Factor Price Rigidities in an Open Economy

by

Richard Cornes*

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INTRODUCTION

The objective of this paper is to analyse some issues raised by the exogenous determination of factor prices in an open economy. To do this, we exploit the tools of duality analysis, particularly the restricted profit function.

Some of these issues have been discussed by Brecher (1974) and Schweinberger (1978). Our treatment is closer in spirit to that of Schweinberger, which restricts attention to the small country case and which has n produced commodities. The present analysis considerably simplifies derivation of existing results, extends the discussion to consider the effects of exogenous commodity price changes on the system, and looks at an instructive special case.

Using a restricted profit function of the type discussed by Lau (1976), we extend the analysis by considering the consequences of exogenous changes in goods prices on the value of output, and obtain results which have a very similar flavour to those obtained from the analysis of factor price changes. The exogenous price changes, while they may be interpreted as changes in taxes and subsidies, have alternative interpretations as simply a prices and incomes policy, or wage indexation or, in the case of final goods prices, simply exogenous world price changes or currency revaluation. We will simply talk of exogenous price changes. In Section IV we look at some special cases which may be of particular interest to the trade theory and which permit stronger comparative static conclusions. In addition, section III contains a comparison between the magnitude of supply responses with and without wage rigidities. One result of this is that even though the aggregate level of activity may fall as a result of an individual commodity price increase, the output level of that commodity will generally increase by more than if all factor prices were flexible and full employment maintained. Throughout most of the analysis, we assume that none of the inputs are internationally traded and that wage rigidities are associated with domestic unemployment of the relevant input. Section V consists of a brief comment on an alternative interpretation.

I An open economy with flexible prices

We begin with a brief discussion of the production sector in the standard model with flexible prices. The vector $\underline{s}$ denotes net outputs of goods, all of which are internationally traded at given world prices $\underline{p}$. Production involves the input of a vector of primary factors, $\underline{v}$, which are not internationally traded and which are available in fixed quantities. $\underline{v}$ is therefore exogenously determined in this model. Technology exhibits constant returns to scale. Domestic producers are price takers in all markets and produce at minimum cost. It may be shown that the outcome may be described by means of the revenue, or national product, function

$$R(\underline{p}\ \underline{v}) \qquad \underset{\underline{s}}{\text{Max}} \left\{ \underline{p}.\underline{s} \,\middle|\, (\underline{s},\underline{v}) \text{ feasible} \right\} \tag{1}$$

The properties of $R(\ )$ are well-known - see, for example, Diewert (1974) or Dixit and Norman (1980). For present purposes, the following observations are useful:

(i) $R(\underline{p}\ \underline{v})$ is an increasing function of $\underline{p}$, and also of $\underline{v}$.

(ii) $R(\underline{p}\ \underline{v})$ is linear homogeneous of degree 1 in $\underline{p}$, and also in $\underline{v}$.

(iii) $R(\underline{p}\ \underline{v})$ is convex in $\underline{p}$: concave in $\underline{v}$.

(iv) Assuming the existence of the relevant derivatives - of which more shortly - R_{pp} is positive semidefinite and R_{vv} is negative semidefinite. This follows from (iii).

(v) Subject to the same proviso as in (iv), the vector R_p yields the optimum net outputs, $\underline{s}(\underline{p}\ \underline{v})$, and R_v yields the vector of shadow prices of factor inputs, $\underline{w}(\underline{p}\ \underline{v})$. Given the competitive framework, $\underline{w}$ is the vector of market prices.

With constant returns to scale, the differentiability of $R(\ )$ with respect to $\underline{p}$ and the existence of single-valued supply functions require that there be at least as many primary factors as there are produced commodities. This we assume.

II An open economy with rigid factor prices : the revenue function

Our interest is in an economy which differs from the standard model by virtue of having a subset of primary factors with exogenously determined prices. Accordingly, the vector of factor prices is partitioned: $\underline{w} = (\underline{w}_R\ \underline{w}_F)$, where $\underline{w}_R$ is the vector of rigid factor prices, and $\underline{w}_F$ is the vector of flexible factor prices. There is a corresponding partitioning of $\underline{v}$. In equilibrium, firms employ the factors $\underline{v}_R$ up to the point where their marginal productivities equal the exogenous prices $\underline{w}_R$. By assumption, the level of employment of all such factors falls short of their domestic endowment, so that there is unemployment of all such factors. The remaining factors are fully employed, with $\underline{w}_F$ being endogenously determined. The situation envisaged is one in which unspecified institutional constraints make for downward rigidity in factor prices, whereas the tendency for price to increase in response to excess demand for a factor is allowed to work itself out. Given a particular partitioning of $\underline{w}$ into $(\underline{w}_R, \underline{w}_F)$, the results obtained are valid for that subset in the factor price space in which the derived demand for each of the exogenously priced factors falls short of its endowment. Such subsets, which we do not determine explicitly except in the special case of section IV, correspond to the regimes discussed by Malinvaud (1977) and other modern macro-economists.

For the moment, we continue to treat $\underline{v}_R$ as if it were predetermined. As before, a revenue function is defined, as $R(\underline{p}\ \underline{v}_R\ \underline{v}_F)$. Denote the vectors $\partial R/\partial v_R$ and $\partial R/\partial v_F$ by R_R and R_F respectively. Also, the matrix of second partial derivatives with respect to employment levels is written

$$R_{vv} = \begin{pmatrix} R_{RR} & R_{RF} \\ R_{FR} & R_{FF} \end{pmatrix}$$

Since R_{vv} is negative semidefinite, so too are R_{RR} and R_{FF}. We assume them to be non-singular, so that inverses exist. Supply and shadow price functions are defined:

$$\underline{s}(\underline{p}\ \underline{v}_R\ \underline{v}_F) \equiv R_p(\underline{p}\ \underline{v}_R\ \underline{v}_F)$$

$$\underline{w}_R(\underline{p}\ \underline{v}_R\ \underline{v}_F) \equiv R_R(\underline{p}\ \underline{v}_R\ \underline{v}_F)$$

$$\underline{w}_F(\underline{p}\ \underline{v}_R\ \underline{v}_F) \equiv R_F(\underline{p}\ \underline{v}_R\ \underline{v}_F) \quad .$$

The difference between these functions and their counterparts in section II is that the vector $\underline{w}_R$ is in fact exogenous and the vector of quantities becomes endogenous in the economy with rigid factor prices and unemployment.

It is certainly possible to use this formulation for comparative static analysis. For example, if we wish to consider the effect of exogenous changes in $\underline{w}_R$ - the result, perhaps, of factor input subsidies or wage indexation on the value of output, simply note that

$$\underline{w}_R \equiv R_R(\underline{p}\ \underline{v}_R\ \underline{v}_F) \tag{2}$$

$$\therefore \quad d\underline{w}_R = R_{RR}\, d\underline{v}_R \quad \text{if } \underline{p} \text{ and } \underline{v}_F \text{ are fixed}$$

$$\therefore \quad d\underline{v}_R = (R_{RR})^{-1}\, d\underline{w}_R \tag{3}$$

$$\therefore \quad d(\underline{p}.\underline{s}) = dR = R_R\, d\underline{v}_R = w_R (R_{RR})^{-1}\, d\underline{w}_R \tag{4}$$

This immediately yields Schweinberger's (1978) result. If $d\underline{w}_R = \alpha.\underline{w}_R$, where α is a scalar,

$$d(\underline{p}.\underline{s}) = \underline{w}_R (R_{RR})^{-1}\, \underline{w}_R\, \alpha \tag{5}$$

Since R_{RR} is negative semidefinite, so too is its inverse. Hence the quadratic form is negative. An equal proportional fall in all components of $\underline{w}_R$ will raise the value of output.

It is, however, more natural to use an alternative functional form to analyse such problems. The form which we now develop has as arguments the truly exogenous variables $\underline{p}$ $\underline{w}_R$ and $\underline{v}_F$ and yields particularly simple results.

III An Alternative Treatment of the Open Economy with Rigid Factor Prices

(i) The restricted profit function

Since $\underline{w}_R$, rather than $\underline{v}_R$, is exogenous, we define the profit function

$$\Pi(\underline{p}\ \underline{w}_R\ \underline{v}_F) \equiv \underset{\underline{s},\ \underline{v}_R}{\text{Max}} \left\{ \underline{p}\cdot\underline{s} - \underline{w}_R\cdot\underline{v}_R \,\middle|\, (\underline{s}\ \underline{v}_R\ \underline{v}_F) \text{ feasible} \right\}$$

Properties of Π which are relevant for our purposes are :

(i) $\Pi(\ )$ is an increasing function of $\underline{p}$ and $\underline{v}_F$, and a decreasing function of $\underline{w}_R$.

(ii) $\Pi(\ )$ is a linear homogeneous of degree one function of $(\underline{p}\ \underline{w}_R)$, and also of $\underline{v}_F$ so long as factors with rigid prices all remain at least partly unemployed.

(iii) $\Pi(\ )$ is convex in $(\underline{p}, \underline{w}_R)$, and concave in $\underline{v}_F$.

(iv) The matrix $\begin{pmatrix} \Pi_{pp} & \Pi_{pR} \\ \Pi_{Rp} & \Pi_{RR} \end{pmatrix}$

is positive semidefinite. (Note that, in writing Π_{pR} and Π_{RR} , we are differentiating with respect to the prices, not quantities, of the factors with rigid prices) It follows that Π_{pp} and Π_{RR} are positive semidefinite.

Π_{FF} is negative semidefinite.

(v) Π_{p} yields the vector of optimum net outputs as a function of $(\underline{p}\ \underline{w}_R\ \underline{v}_F)$. This we write as $\underline{x}(\underline{p}\ \underline{w}_R\ \underline{v}_F)$. Similarly, $\underline{v}_R(\underline{p}\ \underline{w}_R\ \underline{v}_F) \equiv -\Pi_R(\underline{p}\ \underline{w}_R\ \underline{v}_F)$ is the vector of optimum inputs of factors with rigid prices. Finally, $\underline{\omega}_F(\underline{p}\ \underline{w}_R\ \underline{v}_F) \equiv \Pi_F(\ )$ is the vector of shadow prices of fully employed factors, (to be distinguished from $\underline{w}_F(\ ) \equiv R_F(\ )$).

(ii) Comparative static analysis of exogenous factor price changes

First, consider the effect on the value of output, $\underline{p}.\underline{x}$. By definition,

$$\underline{p}\cdot\underline{x} = \Pi + \underline{w}_R\,\underline{v}_R$$

$$= \Pi - \underline{w}_R\,\Pi_R$$

$$\therefore \quad d(\underline{p}\cdot\underline{x}) = \Pi_R\,d\underline{w}_R - \underline{w}_R\,\Pi_{RR}\,d\underline{w}_R - \Pi_R\,d\underline{w}_R$$

$$= -\underline{w}_R\,\Pi_{RR}\,d\underline{w}_R\ .$$

If $d\underline{w}_R = \alpha\underline{w}_R$, where α is a scalar, then

$$d(\underline{p}.\underline{x}) = (-\underline{w}_R\,\Pi_{RR}\,\underline{w}_R)\,\alpha\ . \tag{6}$$

Since Π_{RR} is positive semidefinite, the result that a proportional reduction in $\underline{w}_R$ leads to an increase in the value of output follows immediately. To obtain stronger results, further restrictions are required. For example, if all elements of Π_{RR} were negative, then a reduction in any individual element of $\underline{w}_R$ will increase the value of output. The reason for this is clear once we recall that $-\Pi_R$ is the vector of optimal factor inputs, so that the requirement is that all own- and cross-effects $\partial v_i/\partial w_j (i, j \in R)$ be negative. Alternatively, note that the homogeneity of Π implies that $\underline{p}\, \Pi_{pR} + \underline{w}_R\, \Pi_{RR} = 0$, so that (6) may be written as

$$d(\underline{p}.\underline{x}) = \underline{p}\, \Pi_{pR}\, \underline{w}\quad \underline{\alpha}_R$$

or

$$= \sum_j \Big[\sum_i p_i\ \partial x_i/\partial w_j \Big] w_j\quad \underline{\alpha}_R$$

Hence if the economy is such that all the responses $\partial x_i/\partial w_j (j \in R)$ are negative, it again follows that any reduction in $\underline{w}_R$ will raise the value of output. There is no particular reason to expect such conditions to be satisfied in general, although we treat a special case in section IV in which they do hold.

(iii) Comparative static analysis of exogenous commodity price changes

Now consider the effect of commodity price changes, $d\underline{p}$, on the value of output at initial prices. Quite apart from fortuitous changes in the world prices, the possibility of subsidising domestic production rather than factor input usage makes this an interesting question. Recall the optimum net output functions :

$$\underline{x} = \Pi_p(\underline{p}\ \underline{w}_R\ \underline{v}_F)$$

$$\therefore \quad d\underline{x} = \Pi_{pp}\ d\underline{p}$$

$$\therefore \quad \underline{p}d\underline{x} = \underline{p}\ \Pi_{pp}\ d\underline{p}$$

If $d\underline{p} = \beta\underline{p}$, where β is a scalar, then

$$\underline{p}\, d\underline{x} = (\underline{p}\, \Pi_{pp}\, \underline{p})\, \beta \qquad (7)$$

from which, since Π_{pp} is positive semidefinite, an equal proportional increase in all output prices implies an increase in the value of output at the initial price level. For example, if the comparison is between long run equilibrium before and after a devaluation, where "long run" means that monetary effects have worked their way out of the system, then (7) shows that a devaluation increases the value of output at initial prices.

The similarity between (6) and (7) is clear, and has a straightforward interpretation. Fixed relative output prices allow us to exploit the composite commodity theorem and define a single output, just as fixed relative factor prices for $\underline{v}_R$ allow us to define a composite factor. Let the prices of these composites be P and W respectively. Increasing P with W constant has the same real consequences as reducing W while keeping P constant. Schweinberger's [(1978) p. 370] discussion applies to both situations. Again, to obtain stronger results more restrictive assumptions are necessary.

(iii) Supply responses with and without factor price rigidities

In the flexible price model, it is well-known that the own supply responses $\partial s_i(\underline{p}\ \underline{v}_R\ \underline{v}_F)/\partial p_i$ are non-negative. Since the possibility has been raised that, in the presence of factor price rigidities, the value of output at initial prices may fall as a result of an increase in, say, p_i , one may wonder whether the own response may be dampened, or even made negative, by such rigidities. We now show that this is not the case, and indeed that in a sense the own responses will tend to magnified by the presence of factor price rigidities.

That own responses are non-negative in the presence of factor price rigidities has already been established, since the question concerns the responses $\partial x_i/\partial p_i = \partial x_i(\underline{p}\ \underline{w}_R\ \underline{v}_F)/\partial p_i$. Since $\underline{x} = \Pi_p$, and $\underline{x}_p = \Pi_{pp}$, positive semidefiniteness of Π ensures that $\partial x_i/\partial p_i \geqq 0$.

Now consider a fully employed economy. Suppose $\underline{p}$ changes and all domestic factor prices are allowed to adjust to maintain full employment of all the domestic factors. Then the responses of outputs are denoted by the matrix.

$$\underline{s}_p = R_{pp}$$

the properties of which have already been discussed. Now suppose that the same experiment is undertaken with the additional constraint that all factor prices are downward rigid. Suppose that in the new equilibrium there is a vector of factors whose prices $\underline{w}_R$ have remained unchanged and whose employment levels $\underline{v}_R$ have fallen. The supply of responses for such an experiment are given by

$$\underline{x}_p = \Pi_{pp}$$

We wish to show the relationship between $\underline{x}_p$ and $\underline{s}_p$. This is simply done, since

$$\underline{x}(\underline{p}\ \underline{w}_R\ \underline{v}_F) = \underline{s}(\underline{p}\ \underline{v}_R\ \underline{v}_F)\ .$$

$$\therefore \quad \underline{x}_p = \underline{s}_p + \underline{s}_R\ \underline{V}_{Rp}$$

$$\underline{v}_{Rp} = -\Pi_{Rp} = -\Pi_{pR} = -\underline{x}_R$$

$$= -\underline{s}_R\ \underline{V}_{RR}$$

$$= \underline{s}_R\ \Pi_{RR}$$

$$\therefore \quad \underline{x}_p = \underline{s}_p + s_R\ \Pi_{RR}\ s_R$$

Since Π_{RR} is positive semidefinite, the own responses are easily related. Indeed, since the exogenous factor prices are all fixed, we may aggregate into a single factor v_r . The individual own responses are then given by

$$\partial x_i/\partial p_i = \partial s_i/\partial p_i - (\partial s_i/\partial v_r)^2\ (\partial v_r/\partial w_r)$$

$$\geqq \partial s_i/\partial p_i\ , \quad \text{since} \quad \partial v_r/\partial w_r \quad \text{is non-positive}\ .$$

Hence, even though an increase in p_i may in the presence of factor price rigidities, reduce the value of aggregate output, it will still stimulate output of i by more than would be the case with fixed employment of all factors. This result, perhaps surprising at first, is a simple example of the Le Chatelier principle.

IV A Special Case

(i) The model

Suppose that, in an economy of the type analysed in the last section, each of the endogenously priced factors is specific to one sector, to which it is inelastically supplied. Then the production sector may be modelled using production functions which contain only quantities of the exogenously priced factors, $\underline{v}_R$, as arguments. For example, $s_i = g^i(\underline{v}_R^i)$ where $\underline{v}_R^i$ is the vector of employment of exogenously priced factors in the i^{th} sector, and $g^i(\ )$ is an increasing function of $\underline{V}_R^i$. In short, we have replaced explicit reference to the specific endogenously priced, factors by a decreasing returns to scale function of $\underline{v}_R$ alone.

Total cost functions are of the form $c^i(s_i\ \underline{w}_R)$ and production is undertaken up to the point where price equals marginal cost:

$$p_i = \partial c^i(s_i\ \underline{w}_R)/\partial s_i \equiv c_s^i(s_i\ \underline{w}_R) \tag{8}$$

The functions $c_s^i(s_i\ \underline{w}_R)$ are non-decreasing in s_i and are homogeneous of degree 1 in $\underline{w}_R$. Also, the partial derivative $\partial c^i/\partial w_j$ yields the demand function for v_j^i . These are well known results, which may be found in Diewert (1974).

(ii) Comparative statics

Differentiation of (8) yields

$$dp_i = c_{ss}^{\ i}\, ds_i + c_{sw}^{i}\, d\underline{w} \qquad (9\ )$$

Recalling our convention that commodity supply functions in the presence of exogenous factor prices are written as $\underline{x}(\underline{p}\ \underline{w}_R\ \underline{v}_F)$, we can immediately infer from (9) that

$$\partial x_i/\partial p_i = 1/c_{ss}^{\ i} \geqq 0$$

$$\partial x_i/\partial p_j = 0 \quad \text{for} \quad i \neq j$$

$$\partial x_i/\partial w_k = -(\partial^2 c/\partial s_i\ \partial w_k)/(\partial^2 c/\partial s_i^{\ 2}) \ . \qquad (k \in R)$$

Hence the sign of $\partial x_i/\partial w_k$ depends on that of $(\partial^2 c/\partial s_i\ \partial w_k)$. Now $\partial^2 c/\partial s_i\ \partial w_k = \partial^2 c/\partial w_k\ \partial s_i = \partial v_k^i/\partial s_i$. If there are no inferior factors, therefore, $\partial^2 c/\partial s_i\ \partial w_k$ must be positive, and $\partial x_i/\partial w_k$ is negative.

The following results have been established:

(a) An increase in $\underline{p}$ must increase, or leave unchanged, the output level of each commodity. This follows from the fact that Π_{pp} has been shown to be diagonal.

(b) Therefore, an increase in $\underline{p}$ must increase, or leave unchanged the value of aggregate output at initial prices.

If, in addition, we assume that there are no inferior inputs, then

(c) A reduction in $\underline{w}_R$ must increase, or leave unchanged, the output of each commodity.

(d) Therefore, a reduction in $\underline{w}_R$ must increase, or leave unchanged, the value of aggregate output.

(e) An increase in $\underline{p}$ must increase, or leave unchanged, the employment level of each exogenously priced factor.

However, it is not possible to state that a reduction in $\underline{w}_R$ implies an increased employment level of each factor. The matrix Π_{RR}, though positive semidefinite, enjoys no other helpful properties in this regard.

(iii) The Ricardo-Viner model as a subcase

Suppose attention is confined to changes in which $d\underline{w}_R = \alpha \underline{w}_R$. That is, the exogenous factor prices all change by the same proportion, so that their prices relative to one another are unchanged. Then the composite commodity theorem enables us to define a composite factor, v_r with price w_r. The result is the Ricardo-Viner model with an exogenously priced mobile factor. The comparative statics in the 2-sector example are easily performed using Mussa's (1974) diagram. Figure 1(a) graphs the value of the marginal product of the mobile factor against its level of employment in each sector. The graph for sector 1 has origin 0_1, while that for sector 2 is reversed and has origin 0_2. The distance $0_1 0_2$ is the domestic endowment of the mobile factor.

To facilitate demonstration of the Le Chatelier principle suppose that the initial value of w_r is consistent with full employment of

v_r . Equilibrium is at E . Consider a reduction in p_1 . This shifts the MVP^1 curve downwards as shown in 1(a). If w_r were flexible, it would move down to w'_r . In figure 1(b), where output levels in the two sectors are plotted against input levels, the changes in the former can be read off. s_1 falls from s_1^e to s_1' , while s_2 rises from s_2^e to s_2' . With a fixed w_r however, s_1 falls to s_1^* while s_2 remains unchanged at s_2^e . Hence $\partial x_1/\partial p_1 > \partial s_1/\partial p_1$ and $\partial x_2/\partial p_1 = 0$, as shown earlier in this section.

(iv) A 2-commodity 2-mobile factor price example

This model might, with justification, be termed the Heckscher-Ohlin-Ricardo-Viner model. It shares with the Ricardo-Viner model the feature of decreasing returns to the exogenously priced mobile factors, while having the richer structure of intersectoral factor movements of the Heckscher-Ohlin model. It also allows an illuminating geometric treatment.

First, consider the effects of commodity price changes. Figure 2 is drawn in commodity price space. In this space are drawn three lines. Starting from I, each line is the (linearised) locus of values of p_1 and p_2 for which the value of the appropriate labelled variable is unchanged. For example, changes in p_1 while p_2 and $\underline{w}_R$ are fixed does not affect s_2, since $\partial x_2/\partial p_1 = 0$. Along the line Y , we have

$$\underline{p}.d\underline{s} = 0 = p_1(\partial x_1/\partial p_1)dp_1 + p_2(\partial x_2/\partial p_2)dp_2$$

$$\therefore \quad dp_2/dp_1 = -p_1(\partial x_1/\partial p_1)/p_2(\partial x_2/\partial p_2) .$$

Since Y is negatively sloped, any movement that takes us into the shaded area will increase the level of activity in an aggregate sense. Hence, in particular, any arbitrary increase in (p_1,p_2) will increase the value of output at initial prices. In more general models, Y may be as shown in Figure 3. The thrust of section IV(iii) was that while a proportional expansion along the ray u will increase the level of activity, arbitrary increases in $\underline{p}$ need not. Movement along $\underline{z}$, for example, has the opposite effect.

Turning to factor price space, figure 4 shows (linearised) locus of values of w_1 and w_2 which are consistent with an unchanged value of output. In the absence of inferior factors, we have shown $\partial x_i/\partial w_k$ is negative for all i and for all $k \in R$. Therefore

$$dw_2/dw_1 = -(p_1\ \partial x_1/\partial w_1 + p_2\ \partial x_2/\partial w_1)/(p_1\ \partial x_1/\partial w_2 + p_2\ \partial x_2/\partial w_2)$$

$$< 0 .$$

Figure 4(a) depicts this case. Again, any arbitrary reduction in $\underline{w}_R = (w_1\ w_2)$ will increase the level of activity. Even in our special case, however, if an inferior input is allowed the locus may have a positive slope, producing the familiar indeterminate results.

V

We have so far interpreted $\underline{w}_R$ as reflecting some unspecified institutional rigidity which does not permit factor prices to respond to a situation of excess supply. Strictly speaking, for the present approach to work, precisely the same set of markets must be in excess supply both before and after the exogenous change. Although we have simply assumed a given vector $\underline{w}_R$, if the initial equilibrium is one of full employment, then general equilibrium considerations will determine precisely which factors will become unemployed. Whether any particular factor with a downward rigid price actually becomes unemployed will also generally depend on what other factors have price rigidities. These problems have been sidestepped in the present analysis, as have the problems which may arise if factor prices get stuck at levels which are "too low" so that producers face endogenously determined quantity rations.

An alternative interpretation which avoids these problems, and which is of interest in its own right, is one in which domestic inputs are of two kinds. Some are internationally traded at world prices while others are non-traded. The vector $\underline{v}_R$ may be regarded as the vector of tradeable factors whose prices $\underline{w}_R$ are exogenously fixed in the case of a small economy. Any individual traded input may be either exported or imported; there are none of the asymmetries encountered in the "rigid wage" interpretation.

VI Concluding Remarks

There are close parallels between the policy issues raised in this paper and those which arise in the literature on piecemeal policy changes in "second-best" environments. Take a given unemployment equilibrium with factor price rigidities. Then for a particular objective, such as an increase in the value of output at initial prices, or an increase in the employment level of a particular input, there will generally be a whole half-space of admissable directions of policy change which will secure improvement. Problems arise in identifying this halfspace, and in general it may often happen that apparently reasonable policies may fail, in the same way that policy changes once thought to be obviously desirable may have adverse effects in the full-employment world of the second-best literature. In general radial changes in exogenous prices have fairly clear effects, at least on the value of output. To obtain stronger results clearly requires the imposition of extra assumptions about the structure of production.

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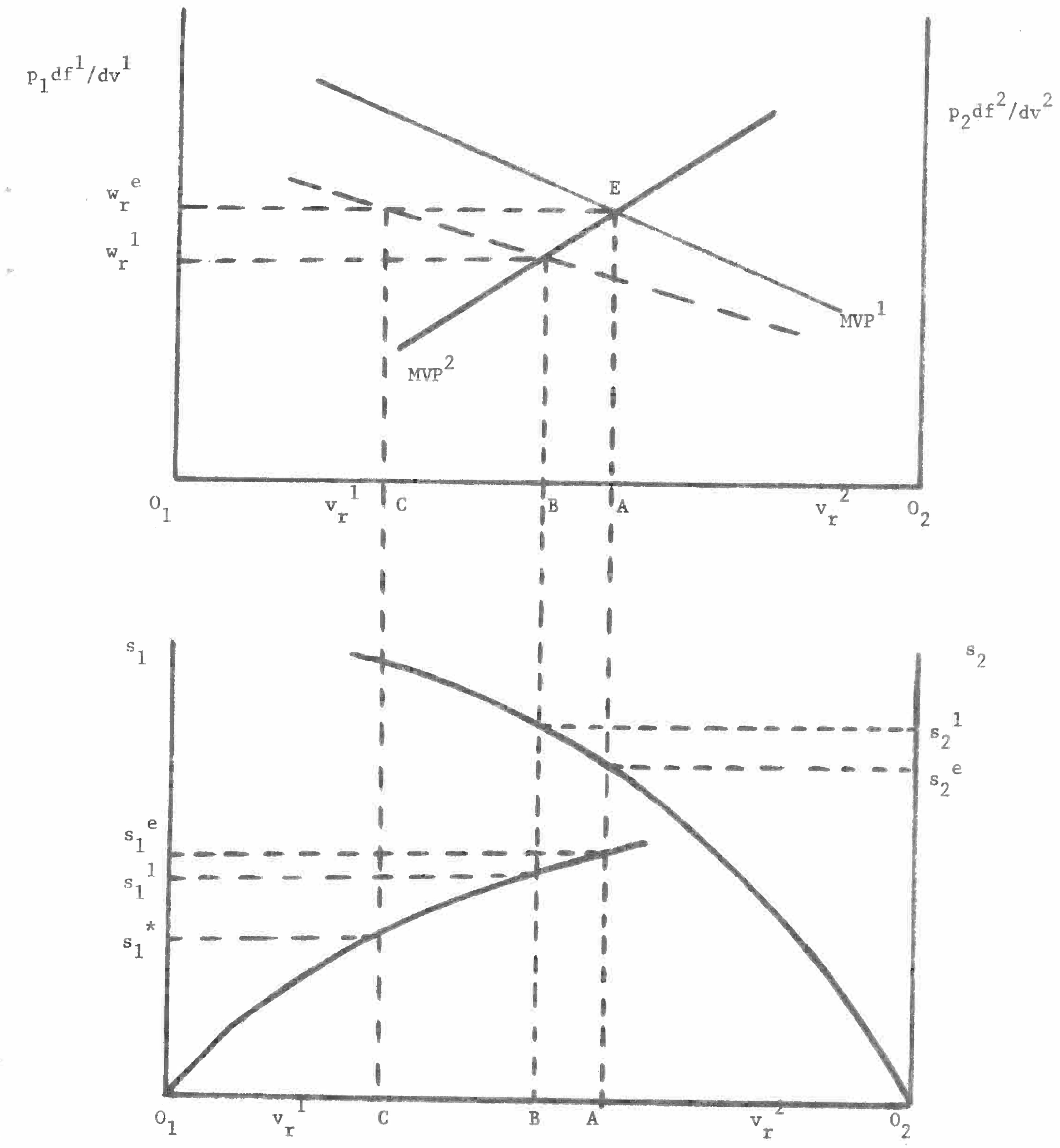

p1df1/dv1
p2df2/dv2
wre
wr1
E
MVP1
MVP2
O1
vr1
C
B
A
vr2
O2
s1
s2
s21
s2e
s1e
s11
s1*
O1
vr1
C
B
A
vr2
O2

(b)

FIGURE 1

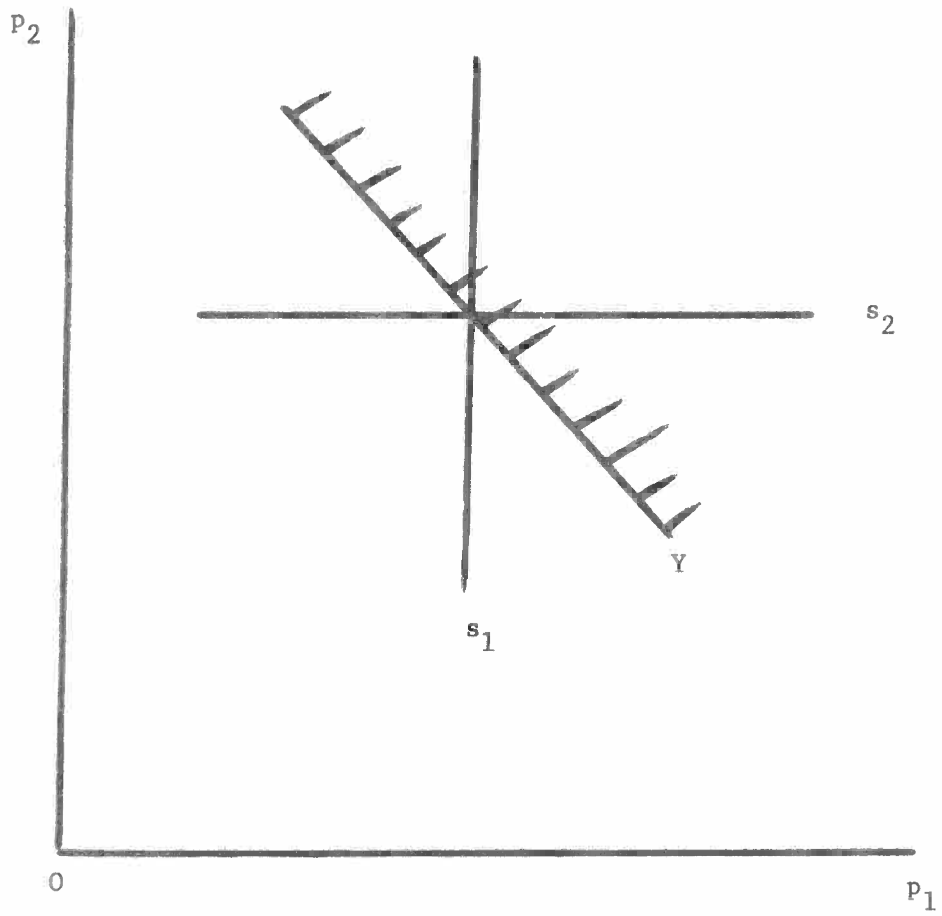

FIGURE 2

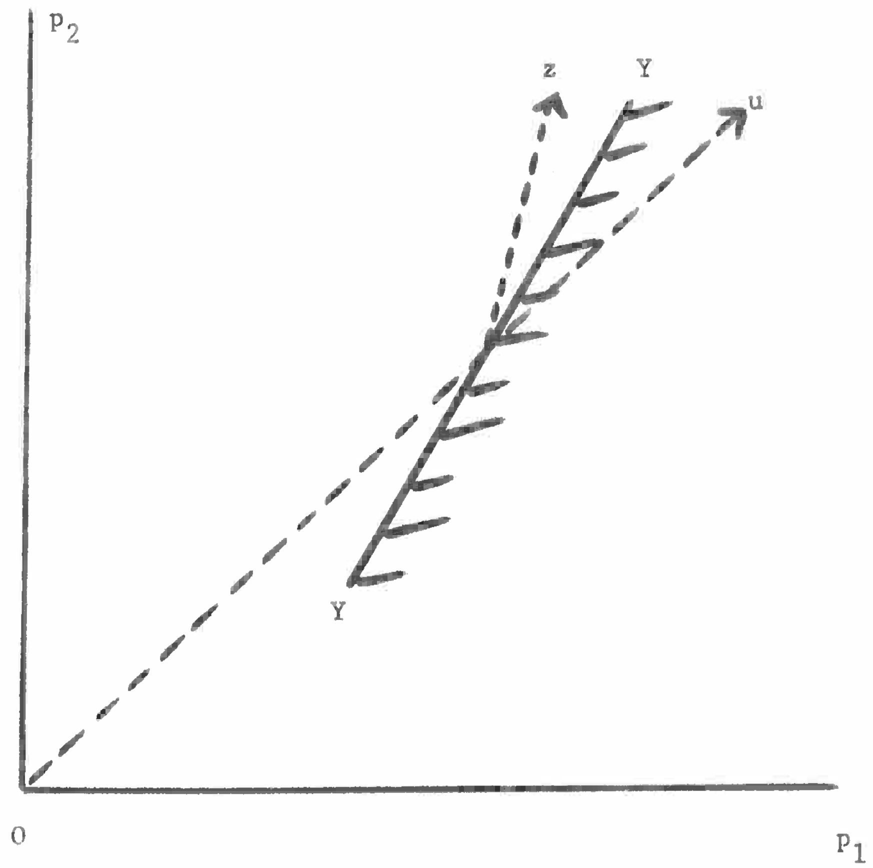

FIGURE 3

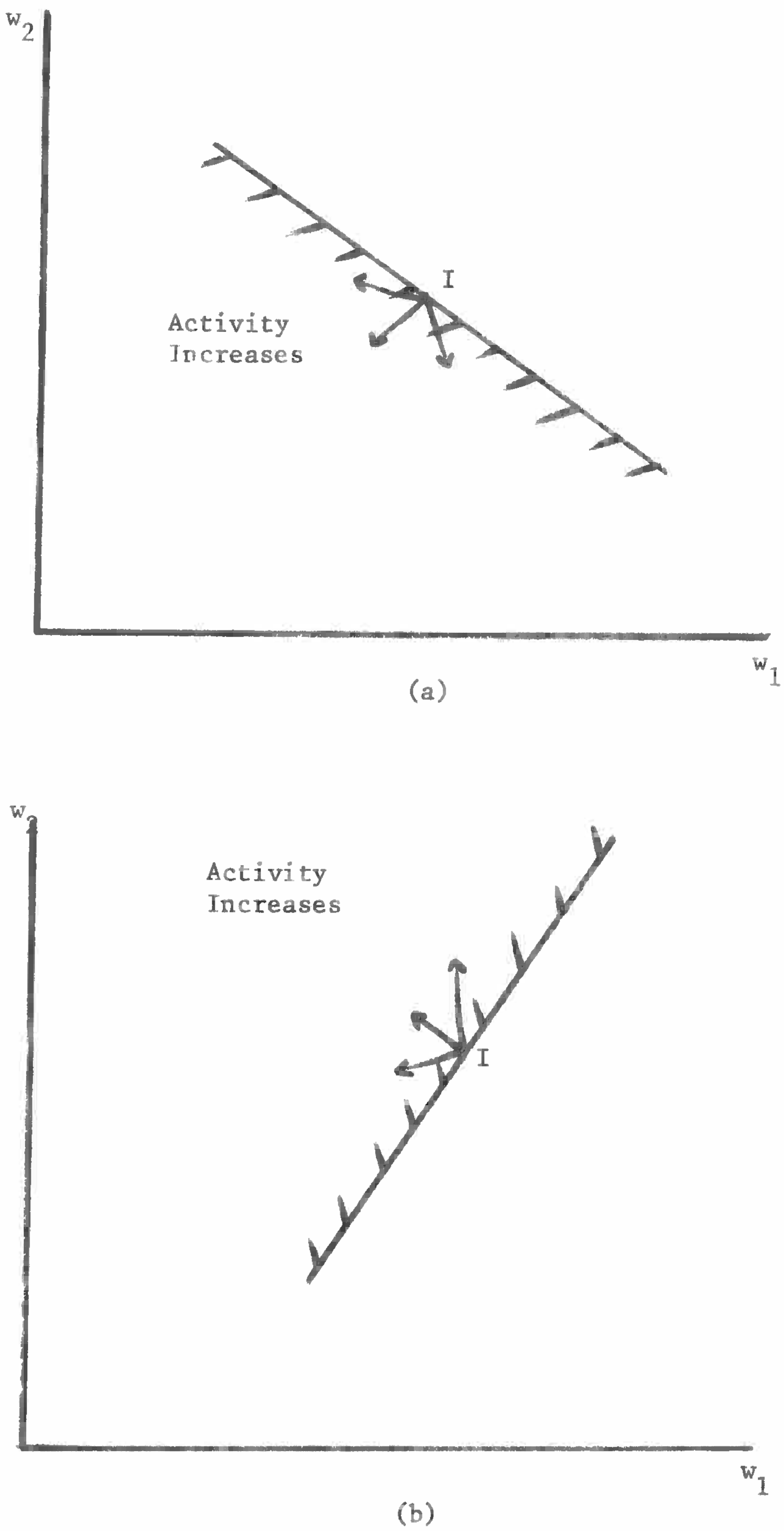

FIGURE 4