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The balance of payments constraint as an explanation of international growth rate differences

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The neo-classical approach to the question of why growth rates differ between countries, typified by the meticulous studies of Denison (1967; 1976) and Maddison (1970; 1972), concentrates on the supply side of the economy using the concept of the production function. Having specified the functional form, the growth of output is apportioned between the growth of capital, the growth of labour, and the growth of total factor productivity obtained as a residual. By this approach, growth rate differences are "explained" in terms of differences in the growth of factor supplies and productivity. While the approach is fruitful, interesting and mathematically precise, it does not tell us why the growth of factor supplies and, productivity differs between countries. To answer this question some would say that a more Keynesian approach is required which stresses demand. For the Keynesian, it is demand that "drives" the economic system to which supply, within limits, adapts: taking this approach, growth rates differ because the growth of demand differs between countries. The question then becomes why does demand grow at different rates between countries? One explanation may be the inability of economic agents, particularly governments, to expand demand. This explanation by itself, however, is not very satisfactory. The more probable explanation lies in constraints on demand. In an open economy, the dominant constraint is the balance of payments. In this paper it is shown how closely the growth experience of several developed countries approximates to the rate of growth of exports divided by the income elasticity of demand for imports, which, on certain assumptions, can be regarded as a measure of what I call the balance of payments equilibrium growth rate. In fact, the rate of growth of exports divided by the income

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elasticity of demand for imports gives such a good approximation to the actual growth experience of major developed countries since 1950 that a new economic law might almost be formulated.

The importance of a healthy balance of payments for growth can be stated quite succinctly. If a country gets into balance of payments difficulties as it expands demand, before the short term capacity growth rate is reached, then demand must be curtailed; supply is never fully utilised; investment is discouraged; technological progress is slowed down; and a country's goods compared to foreign goods become less desirable so worsening the balance of payments still further, and so on. A vicious circle is started. By contrast, if a country is able to expand demand up to the level of existing productive capacity, without balance of payments difficulties arising, the pressure of demand upon capacity may well raise the capacity growth rate. There are a number of possible mechanisms through which this may happen: the encouragement to investment which would augment the capital stock and bring with it technological progress; the supply of labour may increase by the entry into the workforce of people previously outside or from abroad; the movement of factors of production from low productivity to high productivity sectors; and the ability to import more may increase capacity by making domestic resources more productive. It is this argument that lies behind the advocacy of export-led growth, because it is only through the expansion of exports that the growth rate can be raised without the balance of payments deteriorating at the same time. Believers in export-led growth are really postulating a balance of payments constraint theory of why growth rates differ. It should be stressed, however, that the same rate of export growth in different countries will not necessarily permit the same rate of growth of output because the import requirements associated with growth will differ between countries, and thus some countries will have to constrain demand sooner than others for balance of payments equilibrium. The relation between a country's growth rate and its rate of growth of imports is the income elasticity of demand for imports. The hypothesis we shall be testing, from the model to be outlined below, is that, if balance of payments equilibrium must be maintained, a country's

long run growth rate will be determined by the ratio of its rate of growth of exports to its income elasticity of demand for imports.

1. The determination of the balance of payments equilibrium growth rate

Balance of payments equilibrium on current account measured in units of the home currency may be expressed as:

$$P_{dt}X_t = P_{ft}M_tE_t \tag{1}$$

where X is the quantity of exports; P_d is the price of exports in home currency; M is the quantity of imports; P_f is the price of imports in foreign currency; E is the exchange rate (i.e. the home price of foreign currency), and t is time.

In a growing economy, the condition for balance of payments equilibrium through time is that the rate of growth of the value of exports equals the rate of growth of the value of imports i.e.:

$$p_{dt} + x_t = p_{ft} + m_t + e_t \tag{2}$$

where lower-case letters represent (continuous) rates of change of the variables.

Using standard demand theory, the quantity of imports demanded may be specified as a multiplicative function of the price of imports (measured in units of the home currency in order to incorporate the effect of exchange rate changes), the price of import substitutes, and domestic income. Thus:

$$M_t = (P_{ft}E_t)^{\Psi}P^{\Phi}_{dt}Y^{\pi}_t \tag{3}$$

where Ψ is the own price elasticity of demand for imports ($\Psi < 0$); ϕ is the cross elasticity of demand for imports ($\phi > 0$); Y is domestic income, and π is the income elasticity of demand for imports ($\pi > 0$).

The rate of growth of imports may be written:

$$m_t = \Psi(p_{ft}) + \Psi(e_t) + \Phi(p_{dt}) + \pi(y_t) \quad (4)$$

where lower-case letters again represent continuous rates of change of the variables.

The quantity of exports demanded may also be expressed as a multiplicative function in which the arguments in the demand function are: the price of exports measured in foreign currency (to capture the effect of exchange rate changes), the price of goods competitive with exports, and the level of world income. Thus:

$$X_t = \left(\frac{P_t}{E_t}\right)^{\eta} P_{ft}^{\delta} Z_t^{\epsilon} \quad (5)$$

where X_t is the quantity of exports; P_{dt} is the domestic price of exports; P_{ft} is the price of goods competitive with exports; Z is the level of world in come; $1/E$ is the foreign price of home currency; η is the own price elasticity of demand for exports $\eta < 0$); δ is the cross elasticity of demand for exports ($\delta > 0$); ε is the income elasticity of demand for exports ($\varepsilon > 0$), and t is time.

The rate of growth of exports may be written:

$$x_t = \eta(p_{dt}) - \eta(e_t) + \delta(p_{ft}) + \varepsilon(z_t) \quad (6)$$

Substituting equations (4) and (6) into (2), we can solve for the rate of growth of domestic income consistent with balance of payments equilibrium which we shall call the balance of payments equilibrium growth rate, Y_{Bt}.

$$y_{Bt} = \frac{p_{dt}(1+\eta-\Phi) - p_{ft}(1-\delta+\Psi) - e_t(1+\eta+\Psi) + \epsilon(z_t)}{\pi} \quad (7)$$

Remembering the signs of the parameters $\eta<0$; $\Phi>0$; $\delta>0$; $\Psi<0$; $\varepsilon>0$, and $\pi>0$), equation (7) expresses several familiar economic propositions:

(i) Inflation in the home country will lower the balance of payments equilibrium growth rate if the sum of the own price elasticity of demand for exports and the cross elasticity of demand for imports is greater than unity in absolute value (i.e. if $|\eta + \Phi| > 1$).

(ii) Inflation abroad will improve the home country's balance of payments equilibrium growth rate provided the sum of the own of demand for imports and the cross elasticity of exports is greater than unity in absolute value (i.e. if $|\delta + \Psi| > 1$).

(iii) Devaluation or currency depreciation, i.e. a rise in the home price of foreign currency (e_t>0), will improve the balance of payments equilibrium growth rate provided the sum of the own price elasticities of demand for imports and exports exceeds unity in absolute value, which is the so-called Marshall-Lerner condition (i.e. if $|\eta + \Psi| > 1$). Notice, however, the important point that a once-for-all depreciation of the currency cannot raise the balance of payments equilibrium growth rate permanently. After the initial depreciation, e_t=0, and the growth rate would revert to its former level. To raise the balance of payments equilibrium growth rate permanently would require continual depreciation i.e. e_t>0 in successive periods.

(iv) A faster growth of world income will raise the balance of payments equilibrium growth rate.

(v) The higher the income elasticity of demand for imports (π), the lower the balance of payments equilibrium growth rate.

2. Empirical evidence

The interesting question is how well does the actual growth experience of countries approximate to the balance of payments equilibrium growth rate? There may, of course, be an asymmetry in the system. While a country cannot grow faster than its balance of payments equilibrium growth rate for very long, unless it can finance an ever-growing deficit, there is little to stop a country growing slower and accumulating large surpluses. This may particularly occur where the balance of payments equilibrium growth rate is so high that a country

simply does not have the physical capacity to grow at that rate. This typifies many oil producing countries and would also seem to typify the experience of Japan, as we shall see below.

To calculate the balance of payments equilibrium growth rate from equation (7) for a number of countries requires a substantial amount of data and estimates of parameters which are not readily available. If the usual assumption is made, however, that the own, price elasticities of demand for import and exports are equal to the cross elasticities $\Phi=\Psi$ and $\eta = \delta$) equation (7) becomes:

$$y_{Bt} = \frac{(1+\eta+\Psi)\,(p_{dt}-p_{ft}-e_t)+\epsilon(z_t)}{\pi} \qquad (8)$$

which, if the Marshall-Lerner condition is just satisfied or if relative prices measured in a common currency do not change over the long run, reduces to:

$$y_{Bt} = \frac{x_t}{\pi} \qquad \text{(using equation (6))} \qquad (9)$$

Many models (see Ball *et al*., 1977; and Wilson, 1976) and the empirical evidence, suggest that over the long period there can be little movement in relative international prices measured in a common currency, either because of arbitrage (*the law of one price*), or because exchange depreciation forces up domestic prices equiproportionately so that in the long run $(p_{dt} - p_{ft} - e_t) \approx 0$.

Applying equation (9) to international data gives a remarkable approximation to the growth experience of many countries over the last twenty years, and *ipso facto* provides an explanation of why growth rates differ. It might almost be stated as a fundamental law that, except where the balance of payments equilibrium growth rate exceeds the maximum feasible capacity growth rate, the rate of growth of a country will approximate to the ratio of its rate of growth of exports and its income elasticity of demand for imports. The approximation itself vindicates the assumptions used to arrive at the simple rule in equation (9). The hypothesis is tested on two sets of data on the growth of output and

exports: one for the period 1953 to 1976 (Kern, 1978), and the other from a different source (Cornwall, 1977) for the period 1951 to 1973.[1] On the income elasticity of demand for imports, Houthakker and Magee's estimates (Houthakker *et al*., 1969) have been taken as applying to the whole of these periods even though they were only estimated over the period 1951 to 1966. They are the best consistently estimated international estimates available, but are probably now on the low side. The data, and the results of applying equation (9), are presented in tables 1 and 2. In both tables there is a general tendency for the estimates of the balance of payments equilibrium growth rate to be higher than the actual growth rate, which, in time, would produce a balance of payments surplus. For countries which have built up surpluses, the estimates are consistent with the empirical evidence. Japan is a striking example of a country where the gap between its actual growth rate and its balance of payments equilibrium growth rate has resulted in the build up of a huge payments surplus. Presumably Japan could not grow faster than it did because of an ultimate capacity ceiling. But Japan still grew considerably faster than other countries because demand was unconstrained and induced its own supply of factors of production. For countries which have moved into deficit over the period, the estimate of their balance of payments equilibrium growth rate must be too high. As suggested above, this may be because the assumed income elasticity of demand for imports is an underestimate for the period stretching into the late 1960s and 1970s. Also, adverse relative price movements combined with various price elasticity conditions cannot be entirely ruled out as determinants of the balance of payments even though they may be of minor significance compared to income movements and income elasticities of demand for imports and exports. Despite the overestimation of the balance of payments equilibrium growth rate in some cases, and the fact that some countries may grow slower and build up payments surpluses, nonetheless the rank correlations between the predicted growth rates from applying our simple rule and the actual growth rates are very high for both sets of

[1] I did not want to be accused of choosing the source to suit the argument!

data. For the sample of countries in table 1 the Spearman rank correlation is 0.764 and in table 2 the Spearman rank correlation is 0.891.

Table 1- *Calculations of the growth rate consistent with balance of payments equilibrium 1953-1976*

Country	% change of real GNP *(y)*	% change in export volume *(x)*	Income elasticity of demand for imports *(π)*	Balance of payments equilibrium growth rate from applying equation (9)
USA	3.23	5.88	1.51	3.89
Canada	4.81	6.02	1.20	5.02
West Germany	4.96	9.99	1.89	5.29
Netherlands	4.99	9.38	1.82	5.15
Sweden	3.67	7.16	1.76	4.07
France	4,95	8.78	1.62	5.42
Denmark	3.58	6.77	1.31	5.17
Australia	4.95	6.98	0.90	7.76
Italy	4.96	12.09	2.25	5.37
Switzerland	3.56	7.20	1.90	3.79
Norway	4.18	7.70	1.40	5.50
Belgium	4.07	9.24	1.94	4.76
Japan	8.55	16.18	1.23	13.15
Austria	5.17	11.12	n.a	---
United Kingdom	2.71	4.46	1.51	2.95
South Africa	4.97	6.57	0.85	7.73
Spain	5.94	11.10	n.a.	---
Finland	4.55	6.63	n.a.	---

Source of data: Kern (1978), and Houthakker and Magee (1969).

Table 2 – *Calculations of the growth rate consistent with balance of payments equilibrium 1951-1973, Using data given by Cornwall (1977)*

Country	% change in GDP	% change in exports (x)	Income elasticity of demand for imports (π)	Balance of payments equilibrium growth rate from applying equation (9)
Austria	5.1[a]	10.7	n.a.	---
Belgiumj	4.4[a]	9.4	1.94	4.84
Canada	4.6	6.9	1.20	5.75
Denmark	4.2[b]	6.1	1.31	4.65
France	5.0	8.1	1.62	5.00
Germany	5.7	10.8	1.89	5.71
Italy	5.1	11.7	2.25	5.20
Japan	9.5	15.4	1.23	12.52
Netherlands	5.0	10.1	1.82	5.55
Norway	4.2	7.2	1.40	5.14
United Kingdom	2.7	4.1	1.51	2.71
U.S.A.	3.7	5.1	1.51	3.38

Notes: [a]: 1955-73; [b]: 1954-73.
Source: Cornwall (1977, p. 162).

3. Conclusion

The simple policy conclusion for most countries is that if they wish to grow faster they must first raise the balance of payments constraint on demand. To raise the rate of growth of productive capacity (by improving productivity, for example) without being able to raise the rate of growth of demand because of the balance of payments will merely lead to unemployment. If the balance of payments equilibrium growth rate can be raised, however, by making exports more attractive and by reducing the income elasticity of demand for imports, demand can be expanded without producing balance of payments difficulties; and, within limits, demand can generate its own supply by encouraging investment,

absorbing underemployment, raising productivity growth and so on. Thus, the explanation of growth rate differences must lie primarily in differences in the rate of growth of demand, and the major constraint on the rate of growth of demand in most countries is the balance of payments. Our model and the empirical evidence lends strong support to the advocates of export-led growth.

The deeper question lies in why the balance of payments equilibrium growth rate differs between countries. This must be primarily associated with the characteristics of goods produced which determines the income elasticity of demand for the country's exports and the country's propensity to import. For countries with a slow rate of growth of exports, combined with a relatively high income elasticity of demand for imports, the message is plain: the goods produced by the country are relatively unattractive at both home and abroad. We have concentrated in this study on growth rate differences between developed countries. The argument probably has even greater relevance for developing countries.

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