

The Exchange Rate and its Effects An Overvalued Quantity?

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I. Introduction

The Exchange Rate and Competitive Goods

The exchange rate poses an awkward problem; if the same goods are produced by and traded between different countries and if international trade is competitive, the prices of such goods in any country will be the same, regardless of the country of origin. The law of one price must hold within each country; exchange rate movements cannot alter the relative prices in the same country of competing goods according to country of origin. There is, then, no general *a priori* reason why purchasers in a given country should choose the product of one country rather than the competing product of another and the standard argument, that changes in exchange rates alter the volumes of imports and exports through such relative price changes, cannot hold for such goods. The conclusion is that, if most of the imports and exports of a country are goods that have international competition, there is no reason that exchange rate changes will have predictable effects on its balance of trade.

Almost all finished goods and primary products face international competition and they account for much the greater part of international trade. Most trade in finished goods consists of exchanges of similar goods between the developed countries. For example, France, Germany, Italy, Japan, Spain, Sweden and the UK produce motor cars and export them to each other, as well as to the US, which has the biggest motor car industry. The US, Japan, Korea, several European countries, and Taiwan export computers and telecommunications equipment to each other. France, Italy and the US exchange fashion goods and cosmetics, and several countries, notably France, Germany, Switzerland, the UK and the US, exchange pharmaceuticals. The finished goods that developing countries export to developed countries are also produced in the latter. For example, a large part of the exports of developing countries consists of apparel of various kinds, Brazil and Mexico produce motor cars for export and Pakistan sports goods, surgical instruments and carpets.

Similarly, the major primary products are all produced in several countries and their prices are mostly uniform around the world. No one suggests that devaluation is the means for an oil exporting country to

increase its exports of oil. The prices of most other major primary products, bananas, coffee, copper, cotton, rice, sugar, wheat, etc., are determined through commodity markets, through contracts between individual producers or countries and buyers, or even through international agreements. Price differences caused by a change in the exchange rate of a single country are short-lived and have little effect.

Primary products that do not face international competition and unfinished goods account for a smaller, though still large part of international trade, but exchange rate changes rarely have effects on them that are predictable *a priori*. Much the largest part of trade in such goods, estimated at over 30 per cent of all trade, consists of intra-firm shipments of unfinished goods produced by foreign subsidiaries of firms to other parts of the firm. In such cases, the firm has made an investment to produce the good, and the price of the good is internal to the firm, normally the outcome of comparisons of the accounting and tax rules of the countries of production and destination. The effects of changes in the exchange rate, then, are determined by how the firm judges future exchange rate changes will affect the profitability of its investment, as well as by tax and accounting rules, and may follow no consistent pattern. Nor do exchange rates have much influence in the few cases in which a country has a monopoly over a primary product, such as jute and vanilla, since pricing is likely to be set to maximise export earnings and will be independent of the exchange rate.

The Exchange Rate, Employment and Production

This paper is a discussion of the standard argument given above and leaves aside the effects exchange rate changes have on production and employment, although the period between the two World Wars showed the problems arising from these effects when countries produce similar goods. Devaluation enabled countries to reduce the underuse of production capacity and unemployment at home at the cost of increasing them abroad. It allowed a country's producers to lower their prices in the markets of other countries and to force competitors to lower their prices too. Competitors who could not cover costs at the new prices and former levels of production, had to reduce or even stop production. Such 'beggar-my-neighbour' policies described by Joan Robinson¹ were common and the consequences were disastrous. The system of fixed exchange rates that prevailed for some time after World War II was adopted to avoid these policies and, while it prevailed, the developed countries grew faster and at lower rates of unemployment than ever before or since.

¹ Joan Robinson.

Full employment will be assumed here. Since economists and organisations like the IMF do not, nowadays, wish to appear to advocate devaluation in one country at the cost of creating unemployment in others, the standard assumption in balance of payments theory is that full employment is maintained by appropriate monetary policies, which fail only if there are economic 'rigidities'. So, in what follows, exchange rate changes are ruled out if they cause unemployment that cannot be removed except by worsening the balance of trade.

II. Three Alternatives

There are three alternatives for escaping the conclusion that changes in exchange rates do not have predictable effects on trade. One is to deny the assumption that countries produce the same or similar goods. The second is to qualify the assumption that international trade is competitive. The third is to postulate some mechanism that leads to the same conclusion regarding the relations between imports and export volumes without assuming relative price movements of imports and local production.

The ensuing discussion of these alternatives is confined to the short run, though occasionally points are made concerning the longer run if they are closely connected to the main argument. Short run means that the capital stock and nominal wages in terms of the local currency do not change. Manufacturing firms are assumed to have stocks of plant, equipment, buildings, land, vehicles, etc., that constitute their productive capacity. Other assumptions are that costs of transport and trade are negligible, there are no multiple exchange rate practices and exchange rates are mutually consistent. When the prices of goods in different countries are compared, they are compared using the going exchange rates.

Alternative One: Specialisation by Country

The first alternative can be dismissed as incompatible with the facts. It is the oldest, but no longer much in favour among economists. Its authoritative exposition is Meade's book on the balance of payments, which assumes that each country produces a different set of goods. The interaction of price and income elasticities then leads to the desired results. When one country devalues, the prices of its goods fall relative to the prices of other goods and, with normal elasticities, the volume of its exports increases. At one point (pp. 75-6) Meade allows for the case in which a country also produces a good that it imports, but he assumes that imports only satisfy the residual demand after all domestic production has been consumed domestically. In other words, consumers choose between goods according to their origins. If this assumption is dropped, domestically produced goods

might be exported at the same time as the same goods are imported. The balance of trade would not change, but the volumes of exports and imports would be indeterminate.

Alternative Two: Imperfect Competition

The second alternative is to qualify the assumption of competition. It replaces the perfect competition associated with homogeneous goods by the imperfect competition of brand names and product differentiation. Similar goods are not perfect substitutes; their elasticities of demand are finite and their prices differ. Isard states, "With widespread product diversification, most manufactured goods face finite elasticities of demand and are priced under conditions of imperfect competition."² Hence, relative prices of competing goods can change and the exchange rate can change them. Isard's argument is now standard. According to Krugman, "Modern trade imposes less commonality on price-level movements than the trade of 75 years ago."³

The argument is also used to explain why prices of similar goods differ between countries. Numerous empirical studies⁴ have shown that the differences are too great to be explained by trade barriers and transport costs and qualifying the assumption of competition seems to provide an explanation. Several empirical studies have shown both that prices differ from country to country and that there is no clear tendency to equality. Tests of the theory of purchasing power parity (PPP) have established that it does not hold in its absolute form, according to which the prices of the same or similar goods in different countries tend to equality. Some economists using advanced statistical techniques (cointegration) believe they have evidence for its relative form, which asserts that the prices tend to some relationship that is stable.⁵ The periods are long, possibly 70 years.⁶

The argument has the merit of accepting that trade does not equalise the prices of the same goods in different countries, but it attempts to reach two incompatible conclusions. For, if prices do differ in this way, they are not directly related by exchange rates; if the price of a good in an export market is not the same as in its home market, a change in the exchange rate changes the price difference, but does not, *a priori*, lead to the conclusion that a rise or fall of the currency of the producing country will have a similar effect on the good's price in the export market. In the

² Isard. 2. P.60

³ Krugman. 2. P.8

⁴ Isard. 1.; Kravis and Lipsey, and others.

⁵ Dornbusch gives a survey.

⁶ Breuer.

case of a good whose price was higher in its export market than in its home market, special assumptions are needed to conclude both that devaluation of the home country's currency will cause its price in the foreign market to fall and that the producers were maximising profit before and after devaluation. In the opposite case, assuming no anti-dumping measures, the assumptions would need to explain why the producers export at lower prices than they get at home.

The imperfect competition of product differentiation and brand names cannot lead to the conclusion that changes in the exchange rate have determinate effects on trade. Nor does it do so. The elasticities Isard refers to may be finite and yet be greater than one. Then, if producers in one country lower the price of a product in a foreign market, their sales in the latter will increase in volume and value. But their competitors cannot be assumed to accept reduced sales passively; even though their products may not be perfect substitutes, competition may be intense and the competitors will lower their prices to match as long as they can cover their costs. They will be cutting their profit margins and, if the producers who originally lowered their prices were enabled to do so by a devaluation, prices may fall enough to leave their competitors no profit margins at their original levels of production. Then, if the competitors have average unit costs that rise with the volume of production, they reduce production; if these costs are constant or fall, they go out of business. Devaluation by one country causes unemployment in others, unless they find some new export possibilities.

The price comparison that matters most here is between the prices of imported and domestic goods in a given country, and empirical studies have shown, at least for the US, that, contrary to what was the standard conclusion of international trade theory, they do not change relative to each other. It means that the exporting country does not necessarily charge the same prices at home and abroad. One study of this kind, by Marston⁷, shows that Japanese manufacturing companies try to keep the dollar prices of their exports to the US stable. Since then it has become clear that it is not only Japanese exporters who behave like that. When the dollar was exceptionally high in 1983-85, prices of imported manufactures did not fall correspondingly. Krugman⁸ showed that the prices in the US of imported manufactures scarcely changed when the dollar rose by 40 per cent. Yang finds that US prices of simpler goods, such as textiles, apparel, lumber and wood products, and metal products, i.e. goods exported by developing countries, are most affected by exchange rate changes.

⁷ Prices of Japanese exporters.

⁸ Krugman 2.

A specific example discussed by Krugman in 1986 is that of German motor cars, notably BMWs and Mercedes. Someone hoping to buy one of these cars in the US at a price close to that in Germany would have been disappointed. The dollar prices of some models actually rose. The scope for arbitrage was negligible; both BMW and Daimler Benz (the producer of Mercedes) only sold their cars in the US through their authorised US dealers and cars used in the US had to meet specifications different to those of Europe. Someone wanting to import a car at the European price had to go to Europe and buy it there; he might still find that the company would only sell him the car through a US dealer and that dealers would not convert European models to US specifications. Conversion by an unauthorised dealer annulled the manufacturer's guarantee. That this is not peculiar to the US is seen from the recent complaints in the UK that prices of cars there are higher than in many parts of Europe. Sometimes they are as much as 58 per cent higher.⁹

Yet BMW and Mercedes were competing against each other and against other car makers, so why did they not try to increase sales by lowering prices when their production costs had fallen in dollar terms? Ordinary consumer theory using indifference curves does not yield a satisfactory answer. Krugman's discussion examines various alternatives and concludes that the explanation seems to be that purchasers lower their assessment of a brand when its price fluctuates and that the belief was widespread in 1983-85 that the dollar's rise would soon be reversed. A price fall would soon have been reversed.

An explanation ought not to be limited to consumer goods, for later studies showed that all manufactured imports behaved similarly. Krugman's conclusion can hold for goods other than consumer goods, but it presupposes a type of behaviour that might not be true for another country or at another time. The US is a big and largely self-sufficient economy, so people there are likely to be less aware of the effects of exchange rate fluctuations than people in a small, open economy like Denmark, and this holds for purchasers of engineering goods as much as the ordinary consumer. Hence, a Dane considering buying imported goods might not react to price changes caused by exchange rate changes in the same way as an American. Krugman's explanation also depends on the expectation that the high value of the dollar would be short-lived, the implication being that BMW and Mercedes would have lowered their prices otherwise.

What needs to be explained is why the American prices of imports were stable and there are several ways of doing that. One is that, if BMW

⁹ *Financial Times*. 8th December 1998. Car Importers Attached on Prices. John Griffiths.

and Mercedes had lowered their prices, other car makers would have reacted by doing the same. That might have been deterrent enough, but the moment was also particularly dangerous since Chrysler was being helped out of bankruptcy by government loans and Japanese voluntary restraints on their exports of cars to the US (which allowed Japanese car makers to raise prices). Starting a price war then could have provoked curbs on imports of BMWs and Mercedes as well. A second explanation is that neither company wished to increase demand for its cars until it had the production capacity to match and that would have taken a couple of years. Yet another is that these two companies had too small a share of the US market for them to have much effect on prices, in contrast to the Japanese car makers; they were price-takers who could sell all they could produce at those prices.

The example illustrates the limits to the standard arguments that trade equalises prices between countries. One short run argument is that profit maximising firms shift their sales to the market where prices are highest, causing prices to fall there and to rise in other markets. The objection is that, given the size of the American market, the shift would have been large for BMW and Mercedes, even if they had not been producing to capacity, and they would, therefore, have been deterred by the risk that competitors would take over their foregone European sales. As Krugman points out in his 1989 lectures, the establishment of a brand name in a market and the acquisition of market share often constitute a big sunk cost. Recovering the lost market share later would have been slow, costly, perhaps impossible. Firms would not contemplate such a shift if they were not confident that the dollar would remain permanently strong. There was no such confidence and, even if there had been, it would have been surprising to see European industrial enterprises forsake their home markets for foreign ones.

Price equalisation might have been impossible in the long run too, even if firms had been confident and increased their sales in the US by raising production capacity, rather than by sacrificing the home market, or it might have been accompanied by higher unemployment in the US. Growth of domestic production of BMW and Mercedes cars and exports to the US might have forced American car producers to lower their own prices, but, if not enough labour could have been drawn from among the German unemployed or from other activities, the growth might have stopped before US prices fell to European levels. To the extent that American producers were forced to cut back production and were unable to increase exports other than cars at the higher level of the dollar, the US would have had more unemployment or its balance of trade would have deteriorated. Assuming that the government did not step in, as it had done before to persuade Japanese car makers to restrain their exports, the alternatives

might have been the type of 'beggar-my-neighbour' behaviour that was excluded at the outset or more external financing for the US. An alternative to greater domestic production could have been to install capacity in the US. This is not price equalisation through trade, and the high value of the dollar being assumed here would have made it less likely than before.

The other short run argument is that arbitrage will prevent price disparities from persisting. But arbitrage is rare among a wide range of manufactures, which account for the bulk of manufactured imports of developed countries. This is a matter of observation, so there is no need to give more than a rough explanation here. For finished goods arbitrage depends on the buyer being indifferent as to who supplies him and the seller being indifferent as to whom he supplies. For manufactures this often does not hold: buyers want guarantees and service agreements, and they may want adaptation to their specific needs; suppliers want to be sure that the guarantees and service are for their genuine products. Both buyer and manufacturer have, therefore, a motive to deal directly or through authorised agents. Moreover, arbitrage is excluded for a large part of the inputs of the finished goods since a high proportion of trade in manufactures, estimated at over 30 per cent of total world trade, consists of deliveries of unfinished goods produced by foreign subsidiaries of firms to other parts of the firm.

The upshot is that trade does not lead to the equalisation of prices of similar goods in different countries if brand name and product differentiation are important. A separate question is how the prices of goods in one country are affected by a change in the exchange rate of another. In the US prices of imported manufactures remained stable relative to the prices of similar American goods during the period 1983-85, when the dollar was high, and changed relative to the prices in the countries exporting them. In most developing countries, however, prices of manufactures change with the exchange rate. A working hypothesis to reconcile the difference in behaviour is that in large economies imported goods must compete with a local production that is usually greater and sets prices. Smaller economies are price-takers. Thus, the high prices of cars in the UK relative to some other parts of Europe, sometimes 58 per cent higher, which have caused annoyance among the British, are a result of the size of the British car industry. If it did not exist, the British market would not set prices and car prices might be lower. Developing countries are price-takers since the economies of all but the largest of them are small compared to those of the US, Japan and the main Western European countries.

The behaviour of prices of manufactures in developing countries can be explained without assuming 'world prices'. Small economies import large parts of their manufactures from developed countries and have relatively small competing industries. They are also marginal markets for firms in developed countries. Consequently, when a developing country devalues a developed country firm exporting to it can raise its prices in terms of the local currency to keep them at par with its previous prices in terms of its own currency without risk of losing its market to competing local firms. And, even if it risks losing the market, it will be more willing to abandon the market as unprofitable because its sunk cost in acquiring it was small.

Alternative Three: Price Differences Between Tradables and Untradables

The third alternative for arguing that exchange rate movements have determinate effects on the balance of trade is that their price effects shift demand between tradable and untradable goods. Prices of tradables are directly affected by movements in the exchange rate and those of untradables are not. Hence devaluation causes the domestic prices of tradables to rise relative to the prices of untradables, whose prices are assumed not to rise to the same extent. Domestic demand shifts to the goods with lower prices and the balance of trade improves.

Even accepting the assumptions regarding prices, the argument is obviously wrong. The balance of trade (the balance on goods and non-factor services) is equal to the difference between saving and investment; this is an accounting identity. If the balance of trade improves, either saving increases or investment falls. There is no a priori reason why shifts in demand between tradable and untradable goods should have either effect.

One fallacy is to assume that devaluation reduces the prices of untradable goods relative to the prices of tradable goods. The costs of production, excluding profit, of all goods can be assumed to fall in terms of foreign currency since the nominal wage in the local currency is fixed, the prices of untradables can be assumed not to rise enough to offset the relative fall in the nominal wage and the foreign currency prices of tradable inputs do not change. Profit, then, becomes a bigger part of the price of a tradable. Presumably a competitive system will equalise the rates of profit in different sectors. The local currency prices of untradables will, therefore, rise as well. How they will compare with the prices of tradables depends on whether profit was a larger or smaller part of their prices, i.e. on their capital intensity. The local currency price of an untradable that is more capital intensive than the tradables will rise relative to the prices of tradables, that is to say it will rise in foreign currency terms.

A numerical example illustrates this. Assume that the local currency price of a unit of a tradable good is 100 and that this is the world price at the going exchange rate. Of this 30 is labour cost, 60 is the cost of inputs other than capital, which are assumed tradable, and the rest is profit. After devaluation the local currency price is 125. Since labour costs do not change and the cost of tradable inputs rises to 75, profit goes from 10 to 20. Assuming for simplicity that all the capital goods are tradable (and leaving aside the complications of amortisation), the rate of profit rises by $[20/10]/(5/4) - 1 = 3/5$.

Now assume that electric power is untradable and that it is all generated thermally. Taking the price of a unit as 100, let the labour cost be 20 and the cost of inputs other than capital, which are again all tradable, be 60. Assume again that all capital goods for producing electricity are tradable. Then, to earn the same rate of profit on capital, profit must rise from 20 to 40 and the price of electricity must rise to 135. Therefore the price of electricity rises in terms of foreign currency and relative to the prices of tradables.

One objection is that equalisation of profit rates across sectors is slow and that the present discussion is restricted to the short run. If the profit rate in the production of tradables rises immediately following devaluation but untradables take time to catch up, untradables do become cheaper relative to tradables and demand shifts to them. This may describe how economies actually behave, but it makes the effect of devaluation depend on the persistence of an inconsistency in the economy, which is a market inefficiency that should be taken into account in all other analysis of the economy. The objection is inconsistent with the theories published in support of the original argument, which make the usual assumptions that markets are efficient. Moreover, as the profit rates of untradables approach those of tradables, the effects of devaluation are reversed and, if the former are the more capital intensive, the effect of price changes is ultimately to shift demand to tradables.

The second fallacy in the argument that exchange rate changes affect the balance of trade through shifting demand between tradable and untradable goods is that it ignores income distribution. Demand can be assumed to shift from one set of goods to another when the prices of the former rise relative to those of the latter, provided that changes in the distribution of income are minor. But devaluation causes the share of fixed income groups to decline and the share of incomes that are closely related to prices to rise.

A comparison of car and bus rides illustrates how devaluation may affect prices and trade. Assuming that bus rides are untradable and less capital intensive than tradables produce in the country, devaluation causes their prices to fall relative to the prices of cars, which are tradable. If the market and owners of cars and buses correctly account for all costs, whether or not the cost of a car ride rises relative to the price of a bus ride depends on how the various components of the cost of either maintenance, fuel, amortisation, drivers and administrative overheads in the case of a bus company, possibly a driver in the case of the car are composed of labour, tradable and untradable inputs. If convenience, comfort, independence and other characteristics of car and bus rides do not change and car rides are the more capital intensive, they become more expensive relative to bus rides. Then an individual on a fixed income may switch from car rides to bus rides.

But the import of cars does not necessarily fall. If profit earners had higher incomes than people with fixed incomes before devaluation and rode in their own cars while their employees mainly rode in buses, they might after devaluation buy more cars or more expensive models, while their employees reduced their use of their own vehicles.

The only ways that a change in the distribution of income can affect the balance of trade is through the saving or investment rates, but there is no *a priori* reason why it should act one way or the other. Devaluation causing a shift in income to the wealthy can increase the saving rate, but it does not necessarily do so. It can also stimulate investment by raising the rate of profit. The two effects work in opposite directions. In practice, however, devaluation is invariably accompanied by measures to restrain inflation, which may not succeed at that but often do succeed in improving the balance of trade by suppressing investment. Almost every time the balance of trade of a developing country improves, it is the result of a decline in investment.

III. Real, Shadow and Equilibrium Exchange Rates

The exchange rate poses a second awkward problem. According to orthodox economic theory the pattern of trade between countries is determined by the real characteristics of the economies, but the exchange rate, as the ratio at which two currencies exchange, is a monetary quantity. Ricardo's theory postulates that the costs of production of each good in a country are given, the Heckscher-Ohlin theory that each country has an endowment of factors, and trade is determined by how these costs or endowments compare between countries. Neither explains the effects of changes in the exchange rate; for instance, whether or not a permanent

change in the exchange rate can permanently affect the composition of trade.

No synthesis exists. Instead, there is a dichotomy; the assumptions of the various standard theories purporting to explain the pattern of trade being different to the assumptions of the standard theories purporting to explain the balance of payments. It is apparent in textbooks on international economics which always have two corresponding parts, with no attempt to unite them on a common set of assumptions.

Several attempts have been made to avoid the dichotomy, but each has its own special assumptions. All argue that the exchange rate is not merely a monetary quantity, that there is a real, shadow or equilibrium exchange rate that should determine the nominal exchange rate. Some of these exchange rates and the associated special assumptions are discussed below.

Relative Prices as the Real Exchange Rate (RER)

The simplest and most commonly used is the RER defined as the ratio of the prices of the country in question to 'world prices' or the prices of a set of other countries. It purports to derive from the argument that devaluation allows a country to reduce the prices of its goods relative to the prices of goods from other countries and thereby to increase the volume of its exports and reduce the volume of its imports (and conversely for revaluation). But as it is normally used, it requires special assumptions that are not usually explicitly made.

Special assumptions are needed because, instead of direct comparisons of the individual prices of the country in question with the prices of other countries or with world prices, price indices are used. Direct comparisons are never made for this purpose, presumably because they are slow, costly, complicated and uncertain. The appropriate comparison for this purpose is of the prices of tradables, whereas price indices the consumer price index, the wholesale price index, the GDP deflator relate the general level of prices to the level of a base year. But, unless direct comparisons are made at some point, indices cannot show how prices of two countries compare; they cannot show differences, only relative movement. If, for instance, the prices of two countries had been directly compared at some time, a rough estimate of how their prices differed would be obtained from the movements of the price indices.

Use of the RER, therefore, entails the assumption that, however the prices of a developing country may compare with those of other countries,

lowering them further will increase the volume of the country's exports and decrease the volume of its imports. As pointed out earlier, this is not the same as saying that these trade effects will be caused by creating a difference that did not already exist between the prices of the country in question and the prices of others, which had until then been the same.

Disregard for the distinction between RERs using direct price comparisons and those using price indices is common. The IMF always uses indices in its calculations of RERs; it never makes detailed direct comparisons, nor does it ask countries to do so. For developing countries that do not let their exchange rates float and do not have balance of payments problems it advocates constant or gradually depreciating RERs calculated with price indices. For countries with balance of payments problems it insists on devaluation, especially if it estimates that the RER has risen. In this respect the IMF's doctrine is accepted by most economists. A typical example is a standard textbook on international economics by Krugman and Obstfeld, which simply asserts that lowering the RER derived from price indices has the prescribed effects on trade, although a discussion of the purchasing power parity doctrine earlier in the book concludes that prices differ from country to country anyway.

The RER as Shadow Price

A number of definitions of shadow exchange rates were devised in the 1960s and 1970s to show what the exchange rate should be or which should be used in appraising investment projects. These, too, rest on special assumptions. One definition, exemplified by Bruno, has been the dual variable of the balance of trade constraint in an optimisation model of the economy. In principle, this definition is flexible and therefore general; the economy may have no trade barriers or high ones, domestic prices may be determined by world prices or be controlled and wages may be flexible or fixed.

The dual variable of the balance of trade constraint can be assumed to be positive because the constraint is normally binding, but that does not mean it is an exchange rate. World prices may be given in dollars, but there has been no mention yet of a domestic currency. Since the dual variable is the ratio of a change in the optimand's value to a marginal change of the balance of trade constraint when the former is caused by the latter, its interpretation depends on the meaning of the optimand. Bruno brings the domestic currency in by using a linear programming model and putting domestic prices as the weights of the optimand, which makes his dual variable an exchange rate. In general such models do not need a domestic currency to have solutions. They do not, therefore, have exchange rates,

even though world prices are given in dollars and the balance of trade constraint is binding. To obtain an exchange rate the domestic currency must be brought in by some expedient such as Bruno's.

But even if money is brought into an optimisation model, the resulting exchange rate is arbitrary. Consequently, its use in project appraisal or exchange rate policy has no justification. The shadow exchange rate has the same drawbacks as any quantity derived from an optimisation model, it is not necessarily applicable when the economy behaves differently to the model's optimum. If, as is usual, the economy's behaviour does not conform to the model's, the optimand is not what households and firms are trying to optimise, but an expression of the opinion of the economists and politicians who chose it. It is in that sense arbitrary.

Thus Bruno's use of domestic prices as the weights of his optimand is arbitrary since the prices are not necessarily optimal. A consequence is that the solution of Bruno's linear programming model is far from the actual economy; it limits net production to one good and the exchange rate is the ratio of that good's price to its world price. The solution rules out most of the existing economy, which continues to exist anyway, and no explanation is given as to why, if the exchange rate does not apply to most of the economy, it applies to new projects.

The arbitrariness of the optimand can be removed by replacing optimisation by general equilibrium, but that removes Bruno's method of bringing in the domestic currency. Instead of a given optimand, economic agents (households and firms) can be assumed to allocate consumption and goods so as to optimise welfare or profits and, with perfect foresight and perfect forward markets, their choices will give an equilibrium. If world prices are not affected by the economy, the prices of tradables within the economy are equal to world prices and the prices of untradables are production costs. Prices in such models are real, i.e. the unit of account is arbitrary. Again, there is no exchange rate.

The foregoing illustrates the point made by some economists that 'real exchange rate' is a contradiction in terms since exchange rates are relations between currencies and cannot be real in the sense of being independent of money. Optimisation and general equilibrium models in which consumption and production decisions are made by allocating goods and labour do not require money for their solution. If money is brought in, it entails some additional assumptions. Bruno's method of bringing in the domestic currency gives an exchange rate, but it is not real in the sense of being determined by the non-monetary features of the economy.

Another notion of the RER, the ratio of the prices of tradables to the prices of untradables, is real but not an exchange rate. It is real since the price ratio is not a monetary quantity, but, as one of its main proponents, Edwards,¹⁰ seems to admit, it is not a exchange rate. He dismisses as irrelevant the point made by some economists that 'real exchange rate' is a contradiction in terms because an exchange rate is a relation between different currencies and cannot, therefore, be real in the sense of being independent of money. In doing so he seems to agree that the term is a misnomer for that notion, though one that has stuck and he considers harmless since it links the nominal exchange rate to prices. However, Williamson, in his discussion of equilibrium exchange rates, believes there is no material difference between this notion of the RER and the other standard notions. The earlier discussion here showed the fallacies in the arguments for these links put forward by the notion's proponents.

One of the same fallacies, namely that demand can be assumed to be determined by prices, without taking income distribution into account, is common to models that reach determinate equilibrium exchange rates.¹¹ The assumption ensures that, however complicated the equations, domestic and world prices will be related and, therefore, that they will determine an exchange rate. But, if the prices of goods, including capital goods, and of labour are flexible and if world prices are given, the model reverts to the real optimisation or general equilibrium discussed earlier and there is no determinate exchange rate. The difference between this and the equilibrium exchange rate models is that here real incomes are determined by production and real demand by real prices and real incomes. Money prices, then, may move up or down without affecting real prices and, being indeterminate so is the exchange rate.

Williamson¹² quotes a passage by Joan Robinson¹³ in which she points out that the equilibrium exchange rate is a 'chimera' since the exchange rate at any time is influenced by interest rates, wage rates and money supply. Attempts to estimate equilibrium exchange rates, especially for the long run, add behaviour equations for these and other quantities to the model. But they thereby become forecasts and as unreliable as any forecasts of exchange rates. Williamson¹⁴ discusses the kinds of assumptions that need to be made, including the budget and trade balances compatible with equilibrium, and compares several models for estimating exchange rates

¹⁰ Edwards. P.5

¹¹ See for example Williamson in Introduction to Williamson, Ed. Estimating Equilibrium Exchange Rates. Also Stern, and Razin and Collins.

¹² Introduction to Williamson Ed.

¹³ Robinson 2.

¹⁴ Introduction in Williamson Ed.

along these lines.¹⁵ Their assumptions vary widely and the results correspondingly. His preference is for a model that has yielded so far the best forecasts of the exchange rate of the pound sterling. The question then arises as to what significance the equilibrium exchange rate may have if it is simply a forecast.

Perhaps the best comment on the search for real, shadow and equilibrium exchange rates is that made by Joan Robinson regarding another such exercise in international economics, that it is rather like looking in a dark room for a black cat that one is pretty certain is not there.¹⁶

IV. Effects of Devaluation on the Domestic Economies of Developing Countries

The effects of devaluation on exports and imports may not be determinate, but the effects on the domestic economy are. Firstly, devaluation shifts real income away from those with fixed nominal incomes. Usually the shift is from lower to higher income groups. Secondly, it alters the relations between financial stocks and flows when the correct or desired amount of the stock or the flow depend on the exchange rate. Thirdly, repeated devaluation creates incentives that hamper economic development.

Income Distribution

When the purpose of devaluation is to lower the prices of the country's domestically produced goods relative to the prices of the competing goods of other countries, it necessarily entails a fall in the real earnings income of some of those receiving fixed nominal incomes, but in practice more incomes fall than need be. Devaluation achieves its purpose by lowering the production costs of tradable goods in terms of foreign exchange. It is indiscriminate in the sense that it lowers all fixed incomes in the same way, whether they enter into the costs of production of tradables or not. Thus, as prices rise because of the devaluation, pensions, salaries of government employees, ranging from highly ranked administrators and judges to simple policemen and bus drivers, salaries of doctors and nurses employed in hospitals and so on all fall in real terms.

Devaluation could be made less indiscriminate by raising, in step with prices, fixed incomes that do not enter into the costs of production of tradables. But economists and the IMF object to this for two reasons. One is that they believe that devaluation must be accompanied by tightening of restraints on domestic expenditure, both to reduce domestic absorption and

¹⁵ Estimating FEERs in Williamson Ed.

¹⁶ Robinson 3.

to prevent, or at least slow, rises in prices and nominal incomes. Hence interest rates must be raised, budget deficits cut and fixed incomes kept from rising. The other is that they believe that markets should determine the structure of incomes, not the authorities.

The first reason is better applicable to developed than to developing countries. In the latter prices of tradables return to their former parties at the new exchange rate and, the more efficient the markets, the quicker the rise. Then the prices of untradables rise too. Hence efforts to prevent price rises only result in reductions in output and unemployment.

Nor does the shift in income distribution caused by devaluation necessarily imply less domestic absorption. It does so, assuming that investment does not rise, when the gainers save more out of the redistributed income than would have done the losers. That may happen, but it is hard to predict for a particular country and the experience of many countries shows that it is not even an approximate rule. A good rule for developing countries is that the improvement in the balance of trade is the result of a fall in investment. An improvement occurs if investment does not rise as much as or falls less than saving, and it always falls after a devaluation accompanied by tightening of expenditure restraints.

The difficulty of predicting the net effect of devaluation on saving is illustrated by salaries of government employees. In principle devaluation increases the government's revenue more than it increases its expenditure if nominal salaries paid out of the budget are not increased. Revenue from import duties and other indirect *ad valorem* taxes rises with prices in terms of the domestic currency and so does revenue from direct taxes because of the change in income distribution, provided the thresholds for the various income tax rates are not changed to allow for inflation. Since the bulk of budget expenditure is for salaries, the choice is between improving the budget balance and raising salaries.

Either choice could equally well increase or decrease saving and through that the balance of trade. A smaller budget deficit does not necessarily imply more saving; it is merely a change in the way some of the government's expenditure is financed, e.g. a shift from bonds or seignorage to taxes. Whatever effect that change has on saving must be compared with the effect of raising the salaries of government employees. The government's budget deficit or expenditure may need to be reduced for reasons other than reducing domestic absorption, but then the salaries of its employees are just one of several alternatives that need to be considered. The same type of reasoning applies to pensions and medical insurance, whose financing is similar to taxes.

The objection to raising fixed incomes in step with prices, that it is an interference in the market, assumes that free markets determine income structures optimally. Leaving aside theory, the practice in all developed countries is to interfere or allow interference; they all permit trades unions and nearly all have minimum wages. Moreover, devaluation is also an interference in the market, one that alters the relation between wages, profits and prices.

Financial Stocks and Flows

In a developing country three types of financial stocks are affected by devaluation: external debt, amortisation of capital equipment and savings.

External debt

Devaluation raises the cost, in terms of the domestic currency, of debt denominated in foreign currencies and, even if the volume of domestic sales does not fall, only a rise in prices can prevent the liquidity and profits of non-financial businesses from declining. Well established, profitable firms producing for the domestic market are likely to be able to accommodate the effects of a single, moderate devaluation because their foreign currency debts are likely to be small, and, if they have problems, these firms usually have access to cash reserves or bank loans to tide them through until prices rise. New firms, whose initial financing costs are higher relative to their capital and which may not yet generate much, if any, profit, are more likely to be bankrupted.

Financing obtained from banks in terms of the domestic currency can have the same effects as foreign currency loans if the banks themselves have foreign currency debts. As a simple example, a bank that takes a five year loan at five percent and lends it at ten percent, with repayment in both cases in five equal installments, must raise its lending interest rate to $11\frac{1}{4}$ per cent to cover the cost of its own borrowing if the devaluation raises the price of foreign currency by 25 per cent. If the bank wishes to recover its margin of five percent to cover its administrative costs, risk and profit, its lending rate is $16\frac{1}{4}$ per cent.

Since devaluation is accompanied normally by demand restraint intended to keep prices from rising, the effects of the immediate rise in the costs of external debt combined with the slower rise in domestic prices are compounded by a fall in domestic sales. (Further compounding the effects are the rise in the prices of imported inputs.) The greater the devaluation, the greater the compounded effect. If the devaluation is big, firms become unable to stay current on their loans, banks restrict credit because of the

spreading of credit problems, and the demand restraint that was meant to restrain price rises turns the external financing into a source of widespread business failures, as has been evident in East Asia.

Amortisation

Since developing countries as a rule import practically all their plant and machinery from developed countries, the amortisation for replacing their existing equipment and the savings for buying new equipment must be adjusted to the exchange rate. But amortisation is rarely, if ever, adjusted in this way, so that the funds a prudently run firm would set aside for the replacement of old equipment become insufficient if devaluation occurs.

Usually equipment is amortised at historic cost in terms of the domestic currency. Then the shortfall for replacing it is equal to the devaluation. Amortising at replacement cost may be difficult or impossible, even if the firm is eager to do it. One reason is that the firm would need to foresee the devaluation several years in advance. In a country that has not devalued for a long time the expectation of devaluation may arise only weeks or months before the event, whereas the equipment may have been bought several years earlier. If a piece of equipment being amortised over five years is four years old and devaluation rises its replacement cost by 25 per cent in terms of the domestic currency, its amortisation in its last year would need to be 45 per cent of its value. If the firm has not placed this amount in its cash reserves, it will have to borrow from a bank or issue new shares.

A second reason that amortisation at replacement cost may be impossible is that the authorities regulate how amortisation may be calculated, both because it affects the taxes paid by the firm and because rules are needed to protect shareholders, creditors and the public. Hence, even if a firm wishes to amortise at replacement cost, it may be prevented by the rules and it will certainly be unable to persuade the authorities that its forecast of a future devaluation should be used for calculating that cost.

Savings

Since devaluation causes inflation, it reduces the real value of savings in the form of cash, bank deposits, fixed interest securities and acquired pension rights, the principal financial savings of lower and middle income groups. If its purpose is to lower the prices of the country's tradables in terms of foreign currencies, this reduction is an unintended redistribution of wealth.

To some extent, it can be compensated by adjusting the nominal value of the savings in step with prices. This is easier with pensions in a state run system, and such an adjustment would apply to workers producing tradables as to any others. Whether or not it will be financially sustainable in the future is a separate question that can only be answered by an independent assessment of the receipts and payments over the long run. But, judging by the diminution in the real values of pensions in most countries that devalue frequently, it seems that wage earners and middle income groups have merely been the losers in the redistribution of wealth caused by devaluation. Nevertheless, adjusting the nominal value of savings to compensate for higher prices may be impractical in most other cases since it would raise the liabilities of the institutions holding them without corresponding gains in their assets.

Alternatively, the real value of savings can be preserved by adjusting interest for inflation. In practice this happens rarely; the interest received by lower and middle income groups in countries that devalue often does not suffice to offset inflation. The economic difficulties that led to and followed from devaluation have their repercussions in the banking system, which protects itself, in effect, by reducing its liabilities to those who cannot negotiate their own terms for depositing with the banks.

Effects on economic incentives

A single, moderate devaluation that is not expected to be repeated in the foreseeable future is unlikely to alter economic behaviour. Firms and households adjust to the new exchange rate and continue as before. But repeated devaluation creates the expectation of more and the resulting differences in economic incentives harm economic development. The following lists a few of the more important differences and their effects.

Holders of wealth make windfall gains in terms of the domestic currency by converting their financial assets into foreign exchange, i.e. capital flight. Exchange controls can limit the outflow, though they may not stop it altogether. This does not mean that they are useless or undesirable; they prevent the sudden large outflows that afflict countries that do not have them and, properly managed, keep them small. Yet, over time, the loss of international reserves from capital flight is greater than the gains expected from devaluation. Estimates of flight capital in the US from Mexico and Brazil are around \$100 billion and \$150 billion respectively. The estimate for Russian flight capital in Europe is around \$50 billion.

If, as with some countries of Latin America, the accumulate flight capital is large, the owners, most of whom have business interests in their

home countries, have an incentive to press for devaluation of their home country currency since they are usually able to remove their funds at the right moment. Mexico's budget deficits in the early 1990s were financed in great part by Mexican flight capital at high interest rates, usually over 20 per cent, and short term. This was the capital that moved our first when the crisis began at the end of 1994.

Devaluation gives windfall profits to firms producing tradables, unless trade unions are strong enough to keep real wages from falling. Normally unions in developing countries are not that strong. Firms then have an incentive to press the authorities for more devaluation as a source of profit, rather than to improve efficiency and seek new products and markets. The result is inefficient industries and impoverishment of workers and middle classes.

Since amortisation does not normally suffice for replacement of equipment, firms resort to more bank loans. The greater the rate of devaluation, the more indebted they become.

Inflation becomes permanent and deters holding savings in the form of bank deposits and fixed interest securities, which usually offer yields below the inflation rate. Long run savings, notably pension plans, lose most of their expected value unless they are indexed to inflation, which does not happen in most developing countries.

If trades unions are strong, they have an incentive to press for repeated wage increases to keep pace with inflation. The authorities try to oppose this in the short run by making demand restraint more stringent. The results are higher unemployment and impoverishment of workers who do not belong to strong unions and the middle classes. Over the long run, the authorities try to break the power of the unions and thus enhance the effect of devaluation in making the distribution of income more uneven.

V. Summary and Conclusions

Summary

If countries produce the same or similar goods and markets are competitive the law of one price holds in each market. If a country's producers lower their prices, their competitors do the same. The standard argument, that devaluation enables a country's producers to reduce the prices of their products below the prices of their competitors and thus increase the volume of the country's exports and decrease the volume of its imports, does not hold.

But devaluation has these trade effects if the lower prices force producers in other countries to reduce or cease production because they cannot cover costs. Then the devaluing country is able to use idle labour and production capacity, with the reverse effects elsewhere.

One way of escape from these conclusions, assuming that countries produce different goods, can be dismissed as incompatible with the facts.

A second way is to deny that markets are competitive. Studies show that the prices of the same goods vary from country to country. But the market of each country may still be competitive, while the mechanisms for equalising prices between countries only work for simple goods with little brand or product differentiation. In larger economies prices of imports of goods for which differentiation is important conform to domestic prices of competing goods. Developing countries, unless they are big, are price-takers.

If prices of the same or competing goods differ between countries but are the same within each country, a country that devalues may alter the difference between its domestic prices and prices in other countries, but not increase any difference between the prices of its goods and the prices of competing goods in its export markets.

A third way is to argue that devaluation causes the prices of tradables to rise relative to the prices of untradables and to result in a shift of demand from the former to the latter. This is supposed to increase the supply of exports and reduce the demand for imports. It is obviously mistaken since the improvement in the balance of trade requires that saving increase or investment fall and there is no reason why this shift in demand should have either effect.

One mistake is to suppose that prices of untradables necessarily fall. Since devaluation causes profits to rise, untradable goods that are relatively capital intensive will rise in price relative to tradable goods. Another mistake is to ignore income distribution; the relation between demand and prices depends on the distribution of income and devaluation shifts income from wages to profits.

Since the exchange rate is a purely monetary quantity, whereas orthodox economic theory holds that the pattern of trade is determined by the real characteristics of economies, some economists have argued that there is an exchange rate that also reflects the real characteristics of the economy and that the nominal exchange rate should be determined by it.

One proposal for such an exchange rate is the ratio of the country's prices to world prices or to the prices of other countries. But, since prices differ between countries in any case, it is not necessarily useful for determining the nominal rate. Moreover, it is never calculated by comparing prices directly, but by following the relative movements of price indices and, therefore, does not, in practice, show how prices actually compare.

The exchange rate defined as the dual variable of the balance of trade constraint in an optimisation model of the economy is not necessarily an exchange rate if the model is real. To make it an exchange rate the domestic currency must be brought in by some expedient, like expressing the optimand in terms of it, though this makes it depend on domestic prices, which are not necessarily optimal. Since the choice of optimand is arbitrary, the exchange rate is arbitrary too. Moreover, it does not necessarily apply to an economy that does not conform to its optimum.

The exchange rate defined as the ratio of the prices of tradables to the prices of untradables is not an exchange rate and, as shown earlier, its link to the nominal exchange rate is ambiguous.

Equilibrium exchange rates are calculated by assuming that demand is a function of prices, without taking account of income distribution. If, instead, demand is determined by incomes, as well as prices, and incomes are determined by production, the equations give a real model, and then the domestic currency must be brought in through more assumptions. Calculations of equilibrium exchange rates also assume relations governing the behaviour of economic quantities such as interest rates, money supply, wages, exports and demand. This makes them merely forecasting models whose results vary according to the assumptions.

Conclusions

Exchange rate changes have no *a priori* determinate effects on the volumes of exports or imports. The only mechanism by which devaluation can be expected to increase the volume of exports is reducing prices to the point where competitors have to reduce or stop production. Then the devaluing country increases its capacity utilisation and reduces its unemployment at the cost of the reverse effects elsewhere.

World prices exist only for goods for which brand and product differentiation are not important. Most manufactures do not have world prices.

Dumping can occur when exporters from developed countries follow their normal practice of pricing their products in the markets of other developed countries according to the price levels of those markets. If the currency of an exporting country appreciates, the country's domestic prices or production costs may rise above the market prices of the importing country.

Overvaluation and undervaluation are usually meaningless terms. No general criterion exists by which they can be judged. A currency may be said to be overvalued if it is obvious that it will be able to increase exports by devaluing and it is desirable to do so. It can be said to be undervalued if it is obvious that it can maintain its exports by revaluing and that it is desirable to do so. No general criterion exists for either.

Floating exchange rates cannot be stable unless expectations make them so. If changes in the exchange rate do not have predictable effects on the balance of trade, there is no 'correct' exchange rate to which the actual exchange rate should move. Unlike markets for goods, where costs of production set limits to prices, the exchange rate of a country may have no identifiable limits to its range of variation. If the market believes that a country's exchange rate is right or if the country has enough reserves to deter speculation, the exchange rate will be stable. Otherwise, it can fluctuate widely and is determined by herd behaviour.

Devaluation has predictable effects on the domestic economy. In all but the very biggest developing countries it is inflationary, because they are price-takers. It shifts income from recipients of fixed incomes, who are usually lower and middle income groups. It also reduces the real value of their wealth, including acquired pension rights. Firms borrow more from banks because their plant and machinery are imported from the developed countries, so that their amortisation of capital equipment according to the usual rules for historic cost and their savings for expansion become inadequate.

Repeated devaluation results in expectations that devaluation will occur again and that inflation will continue for a long time. The resulting incentives hamper economic development. Windfall profits are made from capital flight and, if trades unions are weak, from the rise in prices relative to wages. Firms pay less attention to efficiency and the search for new opportunities. The prospect of permanent inflation deters saving in the form of bank deposits and fixed interest securities.

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