal relationships between the series. In the export equation two coefficients of lagged productivity and two coefficients of the lagged terms of trade as well as one coefficient of lagged world output are significant at the 5 percent level. The causality tests reported in Table 2A also provide strong evidence that productivity (at the 10 per cent significance level), price competitiveness, and world output cause Japanese exports. In the productivity equation lagged exports and lagged world output have significant coefficients

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TABLE 1A

VECTÓR AUTREGRESSIVE REPRESENTATION OF EXPORTS, PRODUCTIVITY, THE TERMS OF TRADE, AND WORLD OUTPUT, JAPAN

Regressors	Dependent Variables (t-values in parenthesis) X	PR	TOT
X-1	.99	-.08	-.03
	(9.32)	(1.86)	(.33)
X-2	-.40	.007	-.03
	(3.72)	(.12)	(.22)
X-3		.08	.02
		(1.22)	(.17)
X-4		.002	.009
		(.04)	(.10)
PR-1	-.60	1.18	-.09
	(2.01)	(9.99)	(.34)
PR-2	1.03	-.23	-.13
	(2.22)	(1.27)	(.31)
PR-3	-.62	-.22	.31
	(1.34)	(1.82)	(.77)
PR-4	.34		-.22
	(1.12)		(.85)
TOT-1	-.55	-.06	1.50
	(4.04)	(1.09)	(12.88)
TOT-2	.47	.007	-.74
	(2.01)	(.07)	(3.83)
TOT-3	-.21	.08	.03
	(.88)	(.77)	(.21)
TOT-4	-.001	-.03	
	(.08)	(.46)	
Q-1	1.35	.57	-.06
	(2.74)	(2.94)	(.15)
Q-2	-.88	-.66	.08
	(1.09)	(2.07)	(.11)
Q-3	-.35	.35	.31
	(.43)	(1.16)	(.45)
Q-4	.41	-.08	-.24
	(.86)	(.43)	(.57)
R^2	.869	.910	.895
SE	.05382	.02098	.04594

Note: See Note of Table1.X follows an AR2 and PR, TOT an AR3 process, respectively.

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TABLE 2A
CAUSALITY TESTS FOR EXPORTS, PRODUCTIVITY, AND THE TERMS OF TRADE, JAPAN

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
X	PR	2.24	7.11
	TOT	5.76	0.04
	Q	2.50	4.85
PR	X	2.54	4.56
	TOT	.94	44.64
	Q	2.53	4.62
TOT	PR	.29	88.29
	X	.15	96.37
	Q	.19	94.17

1) See Note of Table 2.

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which is again confirmed by the causality tests given in Table 2A. Japan's productivity is Granger-caused by exports, and world output, while the statistic for the test of causality from the terms of trade to productivity is not significant at conventional levels. In the terms of trade equation there are no significant coefficients except that for own lags with a similar result obtained by the causality tests.

Summing up, the causal structure of the Japanese time series look very similar to that of Germany. The only exception is the feedback found between exports and productivity. Both variables seem to have reinforced each other which is in accordance with the causal implications of the models discussed in section 2. Japan's export market growth has been backed by its productivity growth and its export market growth has contributed to its productivity performance. Japan's productivity seems, however, not to have been policy induced (in the form of import tariffs) as no causal impact from the terms of trade on productivity could be found.[9)]

United States

Tables 1B and 2B give the results for the US. The dominant feature of the findings is that US exports are exogeneous to the system neither caused by productivity, price competitiveness nor by world output. Furthermore, the test reported in Table 2B indicates that the null hypothesis of no causality from exports to productivity is easily rejected. It is interesting to observe that the overall impact of exports on productivity appears to be negative suggesting that export induced entry of firms seems to have outweighted possible scale effects of higher exports. As minimum efficient scale is more likely to be small relative to the home market size in the United States this result seems not to be particularly surprising. In contrast to the other countries, the causality tests provide strong evidence that exports cause the terms of trade while as for Germany and Japan there is no evidence that the terms of trade causes productivity.

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TABLE 1B
VECTOR AUTOREGRESSIVE REPRESENTATION OF EXPORTS, PRODUCTIVITY, TERMS OF TRADE, AND WORLD OUTPUT, U.S.A.

Regressors	Dependent Variables (t- values in parentheses		
	X	PR	TOT
X-1	.46	-.005	-.02
	(4.24)	(.26)	(.50)
X-2	.36	-.05	-.07
	(3.08)	(2.09)	(1.76)
X-3	.19	-.03	.01
	(1.63)	(1.55)	(.38)
X-4	-.42	.01	-.07
	(3.73)	(.60)	(1.91)
PR-1	.32	1.03	-.26
	(.45)	(7.98)	(1.15)
PR-2	-.02	-.29	-.02
	(.02)	(2.28)	(.07)
PR-3	-1.18		.35
	(1.24)		(1.20)
PR-4	.75		-.29
	(1.23)		(1.52)
TOT-1	-.41	-.15	1.25
	(1.19)	(2.20)	(14.63)
TOT-2	-.02	.09	-.69
	(.03)	(.95)	(7.50)
TOT-3	.46	.02	
	(.91)	(.19)	
TOT-4	-.72	-.08	
	(1.97)	(1.14)	
Q-1	1.07	-.008	-.10
	(1.52)	(.06)	(.46)
Q-2	-.83	-.05	.28
	(.73)	(.22)	(.78)
Q-3	.82	.03	-.28
	(.74)	(.15)	(.80)
Q-4	-.59	-.02	.07
	(.93)	(.21)	(.36)
R^2	.726	.836	.845
SE	.06793	.01313	.02187

Note: See Note of Table 1. X follows an AR4 and PR, TOT an AR2 process, respectively.

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TABLE 2B

CAUSALITY TESTS FOR EXPORTS, PRODUCTIVITY, AND THE TERMS OF TRADE, USA

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
X	PR	0.63	64.51
	TOT	1.34	26.16
	Q	1.37	25.09
PR	X	3.48	1.11
	TOT	1.48	21.44
	Q	.18	94.76
TOT	PR	.96	43.68
	X	4.59	.21
	Q	.22	92.68

1) See Note of Table 2.

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United Kingdom

In Tables 1C and 2C the estimates for the United Kingdom are provided. It appears from the Tables that the causal relationship between the British time series look quite similar to those of the United States (for a summary of the causal orderings for all four countries see Fig. 1). Causality from productivity and world output to exports is rejected while lagged price competitiveness significantly influences current exports. The most interesting result is obtained for the productivity equation. The test statistic for joint causality from exports, the terms of trade, and world output to productivity is highly singificant. As in the United States the overall impact of exports on productivity appears to be negative which is not a result a priori expected for a small open economy.[10] Moreover, an inspection of the coefficient estimates of the lagged terms of trade on productivity in column 2 of Table 1C shows that a deterioration in the terms of trade (due to an imposition of an import tariff and/or exchange rate devaluations) seems tohave accelerated productivity. This ambiguous result, that higher exports did not exhibit productivity encouraging effects, while lower imports due to higher import prices did favour productivity might be explained by structural differences between the export and import competing sector in Britain. Higher exports might have shifted resources to low productivity areas thereby compensating any export induced scale effect, a reallocation which did not take place in response to higher demand in the import competing sector.[11]

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TABLE 1C
VECTOR AUTOREGRESSIVE REPRESENTATION OF EXPORTS, PRODUCTIVITY, TERMS OF TRADE, AND WORLD OUTPUT, UK

Regressors	Dependent variables (t- values in parentheses) X	PR	TOT
X-1	.32	-.11	.04
	(2.62)	(3.48)	(1.23)
X-2	.28	-.02	.02
	(2.08)	(.58)	(.56)
X-3	.19	-.002	-.07
	(1.41)	(.06)	(1.73
X-4	-.17	.03	.00
	(1.27)	(1.01)	(.00)
PR-1	-.20	.56	.04
	(.41)	(4.59)	(.34)
PR-2	.09	.20	-.37
	(.16)	(1.47)	(2.52)
PR-3	.23	.13	.17
	(.43)	(.95)	(1.11)
PR-4	-.30	-.29	-.01
	(.64)	(2.46)	(.06)
TOT-1	-.69	-.15	1.19
	(1.46)	(1.24)	(8.57)
TOT-2	-.18	.40	-.27
	(.22)	(1.95)	(1.17)
TOT-3	.55	-.49	-.15
	(.65)	(2.27)	(1.03)
TOT-4	-.36	.09	
	(.63)	(.64)	
Q-1	.50	.34	-.09
	(.66)	(1.75)	(.42)
Q-2	-.30	-.13	.12
	(.24)	(.38)	(.31)
Q-3	.12	-.22	-.002
	(.10)	(.70)	(.01)
Q-4	-.56	-.04	.02
	(.78)	(.22)	(.10)
R^2	.571	.781	.855
SE	.07242	.01841	.02123

Note: All regressions cover 1962.1-1983.2. X and PR follow an AR4 and TOT an AR3 process, respectively.

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TABLE 2C

CAUSALITY TESTS FOR EXPORTS, PRODUCTIVITY, AND THE TERMS OF TRADE, UK

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
X	PR	0.13	96.99
	TOT	2.66	3.99
	Q	.91	46.61
PR	X	4.82	.17
	TOT	3.01	2.39
	Q	3.22	1.76
TOT	PR	2.17	8.15
	X	1.02	40.25
	Q	.20	93.77

1) See Note of Table 2.

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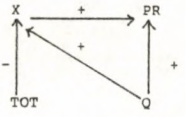
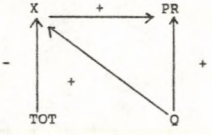
Figure 1
Causal Ordering of Exports (X), Productivity (PR), the Terms of Trade (TOT) and World Output (Q)

GERMANY

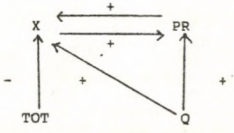


5 percent significance level

JAPAN

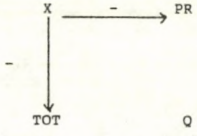


5 percent significance level



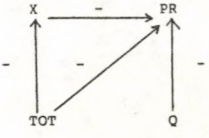
10 percent significance level

USA

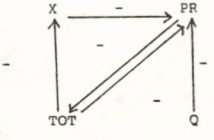


5 percent significance level

UK



5 percent significance level



10 percent significance level

Note: An arrow running, for example, from X to PR is used to denote that "X causes PR" where "+" or "-" indicates the sign of the causal link as obtained by the sum of the coefficients.

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4. SUMMARY AND CONCLUSIONS

This paper has investigated the relationship between exports, productivity, the terms of trade and world output for the US, Japan, Germany and the UK on the basis of VAR models and Granger's concept of causality. The findings of the econometric analysis can be summarized as follows. Exports are Granger-caused by productivity only in Japan (at the 10 per cent level), while in the other countries no causal link from productivity to exports has been found. This would not be particularly surprising if productivity changes were reflected in the terms of trade which, however, was only the case for the British data.

In all countries labour productivity has been Granger-caused by exports. While exports resulted in productivity gains in Germany and Japan, they led to a productivity decline in the US and the UK. Causality from the terms of trade to productivity - a link much stressed by the recent theoretical literature - has only been identified for the British data, while for the other countries causality from the terms of trade to productivity is not statistically significant at conventional levels. An inspection of the coefficient estimates indicates, however, that a deterioration of the terms of trade (due to a tariff increase and/or an exchange rate devaluation) favours productivity in all countries. The link is statistically least supported for Japan (Prob value:44.7) and strongest supported for Britain (Prob Value:2.4).

With the exception of the US, in all other countries - besides the causal link from world output via exports on productivity - a direct causal link from world output to productivity has been found. While in the UK increases in world output led to a productivity decline, in Japan and Germany world output resulted in productivity gains. Causality from world output to productivity might be an indication of internationally increasing returns to scale due to horizontal and vertical specialization in the presence of

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multinational corporations - productivity depending on the size of the international market rather than national output (see Ethier (1979)).

It seems, therefore, that the present causality analysis is only consistent with some aspects of recent trade theory. While the estimated causality from exports to productivity is in accordance with the causal hypotheses of the theories of intra-industry trade the estimated absence of any causal link from the terms of trade on productivity (with the exception of Britain), seems to suggest that disturbances caused by a devaluation of the exchange rate and/or by an import tariff do not seem to be capable of changing productivity as is implied by recent trade literature.

A comparison of the causal structure between the four countries reveals (see Fig. 1 for a summary) that Japan and Germany on the one hand and the US and the UK on the other share common causal features. Productivity in Japan and Germany has been supported by export as well as world market growth, while the unfavourable productivity performance in the US and the UK can also be attributed to exports and for the UK to world output.[12] As exports were Granger-caused by productivity only in Japan, the divergent development in export market shares in the other countries cannot be attributed to differences in productivity performance and thus is still open for further research.

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NOTES

1) The potential impact of intersectoral interactions will be taken up in the empirical part.

2) Note, however, that the welfare implications are not symmetric to those of productivity. Welfare will be highest under free entry, if there is sufficient monopolistic distortion on the domestic market.

3) If, however, there exists a further sector producing differentiated goods with increasing returns to scale which uses input factors substitutable for product development in the other differentiated sector, then the tariff might lead to a productivity decline if scale economics are more important in the former than in the latter. See Dixit/Grossman (1984) for the consequences of intersectoral interactions.

4) For a similar result for the Austrian manufacturing sector in response to exchange rate changes see Marin (1985, 1986).

5) The term "causality" is somewhat misleading, since the criterion for the test is whether one variable "precedes" another one. For a critique on the notion see Leamer (1985).

6) In an other study, based on a subset model approach, however, longer-run causal linkages were not found, see Kunst/Marin (1987).

7) The correlation matrices of innovations measuring instantaneous causality are not reported and are available on request.

8) The summation of coefficients is, however, only an approximate way to determine the sign of the influence since the feedback loops running between the endogenous variables are ignored. See Kunst/Marin (1987).

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9) This finding seems to contradict the Baldwin/Krugman (1986) result which suggests that import protection played a major role in Japan's success in 16K RAM in the domestic and foreign markets. As Baldwin/Krugman mention, however, major protection of the chips market did not take the form of tariffs and quotas but more hidden forms which are not reflected in terms of trade changes so that this form of protection is not captured by our analysis. Moreover, the Baldwin/Krugman result obtained for one very specific sector need not necessarily hold for manufacturing as a whole.

10) For the results for an other small open economy, see Kunst/Marin (1987).

11) See Stout (1977) supporting this explanation.

12) This does, of course, not imply that exports resulted in a welfare loss in the US and the UK, since the unfavourable effect on productivity might have been outweighted by the procompetitive effect of higher exports.

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REFERENCES

AKAIKE, H. (1974): A New Look at Statistical Model Identification, IEEE Transactions on Automatic Control, AC-19, 716-723.

BALDWIN,R. and P.R.KRUGMAN (1986): Market Access and International Competition: A Simulation Study of 16K Random Access Memories, National Bureau of Economic Research, Working Paper No. 1936

BRANDER,J.A. (1981): Intra-Industry Trade in Identical Commodities, Journal of International Economics 11, 1-14.

BRANDER, J.A. and B.J. SPENCER (1985): Export subsidies and International Market Share Rivalry, Journal of International Economics 18, 83-100.

CAVES, R.E. (1981): Intra-Industry Trade and Market Structure in the Industrial Countries, Oxford Economic Papers 33, 208-233.

CAVES, R.E., M. PORTER and A. SPENCE (1980): Competition in the Open Economy: A Model Applied to Canada, Cambridge

CAVES, R.E. MASU UEKUSA (1976): Industrial Organization in Japan, Brookings Institution, Washington.

COX,D. and R.HARRIS (1985): Trade Liberalization and Industrial Organization: Some Estimates for Canada, Journal of Political Economy 93, 115-45.

DEARDORFF, A.V. (1984): Testing Trade Theories and Predicting Trade Flows in R.W. Jones/P.B. Kenen, (eds.), Handbook of International Economics, Vol. 1, Amsterdam-New York-Oxford, 467-517.

DIXIT, A.K. (1984): Internatinal Trade Policy for Oligopolistic Industries, Economic Journal 94, 1-16.

DIXIT, A.K. (1987): Tariffs and Subsidies under Oligopoly: The Case of the US Automobile Industry, in: H. Kierzkowski (ed.) Protection and Competition in International Trade, Oxford 1987, 112-127.

DIXIT, A.K. and G.M. GROSSMAN (1984): Targeted Export Promotion with Several Oligopolistic Industries, Discussion Paper in Economics No. 71, Woodrow Wilson School, Princeton University.

ETHIER, W. (1979): Internationally Decreasing Costs and World Trade, Journal of International Economics 9 1-24.

FLAM,H. and E.HELPMAN (1987): Industrial Policy Under Monopolistic Competition, Journal of International Economics 22, 79-102.

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GEROSKI,P. and A.JACQUEMIN (1985): Industrial Change, Barriers to Mobility, and European Industrial Policy, Economic Policy 1, 170-205.

GLEJSER,H., A.JACQUEMIN and J.PETIT (1980): Exports in an Imperfect Competition Framework: An Analysis of 1446 Exporters, Quarterly Journal of Economics, 94.

GEWEKE, J., R, MEESE, W. DENT (1983): Comparing Alternative Tests of Causality in Temporal Systems - Analytic Results and Experimental Evidence, Journal of Econometrics 21, 161-194.

GRANGER, C.W.J. (1969): Investigating Causal Relations by Econometric Models and Cross-spectral Methods, Econometrica 37, 424-438.

HELPMAN,E., P.KRUGMAN (1985): Market Structure and Foreign Trade, Cambridge.

JACQUEMIN A. (1982): Imperfect Market Structure and International Trade Some Recent Research, Kyklos, 35, 75-93.

JACQUEMIN, A., E. DE GHELLINCK and C. HUVENEERS (1980): Concentration and Profitability in a Small Open Economy, Journal of Industrial Economics, 28.

KRUGMAN, P.R., (1979): Increasing Returns, Monopolistic Competition and International Trade, Journal of International Economics, 9, 469-479.

KRUGMAN, P. (1984): Import Protection as Export Promotion, in: H. Kierzkowski (ed.) Monopolistic Competition and International Trade Oxford, 180-193.

KUNST, R. and D. MARIN (1987): The Export-Productivity Relationship: A Time Series Analysis, Paper presented at the 14th E.A.R.I.E. Conference, Madrid.

LEAMER, E. (1984): Sources of International Comparative Advantage: Theories and Evidence, Cambridge.

LEAMER, E. (1985): Vector Autoregressions for Causal Inference?, Carnegie Rochester Conference Series on Public Policy 22, 255-304.

MARIN,D. (1985): Structural Change through Exchange Rate Policy, Weltwirtschaftliches Archiv 3, 471-491.

MARIN,D. (1986): Exchange Rate and Industrial Profits, Applied Economics 6, 675-689.

PIERCE, D.A., L.D. HAUGH (1977): Causality in Temporal Systems, Journal of Econometrics 5, 265-293.

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SIMS, Ch.A. (1972): Money, Income and Causality, American Economic Review 62, 540-552.

STOUT D. (1977): International Price Competitiveness, Non-Price Factors and Export Performance. National Economic Development Office, London.

VENABLES,A.J. and A.SMITH (1986): Trade and Industrial Policy Under Imperfect Competition, Economic Policy 3, 622-660.

YAMAWAKI, H. (1986): Exports, Foreign Market Structure, and Profitability in Japanese and U.S. Manufacturing, Review of Economics and Statistics, 4, 618-627.

YAMAWAKI,H. and D.B.AUDRETSCH (1987): Import Share under Internatinal Oligopoly with Differentiated Products: Japanese Imports in U.S. Manufacturing, Science Center Berlin.

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Appendix: Vector Autoregression and Causality of the Ratio of Net Trade to Gross Trade, Productivity, Terms of Trade, and World Output, Germany, Japan, USA and UK

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TABLE 3

VECTOR AUTOREGRESSIVE REPRESENTATION OF INTRA-INDUSTRY TRADE (IIT), PRODUCTIVITY (PR), TERMS OF TRADE (TOT), AND WORLD OUTPUT (Q), GERMANY

Regressors	Dependent variables (t- values in parenthesis)		
	IIT	PR	TOT
IIT-1	.68	.003	.005
	(5.86)	(.79)	(.88)
IIT-2	.13	-.005	-.001
	(.96))	(1.14)	(.15)
IIT-3	.06	-.002	-.001
	(.55)	(.44)	(.22)
IIT-4	-.49	-.01	.001
	(4.40)	(2.56)	(.23)
IIT-5	.22		
	(1.77)		
IIT-6	-.05		
	(.47)		
PR-1	-3.03	.40	.14
	(.97)	(3.24)	(.80)
PR-2	-7.99	.14	-.15
	(2.37)	(1.07)	(.78)
PR-3	3.41	.24	.16
	(1.00)	(1.68)	(.80)
PR-4	-1.34	-.42	-.02
	(.47)	(3.48)	(.10)
TOT-1	1.71	-.12	1.11
	(.9)	(1.52)	(10.23)
TOT-2	-3.36	.11	-.28
	(1.23)	(.99)	(1.77)
TOT-3	2.41	.09	-.06
	(.87)	(.72)	(4.6)
TOT-4	-2.07	-.13	
	(.97)	(1.39)	
Q-1	.59	.69	-.48
	(.11)	(3.09)	(1.57)
Q-2	15.76	-.50	.53
	(1.86)	(1.45)	(1.10)
Q-3	-14.17	-.22	-.05
	(1.66)	(.64)	(.10)
Q-4	1.39	.20	-.11
	(.29)	(1.00)	(.38)
R^2	.730	.715	.774
SE	.49245	.02118	.02928

Note: See Note of Table 1. The regression for IIT covers 1963.1-1987.2. IIT follows an AR6 process. IIT is defined as $\frac{|X-M|}{X+M}$ where X and M represent the value of manufacturing exports and imports, respectively.

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TABLE 4

CAUSALITY TESTS FOR TRADE, PRODUCTIVITY AND TERMS OF TRADE, GERMANY

Test for Causality of	by	Test Statistic [1]	Prot Value [1]
IIT	PR	2.72	3.53
	TOT	.69	60.35
	Q	2.48	5.06
PR	IIT	2.19	7.68
	TOT	1.05	38.91
	Q	3.16	1.81
TOT	PR	.36	83.79
	IIT	.28	89.23
	Q	.66	61.90

1) See Note of Table 2.

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TABLE 3A
VECTOR AUTOREGRESSIVE REPRESENTATION OF INTRA-INDUSTRY TRADE, PRODUCTIVITY, TERMS OF TRADE, AND WORLD OUTPUT, JAPAN

Regressors	Dependent Variables (t-values in parentheses)		
	IIT	PR	TOT
IIT-1	0.56	-.001	.002
	(5.60)	(.55)	(.37)
IIT-2	-.17	.002	.004
	(1.51)	(.60)	(.68)
IIT-3	-.15	-.003	.001
	(1.34)	(1.24)	(.23)
IIT-4	-.35	.0001	-.0002
	(3.49)	(.01)	(.04)
PR-1	8.48	1.24	-0.07
	(1.62)	(10.40)	(.27)
PR-2	-6.91	-.22	-.16
	(.85)	(1.20)	(.39)
PR-3	-.10	-.28	.30
	(.01)	(2.33)	(.77)
PR-4	4.89		-.23
	(.93)		(.91)
TOT-1	5.89	-.005	1.49
	(2.59)	(.10)	(13.53)
TOT-2	-6.76	.01	-.69
	(1.66)	(.31)	(3.73)
TOT-3	4.11	.05	.007
	(.98)	(.48)	(.06)
TOT-4	.25	-.04	
	(.10)	(.59)	
Q-1	-3.72	0.47	.03
	(.44)	(2.35)	(.08)
Q-2	-19.21	-.84	-.17
	(1.36)	(2.58)	(.25)
Q-3	30.39	.54	.39
	(2.11)	(1.71)	(.56)
Q-4	-17.54	-.06	-.18
	(2.04	(.33)	(.44)
R^2	.632	.902	.898
SE	.93836	.02188	.04538

Note: See Note of Table 1 and 3, IIT follows an AR4 process.

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TABLE 4A

CAUSALITY TESTS FOR TRADE, PRODUCTIVITY AND THE TERMS OF TRADE, JAPAN

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
IIT	PR	1.12	35.1
	TOT	3.18	1.75
	Q	2.16	8.08
PR	IIT	0.63	64.05
	TOT	0.57	68.29
	Q	1.78	14.10
TOT	PR	.36	83.33
	IIT	.67	61.16
	Q	.15	96.30

1) See Note of Table 2.

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TABLE 3B

VECTOR AUTOREGRESSIVE REPRESENTATION OF INTRA-INDUSTRY TRADE, PRODUCTIVITY, TERMS OF TRADE AND WORLD OUTPUT, USA

Regressors	Dependent variables (t- values in parentheses) IIT	PR	TOT
IIT-1	.19	.002	.004
	(2.03)	(.92)	(1.51)
IIT-2	.22	-.001	-.002
	(2.24)	(.49)	(.62)
IIT-3	-.11	.001	.005
	(1.06)	(.77)	(1.69)
IIT-4	-.49	.001	-.003
	(5.13)	(.34)	(.97)
PR-1	19.89	1.12	.01
	(2.41)	(8.55)	(.04)
PR-2	-6.43	-.28	-.07
	(.57)	(2.11)	(.23)
PR-3	-.85		.29
	(.08)		(.95)
PR-4	9.44		-.24
	(1.30)		(1.21)
TOT-1	-12.85	-.06	1.32
	(3.21)	(.83)	(13.73)
TOT-2	18.54	.06	-.58
	(2.89)	(.59)	(6.01)
TOT-3	-9.92	.03	
	(1.51)	(.23)	
TOT-4	3.64	.01	
	(.86)	(.05)	
Q-1	-9.97	-.002	-.13
	(1.18)	(.02)	(.53)
Q-2	-.47	-.13	.16
	(.03)	(.58)	(.41)
Q-3	.69	-.03	-.16
	(.05)	(.16)	(.45)
Q-4	-3.20	.04	.05
	(.42)	(.35)	(.26)
R^2	.533	.813	.824
SE	.82284	.01399	.02326

Note: See Note of Table 1 and 3, IIT follows an AR4 process.

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TABLE 4B

CAUSALITY TESTS FOR TRADE,
PRODUCTIVITY, AND THE TERMS OF TRADE, USA

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
IIT	PR	3.52	1.05
	TOT	3.26	1.56
	Q	2.84	2.90
PR	IIT	.48	74.76
	TOT	.79	53.37
	Q	1.47	21.89
TOT	PR	.42	79.75
	IIT	1.56	19.26
	Q	.22	92.89

1) See Note of Table 2.

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TABLE 3C

VECTOR AUTOREGRESSIVE REPRESENTATION OF INTRA-INDUSTRY TRADE, PRODUCTIVITY, TERMS OF TRADE, AND WORLD OUTPUT, UK

Regressors	Dependent variabes (t- values in parentheses) IIT	PR	TOT
IIT-1	.14	.003	.001
	(1.20)	(.62)	(.24)
IIT-2	.10	-.004	-.001
	(1.00)	(1.12)	(.20)
IIT-3	.07	-.003	.003
	(.68)	(.67)	(.80)
IIT-4	-.62	-.01	.01
	(5.53)	(2.11)	(2.78)
PR-1	4.72	.59	.09
	(1.39)	(4.50)	(.66)
PR-2	3.40	.20	-.28
	(.88)	(1.36)	(1.95)
PR-3	-4.14	.20	-.06
	(1.10)	(1.40)	(.37)
PR-4	.80	-.27	-.04
	(.24)	(2.05)	(.26)
TOT-1	-1.10	-.13	1.14
	(.31)	(.92)	(8.06)
TOT-2	3.57	.43	-.25
	(.60)	(1.87)	(1.11)
TOT-3	-9.74	-.49	-.11
	(1.62)	(2.10)	(.76)
TOT-4	2.60	.14	
	(.68)	(.96)	
Q-1	15.34	.32	-.12
	(2.81)	(1.55)	(.56)
Q-2	-22.78	-.18	.16
	(2.45)	(.51)	(.43)
Q-3	7.26	-.34	.09
	(.82)	(.98)	(.27)
Q-4	2.37	.15	-.05
	(.47)	(.77)	(.25)
R^2	.556	.746	.864
SE	.51579	.01983	.02055

Note: See Note of Table 1 and 3. All regressions cover 1962.1-1983.2. IIT follows an AR4 process.

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TABLE 4C

CAUSALITY TESTS FOR TRADE, PRODUCTIVITY, AND THE TERMS OF TRADE, UK

Test for Causality of	by	Test Statistic[1)]	Prob Value[1)]
IIT	PR	1.61	18.08
	TOT	2.79	3.28
	Q	2.17	8.19
PR	IIT	1.77	14.55
	TOT	1.56	19.37
	Q	2.02	10.15
TOT	PR	2.15	8.38
	IIT	2.27	7.09
	Q	.65	62.99

1) See note of Table 2

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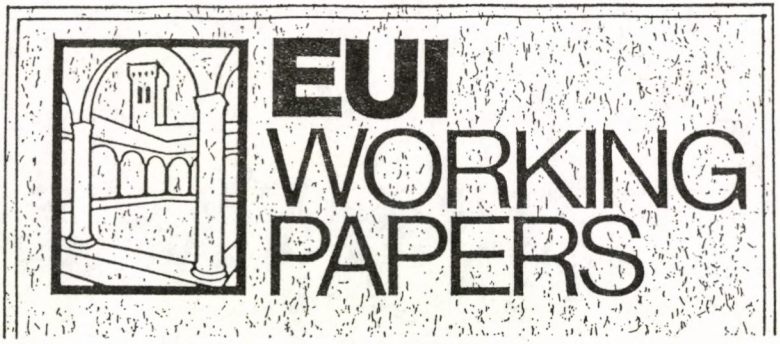

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