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THE HARROD TRADE MULTIPLIER AND THE IMPORTANCE OF EXPORT-LED GROWTH

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The paper attempts to revive the idea that the level and growth of output of countries in a balance of payments constrained framework are determined by the workings of the foreign trade multiplier; an idea first put forward by Harrod in 1933. Evidence is presented for a range of developed and developing countries, which suggests that the Harrod trade multiplier works in developed countries, but much more loosely in developing countries where capital flows and terms of trade changes are more important in determining growth performance. The relevance of the model for explaining regional growth, and the growth of industry in the early stages of development, is also discussed.

I. Introduction

A full employment equilibrium level of income and a full employment growth rate in an open economy with government activity requires that all planned leakages from the circular flow of income at full employment should be matched by an equivalent amount of expenditure. In the simple Keynesian model, planned investment must equal planned saving. In the more complex economy, there are the additional leakages of income into imports and taxation which must be matched. It was natural in the prevailing economic and intellectual conditions of the time for Keynes to focus on the imbalance between saving and investment, particularly since the prevailing classical orthodoxy was that savings and investment tended to equilibrium at full employment through adjustment in the rate of interest. In the open economy, however, an equally important consideration is the potential imbalance between export earnings and full employment imports, particularly since the power of governments to rectify this imbalance is in general much more limited than the power to fill a gap between investment

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and full employment saving. For many developed and less developed countries in the post-war period there is reason to believe that the ability to export to pay for full-employment imports has been a much more pervasive force determining the level of employment and growth experience. If exports fall short of full employment imports, either income and employment will fall automatically at a given terms of trade if other sectors of the economy are in overall balance; or if other sectors of the economy are in overall deficit (with spending in excess of income), income may be forced to contract by government deflationary measures if a balance of payments deficit cannot be financed.

Professor Johnson (1961) once said that the greatest disservice Keynes did to economics was to cast his model in a closed economy framework. He was probably right. There is a great deal of empirical evidence to suggest that it is impossible to understand the cconomic performance of nations without reference to their trading sector; that is, without reference to the performance of exports relative to the propensity to import. What is required is a simple model which brings to the fore the importance of the balance between exports and imports in both a static and dynamic context, in the same way that Keynesian theory, later extended by Harrod, brought to the fore the importance of the balance between investment and saving for the determination of the equilibrium level and growth of income in the closed economy.

Before Harrod made Keynesian theory dynamic, he published an important book, *International Economics,* in 1933. There, Harrod puts forward the idea that the level of output of industrial countries is to be explained by the principle of the foreign trade multiplier which at the same time provides the mechanism for keeping the balance of payments in equilibrium. Kaldor (1979) has argued that this proposition, underlying Keynes's principle of effective demand, never received the attention it deserved, although some economists working in the field of international trade theory (particularly P. Barrett Whale) recognised that Harrod's theory provided a far more convincing explanation of the workings of the nineteenth century gold standard than the classical theory which relied on gold flows or on induced relative price changes. The Harrod trade multiplier predates the Keynesian investment multiplier and may be the more important mechanism in the real world for understanding not only the growth experience of countries, but also the structural transformation of developing economies and the ups and downs of the world economy at large. The international evidence to be presented later certainly suggests that the Harrod trade multiplier works in many countries, and that differences in export performance are an important source of international growth rate differences. Kaldor, who has done more than anyone

to revive the idea and significance of the Harrod trade multiplier, is convinced of its importance. He says (1975);

> "In some ways I think it may have been very unfortunate that the very success of Keynes's ideas in explaining unemployment in a depression – essentially a short period analysis – diverted attention from the foreign trade multiplier which over longer periods is a far more important principle for explaining the growth and rhythm of industrial development. For over longer periods, Ricardo's presumption that manufacturers and traders only save in order to invest, so that the amount and/or the proportion of savings would adapt to changes in the opportunities for, or profitability of, investment, seems to me more relevant than the Keynesian assumption for explaining the true constraints on the growth of production and employment in the 'capitalist' industrial sector."

Kaldor's discussion here relates to a model of the interaction between industry and agriculture, or between industrial production and primary production in the world economy, but the proposition is quite general that the gap between planned imports and exports at full employment may be a much more difficult and stubborn gap to fill in the long run than the gap between savings and investment, and therefore may act as the greater constraining influence on full employment output growth.[1]

II. The Harrod Trade Multiplier

In his original derivation of the foreign trade multiplier Harrod (1933) assumes two types of output generating income, the production of consumption goods (C) and exports (X), and assumes that all income is consumed either on domestic goods or imports (M). There is no leakage of income into savings and taxation; no other induced expenditure; no other autonomous expenditure except export demand and the terms of trade are assumed constant. On these assumptions trade is always balanced. For an individual country we have

$$Y = C + X \tag{1}$$

[1] As a matter of historical interest, the Harrod (and Keynesian) multiplier was precisely anticipated by a Danish parliamentarian, Julius Wulff in 1896 [see, Hegeland (1955), and Shackle (1967)], and by the Australian economist, L.F. Giblin in 1930 [see Giblin (1930)].

$$Y = C + M \tag{2}$$

$\therefore$

$$X = M \tag{3}$$

Using an import function of the form $M = mY$, equation (3) becomes:

$$X = mY \tag{4}$$

Thus

$$\frac{\Delta Y}{\Delta X} = \frac{1}{m} \tag{5}$$

Any change in autonomous exports is exactly matched by an equal change in the level of imports, therefore preserving a trade balance. Although Harrod does not do so, allowance can easily be made for autonomous imports by specifying the import function as $M = \overline{M} + mY$, and the same multiplier can be derived (but with opposite sign) with respect to an autonomous change in imports:

$$X = \overline{M} + mY \tag{6}$$

$\therefore$

$$\frac{\Delta Y}{\Delta \overline{M}} = -\frac{1}{m} \tag{7}$$

Any change in autonomous imports will change income sufficiently in the opposite direction to preserve imports at their initial level, and again maintaining a trade balance. In this model (as in the Keynesian model with respect to savings and investment) it is income that adjusts to preserve an equilibrium not relative prices. The assumption in the Harrod trade multiplier of a constant real terms of trade may not be as unrealistic in practice as it seems in theory, at least in the long run. The other assumptions made above that all income is consumed; that there is no saving and investment, and no government activity, are clearly unrealistic. It is easy enough to relax the assumption and modify the Harrod trade multiplier accordingly. The interesting question is under what circumstances might the use of the simple Harrod multiplier for an open economy still be more relevant than alternative approaches for understanding the process of income determination and international growth rate differences. Since the simple multiplier is derived on the assumption that trade balances, the Harrod case will still rule if (i) other expenditures and withdrawals from the circular flow of income balance each other in the aggregate or (ii) balance of payments equilibrium is, for one reason or another, a policy objective, so that the level and growth of income must of necessity be constrained in the long run to preserve a balance bet-

ween exports and imports. Considering the first point, let us develop a more realistic multiplier and see the conditions under which trade would still be balanced.

III. A More Realistic Multiplier

Let income be saved (S) and taxed (T) as well as used for the purchase of home consumption goods and imports, and let us assume that ivestment (I) and government expenditure on goods and services (G) may also generate income in addition to the production of consumption goods and exports. Equitions (1) and (2) then become:

$$Y = C + X + I + G \tag{8}$$

and

$$Y = C + M + S + T \tag{9}$$

$\therefore$

$$X + I + G = M + S + T \tag{10}$$

Now suppose to start with that all these additional leakages and expenditures are proportional to income (with no autonomous elements) so that $S = sY$; $T = tY$; $G = gY$, and $I = aY$. Substituting into (10) gives:

$$X + aY + gY + = \bar{M} + mY + sY + tY \tag{11}$$

$\therefore$

$$Y = \frac{X - \bar{M}}{m + s + t - a - g} \tag{12}$$

Clearly, the condition for the simple Harrod multiplier to hold is that induced expenditures should equal induced leakages i.e. $s + t = a + g$. This will prevail if firstly Ricardo and Kaldor are right that either all saving is done for investment or all investment will generate its own saving and governments run balanced budgets, or secondly, if any surplus/deficit in the government sector is exactly offset by a corresponding deficit/surplus in the private sector. If leakages exceed injections $(s + t > a + g)$, exports will exceed imports. If injections exceed leakages there will be a trade deficit and the question then is how long the deficit can be allowed to persist without corrective action having to be taken. If relative prices cannot be adjusted, it is income that would have to be adjusted through government contraction of demand. We would be back in a Harrod multiplier world with the level and growth of

income fundamentally determined by the level and growth of export demand.

IV. Other Autonomous Expenditure

Up to now, exports and autonomous imports have been the only autonomous variables. If other items of autonomous expenditure are considered equation (12) becomes:

$$Y = \frac{X - \overline{M} + \overline{E}}{m + s + t - a - g} \tag{13}$$

where $\overline{E}$ stands for all other items of autonomous expenditure (i.e. autonomous consumption, investment and government expenditure). Positive or negative (other) autonomous expenditure makes no difference to the value of the Harrod trade multiplier if $(s + t) = (a + g)$, but if $\overline{E} \neq 0$, there will be balance of payments disequilibrium. If $\overline{E} > 0$ a balance of payments deficit would prevail and the empirical question would again arise of how long the deficit can be maintained without corrective action having to be taken of an expenditure reducing type. Initial balance of payments disequilibrium makes a difference to the *'dynamic'* Harrod trade multiplier which is discussed below.

V. The Dynamic Analogue of the Harrod Trade Multiplier

The question we now consider is does the Harrod trade multiplier work? It is true, of course, that not every country in the world can be governed by the Harrod trade multiplier because in the world as a whole *net* exports would be zero and each country's level of income would be indeterminate. It only requires one country, or block of countries, to be in balance of payments surplus, however, for all the rest to be constrained in their activity and to function according to the principle of the Harrod trade multiplier with income adjusting (downwards) to restore balance[2] rather than relative price changes or fully accommodating capital flows.

It is natural that the measurement of economic performance, and particularly international comparisons, should focus on the rate of growth of in-

[2]If there is net induced saving, the multiplier will not restore balance completely, but if balance of payments equilibrium is a requirement, there will have to be some downward adjustment in net autonomous expenditure.

come, and we shall consider the question of whether the Harrod trade multiplier works in a *growth* context. To answer the question, however, we must first make the Harrod trade multiplier dynamic. This is easily done. The dynamic analogue of the simple Harrod trade multiplier can be shown to be equal to:

$$y = \frac{x}{\pi} \tag{14}$$

Where y is the rate of growth of real income; x is the rate of growth of export volume and π is the income elasticity of demand for imports. The proof is as follows: In the simple Harrod case we have[3]:

$$Y = \frac{X}{m} \tag{15}$$

Hence

$$\frac{\Delta X}{\Delta Y} = m = \frac{\Delta M}{\Delta Y} \tag{16}$$

If the terms of trade remain unchanged, we can use the equilibrium condition under which the Harrod multiplier works and multiply the L.H.S. of (16) by Y/X and the R.H.S. by Y/M to give:

$$\frac{\Delta X}{\Delta Y}\ \frac{Y}{X} = \frac{\Delta M}{\Delta Y}\ \frac{Y}{M} \tag{17}$$

$$\therefore \qquad \frac{\Delta Y}{Y} = \frac{\Delta X}{X} \Big/ \frac{\Delta M}{\Delta Y}\ \frac{Y}{M} \tag{18}$$

or

$$y = \frac{x}{\pi} \tag{19}$$

The hypothesis that the Harrod trade multiplier works starting from initial balance of payments equilibrium would be supported by finding that the long run growth rates of countries approximate to their rate of growth of exports divided by their income elasticity of demand for imports.

An alternative approach to the derivation of the dynamic version of the Harrod trade multiplier is to specify import and export demand functions with income and relative prices as independent variables and then solve for

[3] Alternatively X can be thought of as net autonomous demand for traded goods *i.e.* autonomous exports minus autonomous imports.

the balance of payments equilibrium growth rate on the assumption that relative prices measured in a common currency remain unchanged and that no country can grow for very long at a rate different from its balance of payments equilibrium growth rate, unless it can finance an ever growing deficit, or decides to accumulate reserves if in surplus. The balance of payments equilibrium condition measured in domestic currency is:

$$P_{dt} X_t = P_{ft} M_t E_t \tag{20}$$

Now let the export and import functions be specified as:

$$X_t = \left(\frac{P_{dt}}{P_{ft} E_t}\right)^{\eta} Z_t^{\epsilon} \quad \text{and} \quad M_t = \left(\frac{P_{ft} E_t}{P_{dt}}\right)^{\psi} Y_t^{\pi}$$

where P_{dt} is an index of domestic prices; P_{ft} is an index of foreign prices; E_t is the exchange rate (the domestic price of foreign currency); Z_t is 'world' income; Y_t is domestic income; η is the price elasticity of demand for exports ($\eta<0$); ψ is the price elasticity of demand for imports ($\psi<0$); ϵ is the income elasticity of demand for exports ($\epsilon>0$), and π is the income elasticity of demand for imports ($\pi > 0$).

Substituting X_t and M_t into (20) and taking rates of change of the variables (denoted by lower case letters) gives the growth rate of domestic income consistent with balance of payments equilibrium of:

$$y_{Bt} = \frac{(1+\eta+\psi)\ [p_{dt} - p_{ft} - e_t] + \epsilon(z_t)}{\pi} \tag{21}$$

Now if relative prices measured in a common currency remain the same through time the expression in square brackets will be zero and we have:

$$y_{Bt} = \frac{\epsilon(z_t)}{\pi} = \frac{x_t}{\pi} \tag{22}$$

which is the dynamic Harrod trade multiplier. From this formulation, if relative prices are not working as an adjustment mechanasim in international trade, the empirical evidence on the growth rates of countries should approximate to the rates predicted by the dynamic Harrod multiplier, except for countries that over the period considered started in initial disequilibrium and moved further into substantial deficit or surplus.

VI. The Balance of Payments Constrained Growth Rate Starting from Disequilibrium

Let us consider the balance of payments constrained growth rate starting from initial disequilibrium. If the balance of payments is in initial deficit, either because $(s + t) < (a + g)$ and/or because $\bar{E} > 0$, the rate of growth of income will depend on what happens to the growth of capital imports. The initial position will be:

$$P_{dt}X_t + C_t = P_{ft}M_tE_t \tag{23}$$

where C_t (> 0) is the value (in domestic currency) of capital inflows. Taking rates of change of the variables gives:

$$\frac{E}{R}(p_{dt} + x_t) + \frac{C}{R}c_t = p_{ft} + m_t + e_t \tag{24}$$

where lower case letters represent rates of growth of the variables, and E/R and C/R are the shares of export receipts and capital inflows respectively in total receipts (or, in other words, the proportions of the import bill financed by export earnings and capital inflows respectively).

Using the export and import demand functions specified; taking rates of change of the variables, and substituting for x_t and m_t in equation (24), gives the balance of payments constrained growth rate[4] of:

$$y_{Bt} = \frac{(\frac{E}{R}\eta + \psi)(p_{dt} - e_t - p_{ft}) + (p_{dt} - p_{ft} - e_t) + \frac{E}{R}[\epsilon(z_t)] + \frac{C}{R}(c_t - p_{dt})}{\pi} \tag{25}$$

The first term on the R.H.S. gives the volume effect of relative price changes on balance of payments constrained real income growth; the second term gives the terms of trade effect; the third term gives the effect of exogenous changes in income growth abroad, and the last term gives the effect of the rate of growth of capital flows. If $p_{dt} = e_t + p_{ft}$ *i.e.* if relative prices measured in a common currency were to remain unchanged over the long run, equation (25) would reduce to:

$$y^*_{Bt} = \frac{\frac{E}{R}[\epsilon(z_t)] + \frac{C}{R}(c_t - p_{dt})}{\pi} \tag{26}$$

[4] The balance of payments constrained growth rate here signifies that rate consistent with *overall* balance of payments equilibrium.

In other words, the balance of payments constrained growth rate starting from initial current account disequilibrium is the weighted sum of the growth of exports due to exogenous income growth outside the country, and the growth of *real* capital inflows, divided by the income elasticity of demand for imports. Since by national income accounting, equation (25) must hold,[5] deviations of the actual growth rate from y^*_{Bt} will be a reflection of the effect of the two relative price terms in equation (25). It is clear that with relative prices (measured in a common currency) unchanged, and starting from initial equilibrium, equation (26) collapses to (22), so that the balance of payments constrained growth rate starting from disequilibrium will only be the same as that starting from equilibrium if $(c_t - p_{dt}) = x_t$; that is, if the rate of growth of real capital imports is equal to the growth of export volume. This result is apparent from equation (24) as well. Without initial disequilibrium, the balance of payments constrained growth rate is defined where $p_{dt} + x_t = p_{ft} + m_t + e_t$ and for the weighted sum of $(p_{dt} + x_t)$ and c_t to equal $(p_{dt} + x_t)$, c_t must grow at the same rate as $(p_{dt} + x_t)$.[6]

We end up, therefore, with a very simple guideline. If a country starts in balance of payments disequilibrium, and relative prices remain unchanged, the simple Harrod rule for predicting the growth rate will underpredict or overpredict according to whether $(c_t - p_{dt}) \gtrless x_t$.

It is of some interest to fit equation (22) to the data for various countries [and in principle equation (25) can also be fitted if data are available]. Alternatively equation (26) can be fitted substituting x_t for $\epsilon(z_t)$ and leaving the effect of relative price changes on imports and the pure terms of trade effect as a residual. We might expect the model with capital inflows to fit better the experience of less developed countries, many of which have been allowed to accumulate substantial debts abroad.

VII. Empirical Evidence for Developed Countries

Table 1 presents data on GNP growth and export growth, and applies the Harrod trade multiplier formula [equation (22)] using Houthakker and Magee's (1969) estimates of the income elasticity of demand for imports. The estimates are somewhat dated, and probably slightly on the low side for application to data extending into the 1970s, but they are the best consis-

[5] Equation (25) is derived from (23), and the latter is another way of writing the ex-post accounting identity that $P_d Y = P_d A + P_d X - P_f EM$, where Y is income; A is absorption, and C_t is the difference between income and domestic absorption.

[6] In other words, $(c_t - p_{dt})$ must grow at the same rate as x_t.

TABLE 1.

A comparison of the actual growth rate with that predicted from the dynamic Harrod trade multiplier

Country	%Δ in Real GNP(y)		%Δ in Export Volume (x)		Income Elasticity of Demand for Imports (π)	Predicted Growth Rate from the Harrod Trade Multiplier (%)	
	1951-73	1953-76	1951-73	1953-76		1951-73	1953-76
USA	3.7	3.23	5.1	5.88	1.51	3.38	3.89
Canada	4.6	4.81	6.9	6.02	1.20	4.84	5.02
West Germany	5.7	4.96	10.8	9.99	1.89	5.71	5.29
Netherlands	5.0	4.99	10.1	9.38	1.82	5.55	5.15
Sweden	–	3.67	–	7.16	1.76	–	4.07
France	5.0	4.95	8.1	8.78	1.62	5.00	5.42
Denmark	4.2	3.58	6.1	6.77	1.31	4.65	5.17
Australia	–	4.95	–	6.98	0.90	–	7.76
Italy	5.1	4.96	11.7	12.09	2.25	5.20	5.37
Switzerland	–	3.56	–	7.20	1.90	–	3.79
Norway	4.2	4.18	7.2	7.70	1.40	5.14	5.50
Belgium	4.4	4.07	9.4	9.24	1.94	4.84	4.76
Japan	9.5	8.55	15.4	16.18	1.23	12.52	13.15
UK	2.7	2.71	4.1	4.46	1.51	2.71	2.95
South Africa	–	4.97	–	6.57	0.85	–	7.73

Sources: Data for 1951-73 from Cornwall (1977).
Data for 1953-76 from Kern (1978).
Extimates of π from Houthakker and Magee (1969).

tent estimates available for a variety of countries. The predicted estimates of the growth rate from the Harrod formula are very close to the actual growth rates experienced with one or two exceptions, the most notable being Japan which grew much slower than her balance of payments equilibrium growth rate and experienced massive current account surpluses. Thus the empirical evidence, at least for a range of industrialised countries over the post-war period, supports the workings of the Harrod trade multiplier and suggests that it is export performance relative to the income elasticity of imports that governs the long run rate of growth of output. By implication, the evidence also suggests that the real exchange rate must be fairly sticky in the long run, and that for countries in current account disequilibrium the rate of growth of capital flows (in or out) must have been roughly equal to the rate of growth of export earnings (except for Japan).

From a policy point of view, the important question is what determines x and π. If relative prices measured in a common currency are relatively fixed in the long run, x is determined by the income elasticity of demand for exports in world markets which captures all the non-price factors which determine the demand for commodities as income grows. Whether this income elasticity is high or low depends on the structure of production and on the innovative ability and adaptive capacity of a country's manufacturers in the field of product development. Probably the most important aspect of technical progress as far as trade is concerned takes the form of the development of new products which either meet an existing need in a superior way or 'create' new needs. Manufacturers at the forefront of product development will find their markets growing much faster than income and demand overall as consumers switch to superior products. It is product development combined with vigorous marketing that makes for successful exporting. The same forces which make the rate of growth of exports high will tend to reduce the income elasticity of demands for imports, although from the data in Table 1, the positive correlation between the rate of growth of output and exports is much stronger than the negative correlation between the rate of growth of output and the income elasticity of demand for imports.

VIII. Empirical Evidence for Less Develped Countries

In Table 2 the results are shown of applying the simple Harrod trade multiplier [equation (22)] and the extended model [equation (26)] [7] to a

[7] With x_t substituted for $\epsilon(z_t)$, the export volume effects of relative price changes are incorporated in the result, but not the import volume effect or the pure terms of trade effect.

TABLE 2.

The annual growth rate of output, exports and real capital flows; and growth rate predictions from the simple and extended Harrod trade multiplier model.

Countries	Growth of Income (y)	Growth of Exports (x)	Income Elasticity of Demand for Imports (π)	Simple Harrod Trade Multiplier Prediction $y_B = x/\pi$	Growth of Real Capital Imports (C_r)	Predicted Growth Rate from Extended Model Including Capital Flows y_B^*
I. 1951-1969[1]						
Costa Rica	0.040	0.080	2.046	0.039	0.350	0.053
Ecuador	0.048	0.064	0.555	0.120	– 0.231	0.110
Pakistan	0.069	0.062	1.020	0.060	0.199	0.089
Sri Lanka	0.061	0.013	0.218	0.059	0.088	0.067
Philippines	0.053	0.046	0.668	0.068	0.013	0.063
Colombia	0.050	0.025	0.290	0.086	– 0.138	0.060
II. 1951-1966[2]						
India	0.024	0.040	1.43	0.028	0.134	0.037
Portugal	0.051	0.080	1.39	0.057	0.039	0.050
Mexico	0.060	0.060	0.53	0.110	0.007	0.100
III. Various Dates[3]						
Tunisia	0.064	0.045	0.91	0.050	0.086	0.060
Cyprus	0.034	0.035	1.05	0.035	0.017	0.033
Kenya	0.081	0.085	0.99	0.086	0.017	0.060
Honduras	0.042	0.070	0.89	0.079	0.363	0.082
Jamaica	0.040	0.052	0.70	0.074	– 0.022	0.058
Thailand	0.068	0.062	0.93	0.066	0.110	0.073
Sudan	0.054	0.053	0.64	0.083	0.070	0.085
Morocco	0.033	0.030	0.43	0.069	– 0.004	0.062
Brazil	0.095	0.083	2.05	0.040	0.350	0.094
Zaire	0.060	0.037	0.53	0.069	– 0.180	0.054
Turkey	0.058	0.056	0.92	0.061	0.053	0.059

Sources: (1) from Khan (1974); (2) from Houthakker and Magee (1969); (3) own extimates [see Thirlwall and Hussain (1982)].

sample of less developed countries for which estimates were obtainable of the income elasticity of demand for imports. Neither model predicts very well the actual growth experience. The mean absolute error of prediction of the simple Harrod multiplier equation is 2.01 percentage points, while the mean absolute error of prediction of the extended model with capital inflows is 1.58 percentage points. The results suggest that the effects of relative price movements on balance of payments constrained real income growth are more important in less developed than developed countries. The evidence indicates, in fact, adverse relative price effects since the average growth rate predicted by the simple Harrod result is below the average growth experienced while the average growth predicted by the extended model is higher. The adverse relative price effects seem to be due to an adverse pure terms of trade effect not offset by an import volume effect. If anything, the import volume effect looks perverse. The experience of individual countries differes considerably [see Thirlwall and Hussain (1982)], but in general the Harrod trade multiplier appears to work much more loosely in the case of less developed countries than in developed countries. There are good reasons for this, however, connected with international lending and the nature of the goods they produce which tend to make relative prices more volatile and subject to long run change.

IX. Regional Problems are Balance of Payments Problems

The analysis and argument that has so far been applied at the national level may apply with even greater force at the regional level within countries. The employment and unemployment difficulties of regions must be looked at in a growth context, and regional growth is obviously not constrained by indigenous factor supplies because of the high degree of interregional factor mobility. With the exception of land-based activities, growth must be primarily constrained by demand with exports as the major component of autonomous demand. With relative prices between regions fixed, and a very high proportion of regional output traded, it is not fanciful to think of regional problems of slow growth and unemployment as balance of payments problems associated with a weak trading sector [Thirlwall (1980)]. Of course, in the regional case, unlike the individual country case, growth will not be constrained by the balance of payments in the sense that a currency value has to be defended or because creditors refuse further loan finance. But if the conditions prevail, the region will be deflated automatically by the workings of the Harrod trade multiplier in the manner already described. Traditionally, countries concerned with regional desparities allow depressed regions to

run balance of payments deficits by income transfers of various types which support consumption and investment in the regions. If the trade sector of the region is large, however, the level of compensation required may be unbearably high to prevent the Harrod trade multiplier from working.

X. Sectoral Growth

The Harrod trade multiplier also has application at the sectoral level in considering the process of industrialisation in a developing country in the early stages of development, and in considering growth and fluctuations in industrial production in the world economy. Consider a closed economy with two sectors: agriculture and industry. The agricultural sector produces wage goods; the industrial sector produces investment goods, and trade takes place between the sectors at an equilibrium terms of trade. What determines the rate of growth of industrial output? Neo-classical theory looks at this question purely from the supply side. If labour is surplus on the land, however, and capital is a produced means of production, a supply-orientated approach to industrial growth is not satisfactory. A model on alternative lines has recently been developed by Kaldor, Thirlwall and Vines (1981). It is the rate of growth of demand for industrial output which governs the long run rate of growth of output, and the major source of autonomous demand for industrial output comes from the agricultural sector. Let us model the industrial sector and derive the equilibrium level of industrial output:

Let
$$Y_I = I_I + X \tag{27}$$

where Y_I is the level of industrial output; I_I is the industrial output retained by the industrial sector itself, and X is the industrial output exported to the agricultural sector.

Also
$$Y_I = I_I + (1 - c_I)Y_I \tag{28}$$

where I_I is the amount of industrial income spent on its own output and $(I - c_I)$ is the proportion of industrial income spent on agricultural goods.

Thus
$$X = (1 - c_I)Y_I \tag{29}$$

or
$$Y_I = \frac{X}{I - c_I} \tag{30}$$

In other words, the equilibrium level of industrial output is determined by the demand for industrial products coming from agriculture divided by the share of expenditure on agricultural products in total industrial income. By analogy with our previous dynamic version of the Harrod trade multiplier, the rate of growth of industrial output is determined by the rate of growth of demand for industrial products from agriculture divided by the income elasticity of demand for agricultural goods. In this simple model the Harrod multiplier will always hold if there is a terms of trade which balances exports and imports between the two sectors. The growth of industrial exports to agriculture depends on the rate of growth of agricultural income times the income elasticity of demand for industrial products. Given that agricultural output is subject to diminishing returns, the major determinant of the rate of growth of agricultural income at a given terms of trade is the rate of land saving inventions. Thus the rate of growth of industrial output depends fundamentally on the rate of land saving inventions in agriculture, which is the true constraint on industrial growth.

This simple model can be applied both to the world economy as a closed system, divided as it is between land based and industrial activities, and to the industrial sector of an individual country in the earliest stage of development when its foreign trade sector is very small and the major source of autonomous demand for industrial output comes from agriculture. At the level of the world economy, therefore, the Harrod multiplier theory predicts that the rate of growth of world industrial production depends on the growth of income of primary producers, and at the individual country level the theory predicts that the speed of industrialisation will depend on the health of the agricultural sector – not an unfamiliar proposition but now with a stronger theoretical basis.

In the later stages of economic development, however, industrial exports will take over from agricultural demand as the major source of autonomous demand, and it will be the rate of growth of exports that determines the long run rate of growth of industrial output and the growth of the economy as a whole.

XI. Empirical Evidence on the Relationship Between Export Growth and Output Growth

The data presented by the World Bank in its World Development Report provides a valuable data set for over 100 countries outside the eastern bloc for examining the relationship between export performance and the rate of growth of industrial output and GDP. Two hypotheses are examined here

for the two time periods 1960-1970 and 1970-1977, taking the whole sample of countries, and also a breakdown of the countries into low income, middle income and industrialised. The first hypothesis tested is that the rate of growth of GDP is significantly dependent on the rate of growth of exports. The test of this hypothesis is not the same as testing the hypothesis that the rate of growth of output will approximate to the balance of payments equilibrium growth rate because the behaviour of imports is left out of consideration. A very high correlation, therefore, is not to be expected unless there is also a high negative correlation between the rate of growth of exports and the rate of growth of imports relative to GDP growth. Nevertheless we expect a positive and significant relation between GDP growth and export growth. The results are reported in Table 3.

The second hypothesis tested is that the rate of growth of industrial output is significantly related to the growth of agricultural output and export growth, with agricultural output growth dominant in low income countries and export growth taking over in the middle to high income countries as economies become more open. Total export growth is taken as the independent variable, rather than industrial export growth, to reflect the overall balance of payments constraint on industrial growth.[8] The results are reported in Table 4.

The results in Table 2 show that over the period 1960-70 there existed a strong positive relation between the rate of growth of GDP and export growth, except for the small sample of low income countries. The significance and explanatory power of the export variable in the sample of eighteen industrialised countries is extremely high. If it was assumed that the rate of growth of autonomous imports and exports were approximately equal, the reciprocal of the coefficient on x would be equal to the income elasticity of demand for imports if all countries together experienced on average balance of payments equilibrium. This would give an income elasticity of demand for imports of 1/0.416 = 2.40. For the period 1970-77, the explanatory power of export growth as a determinant of output growth is somewhat weaker, although it now appears as a significant determinant in the low income countries, but insignificant in the industrialised countries. It must be remembered, however, that the period 1970 to 1977 was one of general economic upheaval precipitated by the breakdown of the international monetary system and the explosion of oil prices in 1973, and the import experience of the industrialised countries has been extremely diverse upsetting the normal relationship experienced between export performance and the overall performance of the balance of payments.

[8] Tests reported in Kaldor, Thirlwall and Vines (1981) suggest this to be a more important determining factor than the direct stimulus of industrial export demand to industrial output growth.

TABLE 3

The relationship between GDP growth (g) and export growth (x), 1960-70 and 1970-77.

		r^2	No. of Observations
All Countries			
1960-70	$g = 3.987 + 0.182\,(x)$ (0.031)	0.288	83
1970-77	$g = 3.615 + 0.216\,(x)$ (0.047)	0.212	79
Low Income Countries			
1960-70	$g = 3.541 + 0.101\,(x)$ (0.081)	0.104	15
1970-77	$g = 1.806 + 0.309\,(x)$ (0.123)	0.341	14
Middle Income Countries			
1960-70	$g = 4.542 + 0.170\,(x)$ (0.038)	0.293	50
1970-77	$g = 5.351 + 0.112\,(x)$ (0.048)	0.104	47
Industrial Countries			
1960-70	$g = 1.261 + 0.416\,(x)$ (0.067)	0.702	18
1970-77	$g = 1.871 + 0.225\,(x)$ (0.136)	0.145	18

Note: Standard errors in parentheses

TABLE 4.

The relationship between industrial output growth (g_I) and the rate of growth of agriculture (g_A) and exports (g_x), 1960-70 and 1970-77

		r^2	No. of Observations
All Countries			
1960-70	$g_I = 4.710 + 0.293\, g_A + 0.279(x)$ (0.185) (0.054)	0.337	67
1970-77	$g_I = 3.632 + 0.403\, g_A + 0.291(x)$ (0.157) (0.067)	0.353	73
Low Income Countries			
1960-70	$g_I = 3.734 + 0.895\, g_A + 0.321(x)$ (0.288) (0.082)	0.709	13
1970-77	$g_I = 4.535 + 0.393\, g_A + 0.412(x)$ (0.339) (0.169)	0.527	13
Middle Income Countries			
1960-70	$g_I = 6.877 - 0.363\, g_A + 0.363(x)$ (0.288) (0.073)	0.414	38
1970-77	$g_I = 5.041 + 0.114\, g_A + 0.327(x)$ (0.213) (0.077)	0.323	46
Industrialised Countries			
1960-70	$g_I = 2.285 + 0.039\, g_A + 0.401(x)$ (0.245) (0.099)	0.630	16
1970-77	$g_I = 2.225 + 0.180\, g_A + 0.148(x)$ (0.296) (0.216)	0.145	14

Note: Standard errors in parentheses

The second hypothesis that industrial output growth is dependent on the growth, of agriculture and exports is strongly supported by the evidence, at least for the period 1960 to 1970. In the low income countries, the performance of agriculture as well as exports is important in determining industrial grwoth, and together these two variables 'explain' over 70 percent of the variance in inter-country growth rate differences. In the middle income and industrialised countries, however, only export performance appears to be important. In the 1970-77 period, the expected relationships seem to break down. Agricultural growth ceases to be an important independent variable in the low income country sample and export growth loses its importance in the sample of industrialised countries. Again, the weak results for the years 1970-77 may be a reflection of the general economic conditions.

XII. Conclusion

The empirical work reported needs extending and refining. There can be no doubt, however, that countries themselves recognise the importance of export growth, and the international monetary system itself is designed to relax the balance of payments constraint on growth in countries prone to persistent deficit. In a world in which the balance of payments presents a major constraint on the growth of output in a large number of countries, the Harrod trade multiplier provides a useful starting point for an analysis of inter-country growth rate differences. The ideas presented here have a close affinity with theories of export-led growth and with dual-gap analysis with foreign exchange as the dominant constraint. The next step must be the integration of these theories and a rewriting of trade theory away from its classical orientation of real resource augmentation and in the direction of the role of trade as a provider of foreign exhange which is much more relevant in a world characterised by unemployment associated with balance of payments constraints on demand.

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