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FIXED PRICE EQUILIBRIA IN OPEN ECONOMIES

BERND KOSCH

This paper contains preliminary findings from research work still in progress and should not be quoted without prior approval of the author.

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FIXED PRICE EQUILIBRIA IN OPEN ECONOMIES

by

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ABSTRACT

The present article provides a general framework for the local comparative static analysis of fixed price equilibria and applies it to the discussion of a general aggregated two country model of international trade. The model, which can be seen as a generalization of existing fixed price models and also of the standard Keynesian textbook model, is analyzed for the cases of fixed and flexible exchange rates and with respect to parameter variations which have been focussed on before by the new microeconomic approach to macroeconomics or by the traditional open economy macroeconomics. It turns out that most of the closed economy results which are obtained on the basis of a macroeconomic model with microeconomic foundations carry over to the case of an open economy. Several results in monetary trade theory, however, can be distinguished as special cases of a more general approach.

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1. INTRODUCTION

In recent years several macroeconomic models have been produced which are supposed to form the beginning of a rigorous microeconomic foundation of macroeconomics. In particular the approach of Malinvaud [1977], who has shown that the different disequilibrium configurations Barro and Grossman [1976] had introduced on the basis of Clower's dual decision hypothesis can be regarded as special types of non-Walrasian equilibria in the sense of Benassy [1975] or Dreze [1975], is widely accepted as the starting point for an integration of micro- and macroeconomic theory.

Numerous extensions have been developed on the basis of Malinvaud's model. Muellbauer and Portes [1978] provided a symmetric treatment of consumers and producers with respect to intertemporal choice and Dixit [1978] extended the analysis to the case of a small open economy. Other issues in relation to international trade were discussed by Neary [1978] and Steigum [1978] and in their integrated approach to pure and monetary trade theory Dixit and Norman [1980] analyzed international equilibria in a two-country model. Up to now there has been, however, no complete discussion of the set of fixed-price equilibria in a two-country world based on the general symmetric Malinvaud/Muellbauer/Portes model.

Of course the analysis of any type of equilibrium arising in such a model should be possible on the basis of the existing literature. But since the number of different equilibrium configurations in a fixed-price model increases
rapidly when the number of markets is enlarged the consecutive treatment of any one equilibrium type does not yield a really satisfying result. The large variety of multiplier expressions that are obtained for the $2^n$ possible situations with $n$ markets confuses the analyses and has generated some doubts about the validity of the fixed price method as such.

The present paper provides a technique which enables a direct connection of two-country phenomena to closed economy results without explicit reference to the types of equilibria in question. Such a technique has two important aspects. On the one hand it reduces the size of the computational procedure to the analysis of a single system of equations—in fact the distinction of different types of equilibria is redundant at that stage. On the other hand it allows one to focus on trade issues by making implicit use of the disequilibrium analysis that has already been worked out in detail for the closed economy case and which can in this context be largely abstracted from. Therefore, this technique enables a very general analysis of trade issues in a non-Walrasian equilibrium context and a clear cut distinction between phenomena which refer to either the fact that the economy is open or to the fact that the economy is in a non-Walrasian situation or which are brought about by a particular type of constraint configuration, exchange rate system or rationing mechanism.

2. FIXED PRICE EQUILIBRIA IN MACROECONOMIC MODELS

Any macroeconomic equilibrium is defined by the condition of overall market clearing—in each market demand should equal supply. In the present context of non-Walrasian prices it is not the notional quantities that matter. Instead the effective demands and supplies which are formed on the basis of perceived
constraints have to match in an equilibrium. Given a set of effective demands and supplies, a fixed-price equilibrium, in the sense of the definition of an equilibrium under price rigidities by Drèze [1975] but expressed on a macroeconomic level, is characterized by the following two conditions:

i) One-sidedness of rationing: only the long side of each market faces a binding quantity constraint in the commodity traded there;

ii) Market clearing for all commodities.

This means that the quantity exchanged in any particular market represents a constraint for one market-side (maybe a non-binding one) and is equal to the effective quantity of the other market side. In other words, without reference to a particular constraint configuration an equilibrium is characterized by the condition that the quantity actually exchanged and the effective quantity, which may be defined as the minimum of effective demand and supply, are equal in each market. This means that all equilibrium quantities are given as a fixed point of a mapping which is represented by a suitable set of effective demand and supply functions. This representation is invariant with respect to local parameter variations.

In a model with \((n+1)\) commodities, indexed \(0, 1, \ldots, n\) where the index 0 refers to money, and with monetary exchange the equilibrium quantities \(x_1, \ldots, x_n\) of the non-money commodities have a local characterization of the form
(1) \[ X_1 - X_1(x_2, x_3, \ldots, x_n; \alpha) = 0 \]
\[ X_2 - X_2(x_1, x_3, \ldots, x_n; \alpha) = 0 \]
\[ \vdots \]
\[ X_n - X_n(x_1, x_2, \ldots, x_{n-1}; \alpha) = 0 \]

where \( X_i: \mathbb{R}^n \to \mathbb{R} \) (i=1,...,n) are effective demands and supplies, the representation of which does not change with respect to local variations of \( \alpha \) which may be regarded as any parameter of the model on which the comparative static analysis is to focus. Due to condition (i) \( X_i \) does not depend on \( x_i \). The symbols \( X_i \) can be understood as variables in the function space \( \zeta(\mathbb{R}^n, \mathbb{R}) \) and comparative statics may be carried out on the basis of the system (1). This analysis will not immediately yield the desired multipliers: instead the result will be an expression in terms of partial derivatives of these variables \( X_i \): Such an expression will be called a multiplier-structure. Reference to a certain type of equilibrium means replacement of the \( X_i \) by concrete demand and supply functions according to the respective constraint structure. This procedure may be postponed until the stage of interpretation of the derived multiplier (structures) is reached.

For illustration take the basic three commodity closed economy model and let \( \lambda, c \) denote the equilibrium quantities on the labor and the goods market respectively. The effective quantities are defined as \( X_\lambda \) and \( X_c \). Then (1) takes the following form

(2) \[ c - X_c(\lambda, \alpha) = 0 \]
\[ \lambda - X_\lambda(c, \alpha) = 0 \]

which is easily reduced to

(3) \[ \lambda - X_\lambda(x_c(\lambda, \alpha), \alpha) = 0 \]
From (3) one obtains the following multiplier-structure for the equilibrium employment level (the second subscript indicates a partial derivative):

\[
\frac{d\dot{k}}{d\alpha} = \frac{X_{\dot{c}\alpha} + X_{\dot{c}c} \frac{X_{c\alpha}}{1 - X_{c\dot{c}}} \frac{X_{c\alpha}}{X_{c\dot{c}}}}
\]

These expressions are well-defined if the following condition is satisfied

\[
X_{c\dot{c}}, X_{c\alpha} \in [0,1)
\]

which also guarantees the global uniqueness and stability of the solution to (2) (see Kosch [1982]).

In this model four equilibrium types can be distinguished:

K) Keynesian unemployment
C) Classical unemployment
I) Repressed inflation
U) Underconsumption

Using the notation

\begin{align*}
g & \quad \text{government spending (exogenous)} \\
D^c(\dot{c},\alpha) + g & \quad \text{effective demand for goods} \\
D^c(c,\alpha) & \quad \text{effective demand for labour} \\
S^c(\dot{c},\alpha) - g & \quad \text{effective supply of goods} \\
S^c(c,\alpha) & \quad \text{effective supply for labour}
\end{align*}

the functions \( X_c \) and \( X_{\dot{c}} \) take the following forms
(6) 

<table>
<thead>
<tr>
<th>Equilibrium type</th>
<th>X_c</th>
<th>X_l</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>$D^c + g$</td>
<td>$D^l$</td>
</tr>
<tr>
<td>C</td>
<td>$S^{c*} - g$</td>
<td>$D^{c*}$</td>
</tr>
<tr>
<td>I</td>
<td>$S^c - g$</td>
<td>$S^l$</td>
</tr>
<tr>
<td>U</td>
<td>$D^{c*} + g$</td>
<td>$S^{c*}$</td>
</tr>
</tbody>
</table>

where the superscript "*" indicates notional quantities. From now on we use these specifications and the following assumptions about the qualitative dependence of the above functions on the exogenous parameters:

- $p$: price level in the goods market
- $w$: wage rate
- $m$: initial money holdings of consumers
- $h$: initial money holdings of producers
- $q$: initial stocks of goods

where "\(+\)" means "increasing with respect to this parameter", "\(-\)" means "decreasing with respect to this parameter" and "\(0\)" means independence.

(7)

<table>
<thead>
<tr>
<th></th>
<th>$g$</th>
<th>$p$</th>
<th>$w$</th>
<th>$m$</th>
<th>$h$</th>
<th>$q$</th>
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<tbody>
<tr>
<td>$D^c + g$</td>
<td>$+$</td>
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<tr>
<td>$D^{c*} + g$</td>
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</tr>
<tr>
<td>$D^l$</td>
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<td>$+$</td>
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<tr>
<td>$D^{c*}$</td>
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<tr>
<td>$S^c - g$</td>
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</tbody>
</table>
These assumptions can be based on choicetheoretic considerations (see, e.g., Böhm [1980]). Combining (4), (6) and (7) gives the qualitative comparative statics of this model. For instance the response of the equilibrium employment level to a rise in the consumers' initial money holdings can be calculated as (additional subscripts indicate partial derivatives):

\[ \frac{dL}{dm} = \frac{0 + D^cD^m}{1 - D^cD^m} > 0 \]  

(8)

\[ \frac{dL}{dm} = \frac{0 + 0 D^m}{1 - 0} = 0 \]  

(9)

\[ \frac{dL}{dm} = \frac{S^l + S^m}{1 - S^c S^m} < 0 \]  

(10)

\[ \frac{dL}{dm} = \frac{S^m + 0}{1 - 0} < 0 \]  

(11)

The complete qualitative comparative statics of local parameter variations for this model is given in the following table:

\[
\begin{array}{c|cccc}
\frac{dL}{d\alpha} & K & C & I & U \\
p & -1 & + & + & + \\
w & -2 & - & +2 & + \\
m & + & 0 & - & - \\
h & + & + & - & 0 \\
q & - & - & + & 0 \\
g & + & 0 & - & 0 \\
\end{array}
\]

\footnote{Under the assumption of a sufficiently large own-price effect on the goods market.}

\footnote{Under the assumption of a sufficiently large own-price effect on the labor market.}
3. A TWO-COUNTRY MODEL

For the analysis of problems that arise in the context of international trade the approach described so far has to be slightly generalized. As Dixit and Norman [1980] pointed out, International Trade Theory should be regarded as general equilibrium theory for a system of markets in hierarchical structure: there are international markets and national markets (and maybe regional markets and so on) and the focus on their interactions is the very nature of trade theory. In a macroeconomic model this means however that not all market sides can be aggregated up to a single agent. In this respect and for the definition of external balance the model has to be enlarged, before the comparative statics of open economies may be considered.

3.1 International Equilibria

The model we shall consider here is the most straightforward generalization of the closed economy approach. All agents behave in the same way as they would if the economy was closed, they have no possibility to hold foreign money or to enter the foreign labor market. Only the goods market is international and there the exchange is coordinated by suitable central bank operations according to the exchange rate system. Therefore the agents need not pay attention to the fact that the economy is open, and this in turn means that the functions (7) are suitable representations of the agents' actions in all countries. From now on symbols which refer to the foreign country are written in capital letters, those which refer to the home country or to the world economy as a whole are denoted by small letters.

p and P are the prices of goods expressed in domestic and foreign currency respectively, e is the exchange rate defined as the price of one
unit of foreign money expressed in units of domestic money. We assume, of course, purchasing power parity

\[ p = eP \]

which implies that for a change in the exchange rate the following condition holds \( p = e = P = 1 \) without loss of generality.

\[ dp = de + dP. \]

In this context the additional assumption

\[ \frac{dp}{de} = 1 - \frac{dP}{de} \in [0,1] \]

seems natural. It says that those price changes which occur as a result of a change in the exchange rate have the sign which is necessary to restore (13). Of course equiproportionate price changes can be analyzed as well.

If there is more than one agent on a market side which faces a binding quantity constraint the model has to include a rule according to which the equilibrium quantity in this market is split into individual quantities which form constraints for the single agents. Since there is no theoretical foundation for such a rule, it should be as general as possible.

We, therefore, choose to define the equilibrium quantities of goods for the two countries as \( b,B \) satisfying

\[ b = b(c,C); B = B(c,C), \quad b_i = 1-B_i \in [0,1] \quad (i=c,C) \]

where \( b \) refers to the home country and \( B \) to the foreign country and \( c,C \) denote the equilibrium quantities of goods which are expressed as effective quantities in the home and foreign countries respectively. \( (b,B) \) should not
be confused with a rationing scheme which could, of course, in general not be
defined as a function of $c, C$ alone. Equation (16) simply says that the
equilibrium quantity of goods which forms the constraint for the long
market-side is split in such a way that--comparing two equilibria--a higher
value of the total constraint, resulting from an increase in $c$ or $C$, cannot
be compatible with a lower individual constraint for one country. One
would expect such a situation to be the result of a very wide class of
rationing mechanisms.

In the present model there are three non-money commodities: goods,
domestic labor and foreign labor. Therefore there are 8 different types
of equilibria. Using the terminology of the previous paragraph they can
be denoted by

$$
\begin{array}{cccc}
K-K) & C-C) & I-I) & U-U) \\
K-U) & C-I) & I-C) & U-K)
\end{array}
$$

where the first symbol refers to the state of the home economy and the
second to that of the foreign one.

The equilibrium in a two-country world can now be described by the
following system of equations which corresponds to (2) in the closed economy
case

$$
\begin{align}
(17) & \quad (b + B) - (X_c(A, \alpha) + X_c(L, \alpha)) = 0 \\
& \quad \phi - X_c(b, \alpha) = 0 \\
& \quad L - X_c(B, \alpha) = 0
\end{align}
$$

where $b, B$ are given by functions satisfying (16). This system forms the
basis for the local comparative static analysis of the response of the two
countries' employment levels to parameter changes. The balance of trade is locally described as

(18) \[ z = \sigma p(x_c - b(c,C)) \]

where

\[ \sigma = \begin{cases} 
1 & \text{in all states with rationing of the supply of goods} \\
-1 & \text{in all states with rationing of the demand for goods} 
\end{cases} \]

3.2 Comparative Statics

The system (17) and equation (18) form the basis of the following analyses. The parameters \( \alpha \), the variations of which are focussed on, are the same as those of the closed-economy model, the only new feature in this respect is the analysis of a change in the exchange rate. This implies different price changes in the two countries.

3.2.1 Fixed Exchange Rate

In a fixed exchange rate regime the comparative statics of the two countries' employment levels is based on (17); the external balance can be analyzed on the basis of (18) and the internal balance results.

Differentiation of (17) gives

(19) \[
\begin{bmatrix}
1 - x_L c b x_c c_L & -x_L c b x_c c_L \\
-x_L b x_c c_L & 1 - X_L b x_c c_L \\
\end{bmatrix}
\begin{bmatrix}
d\lambda \\
dL \\
\end{bmatrix}
= \begin{bmatrix}
x_L \alpha + x_L (b c x_c + b c x_c) \\
x_L \alpha + X_L (b c x_c + b c x_c) \\
\end{bmatrix} \, d\alpha.
\]

The determinant of this system is
\[ \Delta = 1 - x_{Lc} b_{c} c_{Lc} - X_{Lc} B_{c} X_{cL} + (B_{c} - B_{c}) x_{Lc} b_{c} c_{Lc} X_{cL} \]

Global uniqueness and stability of the equilibrium follows from the conditions (see Kosch [1982])

\[ 1 - x_{Lc} x_{cL} > 0, \quad 1 - X_{Lc} X_{cL} > 0 \quad \text{and} \quad \Delta > 0 \]

which will be satisfied if all effective demands and supplies are sufficiently inelastic with respect to changes in quantity constraints. From (19) the following multiplier-structures are easily calculated

\[ \frac{d\Delta}{d\alpha} = \frac{1}{\Delta} ((x_{Lc} + x_{cL} (b_{c} x_{cc} + b_{c} x_{cc})) (1 - X_{Lc} B_{c} X_{cL}) + (X_{Lc} + X_{cL} (B_{c} x_{cc} + B_{c} x_{cc})) x_{Lc} b_{c} X_{cL}) \]

\[ \frac{dL}{d\alpha} = \frac{1}{\Delta} ((x_{Lc} + x_{cL} (b_{c} x_{cc} + b_{c} x_{cc})) (1 - x_{Lc} b_{c} x_{cL}) + (x_{Lc} + x_{cL} (b_{c} x_{cc} + b_{c} x_{cc})) X_{Lc} B_{c} x_{cL}) \]

These general expressions are interesting only in so far as they show that there is no qualitative difference between domestic and foreign agents with respect to the system's response to changes in their separate effective demands and supplies. Regarding the structure of this model and remembering some standard results of monetary trade theory for the case of the equilibrium type K-K this should not be surprising.

Parameter changes which have a direct influence only on domestic residents are described by the following multiplier-structures
\[ \frac{d\dot{\lambda}}{d\alpha} = \frac{1}{\Delta} \left[ x_{c\alpha} x_{cL} (b_c x_{cL} x_{cL} + b_c (1 - x_{cL} x_{cL})) + x_{\alpha\alpha} (1 - x_{cL} b_c x_{cL}) \right] \]

\[ \frac{d\lambda}{d\alpha} = \frac{1}{\Delta} \left[ x_{c\alpha} + x_{\alpha\alpha} x_{c\alpha} x_{cL} B \right]. \]

Comparing (24) and (4) shows that the two primary effects \( x_{c\alpha} \) and \( x_{\alpha\alpha} \) enter into the open-economy multipliers qualitatively in the same way as into the closed-economy multipliers in the following sense: The only difference between (4) and (24) consists in the size of the non-negative weights associated with these primary effects. This means that all qualitative comparative static results which are uniquely determined in the closed economy are also valid in the open economy under a fixed exchange rate regime—whatever the state of the foreign country may be. Therefore table (12) is also valid in this case.

Comparing (24) and (25) shows that the same assertion applies to the foreign country as well. The effect on the foreign employment level always has the same direction as the domestic one when a parameter change occurs in the home country. If \( X_{cL} = 0 \), i.e. if the foreign country is in a state of type C) or U) then of course the foreign employment level is not affected; the general result is that the only difference between (4), (24) and (25) consists in the different non-negative weights of the primary effects.

Table (12) is valid for the world as a whole and for any single country.

Those parameter changes which cause primary effects that influence all multipliers in opposite directions may of course have different qualitative results in open and closed economies and (24) shows which factors cause the relative importance of the different primary effects to change as compared with the case of a closed economy.
The role of foreign repercussions becomes very clear in (24) too. As far as a comparison of multipliers for different equilibria makes sense, (24) shows that the well-known results for K-K type equilibria apply to any other two-country, fixed price equilibrium and any uniquely determined multiplier effect.

For the separate primary effects the following inequalities hold:

\[
\frac{x_{Lc}}{1 - x_{Lc} c_{c_L}} \leq \frac{x_{Lc}(1 - X_{Lc} B_{c_L} X_{c_L})}{1 - x_{Lc} c_{c_L}} (\text{small country, } X_{Lc} = \text{const.})
\]

\[
\leq \frac{x_{Lc}(1 - X_{Lc} B_{c_L} X_{c_L})}{1 - x_{Lc} c_{c_L}} (\text{general structure})
\]

\[
\leq \frac{x_{Lc}}{1 - x_{Lc} c_{c_L}} (\text{closed economy, } b_{c_L} = B_{c_L} = 1)
\]

Let us now turn to the balance of payments reaction on parameter changes in the two countries. The general multiplier-structure is

\[
\frac{\Delta z}{\Delta} = (x_{Lc} c_{Lc} + x_{c_L})(1 - X_{Lc} X_{c_L}) b_{c_L}
\]

\[-(x_{Lc} c_{Lc} + x_{c_L})(1 - X_{Lc} X_{c_L}) b_{c_L}
\]

It is obviously very closely related to (4) and is amenable for direct interpretation. Formula (27) is a weighted difference of primary effects occurring in the home and the foreign country respectively and the weights have the same sign. This gives rise to the following conclusion: Any disturbance which is associated with only primary effects in the home country having the same sign leads to a change in the balance of trade surplus which is described by (12) in all equilibria with excess demand in the goods market whereas the opposite result applies to all other equilibria. A similar
argument applies to foreign disturbances and to opposite primary effects in both countries.

For the analysis of the effect of a devaluation (27) may be transformed into

$$\frac{dz}{de} = \frac{\sigma}{\Delta} \left( (x_p x_{cL} + x_{cp})(1 - X_{cL} X_{Lc})^b c p' \right. $$

$$\left. + (X_{pL} X_{cL} + X_{cp})(1 - x_{cL} x_{cL})^b c p' \right) + zp'$$

This expression shows that a devaluation will always improve the balance of trade if both countries are characterized by (12) and if a possible existing initial deficit is sufficiently small. This result is of course important for the subsequent analysis of the flexible exchange rate case which would not be well-defined otherwise.

3.2.2 Flexible Exchange Rate

In a flexible exchange rate regime the system (17) has to be augmented by another equilibrium condition which determines the exchange rate. Since the present approach abstracts from financial capital movements, it seems appropriate to define e by

$$z = 0$$

It should however be mentioned that the derived results would not change if in (29) 0 were replaced by an arbitrary constant which is large enough to guarantee $\frac{dz}{de} > 0$.

Differentiation of this enlarged system gives
Given the assumptions made so far, the determinant of this system, 

\[
\Gamma = \sigma (x_{cP} + x_{dP} x_{cL}) b_c (1 - x_{cL} x_{Lc}) p' - \sigma (x_{cP} + x_{LP} x_{cL}) b_c (1 - x_{cL} x_{Lc}) p',
\]
is positive and the equilibrium is globally unique and stable. Therefore the analysis is well-defined.

Let us first concentrate on the external balance and calculate the multiplier-structure for the exchange rate. Applying Cramer’s rule to (30) gives

\[
\frac{de}{d\alpha} = \frac{\sigma}{\Gamma} [(x_{c\alpha} + x_{d\alpha} x_{cL}) b_c (1 - x_{cL} x_{Lc})
- (x_{c\alpha} + x_{LP} x_{cL}) b_c (1 - x_{cL} x_{Lc})]
\]

which is, of course, closely related to (28) and, therefore, needs no further comment.

As usual, the internal balance multipliers can be obtained by direct calculation or by using the identity

\[
\frac{d\xi}{d\alpha} \bigg|_{flex} = \frac{d\xi}{d\alpha} \bigg|_{fix} + \frac{de}{d\alpha} \bigg|_{fix} \frac{de}{d\alpha} \bigg|_{flex}
\]
this gives

$$\frac{d\Lambda}{d\alpha} = \frac{\sigma}{\Gamma} \left( x_c \alpha (B \left( 1 - X_{Lc} X_{cL} \right) X_{cp} \lambda - b_c (X_{cL} X_{LP} + X_{cp} \lambda) \lambda' \right)$$

$$- X_{cp} ((8_c (1 - X_{Lc} X_{cL} X_{cp}) \lambda' - b_c (X_{cL} X_{LP} + X_{cp} \lambda' X_{cP} \lambda'))$$

$$(- X_{cp} ((8_c (1 - X_{Lc} X_{cL}) X_{cp} \lambda' - b_c (X_{cL} X_{LP} + X_{cp} X_{cP} \lambda'))))$$

$$\frac{dL}{d\alpha} = - \frac{\alpha}{\Gamma} c (x_c x_{Lc} \alpha + x_{cp} (X_{LP} + X_{Lc} X_{cp}) \lambda'$$

Despite a certain algebraic complexity, the previous comments on (24) and (25) apply to (33) and (34) as well. Compared with (4) no sign of the primary effects $x_c \alpha$ and $x_{cp}$ will be reversed in these expressions. Therefore, also in these cases, the comparative statics of domestic disturbances are described by (12). One might, therefore, argue that the price rationing entailed by the flexible exchange rate system shows no qualitative difference to the purely quantitative rationing under fixed exchange rates. Given this result the question arises as to whether there are clear-cut quantitative differences in the multipliers corresponding to the alternative exchange rate regimes. The answer to this question is "no". Obviously (33) and (34) crucially depend on the exogenous specification of $\lambda'$ and $\lambda'$. Only special cases may be considered. If a small country is defined by the condition $\lambda' = 1$ then of course $\frac{dL}{d\alpha} = 0$ but even then the response of domestic employment depends on $x_{cp}$ and $x_{cp}$ and a comparison of multipliers gives no clear-cut results, unless specific assumptions are made with respect to these derivatives.
4. A REMARK ON THE GENERALITY OF THE ANALYSIS

The analysis carried out in this paper is of course severely limited by the assumption that there is only one traded good. It should, however, be pointed out clearly that this is the level of generality which non-Walrasian theory of international trade, usually called "monetary theory" or "open economy macroeconomics", has focussed on here to fore. The standard two-country model, although often named differently, is in fact a one-good model and therefore a particular special case of the present approach.

If we drop the separate consideration of a labor market in each country by setting $x_{Ac} = x_{cA} = X_{cL} = X_{Lc} = 1$ and call $\ell, L$ "national incomes" or "quantities of products which the respective countries are specialized in" then for $b : = b_1(c) + b_2(c)$, $B : = B_1(c) + B_2(c)$ the functions $b_1, B_1$ may be regarded as "consumption functions" and $b_2, B_2$ as "import demands" as long as we focus on K-K type equilibria only. In fact the usual assumption of complete specialization in production makes a two-good world a one-good world as long as only Keynesian states are analyzed.

One major difference between the present approach and the standard model is the treatment of rationing mechanisms. Whereas it is common in the literature to use ad-hoc constructions to make rationing dependent on the parameters which are varied, this analysis did not depend on such an argument at all. It would of course be easy to incorporate such a dependence, the usual analysis suggests that $b, B$ might, for instance, depend on the exchange rate. At first glance it may seem surprising that the normal balance of payments reaction which was shown before does not depend on any assumption of this type.
5. **A GRAPHICAL REPRESENTATION**

The following diagram shows a situation with either excess demand or excess supply on the labor market of the home country. In a situation with unemployment in the domestic economy, four different equilibrium configurations are possible; two of them entail a state of classical unemployment at home which is not very interesting to analyze graphically, since there are no spillovers in the domestic economy, which behaves almost as if it was closed. In an equilibrium of type K-K a curve \((b,B)(c)\) in the \((b,B)\)-plane can be defined by

\[
\{(b,B) \in \mathbb{R}^2_+ | \exists c \in \mathbb{R}_+ : b(c,C) + B(c,C) = c + C\}
\]

where \(c \in \mathbb{R}\) is given. This curve shows the equilibrium levels of \(b, B\) which are compatible with a domestic effective quantity level \(c\) as far as rationing is concerned. Varying \(c\) on \(\mathbb{R}_+\) we obtain a graph \((b,B)\) which is upward sloping, maybe with a slope equal to zero or infinity.

A second curve \((x,X)\) is defined by

\[
\{(b,B) \in \mathbb{R}^2_+ | x_c(x_L(b,\alpha),\alpha) + x_c(x_L(B,\alpha),\alpha) = b + B\}
\]

where \(\alpha\) is a given parameter. This curve shows all equilibrium levels of \((b,B)\) which are compatible with goods market equilibrium. A third curve \((z,Z)\) defined by

\[
\{(b,B) \in \mathbb{R}^2 | x_c(x_L(B,\alpha),\alpha) = B\}
\]

showing all levels of \((b,B)\) which are compatible with external balance for the foreign country. A fixed price equilibrium with the additional property \(z = 0\) is an intersection of all three curves like (I), if \(z \neq 0\) the equilibrium is an intersection of \((b,B)\) and \((x,X)\) which lies above \((z,Z)\) if \(z < 0\) (if \(z > 0\) in an equilibrium with excess demand for labor at home).
First look at a parameter change under fixed exchange rates which directly affects only the home economy. If $x_c^t$ or $x_d^t$ shifts upward then $(x,X)$ is shifted upward too whereas $(b,B)$ does not move at all. The new intersection (II) of these two curves shows a level of $B$ which is, because of $x_c^t X_{ac} < 1$, incompatible with balance of payments equilibrium. We therefore see:

- The rationing levels of both countries have increased.
- The balance of payments of the home country shows a deficit (a surplus in equilibria with excess demand for labor at home).

The curves $(b,B)$, $(x,X)$, $(x,b)$ show the final state under fixed exchange rates; in a flexible exchange rate system this is the starting point for exchange rate adjustment leading to an equilibrium with $z = 0$. 
A rise in the exchange rate causes $p$ to rise and $P$ to fall. The movement of $(\bar{x}, \bar{x})$ is therefore not clear but since the equilibrium under flexible exchange rates is always the intersection of all three curves we may concentrate on $(b, B)$ and $(x, b)$ in order to gain insight into the qualitative behavior of the system. $(x, b)$ is obviously shifted upward into a position $(\bar{x}, \bar{b})$ and $(b, B)$ is again unaffected. So we conclude that, wherever the final intersection of all curves $(\bar{x}, \bar{x}), (\bar{x}, \bar{b})$ and $(b, B)$ may be, the levels of $b, B$ must both be higher than in the initial position (I) whereas no general statement can be made with respect to their relation to (II).

The relation of the movements in $(b, B)$-space to those in $(\lambda, L)$-space is given by

$$(\lambda, L) = (x_b(b, \alpha), x_L(B, \alpha)).$$
6. CONCLUSIONS

The analysis of this article has focussed on a new general way of representing fixed price equilibria and on its applications to the comparative statics of a (with respect to this approach) basic two-country model. In this framework several general conclusions can be drawn.

- The nature of those comparative static effects which are uniquely determined with respect to their directions in a closed economy does not change when the closed economy assumption is relaxed and it does not depend on any assumption of a particular type of open economy nor on the exchange rate system.

- There is a general relationship between domestic and foreign effects of parameter changes which are associated with initial effects of the same direction in both countries.

- There is a general relation between internal and external balance effects depending on the type of equilibrium under consideration.

- Quantitative comparisons of multipliers given in the open-economy macroeconomic textbook analysis for fixed exchange rates carry over to different types of non-Walrasian equilibria. However, no general comparison between fixed and flexible exchange rates is possible in this respect. This means of course that existing statements with respect to the latter comparisons are based on, maybe hidden, special assumptions.

In the light of this analysis it becomes clear which results may be derived from particular assumptions, the remaining question is, whether this framework with its minimal commodity space is restrictive itself. In an analysis of the
general n-good case Kosch [1982a] has demonstrated that this question must be answered with a clear "yes" with respect to nearly all conclusions drawn above. Therefore the present framework may be taken as a general framework for an analysis in which a different reasoning suggests that there is no doubt about the justification of the use of a completely aggregated model.
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