

## COMMERCIAL POLICY UNDER FIXED AND FLEXIBLE EXCHANGE RATES \*

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I. Is devaluation deflationary? 437.—II. The Keynesian model, 442.—III. Commercial policy under fixed rates, 446.—IV. Commercial policy under flexible rates, 449.—V. The terms-of-trade effect can be zero or negative, 452.—VI. Concluding remarks, 453.

The differential effects of financial policy under fixed and flexible exchange rates have been thoroughly analyzed by Mundell, Fleming, and a host of more recent studies. But commercial policy under the two systems has hardly been treated at all. This is a serious omission, because in recent years commercial policy has been widely used as a balance of payments instrument. Section I of this study treats the effects of commercial policy when full employment and payments balance are maintained by exchange rate adjustment combined with either flexible prices or stabilization policy. The rest of the paper draws on some of these results to provide a basic analysis of the effects of commercial policy under fixed and flexible exchanges. It uses a very simple Keynesian model and considers the effects of both tariffs and quotas for four alternative assumptions about the disposal of the revenue from protection. The results pertaining to flexible rates are also solutions to the mathematically equivalent question of the impact on domestic output and the price level of currency depreciation accompanied by just enough trade liberalization to maintain equilibrium in the balance of trade.

Mundell has provided the standard (although very brief) treatment of commercial policy under fixed and flexible exchanges.<sup>1</sup> Defining "commercial policy to be any policy that restricts imports or promotes exports without directly affecting the level of saving or investment," he concludes that commercial policy under fixed rates

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1. See pp. 514-15 of R. A. Mundell, "Flexible Exchange Rates and Employment Policy," *Canadian Journal of Economics and Political Science*, XXVII (Nov. 1961), 509-17; reprinted as Chapter 17 of R. A. Mundell, *International Economics* (New York: Macmillan, 1968).

improves the balance of payments and is reflationary, whereas under flexible rates it causes appreciation of the domestic currency and is deflationary. But as this paper shows, he treats only one out of four plausible cases and makes an important implicit assumption about the initial level of protection.

### I. IS DEVALUATION DEFLATIONARY?

Fifteen years ago Egon Sohmen<sup>2</sup> attacked "the widespread belief that depreciation of an overvalued currency must necessarily entail a rise in the domestic price level of the depreciating country, unless it is accompanied by deflationary fiscal and monetary policies." He considered the case where the domestic currency is depreciated with a simultaneous freeing of trade by just enough to maintain equilibrium in the balance of trade. Prices were assumed flexible, so that both economies stay fully employed. He pointed out that if and only if protection is initially above the "optimum level," tariff reduction accompanied by the appropriate exchange rate change will cause domestic welfare to rise.<sup>3</sup> Inflation (deflation) was said to occur if the same money expenditure buys goods affording less (more) welfare than before. Thus, he concluded that devaluation accompanied by tariff reduction is inflationary or deflationary depending on whether tariffs initially are below or above the optimum level. Sohmen's demonstration is a flawless statement about life in a "quantity theory" world with perfectly flexible wages and prices, a constant money supply, and a constant ratio of money holdings to money expenditure.

Now let us consider an economy with money illusion in the labor market and a government that is committed to a policy of

2. E. Sohmen, "The Effect of Devaluation on the Price Level," this *Journal*, LXXII (May 1958), 273-83. Chapter VI of E. Sohmen, *Flexible Exchange Rates*, revised edition (Chicago and London: University of Chicago Press, 1969) is based on this article. See also the comments by Hinshaw and Vanek, and reply by Sohmen, this *Journal*, LXXII (Nov. 1958), 614-32; the discussions of Sohmen's paper in Carlos F. Diaz Alejandro, *Exchange-rate Devaluation in a Semi-Industrialized Country* (Cambridge: M.I.T. Press, 1965), pp. 14-16; and L. B. Yeager, *International Monetary Relations* (New York: Harper and Row, 1966), pp. 184-86.

3. In this paper the terms "real absorption," "welfare," and "potential welfare" are synonymous. In other words, no normative significance is attached to the effect of changes in protection on the interpersonal distribution of purchasing power within each economy. Thus, the "optimum tariff" is the one that maximizes potential welfare within the tariff-imposing economy. Professor Sohmen's analysis was particularly clear on these points. His analysis is complicated, however, by the index number problem associated with discrete changes in tariffs. This difficulty is avoided here by limiting attention solely to differentials.

stable prices as well as full employment and external equilibrium. Such a government may wish to ascertain the effect on the consumer price index of devaluation accompanied by tariff reduction and stabilization policy such that full employment and balanced trade are continually maintained at a constant price of domestic output. To solve this problem, we develop the following model. The country is supposed to be small enough so that, from her own standpoint, foreign demand for her products depends only on the exchange rate. The country and her trading partner are assumed to produce only one good apiece, and the supply of each good is perfectly elastic with respect to its price, measured in units of the currency of the country that produces it. Within both economies perfect competition prevails. The domestic currency values of domestic output, absorption, and exports are denoted by  $Y$ ,  $A$ , and  $X$ , respectively. The price of domestic currency is denoted by  $r$ , which is expressed in units of foreign currency per unit of domestic currency. A unit of foreign currency is defined as the amount that in the initial equilibrium sells for one unit of domestic currency. Hence, initially

$$(1) \quad r = 1.$$

$M$  is the foreign currency value of imports. A physical unit of imports is defined as the quantity that sells for one unit of foreign currency on the world market. Hence  $M$  also represents imports measured in physical units. Defining a physical unit of domestic output as that quantity which sells for one unit of domestic currency, we recognize that  $Y$ ,  $A$ , and  $X$  also represent physical units.

A tariff or quota sets up a differential between the domestic and foreign prices of imports. This differential, expressed as a fraction of the foreign price, is denoted by  $t$ . Thus, denoting the tariff-inclusive price of imports by  $p$ , we obtain

$$(2) \quad p = (1 + t)/r.$$

Since exports depend solely on the exchange rate,

$$(3) \quad dX/X = -xdr/r,$$

where  $x > 0$  is the elasticity of demand for exports. Imports depend on the domestic (protection-inclusive) price of imports and the level of private absorption. Hence,

$$(4) \quad dM = -\mu M dp/p + m dA,$$

where  $m > 0$  is the marginal propensity to import out of absorption and  $\mu > 0$  is the elasticity of demand for imports (defined holding nominal absorption constant).<sup>4</sup> Because capital is assumed to be

4.  $m$  is the marginal propensity to import out of absorption in the initial

completely immobile internationally, the balance of payments evaluated in units of foreign currency ( $B$ ) is equal to the foreign currency value of the trade balance, and since the exchange rate is assumed to adjust in order to maintain payments balance,

$$(5) \quad 0 = B = rX - M.$$

Since output equals absorption plus exports minus imports evaluated at their tariff-inclusive price,

$$(6) \quad dY = dA + dX - d(Mp).$$

Suppose the government either spends the tariff revenues or uses the appropriate incentives (e.g., taxes, subsidies, and interest rates) to manipulate the size (not the composition) of private absorption to maintain full employment. Then output is held constant:

$$(7) \quad dY = 0.$$

The tariff revenue expressed in units of domestic output is given by

$$(8) \quad T = tM/r.$$

Finally, defining units so that real and nominal absorption are equal in the initial equilibrium, we see that the change in real absorption  $A^*$  is equal to the change in nominal absorption minus the level of imports multiplied by the change in their price relative to that of the domestically produced good:

$$(9) \quad dA^* = dA - Mdp.$$

Combining these equations with the differentials of (2) and (5) yields

$$(10) \quad dp = [(1 - mt)(x - 1) + m] dt/E = [x - 1 + mp - xmt] dt/E,$$

$$(11) \quad dT = M[(x + \mu - 1)p - x\mu t] dt/[pE],$$

$$(12) \quad dr = [\mu - mp] dt/[pE],$$

and

$$(13) \quad dA^*/M = [\mu - mp] \{1 + t(1 - x)\} dt/[pE],$$

where  $E = x + \mu - 1 - tmx$ , and  $E$  must be positive for stability of the foreign exchange market (i.e., to assure that  $dB/dr < 0$ ).<sup>5</sup>

equilibrium. From (4) imports depend on their price as well as on absorption. Thus the marginal propensity to import would generally be expected to depend on the price of imports. Our mathematics considers only differential changes and therefore is valid no matter what functional dependence  $m$  is assumed to possess (barring discontinuities in the neighborhood of the initial equilibrium).

5. Differentiating the system indicates that  $dB/dr = -ME/[1 - mt]$ , and the denominator is assumed to be positive. This is because J. Bhagwati and M. Kemp in "Ranking of Tariffs Under Monopoly Power in Trade," this *Journal*, LXXXIII (May 1969), 330-35 have noted that this is the condition for market stability when the terms of trade are given (recognizing that their  $m_i/(1+t)$  corresponds to our  $m$ ). It should be noted that all of the mathematics of the paper is consistent with a rather more general interpretation.

Equation (10) confirms Metzler's conclusion<sup>6</sup> of over two decades ago that when the initial tariff is small ( $t \rightarrow 0$ ), increased protection causes the relative (tariff-inclusive) price of imports to rise or fall depending on whether the elasticity of demand for the country's exports (as a function of the terms of trade) is greater or less than  $1-m$ , where  $m$  is the marginal propensity to import. It is also clear that the higher the initial tariff, the lower this elasticity of demand for exports or the marginal propensity to import must be if increased protection is to reduce the tariff-inclusive price of imports.<sup>7</sup> Equation (11) defines the maximum revenue tariff to be  $1/[x\mu/(x+\mu-1)-1]$ , assuming this expression is positive and infinite if it is negative.<sup>8</sup>

Equation (12) shows that increased protection improves the terms of trade if and only if  $\mu - mp > 0$ . However, if we assume that tariff revenues are distributed equally to domestic residents all of whom are identical, it follows from the Slutsky equation that  $\mu - mp$

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$r$  is the net barter terms of trade (the world price of exports divided by the world price of imports), and  $x$  is the elasticity of the foreign demand for domestic exports as a function of the barter terms of trade (which by definition is the elasticity of the offer curve). Moreover, subject to these interpretations, the mathematics remains valid even in a world in which the foreign supply of domestic imports is upward sloping. In this case  $x = \eta(\sigma + 1)/(\sigma + \eta)$ , where  $\eta > 0$  and  $\sigma > 0$  are the foreign elasticities of demand for domestic exports and supply of domestic imports, respectively.

6. See L. A. Metzler, "Tariffs, the Terms of Trade, and the Distribution of National Income," *Journal of Political Economy*, LVII (Feb. 1949), 1-29; reprinted as Chapter 2 of R. E. Caves and H. G. Johnson, eds., *Readings in International Economics* (London: George Allen and Unwin, 1968). Also see his subsequent note, "Tariffs, International Demand, and Domestic Prices," *Journal of Political Economy*, LVII (Aug. 1949), 345-51.

7. The expressions inside the braces in (10) are zero if and only if the third equation on p. 351 of Metzler's note (*op. cit.*) is satisfied. However, our approach differs in certain respects from Metzler's. In this study all private and official expenditure on imports is assumed to be sensitive to the tariff-inclusive price of imports. Metzler, on the other hand, assumed that a constant fraction of all tariff revenue was spent on imports. Moreover, for him the analysis depended on whether the government or the private sector spends the revenue, since the government was assumed to pay no tariffs. His footnote 2 remarks that his treatment "probably is inconsistent with the classical postulate of a homogeneous consumption function of degree zero." However, our analysis is perfectly consistent with that postulate. Moreover, if tariffs are designed rationally to promote economic efficiency, then the rational government should generally choose between the purchase of domestic and foreign goods on the basis of the tariff-inclusive relative price of imports and domestic goods. From (2), (5), (6), (7), and the differential of (5), the change in absorption (be it official or private) must equal the change in tariff revenue. Thus,  $m$  can be interpreted as the marginal propensity to import out of the tariff revenue if (a) the government spends the revenue or if (b) the government gives the revenue to the private sector, and the private sector's marginal propensity to absorb out of disposable income is one.

8. This is consistent with the expression for the maximum revenue tariff derived in H. G. Johnson, "Optimum Welfare and Maximum Revenue Tariffs," *Review of Economic Studies*, XIX (Jan. 1951), 28-35.

is simply the compensated elasticity of demand for imports, which is necessarily positive. Thus, if increased protection is to worsen the terms of trade, one must postulate that either the private sector is nonhomogeneous or the government spends part of the changes in tariff revenues itself.<sup>9</sup> From (13) if increased protection does improve the terms of trade, welfare is maximized ( $dA^*/dt=0$ ) when the tariff,  $t=1/(x-1)$ , and this is simply the "Bickerdike-Edgeworth-Kahn-Little-Graff" formula for the optimum tariff when the elasticity of import supply is infinite as it is in our model.<sup>1</sup> However, if increased protection worsens the terms of trade, the sign of  $dA^*/dt$  is reversed, and this formula defines the pessimum tariff, in the sense that if the initial tariff deviates in either direction from the extreme point defined above, then further increases in that deviation will necessarily cause real absorption to rise, and reductions in the deviation will cause real absorption to fall. This result implies, counter to intuition, that tariff increases that worsen the terms of trade may still increase domestic welfare. A tariff increase that worsens the domestic terms of trade does so because it shifts the domestic offer curve outward, and this necessarily increases *foreign* welfare. It then follows from this argument that *a tariff increase may actually raise world welfare by simultaneously increasing welfare in each country.*<sup>2</sup>

Let us assume that the terms of trade depend positively on the level of protection. Clearly then, with the price of domestic output constant, the impact of exchange depreciation (combined with trade liberalization) on the price of imports and hence on the consumer price index is indeterminate, but from (10) it will necessarily be inflationary if the elasticity of demand for exports is less than one minus the marginal propensity to spend on imports  $mp$ . On the other hand, devaluation is deflationary in the sense considered by Sohmen if and only if  $t > 1/(x-1)$ , a very different criterion.

9. On all this, see J. N. Bhagwati and H. G. Johnson, "A Generalized Theory of the Effects of Tariffs on the Terms of Trade," *Oxford Economic Papers*, XIII (Oct. 1961), 225-53.

1. It is reproduced on p. 60 of H. G. Johnson, *International Trade and Economic Growth* (London: George Allen and Unwin, 1967).

2. These results remind us that a tariff increase is desirable from the standpoint of domestic welfare if and only if it improves the balance of imports over exports, where imports are valued at their scarcity value to the private sector, i.e., if and only if  $pdM/dt - dX/dt > 0$ . Also, a tariff increase may cause trade to expand in both directions rather than shrink in at least one. Note that we are defining a rise in domestic welfare to occur when the change in the economy's consumption bundle could be redistributed to make everyone at least as well off as before and one person better off, and for the reasons advanced in the text, our analysis of the pessimum tariff implicitly involves interpersonal comparisons of utility, whereas the analysis of the optimum tariff need not do so.

## II. THE KEYNESIAN MODEL

The model of underemployment equilibrium consists of equations (1) through (4) of the previous section plus various equations to be developed below. It is only necessary to redefine  $A$ ,  $M$ , and  $m$  as private absorption, private imports, and the private marginal propensity to import out of private absorption, respectively.

The domestic authority is assumed to exchange money for bonds on demand in order to maintain a constant interest rate.<sup>3</sup> With the interest rate fixed, real domestic private absorption is assumed to depend solely on real domestic disposable income and is an increasing function of it. In an open economy a given "income measured in units of domestic output" will be a smaller "real income" after an increase in the price of imports. The same is true of absorption. As Laursen and Metzler<sup>4</sup> have shown, this implies that changes in import prices cause the consumption function measured in units of domestic currency to shift. The essence of their argument can be easily explained. Remember that  $p$  is the price paid by the private sector for imports, and define units so that in the initial equilibrium each national income aggregate is the same whether measured in real or nominal terms. The average propensity to import out of (real  $\equiv$  nominal) absorption in the initial equilibrium is denoted by  $n$ . Thus,  $n = M/A$ .

Referring to Figure I, suppose that before the increase in the price of imports, disposable income of  $D_0$  units of domestic currency calls forth absorption valued at  $A_0$  units of domestic currency. Then, after a differential increase in the price of imports equal to  $dp$ , this same point on the real absorption function (same real income and same real absorption) corresponds to  $D_0(1 + npdp/p)$  and  $A_0(1 + npdp/p)$  units of domestic currency (since  $np$  is the fraction of absorption expenditure that is spent on the foreign good). Thus,

3. Tsiang refers to this as a "Keynesian neutral monetary policy." For a discussion of some of its implications, see S. C. Tsiang, "The Role of Money in Trade-Balance Stability: Synthesis of the Elasticity and Absorption Approaches," *American Economic Review*, LI (Dec. 1961), 912-36; reprinted as Chapter 24 of Caves and Johnson, *op. cit.* Many of the studies of financial policy in open economies have made the assumption that the authorities peg the interest rate rather than the money supply. For example, see the studies in Mundell's *International Economics, op. cit.*, except for those that assume perfect capital mobility. Also see D. J. Ott and A. Ott, "Monetary and Fiscal Policy: Goals and the Choice of Instruments," this *Journal*, LXXXII (May 1968), 313-25; and T. D. Willett and F. Forte, "Interest Rate Policy and External Balance," this *Journal*, LXXXIII (May 1969), 242-62.

4. S. Laursen and L. A. Metzler, "Flexible Exchange Rates and the Theory of Employment," *Review of Economics and Statistics*, XXXII (Feb. 1950), 281-99.

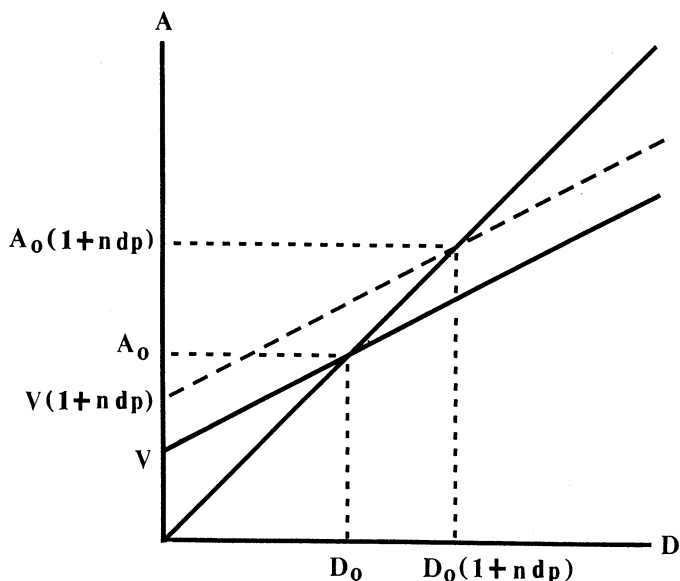


FIGURE I

a point on the new (post-price increase) absorption function can be derived from the corresponding point on the old one, by constructing a ray from the origin to the point on the old absorption function and then lengthening it to  $(1+ndp)$  times its former length. A simple geometrical proof (based on the theorem that if a line cuts two sides of a triangle into parts in the same proportion, it is parallel to the third side) can be used to show that if the old absorption function is a straight line, the new absorption function is a straight line parallel to it, but with the vertical intercept equal to the old one multiplied by  $1+ndp$ . Since only differential changes concern us, our absorption function can be approximated by a straight line. Defining  $V$  as the vertical intercept of the absorption function and  $p$  as the price paid for imports by the domestic private sector, an import-price change causes an upward shift in the domestic private absorption function equal to  $Vndp = (VM/A)dp$ . Defining  $l = V/A \leq 1$ , we can rewrite this as  $lMdp$ . Thus, the differential change in private absorption is

$$(14) \quad dA = adD + lMdp,$$

where  $0 < a < 1$ ,  $0 < l < 1$ , and  $a$  is the marginal propensity to absorb out of disposable income.

A more orthodox but less intuitively appealing derivation is the



following. Denoting variables in real terms with asterisks and assuming equality between nominal and real magnitudes in the initial equilibrium, we find that the linearized absorption function is  $A^* = aD^* + V$ , while the relationships between real and nominal magnitudes are  $dA^* = dA - A ndp$  and  $dD^* = dD - D ndp$ . Differentiating the first equation and substituting from the other two yields  $dA = adD + n[A - aD]dp$ . By rewriting, the coefficient of  $dp$  becomes  $VM/A$  as above or  $[1 - a/(A/D)]M$ . By substituting "consumption" for "absorption," this latter expression is what Jones<sup>5</sup> found for the partial derivative of consumption expenditure with respect to a rise in import prices. Moreover, if we make the additional assumption that in the initial equilibrium  $A = D$ , the coefficient becomes  $M$  times the marginal propensity to save, the expression used by Harberger and Sohmen.<sup>6</sup>

The dummy variables  $h$ ,  $f$ , and  $\tau$  take on the values of 1 or 0, depending on what happens to the revenue associated with protection. Table I indicates the four alternative assumptions that are considered here and the values of  $h$ ,  $f$ , and  $\tau$ , which describe each one.

TABLE I  
DISPOSAL OF THE TARIFF REVENUE

Case I $h=1, f=\tau=0$	The government auctions off all import licenses to competitive bidders and spends all revenues from tariffs and import licenses on home-produced goods.
Case II $f=1, h=\tau=0$	All import licenses are either auctioned off to competitive bidders by the government or given to foreigners, and revenues from tariffs and import licenses are spent on foreign goods, invested abroad, or given to foreigners. This is the case of "voluntary" restrictions on foreign exporters.
Case III $h=f=\tau=0$	The government auctions off all import licenses to competitive bidders, and the government retains all revenues from tariffs and import licenses.
Case IV $\tau=1, h=f=0$	The government gives all revenues from tariffs and any import licenses or the revenue from them to domestics.

The revenue associated with a tariff or the value of import licenses issued<sup>7</sup> is  $Mt/r$ . If the tariff revenues or import licenses are

5. See pp. 78-79 of R. W. Jones, "Depreciation and the Dampening Effect of Income Changes," *Review of Economics and Statistics*, XLII (Feb. 1960), 74-80.

6. Pp. 52-53 of A. C. Harberger, "Currency Depreciation, Income and the Balance of Trade," *Journal of Political Economy*, LVIII (Feb. 1950), 47-60; reprinted as Chapter 21 of Caves and Johnson, *op. cit.*; Sohmen, *Flexible Exchange Rates*, pp. 145-46.

7. The recipients of the import licenses are assumed to sell the permitted

given to the private sector,  $\tau$  (for transfer) is set equal to one. Otherwise, it equals zero. Thus,

$$(15) \quad D = Y + \tau Mt/r,$$

where  $Y$  is domestic output. The variable  $h$  is set equal to one if the official tariff revenues are spent on home-produced goods. Otherwise, it equals zero. Assuming away all other government expenditure, domestic output is equal to private absorption plus exports plus official tariff revenues spent at home minus imports evaluated at the price paid by the private sector. Thus

$$(16) \quad Y = A + X + hMt/r - Mp.$$

The variable  $f$  is set equal to one if the official tariff revenues are spent or invested abroad, or import licenses are given to foreigners. Otherwise, it equals zero. For example,  $f=1$ ,  $h=0$ , and  $\tau=0$  when all protection consists of "voluntary" restrictions on foreign exporters. Assuming capital to be completely immobile internationally, the change in the balance of payments evaluated in units of foreign currency ( $B$ ) is equal to the change in the foreign currency value of the trade balance minus the revenue from domestic protection that accrues to foreigners. Hence,

$$(17) \quad B = rX - M - fMt.$$

Since the balance of payments is assumed to be in equilibrium initially, from (17) the initial equilibrium is characterized by

$$(18) \quad X = M(1+ft)/r.$$

Combining equations (1), (2), (3), (4), (14), and (18) with the differential forms of (2), (15), (16), and (17) yields

$$(19) \quad dYs/M = -Pdr + Qdt/(1+t)$$

and

$$(20) \quad dBs/M = -Rdr + Sdt/(1+t),$$

where  $P$ ,  $Q$ ,  $R$ ,  $S$ , and  $s$  are defined below.

We define  $l' = l(1+t)$ .

(I) If the revenue is spent at home,

$$s = 1 - a(1-m) > 0,$$

$$P = x + \mu - 1 + l'(1-m),$$

$$Q = \mu + l'(1-m),$$

$$R = (x + \mu - 1)(1-a) - ml',$$

and  $S = \mu(1-a) - ml'$ .

(II) If the revenue is acquired by foreigners,

$$s = 1 - a[1 - mp] > 0,$$

$$P = (x + \mu - 1)p + l'[1 - mp],$$

$$Q = (\mu - 1)p + l'[1 - mp],$$

$$R = [(x + \mu - 1)(1 - a) - ml']p,$$

and  $S = [(\mu - 1)(1 - a) - ml']p.$

(III) If the revenue is retained,

$$s = 1 - a[1 - mp] > 0,$$

$$P = (x + \mu - 1)p + l'[1 - mp] - xt,$$

$$Q = (\mu - 1)p + l'[1 - mp],$$

$$R = (x + \mu - 1)(1 - a) - ml' + xmat,$$

and  $S = \mu(1 - a) - ml' + mpa.$

(IV) If the revenue is given to domestics,

$$s = 1 - a(1 - m) > 0,$$

$$P = (\mu - 1)[p - at] + l'[1 - mp] + x(1 - mat),$$

$$Q = (\mu - 1)[p - at] + (l' + a)[1 - mp],$$

$$R = (x + \mu - 1)(1 - a) - ml',$$

and  $S = \mu(1 - a) - ml'.$

In each case  $R$  is assumed to be positive, because of the (realistic) assumption that the foreign exchange market is stable.<sup>8</sup>

### III. COMMERCIAL POLICY UNDER FIXED RATES

Under fixed exchange rates  $dr=0$ , so the expressions for  $QM/[s(1+t)]$  show the effect of increased protection on output. When none of the revenue from protection accrues to domestics ( $h=\tau=0$ ) and the absorption schedule is fixed in nominal terms ( $l=0$ ),<sup>9</sup> increased protection is reflationary under fixed exchange rates if and only if the elasticity of demand for imports is greater

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imports competitively. If the recipients of licenses were assumed to form a cartel, all the licenses would not necessarily be used, and the analysis for certain parameter values would be different. On the relationship between tariffs and quotas in the presence of monopoly power, see J. N. Bhagwati, "On the Equivalence of Tariffs and Quotas," pp. 53-67 of R. E. Baldwin *et al.*, *Trade, Growth, and the Balance of Payments* (Amsterdam: North-Holland, 1965).

8. We wish to analyze comparable situations under fixed and flexible exchanges, and our comparative statics analysis is meaningful under flexible exchanges only if the exchange market is stable.

9. Reasons why  $l$  may equal zero in the real world are presented in section V. Also, from section II,  $l$  will approach zero as the marginal propensity to absorb approaches the corresponding average propensity. The expression "terms-of-trade effect" in this context refers not to the terms of trade of the country, but to the terms of trade at which the private sector exchanges the domestically produced good for imports.

than one.<sup>1</sup> When the revenue from protection is given to the private sector, protection will be reflationary over a wider range of  $\mu$ . Finally, when all of the revenue is spent at home, new barriers to imports are necessarily reflationary. Since an increase in these barriers raises the price that the private sector must pay for imports, the terms-of-trade effect (fixity of the schedule in real instead of nominal terms) implies that increased protection also causes the expenditure schedule to shift upward. Thus, inclusion of the terms-of-trade effect causes protection to be more reflationary or less deflationary than it would otherwise be. Incidentally, only in this paragraph is it assumed that  $1 - mp > 0$ , which is to say that domestic output is not inferior in domestic consumption.

$SM/[s(1+t)]$  indicates the effect of protection on the balance of payments. The payments balance is necessarily improved if the terms-of-trade effect is ignored, whether the revenue from protection is retained, spent domestically, or given to domestics. However, in each of these three cases, additional protection may worsen the balance of payments if the terms-of-trade effect is sufficiently large.<sup>2</sup> But if the revenue accrues to foreigners ( $f=1$ ) and  $l=0$ , tariff increases or quota reductions improve the balance of payments if and only if the elasticity of demand for imports is greater than one. In each case inclusion of the terms-of-trade effect makes balance of payments improvement less likely. These results and those of the next section are summarized in Tables II and III.

In the short run, elasticities of demand for imports and exports may be close to unity, making the proper use of commercial policy difficult to ascertain and introducing the possibility that commercial policy may affect output in different directions in the long and short runs. Similarly, the effect on the balance of payments of voluntary restrictions on foreign exporters may also be uncertain.

1. Although this was pointed out long ago in W. H. White's "Measuring the Inflationary Significance of a Government Budget," *IMF Staff Papers*, I (April 1951), 355-78, many textbooks still give the impression that a tariff is always reflationary. See for example P. T. Ellsworth, *The International Economy*, 3rd edition (New York: Macmillan, 1966), p. 223; P. B. Kenen and R. Lubitz, *International Economics*, 3rd edition (Englewood Cliffs: Prentice Hall, 1971), p. 28; C. P. Kindleberger, *International Economics*, 4th edition (Homewood: Richard D. Irwin, 1968), p. 123; and B. Södersten, *International Economics* (London: Macmillan, 1971), pp. 361-62.

2. It is interesting to note that when real absorption is made to depend on real disposable income (so that in cases I and IV,  $l=1-a$ ), the condition for increased protection to improve the balance of payments or appreciate the domestic currency under assumptions I and IV, and to be reflationary under assumption IV is the same as that for tariff imposition to improve the balance of payments or appreciate the exchange rate when full employment is maintained (equation (12)).

TABLE II\*  
THE QUALITATIVE EFFECTS OF INCREASED PROTECTION IN GENERAL

Case <sup>a</sup>	Real <sup>b</sup> or non-minimal absorption schedule fixed	Under fixed exchanges on Y		Under fixed rates on B or under flexible on 7		Under flexible exchange rates	
		+	-	+	-	On Y	On p
I							
Revenue is spent at home	Nominal Real	+		+		0 x-1	x-1
II							
Revenue is acquired by foreigners	Nominal Real		$\mu-1$		$\mu-1$	0	+
III							
Revenue is retained	Nominal Real		$\mu-1$	+		$(x+\mu-1)+x\mu t/p$ (-if $t=0$ ) $\{\mu-mp\}\{(x-1)t-1\}$ $+pa(1-x)(1-nt)$	$x-(1+g)$
IV							
Revenue is given to domestics	Nominal Real		$\mu[1+t(1-a)]$ $-p[1-a(1-m)]$	+		$-(x+\mu-1)+x\mu t/(1+t)$ (-if $t=0$ ) $\{\mu-m(1+t)\}\{(x-1)t-1\}$	x-1

\* Notes to this table are at the end of Table III. Entries simply indicate the signs of the effects that reflect the assumption of exchange market stability.

Thus, the case for using commercial policy as a stabilization tool rests on second-best considerations, because of the difficulty of predicting its effect on output, the likelihood of foreign retaliation, and the deadweight losses associated with trade barriers.<sup>3</sup> Hence, changes in other forms of taxes, subsidies, and expenditures will generally be preferable tools of macroeconomic policy, particularly if the initial level of protection is already optimal.

#### IV. COMMERCIAL POLICY UNDER FLEXIBLE RATES

Under flexible exchange rates the authorities do not intervene in the foreign exchange market. Thus setting  $dB=0$  and recombining equations (19), (20), and the differential of (2) yields expressions for changes in output and the price of imports faced by the private sector under flexible exchange rates when protection increases.

When the revenue is spent at home,

$$(21-I) \quad Rdp/p = (x-1)(1-a)dt/(1+t),$$

and

$$(22-I) \quad dYR/M = l'(x-1)dt/(1+t).$$

When the revenue is acquired by foreigners,

$$(21-II) \quad Rdp/p = x(1-a)dt,$$

and

$$(22-II) \quad dYR/M = l'xdt.$$

When the revenue is retained,

$$(21-III) \quad Rdp/p = \{ (x-1)[1-a(1-mt)] - ma \} dt/(1+t),$$

and

$$(22-III)$$

$$dYR/M = \{ -[(x+\mu-1)p - x\mu t] + l'[(x-1)(1-mt) + m] \} dt/(1+t).$$

When the revenue is given to domestics,

$$(21-IV) \quad Rdp/p = (x-1)(1-a)dt/(1+t),$$

and

3. For discussions of the U. K. experience with an import surcharge from November, 1964, until November, 1966, see pp. 165-68 of "The Balance of Payments," by R. N. Cooper in R. E. Caves *et al.*, *Britain's Economic Prospects* (Washington: Brookings, 1968) and J. Johnson and M. Henderson, "Assessing the Effects of the Import Surcharge," *Manchester School of Economic and Social Studies*, XXXV (May 1967), 89-110. Cooper discusses the foreign reaction to the surcharge, and Johnson and Henderson find that the surcharge had its largest effect on reducing imports during the first few quarters of its operation. Both studies note that an important role may have been played by expectations.

(22-IV)

$$dYR/M = \left\{ - \left[ (x + \mu - 1)p - x\mu t \right] (1 - a) + l' \left[ (x - 1)(1 - mt) + m \right] \right\} dt / (1 + t).$$

From (21-II), it can be seen that if the revenue from protection accrues to foreigners, increased protection causes the price of imports to the domestic private sector to rise. Thus, the absorption schedule shifts upward, and from (22-II) output expands. Increased protection when revenue from protection is spent at home has an indeterminate effect on the price of imports, causing it to rise if and only if the elasticity of demand for exports is greater

TABLE III

THE EFFECTS OF INCREASED PROTECTION STARTING FROM FREE TRADE WHEN THE ABSORPTION SCHEDULE IS FIXED IN NOMINAL TERMS ( $l=0$ )

Case <sup>a</sup>	Under fixed exchange rates $dY/dt^b$	Under fixed $dB/dt^c$ or Under flexible $dr/dt^d$		Under flexible exchange rates	
				$dY/dt$	$dp/dt^d$
I					
Revenue is spent at home	$\mu$	$\mu$	0	$x-1$	
II					
Revenue is acquired by foreigners	$\mu-1$	$\mu-1$	0	$x$	
III					
Revenue is retained	$\mu-1$	$\mu+ma/(1-a)$	$-M/(1-a)$	$x-1-ma/(1-a)$	
IV					
Revenue is given to domestics	$\mu-1+a(1-m)$	$\mu$	$-M$	$x-1$	

a. More precise definitions of each of the cases are given in Table I.  
 b. Multiply each expression in this column by  $M/[1-a(1-m)] > 0$ .  
 c. Multiply each expression in this column by  $M/[1+ma/(1-a)] > 0$ .  
 d. Multiply each expression in this column by  $1/(x+\mu-1) > 0$ .  
 e. From (2), (15), (16), and (18), it is clear that when the absorption schedule is fixed in real terms,  $D=A$  in all but case III, so that  $l=1-a$ , and in case III  $D=A-Mt/r$ , so  $l=1-a(1-nt)$ .

$a$  = the marginal propensity to absorb out of disposable income.

$B$  = balance of payments.

$m$  = the marginal propensity to import out of private absorption.

$n$  = the average propensity to import out of private absorption.

$p$  = the tariff-inclusive relative price of the imported good.

$r$  = exchange rate (price of domestic currency).

$t$  = the explicit or implicit import tariff rate as a fraction of the foreign price of imports.

$Y$  = output.

$l' \equiv l(1+t) > 0$ , where  $l$  is the ratio of the vertical intercept of the private absorption function to total private absorption.

$\mu$  = the elasticity of demand for imports and is defined to be positive.

$x$  = the elasticity of demand for exports and is defined to be positive.

$g = ma/[1-a(1-mt)] > 0$ .

than one. As a result, the absorption schedule may shift in either direction, causing output to rise or fall depending on whether  $x$  is greater than or less than one.

If the revenue is retained or distributed to the private sector, when the terms-of-trade effect is ignored, increased protection will be deflationary if and only if the initial protection level is below the maximum revenue tariff, and this will always be true if the initial tariff level is close to zero. The expression within the first set of square brackets of (22-III) and (22-IV) shows the sign of the impact of increased protection on official revenue as derived in (11), while the coefficient of  $l'$  in these same equations is the Metzler condition derived in (10). Thus, when the terms-of-trade effect is included, increased protection in both cases will necessarily be deflationary if the initial tariff is below the maximum revenue level and the Metzler condition is satisfied. Conversely, in both cases increased protection will necessarily be reflationary if the initial tariff is above the maximum revenue level and the Metzler condition is unsatisfied.<sup>4</sup>

Perhaps the most interesting finding is what happens to output under flexible rates when all tariff revenues are distributed as a neutral income subsidy and real absorption depends on real disposable income. This is the problem previously analyzed by Mundell. Interestingly enough, the condition for output to rise (case IV real) is the same as that for welfare to fall when output is held constant by official policy (equation (13)). This result is predictable, for if in the full-employment case real absorption rose, then there must have been an upward shift in the real absorption function. This is because with continual payments balance, the change in real absorption is equal to the change in real disposable income. Since the marginal propensity to absorb out of disposable income is less than one, full employment could have been preserved only by an upward shift in the real absorption function. Thus, when there is no such shift, output necessarily falls. Clearly then, the condition for increased protection to be deflationary (or inflationary) is the same

4. The situation corresponding to our case IV has been considered by E. Sohmen, *op. cit.* pp. 157-59. Sohmen assumes "that the State's tariff revenues are redistributed as a neutral income subsidy in a manner that does not affect the propensity to spend." He writes, "the positive employment effects of restrictive commercial policy appear so well grounded in common sense that the opposite seems almost inconceivable. Yet the opposite result is indeed overwhelmingly likely in the pure case of flexible rates. Under normal conditions, increased protection will consequently always have a depressive effect on domestic output." Our analysis under the simplifying assumptions of Table III shows that this opposite result must occur under flexible rates and could conceivably occur under fixed rates as well.



in the frameworks of both Sohmen (see section I) and Mundell.<sup>5</sup> Of course, for Mundell deflation refers to a fall in domestic output, while for Sohmen it refers to a fall in the consumer price index. Thus in both cases deflation occurs if and only if the initial level of protection is below the optimum (assuming that increases in protection improve the terms of trade) or above the pessimum (assuming that increases in protection worsen the terms of trade),<sup>6</sup> where the optimum or pessimum tariff is calculated using the elasticity of reciprocal demand that pertains at the initial equilibrium.

#### V. THE TERMS-OF-TRADE EFFECT CAN BE ZERO OR NEGATIVE

If wealth measured in domestic currency is unaffected by exchange rate changes and consumption is homogeneous of the first degree in income and wealth, then the consumption function measured in domestic currency will also be unaffected by exchange rate changes. However, depreciation of the domestic currency causes an increase in the domestic currency value of that portion of wealth that is composed of either imported capital goods or assets denominated in foreign currency. Consequently, depreciation of the domestic currency causes the consumption function to shift upward. Suppose that investment behavior is described by a simple stock-adjustment model in which the target capital stock is a function of output and the relative costs of capital and labor services. Depreciation, by making the import of foreign capital goods more expensive, encourages the substitution of labor for capital, thereby lowering the incentive to invest.<sup>7</sup> However, because depreciation increases the money value of a unit of real investment, it may cause money investment to increase. In a paper that is available upon request, I have calculated the effects of exchange rate change on aggregate expenditure using sets of parameter values for several hypothetical economies bearing some resemblance to Canada. These calculations indicate that the "terms-of-trade effect" may be of considerable im-

5. Moreover, in Mundell's framework, increased protection improves the terms of trade if and only if it does the same in the context of Sohmen's framework.

6. Mundell's analysis implicitly assumed that the initial tariff was below the optimum level. Also, it should be emphasized that Mundell's analysis, but not his conclusion that commercial policy will be deflationary, depends on the postulate of an absorption function that is fixed in real terms. As Table II, case IV shows, deflation is likely even if the absorption function is fixed in units of domestic output.

7. This mechanism is also noted on pp. 273-74 of S. S. Alexander, "Effects of a Devaluation on a Trade Balance," *IMF Staff Papers*, II (April 1952), 263-78; reprinted as Chapter 22 of Caves and Johnson, *op. cit.*, but he mentions that its importance in any actual case is open to doubt.

portance but that, for plausible parameter values, the aggregate expenditure function may drift either up or down in response to an exchange rate change. Thus, the reader may wish to reinterpret for himself the results of this paper under the assumption that  $l < 0$ ,<sup>8</sup> although in the short run (up to two quarters) it is probably legitimate to assume that changes in relative prices do not significantly influence real investment,<sup>9</sup> which would imply  $l > 0$ .

## VI. CONCLUDING REMARKS

1. The five results most worth remembering are (a) If tariff revenues are retained or accrue to foreigners, and the exchange rate is fixed, then assuming that the absorption function is fixed in units of domestic output, increased protection will be deflationary if and only if the elasticity of demand for imports is less than one. (b) If tariff revenues are spent at home or accrue to foreigners and the exchange rate is flexible, then assuming that the absorption function is fixed in units of domestic output, increased protection has no impact on output. (c) If tariff revenues are retained or distributed as a neutral income subsidy and the exchange rate is flexible, then assuming that the absorption function is fixed in units of domestic output, increased protection will be deflationary if and only if the initial tariff is below the maximum revenue tariff. (d) If tariff revenues are distributed as a neutral income subsidy and the absorption function is fixed in real terms, then under flexible rates (when increased protection improves the terms of trade) increased protection will be deflationary if and only if the initial tariff is below the "optimum" level. (e) Assuming that full employment is continually maintained, if the initial tariff lies above the extreme point defined by the standard formula for the optimum tariff (calculated using the elasticities at the initial equilibrium) and if an incremental

8. This paper's analysis of case IV (in which the revenue from protection is given to the domestic private sector) is only valid under the assumption that investment does not depend on output. If this assumption were relaxed, the marginal propensities to absorb out of output and transfer payments would necessarily differ.

For discussion of other influences on  $l$ , see pp. 270-75 of Alexander *op. cit.* and pp. 358-60 of R. N. Cooper, "Devaluation and Aggregate Demand in Aid-Receiving Countries," Chapter 16 of J. N. Bhagwati *et al.*, ed., *Trade, Balance of Payments and Growth* (Amsterdam: North-Holland, 1971). Some of these are the effects of devaluation on expenditure via money illusion and induced changes in income distribution, investor and consumer expectations, direct foreign investment, the interest rate, and the efficiency of domestic production.

9. For empirical support of this position, see C. W. Bischoff, "Hypothesis Testing and the Demand for Capital Goods," *Review of Economics and Statistics*, LI (Aug. 1969), 354-68.

tariff increase worsens the terms of trade of the tariff-imposing country, then such an increase will cause welfare to rise both at home and abroad.

2. Is currency depreciation deflationary if accompanied by just enough trade liberalization to maintain equilibrium in the balance of payments? The answer depends on the interpretation of the question. If it means what happens either to output or to the consumer price index in the absence of additional stabilization policy, then section IV provides the answer. On the other hand, if full employment is maintained then the effect on the consumer price index is determined in section I, first assuming inflexible wages, then flexible wages and an inflexible money stock.

3. The effects of commercial policy under fixed and flexible exchange rates are summarized in Table III for the special case of zero initial protection and an absorption function fixed in units of domestic output. Equations (19) through (22) and Table II present the corresponding results under more general assumptions.