

Pitchford, John David

Working Paper — Digitized Version

Elasticities and trade imbalances: The significance of the Marshall/Lerner condition

Kiel Working Paper, No. 421

Provided in Cooperation with:

Kiel Institute for the World Economy – Leibniz Center for Research on Global Economic Challenges

Suggested Citation: Pitchford, John David (1990) : Elasticities and trade imbalances: The significance of the Marshall/Lerner condition, Kiel Working Paper, No. 421, Kiel Institute of World Economics (IfW), Kiel

This Version is available at:

<https://hdl.handle.net/10419/46718>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Kieler Arbeitspapiere Kiel Working Papers

Working Paper No. 421

Elasticities and Trade Imbalances:
The Significance of the Marshall/Lerner Condition

by

John Pitchford*

August 1990

Weltwi
20 / 8

Institut für Weltwirtschaft an der Universität Kiel
The Kiel Institute of World Economics

ISSN 0342 - 0787

The Kiel Institute of World Economics
D-2300 Kiel, Düsternbrooker Weg 120

Working Paper No. 421

Elasticities and Trade Imbalances:
The Significance of the Marshall/Lerner Condition

by

John Pitchford*

August 1990

AG 3082 / 90
Weltwirtschaft
Kiel
h5

*The author is visiting professor at the Kiel Institute of World Economics while on leave from

Department of Economics
The Faculties
Australian National University
GPO Box 4
Canberra ACT 2600
Australia

The author, not the Kiel Institute of World Economics, is solely responsible for the contents and distribution of each Kiel Working Paper.

Since the series involves manuscripts in a preliminary form, interested readers are requested to direct criticisms and suggestions directly to the author and to clear any quotations with him.

ISSN 0342-0787

ABSTRACT

The Marshall/Lerner condition is examined in a context in which full account is taken of the intertemporal optimizing conditions inherent in the balance of payments. This analysis suggests that the condition has only a very limited significance.

John Pitchford

One of the central topics in the study of external economic issues is the question of the effect of a devaluation of the real or nominal exchange rate on the current account balance. This is true both for pure and monetary trade analysis. Thus a devaluation will increase a current account surplus or reduce a deficit if the so called Marshall/Lerner condition (hereafter referred to as M/L) is met. This condition requires that domestic and foreign elasticities of demand for imports are not 'too small' and a variety of problems for the economy in question are supposed to ensue if it is not satisfied. Yet there seems no reason at all why elasticities should always have values which fall in some particular range, other than that required by the relevant constraints. So if M/L were not met, a devaluation would *increase* a current account deficit or reduce a surplus, except in the borderline case (which will be neglected in subsequent discussion) where it will have no effect at all.

In itself, this would not seem too much of a problem, but as is shown at an early stage in the development of the pure theory of trade, the real economy will be unstable if M/L is not satisfied. Instability will exist in the sense that a rise in the relative price of a good will increase the excess demand for it. Thus there is a potential quandary if the elasticity condition is not satisfied, because a system which seems perfectly reasonable without trade appears unstable and so unviable when trade is allowed! The problem is resolved by observing that a real model can still be stable when M/L does not hold because it is most likely that the unstable equilibrium is bounded on both sides by stable equilibria. But the practical effect of such a position is that we would expect almost never to observe a situation in which M/L fails to be satisfied. The reason is, of course, that if the economy were in such a situation it would always be moving away from it.

In the monetary theory of trade the M/L requirement also appears as a significant determinant of stability. Indeed, it has sometimes been suggested that the viability of the price system and so of the private enterprise system depends on whether the condition is met! Despite the prediction of pure trade theory that observation of the failure of M/L should be rare, empirical work does seem to throw up low values of trade elasticities and economists do seem to become inflicted with what used to be called 'elasticity pessimism'. Even if M/L were satisfied, there are some who worry about the possible consequences of low price elasticities, particularly if they are accompanied by a high income elasticity of demand for imports. Thus if a country with such elasticities grows rapidly it is supposed thereby to fall into difficulties as the high income elasticity produces a significant 'worsening' of the current account balance, while a very large devaluation is required to 'offset' the effect of the extra import demand.¹ Nonetheless, it seems paradoxical that the characteristics of preferences and technology which produce low price elasticities, constrained as they are by the budgets of consumers,

should be capable of producing what some regard as dire economic consequences.

One problem with some earlier approaches of the monetary theory of trade to the devaluation issue is that they were based on a partial view of the current account which saw it as being generated largely or even solely by trading circumstances. In fact, because the current account deficit is identically equal to an economy's excess of spending over income, it is also generated by the intertemporal decisions which govern spending. It follows that a full analysis of current account issues requires attention to both sets of its causes. Such an approach is taken here. It will be shown that, as a consequence of combining intertemporal optimizing expenditure choices with the elasticities approach, equilibria where the M/L condition is satisfied are stable, whereas when it is not met they are unstable. This results parallel that of pure trade theory. However, the pure theory result is based on *ad hoc* dynamics, in that it requires an adjustment mechanism (such that prices rise when there is excess demand and fall when there is excess supply) which does not necessarily arise from optimal dynamics. The stability results obtained from a consideration of optimal intertemporal decisions does not have such arbitrary features. Further, suppose that while M/L is fulfilled price elasticities are low and income elasticities high. There, is no obvious reason why such elasticities, reflecting as they do optimal consumption choices, should imply any form of problem.

Part I of the paper discusses the nature of the M/L condition in the pure and monetary theory of trade. It is basic that the current account balance is, identically, both the excess of exports and net income from foreign assets over imports and the excess of total spending over income. In part, II a model is set up in which the current account balance is jointly determined by the real exchange rate on the one hand and intertemporally optimal choice of the level of spending relative to income on the other. If M/L is satisfied this model leads to convergence to steady expenditure and debt levels satisfying the condition that the rate of interest on borrowing equals the discount rate. However, with M/L not met the steady state with these characteristics is unstable. Following the concepts of the pure theory of trade, it is then assumed that eventually a zone in which M/L holds will be met as the real exchange rate moves in either direction away from the unstable steady state. It is shown to be possible that the economy may avoid the zones of instability altogether. So it would seem that the non-fulfilment of the elasticities condition may have little or no consequences for economic behaviour as it may be a rare occurrence and, where it is observed the economy concerned would be moving away from the zone in which it holds. The usual version of the Marshall/Lerner condition is expressed in terms of conventional price elasticities. In part III the condition is expressed in this form and the effect of price and expenditure

elasticities on the behaviour of the system is discussed.

I The Marshall/Lerner Condition

In the two good model of the pure theory of trade, a country's offer curve is the locus of combinations of excess demand (demand for imports) and excess supply (supply of exports) at various values of the relative price of the commodities. The M/L condition appears as a requirement on the slopes of the domestic and foreign offer curves which ensures that their intersection is a stable equilibrium. In this analysis the concept of stability is used in the sense that a rise in the relative price of a commodity will reduce the level of excess demand for that commodity. Where at some point of intersection of the offer curves the M/L condition is not satisfied it would seem that, except in unlikely cases, there would exist stable equilibria for relative prices on either side of the unstable one. These cases are illustrated in figure 1. It should be noted that offer curves are normally drawn on the assumption that the trade and current account balances will be zero and because they are both equal, it is implied that there are no foreign assets or debt. The question addressed is how much imports can be exchanged for a given quantity of exports? There is no reason why unbalanced trade should not also be featured in offer curves. Then the question is how much imports can be exchanged for a given amount of exports and a specified reduction in foreign assets or increase in foreign debt? The offer curve concept is by this means extended to the situation of unbalanced trade.

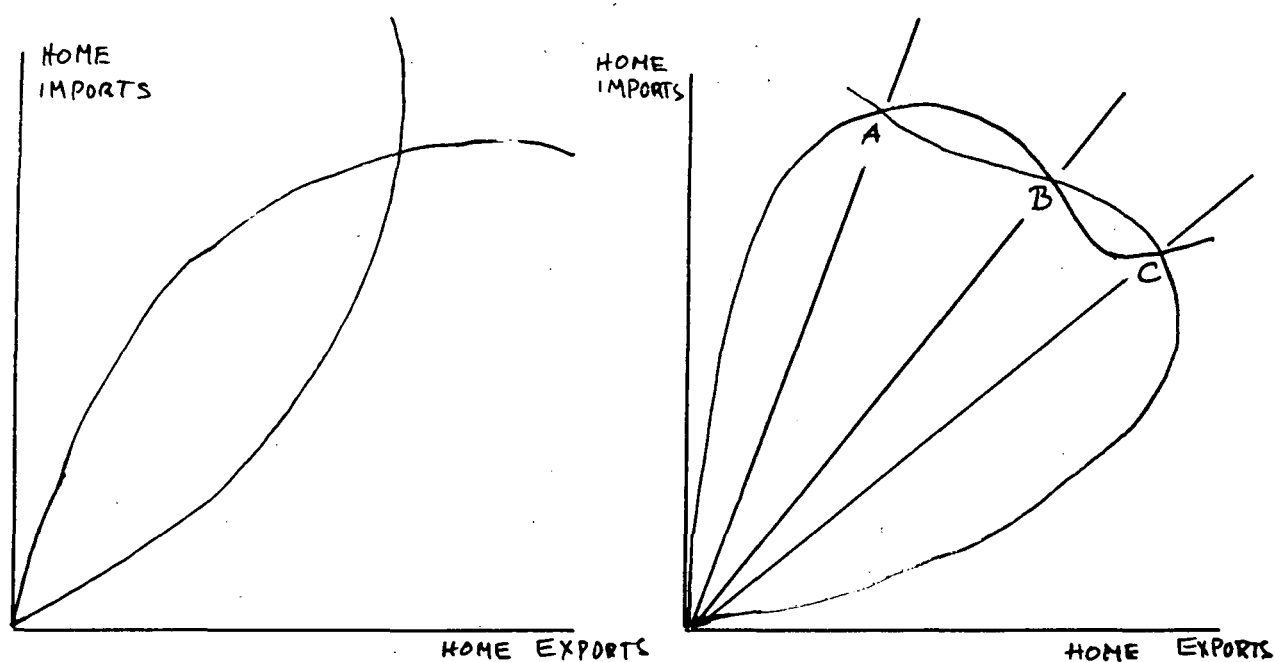


Figure 1

Where the structure of production make them relevant, the M/L condition and trade elasticities feature prominently in open economy macro models. One of the prevalent

themes of international monetary economics has been the issue of elasticity pessimism or optimism. Depending on whether one thought M/L would be satisfied, one had more or less faith in the price system and devaluation to ensure some form of international equilibrium. For instance, Kindleberger² devoted a chapter to so called 'structural disequilibrium problems', defining them as:

".. a maladjustment of the price system. At the goods level, it is a misallocation of resources relative to prices, generally arising from a change in demand or supply for internationally traded goods. It calls for a reduction in expenditure and a shift in resources." [p. 595]

Elasticity pessimists were likely to suggest that economies experiencing the demand and supply shifts of 'structural disequilibrium' would require intervention to direct resources into 'appropriate' areas and possibly also the use of macro policies because of the perceived failure of the price mechanism.

Many estimates have been made of price and income trade elasticities, their purpose often being to assess the likelihood of 'difficulties' arising from low price and high income elasticities of demand for imports, or low export and high import income elasticities. For instance, Houthakker and Magee³ compute estimates for a number of countries to assess these questions, finding that though they are difficult empirical issues:

"For a number of important countries, however, the sum of the import and export price elasticities appears to be greater than one in absolute terms as required for balance of payments stability." [p. 114]

It seems inappropriate to be concerned about a situation which, because of its instability is unlikely to be encountered. However, the explanation could be that the concern is not so much with M/L not being met as with the possibility of elasticities having values leading to 'undesired outcomes'. The significance of various elasticity values will be considered in section III.

The M/L condition also plays an important role in certain dynamic open economy systems such as the portfolio balance models.⁴ The intrinsic dynamics in such models comes through the foreign asset or debt accumulation and decumulation process given by the balance of payments equation. If M/L does not hold such a system could be unstable. Presumably the authors could have taken comfort from the pure theory of trade and argued that in any case, unstable equilibria are bounded by stable equilibria where M/L is met.

II A Model of Intertemporal Choice and Real Exchange Rates

One of the most common models of open economy macroeconomics is the one which assumes that only one good is produced at home while a different good is imported. The popularity of this framework arises because it enables the preservation of much of the standard Keynesian aggregate demand structure. Aggregate supply continues to be supply of a single good, with relative prices entering the system only in so far as the relative price of foreign to domestic goods (real exchange rate) determines the demand for imports and the foreigners' demand for the home good.

For the domestic economy then, suppose that there is a single good produced at home, while two goods are consumed, the second good being imported.⁵ The output of the home good is taken to be fixed in the first version of the system. The demand of the rest of the world for the home good depends on its price relative to that of the import and on foreign real income, this latter being assumed to be a given parameter.

Households are taken to consist of infinitely lived maximizing consumers who choose time paths for the consumption of both goods, subject to their incomes, the prices of the goods and the rate of interest they receive for lending or borrowing. There are various ways these choices can be expressed. In this section the straightforward optimization problem described above is followed, with the consumption of each of the two goods being the control variables. This yields first order conditions which determine consumer responses at given values of the interest rate and relative prices. When these are put into the market clearing and balance of payments conditions, they yield the solution for the course of all variables in the economy through time.

Utility w is supposed to depend on the consumption of the home good c and the imported good m and this function w is assumed to be additively separable⁶ so that

$$w(c, m) = u(c) + v(m); \quad u_c > 0, \quad v_m > 0, \quad u_{cc} < 0, \quad v_{mm} < 0$$

The problem is to maximize the integral of discounted utility subject to the balance of payments (debt generation) constraint:

$$\max_{c, m} \int_0^{\infty} e^{-\rho t} [u(c) + v(m)] dt$$

subject to

$$(1) \quad \dot{D} = \xi - \bar{y} + rD$$

where ρ is the discount rate, $\xi = c + \pi m$ is aggregate expenditure measured in terms

of the home good, while the relative price of imported to home goods (that is, the real exchange rate) π and the interest rate r are taken as given by households. D is net foreign debt and it is assumed that it is denominated in terms of the home good. Define the Hamiltonian H and the shadow price of debt ψ so that

$$H = u(c) + v(m) + \psi(c + \pi m - \bar{y} + rD)$$

Necessary conditions for a maximum are

$$(2) \quad \frac{\partial H}{\partial m} = u_c + \psi = 0$$

$$(3) \quad \frac{\partial H}{\partial m} = v_m + \psi \pi = 0$$

Combining (2) and (3) yields the static optimization condition that the marginal rate of substitution equals the price ratio

$$(4) \quad \frac{v_m(m)}{u_c(c)} = \pi$$

A further necessary condition is

$$(5) \quad \dot{\psi} = -\frac{\partial H}{\partial D} = \psi(\rho - r)$$

The Ramsey equation is derived from differentiation of $u_c(c) = -\psi$ and substitution in (5), so that

$$(6) \quad \dot{c} = \frac{-u_c}{u_{cc}} (\rho - r)$$

The demand conditions (4), the Ramsey rule (6) and the balance of payments constraint (1) represent consumer responses. In aggregate these reactions have the potential to cause the relative price of traded goods to change as demand for the two classes of goods interact with supply. The reasonable assumption will be made that foreign demand for the home good x (equals exports) is a decreasing function of the relative price of home goods to imported goods and so an increasing function of the real exchange rate π .

Equation (6) demonstrates the need for a further market reaction mechanism. The rate of change of consumption is determined by the difference between the discount rate and the interest rate. If the system is to have an equilibrium, one or both of these rates needs to be endogenous. It will be assumed here that this role is played by the

interest rate though it is possible to treat the other cases. The interest rate is assumed to be an increasing function of total borrowing D such that

$$(7) \quad r(D)D = R(D), \quad R' > 0, \quad R'' > 0$$

Using (7) the balance of payments equation (1) becomes

$$(8) \quad \dot{D} = c + \pi m - \bar{y} + R(D)$$

(4), (6), (7) and the home goods market clearing condition

$$(9) \quad c = \bar{y} - x(\pi)$$

are four equations in the variables c , m , π and D and various derivatives. It turns out to be critical to the solution to reduce the system to two equations in the variables D , π and their time derivatives. Debt is obviously central to the problem, so should be one of the variables selected, while working with the real exchange rate π will be seen to reveal the possible phases of the M/L condition. Notice that aggregate expenditure is also an important concept in relation to the balance of payments and for some purposes it will be convenient and/or instructive to work with it.

Now, by definition, expenditure is equal to output minus the trade balance, that is

$$\xi = \bar{y} - x(\pi) + \pi m$$

Differentiating with respect to π

$$(10) \quad \frac{d\xi}{d\pi} = -x_{\pi} + m + \pi \frac{dm}{d\pi}$$

The derivative $\frac{dm}{d\pi}$ can be found from the interaction of demand (given by (4)) and the home goods market clearing condition (9). Differentiating this condition with respect to π ,

$$\frac{dc}{d\pi} = -x_{\pi}$$

From (4)

$$\frac{dm}{d\pi} = \frac{u_c}{v_{mm}} + \frac{\pi u_{cc}}{v_{mm}} \frac{dc}{d\pi}, \quad \text{so that}$$

$$\frac{dm}{d\pi} = \frac{u_c}{v_{mm}} + \frac{\pi u_{cc}}{v_{mm}} (-x_\pi) < 0$$

Substituting in (10)

$$(11) \quad \frac{d\xi}{d\pi} = \frac{d(\xi - \bar{y})}{d\pi} = -x_\pi + m + \pi \frac{dm}{d\pi}$$

This expression is the derivative of the trade deficit with respect to the real exchange rate. It is the counterpart of the Marshall/Lerner condition for this model and as a consequence of devaluation of the real exchange rate, the trade deficit will be reduced, stay constant, or rise as

$$(12) \quad \frac{d\xi}{d\pi} \begin{matrix} \leq \\ > \end{matrix} 0$$

It has been shown that relative prices depend on total expenditure ξ . This arises because the demand for and thus the expenditure on each commodity depends on relative prices so that there is a correspondence between ξ and relative price. Before using this to analyse dynamic choices it is useful to summarise the model by showing how relative prices and the trade balance are determined. The trade balance τ , measured in units of the home good is

$$(13) \quad \tau \equiv \bar{y} - \xi \equiv x(\pi) - \pi m(\pi)$$

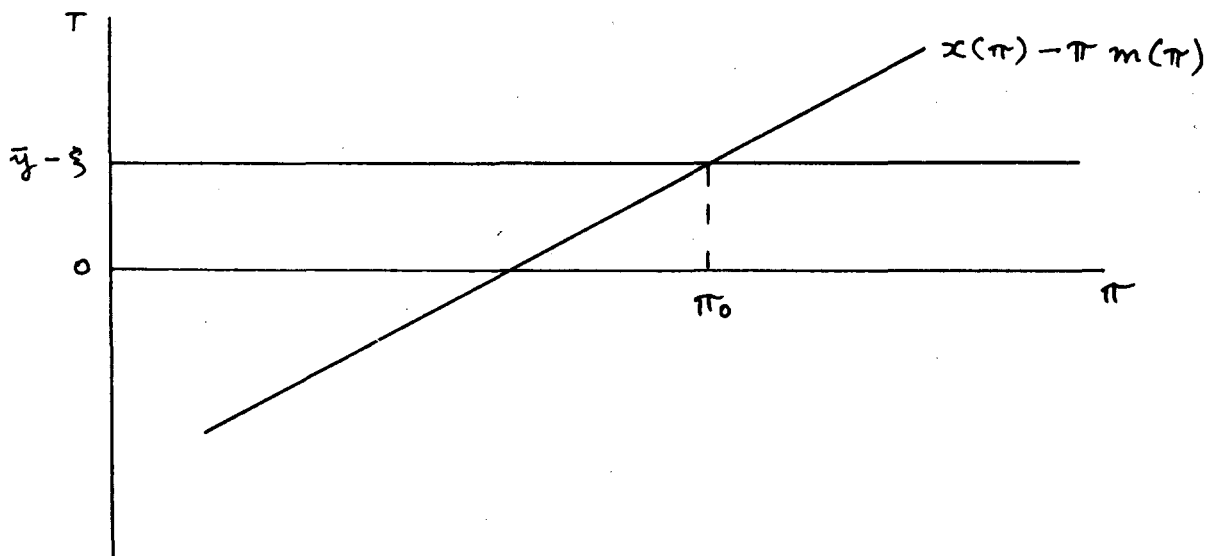


Figure 2

Both sides of the identity (13) are plotted in figure 2. In this model it turns out that the

trade balance is completely determined on the expenditure side of the identity, once expenditure is chosen, because income \bar{y} is taken as given. The relationship between net exports and the real exchange rate is shown as a positively sloped curve so implying that the M/L condition is satisfied. In this case, when expenditure rises the trade surplus is reduced by an appreciation of the real exchange rate. If M/L did not hold the real exchange rate would have to depreciate.

First consider the derivation of the equation for the dynamics of prices. From the home goods market clearing condition $x(\pi) = \bar{y} - c$ it follows that

$$(14) \quad \dot{\pi} = -\frac{1}{x_{\pi}} \dot{c} = \frac{u_c}{x_{\pi} u_{cc}} (\rho - r)$$

Recognizing that the interest rate is a function of the level of debt (14) becomes

$$(15) \quad \dot{\pi} = \frac{u_c}{x_{\pi} u_{cc}} (\rho - r[D])$$

From (15) it follows that when prices are in equilibrium there is a steady state level of debt given by $\rho = r(D^*)$. The balance of payments condition (1) is the equation providing the dynamics of debt accumulation. Using the relationship between expenditure and relative prices given by (11) the balance of payments condition becomes

$$(1') \quad \dot{D} = \xi(\pi) - \bar{y} + rD$$

and equilibrium of the balance of payments can be written

$$(16) \quad \xi(\pi) - \bar{y} + R(D) = 0$$

Differentiating and rearranging shows the slope of the $\dot{D} = 0$ curve in the (D, π) space to be

$$(17) \quad \left. \frac{d\pi}{dD} \right|_{\dot{D}=0} = -\frac{1}{d\xi/d\pi} R'$$

If the Marshall/Lerner condition is satisfied the sign of (17) is positive, but from (11) it may be negative, or the slope may be infinite, if it is not met.

Suppose first that the M/L condition is met. The $\dot{D} = 0$ curve is positively sloped in the (D, π) space and its intersection with the vertical line D^* defines the equilibrium (D^*, π^*) in figure 3. This equilibrium is then a saddle point and the unique stable branch

is taken to be the path which will be followed. As is usual in these models, it is necessary to assume that the agents concerned have some way of choosing their initial expenditure which will put them on the stable branch. With M/L satisfied there will be a unique relationship between expenditure and relative prices. Consumers are taken to operate in competitive markets both with respect to the interest rate and goods prices. Thus they make the assumption that their actions as individuals will have no influence on these variables. However, consistent with rational expectations, they are assumed to know the aggregate economic model and so to recognize that the choice of an unstable path would be non-optimal. There are two types of non-optimal paths. First there are those which lead to infinite asset accumulation. It is readily seen that these are dominated by paths with slower accumulation but higher consumption of at least one of the goods. Secondly, there are those paths which are characterized by high consumption and indefinite debt accumulation. These are ruled out because they must lead in a finite time to negative net worth measured by $(\bar{y}/r) - D$. Hence only stable paths can be regarded as optimal.

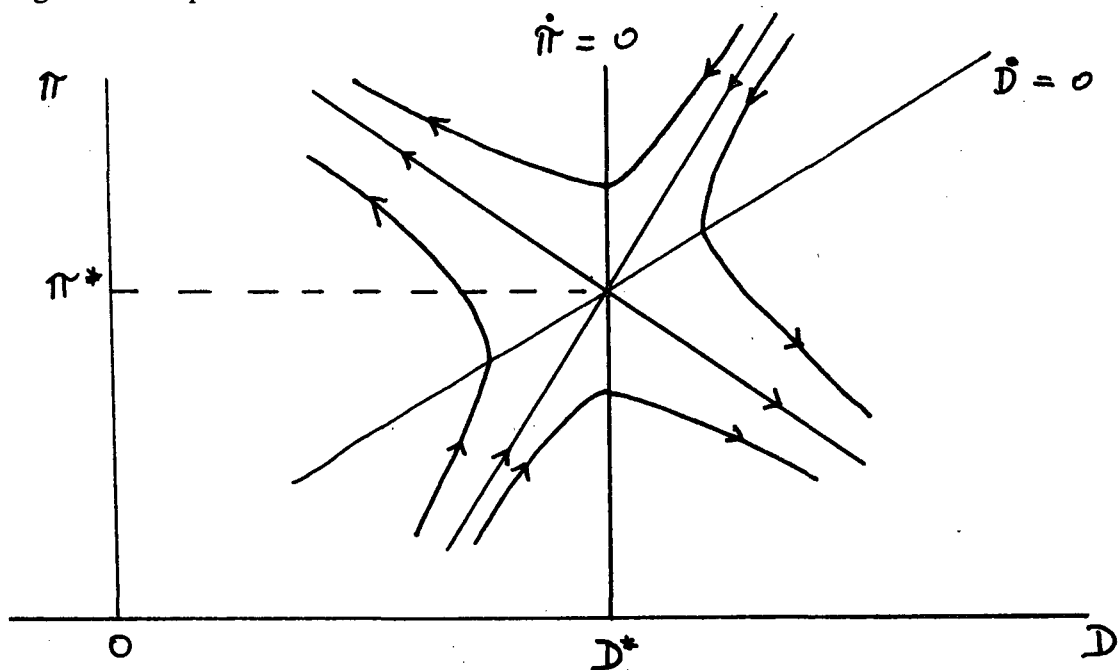


Figure 3

The case of the non-fulfilment of M/L must now be considered. Linearizing the system (1'), (15) in the neighbourhood of a steady state D^*, π^* it becomes

$$(18) \quad \begin{pmatrix} \dot{D} \\ \dot{\pi} \end{pmatrix} = \begin{pmatrix} R' & \frac{d\xi}{d\pi} \\ -r' & 0 \end{pmatrix} \begin{pmatrix} D - D^* \\ \pi - \pi^* \end{pmatrix}$$

The product of the roots of (18) is $r'(d\xi/d\pi)$ and their sum is R' . It follows that when

M/L is not satisfied, both the product of the roots and their sum are positive, so the node D^*, π^* is unstable. Earlier all unstable paths were ruled out as being non-optimal. However, now suppose that the zone in which M/L is not satisfied is surrounded by zones in which it is met. This treatment parallels that of the pure theory of trade as shown in figure 1. These zones are illustrated in figure 4 where π_1 and π_2 are the boundaries of the zone in which M/L is not fulfilled.

It follows that, in general, in this version of the system there will be three equilibria and that the one in the zone of non-fulfilment of M/L will be unstable while the other two will be stable. Where debt levels allow, there will be stable paths which may be chosen.⁷ In the zone of non-fulfilment of M/L the economy will be moving away from the equilibrium there, but towards a stable equilibrium in one of the bordering zones. Hence it follows that it is unlikely that the non-fulfilment of M/L will be observed for long periods of time.

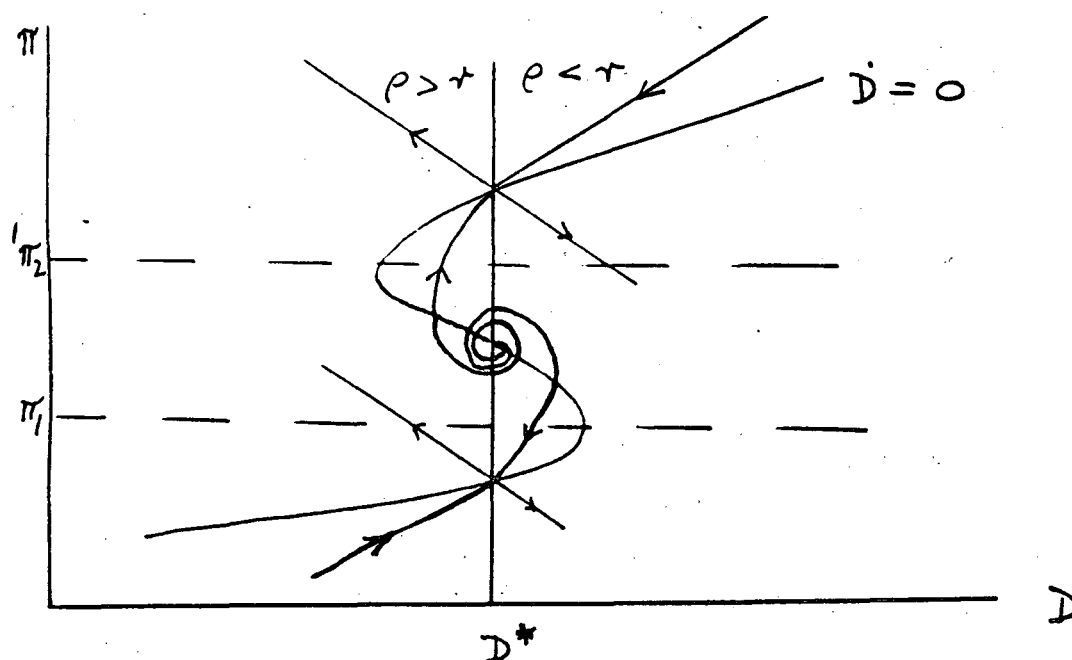


Figure 4

III The Relevance of Price and Income Elasticities

Consider first the conversion of the M/L condition given here by (11) and (12) to elasticity form. The trade balance equation (13) shows imports as a function of the single variable π . From elementary demand theory this function has the form

$$(19) \quad m = m(\pi, \xi)$$

where from the structure of the model ξ is a function of π . It follows that the total derivative of expenditure with respect to the real exchange rate is

$$(20) \quad \frac{d\xi}{d\pi} = -x_\pi + m + \pi \left[\frac{\partial m}{\partial \pi} + \frac{\partial m}{\partial \xi} \frac{d\xi}{d\pi} \right]$$

Hence

$$(21) \quad -\frac{d\xi}{d\pi} = \frac{d\Gamma}{d\pi} = \frac{x_\pi - m - \pi \frac{\partial m}{\partial \pi}}{1 - \pi \frac{\partial m}{\partial \xi}}$$

Converting these expressions to elasticity form

$$(22) \quad \frac{d\Gamma}{d\pi} = \frac{\frac{x}{\pi} [\eta_x + [\frac{\pi m}{x}](\eta_m - 1)]}{1 - \frac{\pi m}{\xi} \eta_\xi}$$

where η_x , η_m , and η_ξ are the price elasticities of demand of foreigners for the home good, of domestic residents for the imported good and the expenditure elasticity of domestic residents for the imported good, respectively. The price elasticities are defined so as to be positive and the expenditure elasticity is taken to be positive and less than unity. The numerator of (22) is the usual M/L expression, and when evaluated at a zero trade balance the M/L condition takes the familiar form

$$(23) \quad \frac{d\Gamma}{d\pi} \geq 0 \text{ as } \eta_x + \eta_m \geq 1$$

Assuming that M/L is met, it would be conventional to say that 'the responsiveness of the trade balance to a devaluation' is greater the higher the price elasticities. Continuing this type of argument, if the expenditure or income elasticity of demand for imports is large the trade balance could be very responsive to a devaluation.⁸

Define the income/expenditure side of the trade balance identity as N, leaving the term T for net exports. Then

$$(24) \quad N \equiv y - \xi \equiv T \equiv x(\pi) - \pi m(\pi, \xi)$$

and

$$(25) \quad \frac{\partial T}{\partial \pi} = \frac{x}{\pi} [\eta_x + \frac{\pi m}{x} (\eta_m - 1)]$$

This is the slope of the T curve shown in figure 5 where both it and the N curve are drawn with expenditure as a parameter. To give the model more interest it is now assumed that the output of the domestic good y is a function of the real exchange rate,

thus making

$$(26) \quad \frac{\partial N}{\partial \pi} = y_{\pi} < 0$$

Assuming M/L , and for any given ξ , the trade balance can be seen to be determined jointly and uniquely by the income/expenditure and the trade balance sides of the identity (24).

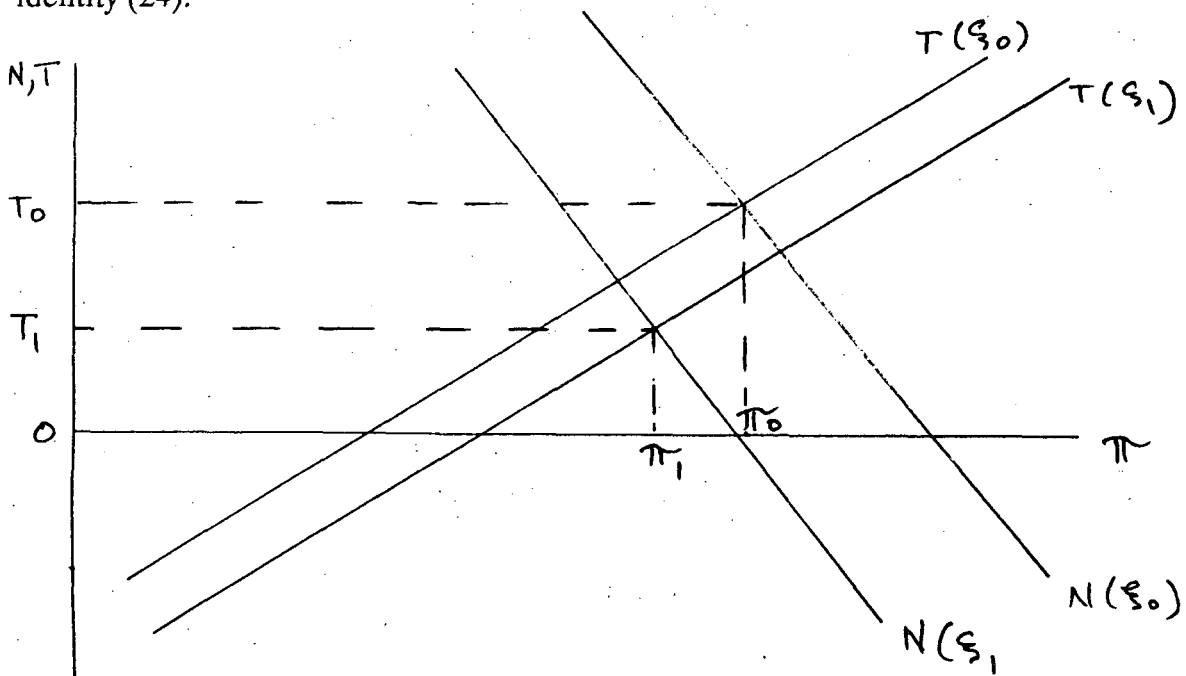


Figure 5

Consider what will happen when expenditure changes. A rise in expenditure will shift the income/expenditure curve down by an amount equal to that rise. Because expenditure affects imports, the trade balance curve also shifts down, but by a smaller amount as the marginal propensity to import is less than unity. Hence the real exchange rate appreciates, and the trade balance falls, but not by as much as the initial fall in expenditure. The extent of the fall in the trade balance will be greater the higher the marginal propensity to spend on imports, the higher the sum of the domestic and foreign import elasticities and the lower the absolute size of the responsiveness of output to relative price changes. This latter effect comes about because an appreciation is an increase in the relative price of the home good and so stimulates an increase in output of that good. The extent of the appreciation will be greater, for any given fall in expenditure, the lower the marginal propensity to import, the smaller the sum of the import price elasticities and the greater the output responsiveness to relative prices.

These results follow from figure 5 and also may be verified from

$$(27) \quad \frac{d\pi}{d\xi} = \frac{-(1 - \pi m_\xi)}{T_\pi - y_\pi}$$

$$(28) \quad \frac{d\Gamma}{d\xi} = \frac{-(T_\pi - y_\pi \pi m_\xi)}{T_\pi - y_\pi}$$

where T_π is the partial derivative of (24) with respect to the real exchange rate and so measures the partial effect of a change in the real exchange rate on the trade balance and πm_ξ is the marginal propensity to spend on imports.

It is obvious that the real exchange rate and the level of expenditure are endogenous variables. However, expenditure could be given some exogeneity by assuming a role for government expenditure and taxation. The real exchange rate likewise could have an exogenous element through the effect of tariffs and certain forms of taxes. However, the real exchange rate is essentially an endogenous variable, so the question 'what is the effect of a change in the real exchange rate on the trade balance?' has only limited significance for policy. It means something in a partial sense about the structure of the model, but because it is normally not possible to bring about a change in the real exchange rate without disturbing internal balance, it is not a question which has policy relevance. Of course, changes in the **nominal** exchange rate can be engineered by policy. However, because this model implicitly assumes internal balance, it demonstrates that such changes can give different results from these only if they cause, or are accompanied by, departures from internal balance.

FOOTNOTES

1. The literature on the current account often employs terms which prejudge the value of outcomes. Its balance does not usually rise or fall, become negative or positive, but worsens (deteriorates) or improves and, indeed, is in surplus or deficit.
2. See Kindleberger [1953, 1963] for derivation and discussions of the M/L condition.
3. See Houthakker and Magee [1969].
4. See for instance, Branson [1977]. For stability in the model of this paper, not only must the elasticity of the trade balance with respect to the exchange rate be positive (the M/L condition), but it must be sufficiently high to offset certain investment income effects in the model.
5. It is assumed that the market for home goods clears and that there is an infinitely elastic supply of imports at the world price.
6. Not only does this simplify the analysis, but it avoids the possibility of multiple equilibria which may be generated from the cross partial effects of w . The essence of the paper is to elucidate the consequences of multiple equilibria arising in relation to the M/L effect, so that it is preferable to avoid other sources of multiple equilibria.
7. Now the stable paths are not unique for all values of D . The choice of which stable path is optimal will presumably be made on the basis of which is best. Lower paths involve better terms of trade and hence could be preferred.
8. Elasticities are not necessarily the best measures of these effects. Note that the share of imports in total expenditure is also involved in the denominator of (22). It follows that it also needs to be high for the trade balance to be very sensitive to exchange rate changes.

REFERENCES

- Branson, W.H., "Asset Markets and Relative Prices in Exchange Rate Determination", *Socialwissenschaftliche Annalen*, Band 1, 1977.
- Kindleberger, *International Economics*, Irwin, Homewood, Illinois, 1963.
- Houthakker, H.S. and Magee, S.P., "Income and Price, Elasticities in World Trade", *Review of Economics and Statistics*, 1969.