CALCULATION OF THE VALUE OF THE FOREIGN TRADE MULTIPLIER OR DERIVATION OF FOREIGN TRADE MULTIPLIER

Mr. Sunil Soni,
Assistant Professor
C.R.K. College, Jind.

Introduction

The Foreign trade multiplier can be derived algebraically as follows. The national income identity in an open economy is

$$Y = C+I+X-M$$

Where Y is the national income, C is national consumption, I is total investment/ X is exports and M i's imports.

The above relationship can be solved as

Y-C = l+X- M

Or S = I+X-M

S+ M = I + X (.: S = Y-C)

Thus at equilibrium levels of income the sum of savings and imports (S+M) must equal the sum of investment and exports (I+X).

In an open economy the investment (I) component is divided into domestic investment (I_d) and foreign Investment (I_f)

$$I = S$$

$$I_d + I_f = S \qquad \text{.....(i)}$$

Foreign investment (I_f) is the difference between exports and imports of goods and services.

$$I_f = X - M \qquad \text{.....(ii)}$$

Substituting (ii) in to (i), we have

$$I_d + X - M = S$$

Or

$$I_d + X = S + M$$

Which is the equilibrium condition of national income in an open economy. The foreign trade multiplier coefficient (K_f) is equal to

$$\frac{\Delta Y}{\Delta X}$$

and $\Delta X = \Delta S + \Delta M$

Dividing both sides by ΔY we get

$$\frac{\Delta X}{\Delta Y} = \frac{\Delta S + \Delta M}{\Delta Y}$$

or $$\frac{I}{K_f} = \frac{\Delta S + \Delta M}{\Delta Y} \qquad (K_f = \Delta Y/\Delta X)$$

or $$K_f = \frac{\Delta Y}{\Delta S + \Delta M}$$

$$K_f = \frac{1}{\frac{\Delta S}{\Delta Y} + \frac{\Delta M}{\Delta Y}} \qquad \text{(Dividing by } \Delta Y\text{)}$$

Hence $$K_f = \frac{1}{MPS + MPM}$$

Hence the smaller the Marginal Propensity to save ($\Delta S/\Delta Y$) and Marginal Propensity to import ($\Delta M / \Delta Y$), the larger will be the value of Foreign trade multiplier and ViceVersa.

Hence: $$K_f = \frac{1}{S + M}$$

It may be recalled here that in a closed economy, Keynes investment multiplier is: k = 1/ MPS. However, in an open economy, as there is also an additional leakage (i.e. imports), the foreign trade multiplier is ; $K_f = \frac{1}{S + M}$

It is, thus evident from the above equation that smaller the leakages (i.e the smaller the MPS and MPM) the greater the foreign trade multiplier and *vice-versa*.

Illustrations: Supposing of S=0.2 and M=0.2 then

$$K_f = \frac{1}{0.2+0.2} = \frac{1}{0.4} = 2.5$$

on the contrary, if S=0.3 and M=0.2, then

$$K_f = \frac{1}{0.3+0.2} = \frac{1}{0.5} = 2$$

i.e an increase in export income of Rs. 100 crore will lead to an increase in national income of Rs. 200 crore when $K_f = 2$.

Since $K_f = \Delta Y/\Delta X$ (By Definition)

Or $K_f = \frac{1}{MPS + MPM}$

Or $\Delta Y = \frac{1}{MPS + MPM} \times \Delta X$

The Process of Foreign Trade Multiplier

The process of foreign trade multiplier can be explained with the help of table.1 given below:

Table 1 Process of Foreign Trade Multiplier

Rounds	Change in Exports (ΔX)	Change in Consumption $\Delta C=C.\ \Delta Y$ where, C=0.5	Change in Imports $\Delta M=m.\ \Delta Y$ where, M=0.2	Change in Saving ΔS where S=0.2	Change in Income (ΔY)
1	1000	500	200	300	1000
2	……	250	100	150	1500
3	…….	125	50	75	1750
4	……	62.5	25	37.5	1875
5	……	31.25	12.5	18.75	1937.5

…. …. …. ….	…… ….. …… …..	…… …… …… ……	….. ……. …… ……	….. …… ….. ……	…… …… …… ……
∞	1000	1000	400	600	2000

In the above table, the level of investment has been assumed as fixed. In the first round the net income from exports is Rs. 1000 crore which is also the national income. Given MPS as 0.5, Rs. 500 crore are being spent on consumption i.e. $\Delta C = 0.5 \times 1000 =$ Rs. 500 crore. MPM has been assumed equal to 0.2 and MPS = 0.3. Hence $\Delta M = 0.2 \times 1000 =$ Rs. 200 crore and ΔS Rs. $= 0.3 \times 1000 =$ Rs. 300 crore. Both these two acts as leakages from the income stream. In the first round, that portion of increased export income which remains after consumption becomes national income in the second round which is equal to Rs. 500 crore. Now MPC being 0.5, Rs. 250 crore (0.5 x 500 = Rs. 250 crore) will be spent on domestic consumption. Similarly Rs.100 crore (0.2 x 500 = Rs. 100 crore) are spent on import and Rs. 150 crore (0.3 x 500 = Rs. 150 crore) are saved. Hence in the third round the level of income is Rs. 125 crore. In this way the income will go on increasing in every round, as is clear from the last column of the table. Finally, the national income increases to the tune of Rs. 2000 crore due to the operation of the foreign trade multiplier. In this example, $Kf = \frac{1}{0.3+0.2} = \frac{1}{0.5}$

=2, which means that owing to an increase in export income of Rs.1000 crore, the national income would increase 1000x2= Rs.2000 Crore.

Assumptions

Following are the assumptions of foreign trade multiplier:

1. There is full employment of the factors of production in the economy.
2. This analysis applies to two countries only.
3. Domestic Investment (I_d) remains fixed.

4. Marginal Propensity to save (MPS) and Marginal Propensity to Import (MPM) remain constant.
5. There is no time gap in increase in income due to increase in investment.
6. The economy is open and there is no restriction on imports and exports, no tariffs, no import restriction and no protection policy.

Graphic Illustration of Foreign Trade Multiplier

The foreign trade multiplier can be explained with the help of Fig..1

In this figure national income has been shown on X- axis and savings, investments, exports and imports have been shown on Y-axis. The horizontal line marked Kx represents exports. The savings and imports functions are represented by the line with a positive slope, marked S + M.

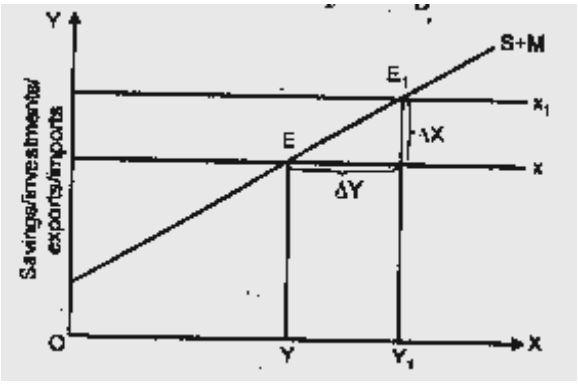


Fig..1 Foreign Trade Multiplier

1. **Autonomous Increase in Exports:** Initially, the economy is in equilibrium at OY level of income where savings plus imports are in balance with exports at point E. Now, let us assume that there is an autonomous increase in exports so that the export function is shifted from KX to KX_1. This autonomous increase in exports may be caused due to a change in the tastes abroad in favour of our export goods.

This increase in exports causes an injection of income in the economy. This will cause the income of the exporting country to rise by more than the amount of new income from exports because people spend most of their additional income on domestic goods and services. Only part of the additional income will leak out by way of savings and imports. Suppose that the

autonomous increase in exports amount to Rs. 100 crore, and the income saved out of it and used for additional imports add up to Rs. 50 crore. Then total expansion of income will be Rs. 200 crore (because S + M = 0.5) and value of K_f = 2.

It becomes clear from fig.1, that, new equilibrium is established at OY_1 level of income where savings + imports are in balance with new level of exports. Figure.1 clearly depicts the multiplier effect of the autonomous increase in exports because ΔY is greater than ΔX. How large the expansionary effects on national income will be from a given increase in exports depends on the slope of the savings + imports schedule. This slope obviously depends on the marginal propensities to save and import. The smaller the sum of these propensities, the smaller will be the slope of the schedule and the larger the expansionary effect of an increase in exports on national income, and *vice-versa.*

The foreign trade multiplier also works in the reverse direction, in an economy, if there is a decline in exports income.

2. Autonomous Increase in Imports: The effect of an autonomous increase in imports on national income will have an opposite effect to that of an autonomous increase in exports. Assuming that owing to an increase in the preference of foreign goods over domestic goods, imports rise. This implies a fall in the demand for domestic goods which in turn will lead to a reduction in production and fall in employment. As a result, income and aggregate demand for domestic goods will fall leading to a further fall in income and aggregate demand. This fall in income via the multiplier effect will continue until finally a new equilibrium is reached at a lower level of national income.

Fig.2 elucidates the contractionary effect of an autonomous increase in imports on national income. The export function is represented by the line marked by KX and the import function by the line represented by M. The economy is initially at equilibrium at OY level of income. An autonomous increase in imports shifts the import function line from M to M_1 and thereby, new equilibrium is established at a lower level of income OY_1. Thus, the increase in imports has a multiplier effect on the Contraction of income is clear from the fact that fall in income i.e. ΔY is

much greater than rise in imports ΔM.

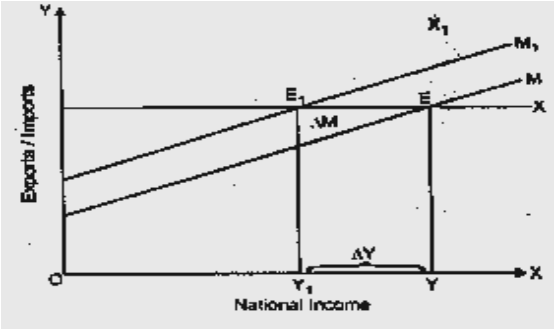


Fig. 2 Impact of Increase in Imports on Income.

3. Foreign Trade Multiplier with Reference to Positive Investment and Savings. However, for a more realistic analysis it is necessary to introduce both S and I into the analysis. It may be understood that the analysis of the equilibrium level of income, in an open economy can also be done in terms of saving and investment schedules. It is done in the figures given below:

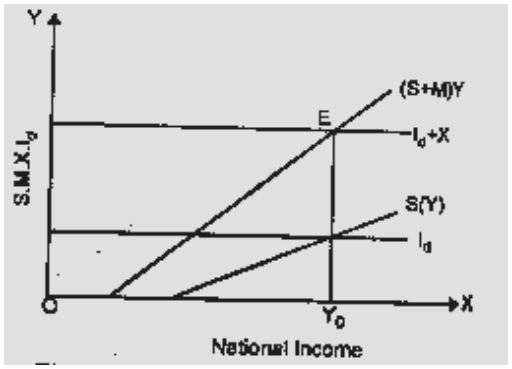


Fig .3 Equilibrium Level of Income with Positive I and S.

The equilibrium level in the economy is shown in Figure.3, where S(Y) is the saving function and (S+M)Y is the savings plus import function I_d represent domestic investment and $I_d + X$ the export plus domestic investment. The (S+M) and $I_d + X$ functions determine the equilibrium level of national income Y_0 where savings equal domestic investment and exports equal imports.

If there is a shift in I_d + X function due to an increase in exports, the national income will increase from Y_0 to Y_1, as shown in figure.4. This increase in income is due to the multiplier effect i.e. $\Delta Y = K_f \Delta X$. The exports will exceed imports by sd, the amount by which savings will exceed domestic investment. The new equilibrium level of income will be Y_1. It is a case of positive foreign investment. The increase in income here is due to the multiplier effect i.e. $\Delta Y = Kf.\Delta X$.

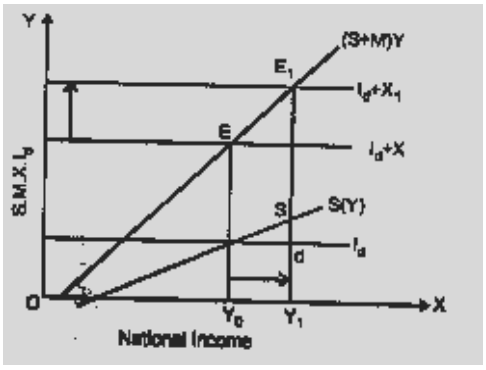


Fig..4 Impact of Increase in Exports on Income

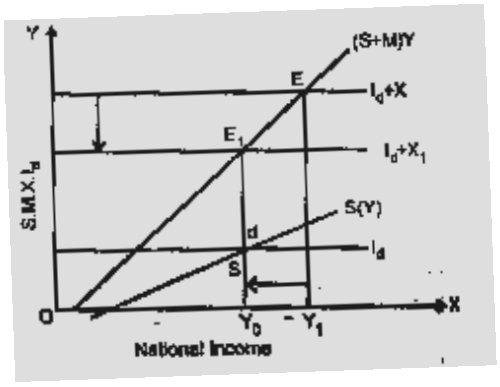


Fig..5 Impact of Fall in Exports on Income.

If there is a fall in exports, the export function will shift downward to Id + Xl as shown in Figure.5. In *this* case imports would exceed exports and domestic investment would exceed savings by ds. The level of national income is reduced from OY_o to OY_I. This is the reverse operation of the foreign trade multiplier.

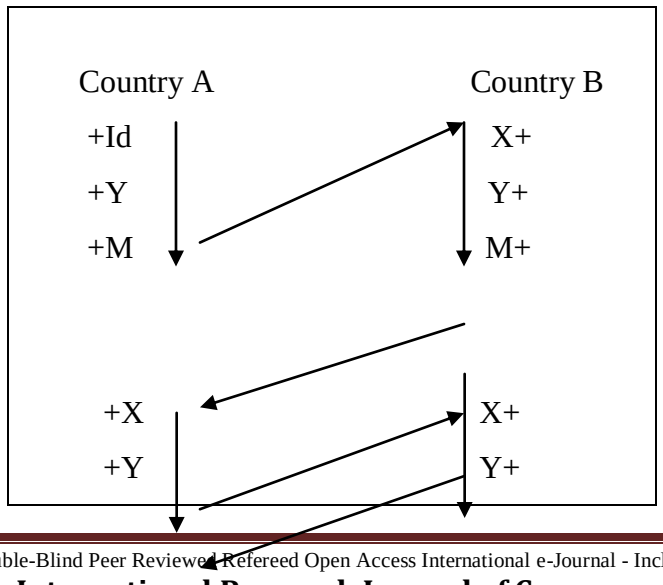
The Foreign Repercussion Effect or Backwash Effect

In the above analysis, the foreign trade multiplier has been studied in the case of only one

country. But, in reality, countries are inter-related with each other through trade. Infact, international trade is a kind of barter, in which the imports of one nation are the exports of the other. As a result, the levels of Y, 0, E in different economies are linked to seller through their international economic transactions.

A country's exports or imports affect the national income of the other country which, in turn, affects the foreign trade and national income of the first country. This is known as foreign repercussion or the backwash effect. Such an effect exists only when the economy of a nation is relatively large as compared to the economy of other nations. The smaller the country in relation to other trading partner, the negligible is the foreign repercussion. Changes in the balance of payments position of a very small nation are not likely to affect significantly the income and employment levels of other nations. But the foreign repercussions will be high in the case of a large country because a change in the national income of such a country will have significant foreign repercussions or backwash effects. As for example, a change in the imports of a country like USA, could significantly affect their national income of one or more countries because of her sheer size.

In order to understand such an effect let us assume that there are two countries or economies. Domestic economy designated by A and foreign economy represented by B. Let us assume that there is autonomous upward shift in the investment demand schedule in 'A'.

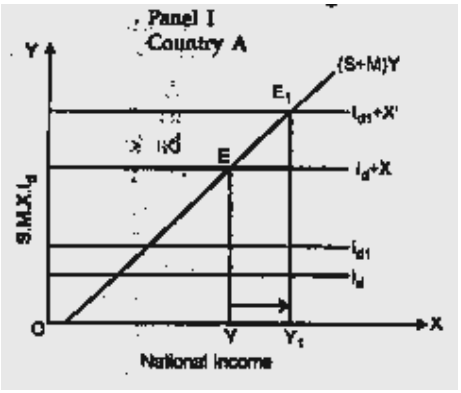


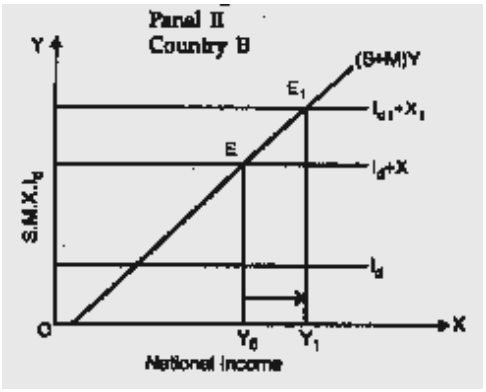
+M	M+
and so on	

In the above table when domestic investment (I_d) increases in country A, it increases its exports to country B. Thus country A's national income increases (+ Y). It induces country A to import more from country B, it increases the demand for country B's exports (X+). Consequently, national income in country B increases (Y+). Now this country imports more (M+) from country A. As the demand for country A's exports increases, its national income increases further. This is the foreign repercussion or the backwash effect for these stages of foreign repercussions are explained in the adjacent diagrams.

In stage I, domestic investment in country A increases from Id to I_{d1} in Panel 1 of Figure .6. This leads to an upward shift in the Id + X schedule to I_{d1}' + X'. As a result, the new equilibrium point is at E_1 which shows an increase in national income from Y to Y_1" As national income increases, the demand for imports from country B also increases. This means increase in the exports of country B. This is shown in Panel II of Figure.6 when the Id + X schedule of country B shifts upward as I_d + X_1.. Consequently, the national income in country B increases from Y_0 to Y_1 at the higher equilibrium level E'. As country B's income increases, its demand for imports from country A also increases. This, in turn, leads to the backwash effect in the form of increase in the demand for exports of country A. This is shown in Panel **III** of Figure.6 where the I_{d1} + X schedule (of Panel I) further shifts upward to I_{d1} + Xl and consequently the national income increases further from Y 1 to Y 2'

This shows how the foreign repercussions in one country affect its own national income and that of the other country which, in turn, again affects its own national income through the backwash effects with greater force.


Panel I
Country A
Y
(S+M)Y
E1
E
S.M.X.Id
O
Y
Y1
X
National Income


Panel II
Country B
Y
(S+M)Y
E1
E
S.M.X.Id
O
Y0
Y1
X
National Income

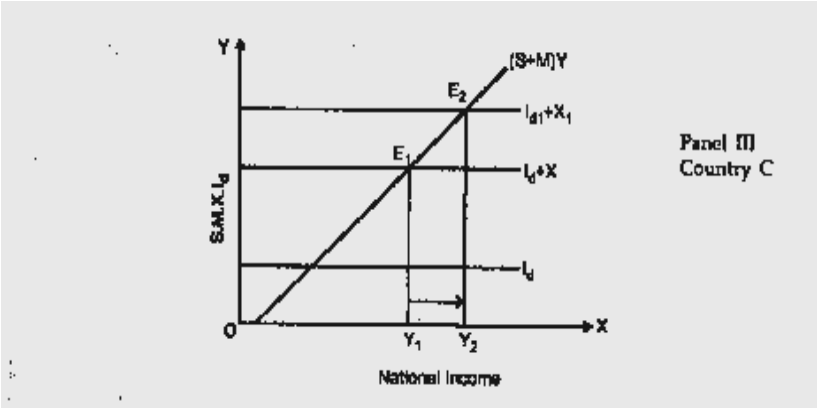


Figure. 6 Determinations in an Open Economy with Foreign Repercussion

Implications of Repercussion Effect

(a) Foreign repercussion effect, thus, points out to an important implication of the foreign trade 'multiplier analysis through the process of international transmission of trade cycles and economic fluctuations. This effect shows how higher propensity to import in the countries having income expansion, will in turn, give greater impulse for expansion to the rest of the world sector through the process of international transmission of economic activities.

(b) Foreign trade multiplier affects not only the level of income, output and employment but also affects in a complex way the trade balances of the countries concerned. A favorable multiplier effect in home country, raising income level is likely to affect its balance of trade unfavorably. A rise in demand for imports from other countries may lower the income level, adversely affecting

balance of trade; while increased demand for domestic exports may raise the level of income and may favorably affect the balance of trade with respect to the rest of the world sector. Since all these factors operate in a complex manner, the effect of foreign trade multiplier on balance of trade and payments is uncertain and unpredictable.

(c) In order to remove unemployment or raise income level the policies to increase exports and reduce imports (usually referred to as 'beggar-my-neighbour- policy) will raise domestic income but will cause a decline in incomes abroad. This is an undesirable implication of foreign trade multiplier. Since the great depression of thirties such policies are discouraged in the interest of wider international trade objectives. It is surprising that regional economic groupings like ECM insist on increasing the poverty of developing nations by following such policy. It is on account of this implication of foreign trade multiplier that expansionary fiscal and monetary policies are suggested to give a boost to internal economies, thereby, reducing dependence on the uncertain effects of foreign trade.

References

1. Dr. Raj Kumar, Kuldip Gupta, "Investment and Foreign Trade Analysis", Business Economics,2006.UDH Publishers & Distributors, New Delhi.
2. J.J.Polak, " Foreign Trade Multiplier", American economic Review, December,1947.
3. Domonick Salvatore, International Economics, 7th edition.
4. Robert H.Heller. International Monetary economics, 1974.
5. Jams E. Meade, The balance of Payments, Oxford University Press,1951.
6. Reserve Bank of India, Report on Currency and Finance.
7. Robert J Carbaugh, International Economics, Thomas Asia, Singapore.
8. BO, Sodersten and Reed, Geoffrey, International Economics, Macmillan, London.
9. Raj Kumar, International Economics, Excel Books, New Delhi.