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UNEQUAL EXCHANGE AND NORTH-SOUTH UNEMPLOYMENT

I. Introduction

The issue of unequal exchange lies at the heart of economic interaction between the richer and poorer groups of nations of the world, (whom we shall refer to as North and South, respectively). Many of the issues, arising out of North-South interaction, were discussed in the works of Prebisch (1950), Singer (1950) and Lewis (1954). Indeed, these ideas can be traced back even further, Naoroji (1901), for example. The common theme running across all of these works is the notion of asymmetrical interdependence between North and South, where the North wields the greater economic power. The term 'unequal exchange' was popularised by Emmanuel (1972), who spoke of it in the context of real wages being higher in the North than in the South. These and other issues pertaining to unequal exchange were formalised in the celebrated paper by Bacha (1978). The issues of unequal exchange between North and South have been examined in two strands, both *trade-theoretic*. One centers around Prebisch (1950) and Singer (1950), who examine differential effects of productivity changes etc. on the terms of trade, ignoring employment changes, certainly in the North. The other strand, associated with Emmanuel (1972), is principally concerned with unequal exchange arising out of international labour immobility, making for lower real wages in the labour surplus South, than in the North. The purpose of this paper is to re-examine some of the issues related to unequal exchange in the context of a *macro-structuralist* model, a gap in the literature which needs to be filled in the light of some recent stylised facts, mentioned below. It is difficult for trade-theoretic models to incorporate these stylised facts, making them somewhat inappropriate for these purposes.

The major innovation of the above-mentioned macro-structuralist models, with pioneering papers by Taylor (1981) and Kanbur-Vines (1986), is to treat the North in a *Keynesian* fashion. Besides being a major source of asymmetry in North-South interaction, it is a manner in which the North gains greater manoeuvrability over the South. It implies quantity adjust-

^{*)} I have benefited from invaluable comments by Somnath Sen.

ments for the Northern goods markets; but more importantly, it points to the presence of excess capacity or (demand deficient) Keynesian unemployment. In contrast to the trade-theoretic models where the North has full employment, this means the *absence of full employment*, which is the manner in which we propose to treat the North. The existence of unemployment is one of the major stylised features of the North at present, and it creates implications for North-South interaction which are absent from those models which assume Northern full employment, such as Bacha (1978) and Findlay (1980). In recent times unemployment in the North has been observed to co-exist with 'union militancy' and real wage resistance. In the 1980s the power of insiders (those in employment) has, arguably, risen along with unemployment (see Blanchard and Summers, 1987). As we shall see below, the implications for North-South worker solidarity, class conflict within the North and productivity changes in either region are somewhat different once we allow for a North with unemployed resources. Northern welfare is no longer synonymous with the terms of trade or the level of real wages, but we need to focus on output (and employment), as well.

As far as the South is concerned we retain the property of surplus labour in that region. Unlike trade-theoretic models, however, we drop the *assumption of balanced trade in equilibrium*. The stylised facts suggest that the South does run a current account deficit with the North, financed by capital flows (see World Tables, 1983). The debt crisis could have emerged, to some extent at least, out of the persistent current account deficits which the South has (or had to) run with the North (see Murshed and Sen, 1988).

The phenomenon of real wage resistance is a growing feature of the Northern labour market. It implies that the Northern worker is concerned with maintaining a particular standard of living. If the basket of goods consumed contains both Northern and Southern goods, then the cost of living should be expressed in terms of a price index, which is a weighted sum of both goods. We plan to utilise such a price index to express and measure the Northern real wage rate, *unlike trade-theoretic models where the Northern real consumption wage rate is in terms of home goods only*. Moreover, desired levels of real wages in the North when expressed in terms of the prices of both Northern and Southern goods, combined with its analogue on the profit side, the desired level of profits, implies in our model that Southern supply behaviour is *redundant* in determining the equilibrium terms of trade. This is because, in equilibrium, the North-South terms of trade have to conform to the objectives of Northern workers and firms (capitalists), as will be seen below. The South is effectively *decoupled* from the international trading system in our model, as far as terms of trade de-

termination are concerned, although it continues to fully participate in trade. This, in our opinion, is where the real issue of unequal exchange lies. It allows the North to avoid, to some extent, internal class conflict as the flex-price South picks up some of the burden of adjustment.

The rest of the paper is organised in the following manner: section II contains a description of the model employed; section III considers the variations in parameters; and finally section IV concludes.

II. The Model

A. The North

We assume that both regions are specialised in the production of a single aggregate good, although both goods are consumed in each region. The Northern economy follows a Keynesian quantity adjustment mechanism whereby excess demand leads to quantity adjustments. In the South discrepancies between demand and supply lead to classical (Walrasian) adjustments in prices or the terms of trade. This distinction between the North and South is along the lines of the fix-price and flex-price dichotomy proposed by Hicks. It should be noted, that fix-price is taken to imply that the price of the good in question is not demand but cost determined. The nature of the goods market in each region, dictates our choice of the fix-price, flex-price distinction, and is not inconsistent with some primary goods produced in the North and some manufactures produced in the South. In the former case, agricultural support schemes are likely to ensure fix-price conditions; while in the latter case, the costs of holding inventories point to flex-price conditions pervading.

One of the major asymmetries in our North-South model arise out of the fix-price North and a flex-price South. When combined with fixed expenditure patterns in the South (see below) it implies that the South's terms of trade is determined almost solely by Northern demand. Another asymmetry arises out of the fact that the North being Keynesian benefits from an export multiplier, unlike the South.

We begin our description of the Northern economy with the equation describing equilibrium (aggregate demand = aggregate supply) in the Northern goods market, obtained after normalisation by the Northern price level, P_I :

$$Q_I = A(Q_I, P_A) + G + C_S (1-v_S) P_A Q_A + (1-a) P_A R - P_A M(Q_I, P_A) \quad (1)$$

where Q_I denotes Northern output; A , absorption (or consumption); G , autonomous expenditure; $C_S (1-v_S) P_A Q_A$ and $(1-a)P_A R$ are Northern ex-

ts to the South; M , Northern imports from the South; and $P_a = P_A/P_I$, the terms of trade, P_A is the Southern price level. The partial derivatives in (1) are of the following order:

$$1 > A_1 > 0; \quad M_1 > 0; \quad A_1 > P_a M_1 \text{ and } M_2 < 0.$$

It is interesting to note that we have made Northern absorption, A , a function of both income, Q_I and the terms of trade, P_a . The inclusion of the latter is dictated by the presence of the Laursen-Metzler (1950) effect. For a detailed derivation see Laursen and Metzler (1950) and Dornbusch (1980). This effect relies on a concept of real income and real absorption obtained by deflating their nominal counterparts by a price index, which is a weighted sum of the expenditure shares of the prices of the (two) goods which enter the Northern consumption (or absorption) basket:

$$P = P_I^\beta P_A^{1-\beta} \quad (2)$$

where β and $1-\beta$ are the shares of home and Southern goods respectively. A deterioration of the Northern terms of trade, a rise in P_a (or a rise in Southern prices, P_A , holding P_I fixed), implies that real income, $P_I Q_I/P$ declines. Real absorption (consumption), $P_I A/P$, will also fall, *but less than real income*, as the marginal propensity to absorb is less than unity. This in turn, implies excess aggregate demand as absorption in nominal terms increases - a beneficial aggregate demand effect for the North.

By including the Laursen-Metzler effect we bring the terms of trade firmly into the centre of things by giving it due emphasis in the Northern model, instead of solely letting it influence the South, as in most of the literature. More importantly the inclusion of this effect in our model provides a *novel* channel of North-South interdependence by letting the terms of trade *directly* affect Northern aggregate demand. Furthermore, the inclusion of the Laursen-Metzler effect is apposite for our open Keynesian (Northern) economy. In the standard Keynesian model, absorption is usually a function of income only, as the prices of the goods in question, are fixed. This practice needs to be modified when at least one of the goods absorbed is flex-price. Formally, the Laursen-Metzler effect in (1) as $A_2 = M(1 - \xi)$, where ξ is elasticity of absorption with respect to real income, $A_2 > 0$.

We turn now to the question of real wage resistance and the supply of output in the North. Following Dornbusch (1980) and Bacha (1978) we postulate that the Northern firm follows a mark-up pricing rule on costs:

$$P_I = W(1+g)/q \quad (3)$$

where W indicates the money wage paid; $1 + g$ the mark-up factor, g , is the desired profit level; and q denotes labour productivity, the output-labour ratio. As far as firms are concerned, (3), can be viewed as the cost function, they will increase the supply of the Northern good, if the real product wage, W relative to P_I falls. note that this is expressed in terms of domestic (Northern) prices.

As far as workers are concerned, they are interested in a targeted or desired standard of living. As consumers of *both* Northern and Southern goods they will view the cost of maintaining this living standard using (2) above. Their desired real consumption wage is

$$w = W/P \quad (4)$$

As in Dornbusch (1980) we postulate that the real wage demand of workers is not fully exogenous, but includes both a targeted element, w , and a cyclical element whereby the desired real wage rises as actual output, Q_I , approaches its full employment level, Q_F :

$$w = \bar{w}(Q_I/Q_F) \quad (5)$$

where σ is the elasticity of the required real wages demanded by workers with respect to Q_I/Q_F . Substituting (5) into (4) using (2) and finally putting it into (3) gives us:

$$P_a = [(1+g) \bar{w} (Q_I/Q_F)^{\sigma/q}]^{-\frac{1}{1-\beta}} \quad (6)$$

where P_a is the *required* terms of trade consistent with both firms and workers objectives, and the P_a indicated by (6) is the terms of trade which must hold in *equilibrium*.

It should be noted that workers being consumers of both goods, a rise in the cost of purchasing the Northern good, P_I can be compensated for by a fall in P_A , the price of the Southern good, and maintain a constant real wage, w . An exogenous increase in the real product wage (or profit rate) does not lead to a fall in the profit rate (or real wage rate). In our model *Northern output*, Q_I adjusts implying employment changes. This also implies, using (3), a constant share of wages and profits in national income.

B. The South

The equilibrium relation in the Southern goods market is modelled, following Kanbur and Vines (1986) by postulating a linear expenditure system. In other words, total consumption and its division between home and Northern goods are a fixed proportion of income or the value of output. The rationale for fixed propensities are the low levels of income in the South which makes for fixed expenditure patterns in the short-run, proportional to income but invariant to relative price changes. Thus:

$$P_A Q_A = c_S P_A Q_A + P_A R + P_A M (*) - c_S(1-v_S) P_A Q_A - (1-a) P_A R \quad (7)$$

where Q_A is Southern output; P_A the Southern price; R denotes some form of residual expenditure carried out by the Southern government, (described below); c_S , v_S and $1-v_S$ are the fixed consumption propensities, expenditure shares of home goods and Northern goods respectively in the South. Dividing through by P_A and cancelling terms gives:

$$Q_A = c_S v_S Q_A + aR + M (*) \quad (8)$$

We postulate that Southern supply behaviour, implies that output rises with its terms of trade, P_a , and a productivity factor, θ . Thus:

$$Q_A = F(P_a, \theta) \quad F_1 > 0 \text{ and } F_2 > 0 \quad (9)$$

This supply function is consistent with profit maximising behaviour or a mark-up rule.¹ (Southern supply is likely to be more competitive than the North.) Surplus labour in the South fixes the wage rate. This wage rate can be expressed in terms of the Northern price, P_I , in keeping with say, the Bacha model. Our characterisation of Southern supply behaviour has similarities with both strands of unequal exchange analysed in the Bacha model. In Bacha's Prebisch-Singer case, the terms of trade are determined mainly by (Northern) demand factors, which is consistent with our model; also in the Emmanuel variant of the Bacha model, the terms of trade have to conform to profit rate equalisation across regions, similar to the terms of trade having to conform to the desired objectives of both firms and workers in our case. However, *in our formulation*, unlike others, there need not necessarily be class conflict within the North between workers and capitalists (firms). Constant shares of wages and profits in total income, as well as desired real wage and profit levels can be maintained in the North, as long as burdens of adjustment are passed on to flexible Southern prices (or terms of trade). The North with its greater economic power is able to do

this, by varying its demand for Southern goods so as the *desired* terms of trade emerge, *which assists the avoidance of internal class conflict* in the North.

We are left with a problem of closing the model. We have already noted that the equilibrium terms of trade has to be consistent with the objectives of Northern firms and workers. These Northern supply considerations in (6) together with the level of Northern goods market equilibrium in (1) will jointly yield equilibrium values of Q_I and P_a . Consequently, we are left with three equations in two unknowns, Q_I and P_a . A third variable is needed to close the model. A plausible candidate for this role could be some Southern variable such as residual expenditure in the South, R . Another possibility is to cast autonomous expenditure in the North, G , into this role. An endogenous, G , would imply that benevolent Northern governments pick up the slack whenever there is excess supply in the South, and conversely reduce G whenever there is excess demand in the South. Kanbur and Vines (1986), for example, consider the latter case only, i.e. Northern governments reduce G whenever there is excess demand for Southern goods putting upward pressure on the terms of trade. They do this because a rise in the terms of trade via its adverse effect on Northern cost of living, has inflationary consequences for the North. However, G , is not increased to eliminate excess supply in the South in the Kanbur and Vines model, precisely because it is unreasonable to expect Northern governments intervening to counter a fall in the Northern cost of living. Given that our problem of closure arises from the fact that once the equilibrium levels of Q_I and P_a are determined in the model we could still be in a situation where the Southern market is not cleared, the choice of the Southern variable, R , allows us to impose a symmetric closure to our model. In other words R rises (falls) whenever there is excess supply (demand) in the South.

Short-run residual expenditure in the South, R , is what remains of aggregate supply after consumption and the trade balance have been accounted for. Residual expenditure can take the form of government expenditure on home goods and/or some type of investment expenditure. We further postulate that a proportion, a , of R is on home goods and a proportion $(1-a)$ of R is expended on Northern goods, both planning decisions.

Note that the model consisting of (1), (6), and (8) in Q_I , P_a and R is further decomposable into two equations by substituting (8) into (1), after using (9) in (8). Thus, (1) becomes:

$$Q_I = A(Q_I, P_a) + G + c_S(1-v_S)P_a F(P_a, \theta) + (1-a)/a (1-c_S v_S)P_a F(*) - P_a M(*) - P_a M(Q_I, P_a) \quad (10)$$

This leaves us with (10) and (6) as the basic equations of the model in Q_I and P_a , from where we can also solve for R .

Lastly, we do not require the balance of trade (current account) to balance in equilibrium, unlike other models we postulate (in our short-run model) that the South runs a trade deficit with the North, financed (implicitly) by capital flows. Thus $c_s > 1$ in (7) and (8), the extent of the deficit decided by Northern factors - a further asymmetry.

III. Variations in Parameters

In order to proceed we totally differentiate (10) and (6) and arrange them in matrix form:

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} dQ_I \\ dP_a \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \end{bmatrix} \begin{bmatrix} dG \\ d\theta \\ dq \end{bmatrix} \quad (11)$$

where:

$$\begin{aligned} a_{11} &= A_1 - 1 - P_a M_1/a \\ a_{21} &= - \left[\frac{\phi}{1-\beta} Q_I \right] - \frac{\phi-1+\beta}{1-\beta} [Q_F] \frac{\phi}{1-\beta} \left[\frac{(1+g)\bar{w}}{q} \right] - \frac{1}{1-\beta} \\ a_{12} &= c_s(1-v_s)F(1+\gamma) + (1-\alpha)R - \xi M - P_a M_2/a + (1-c_s v_s)F\gamma(1-\alpha)/a \end{aligned}$$

where $\gamma = F_1 P_a / F$, the elasticity of output supply in the South with respect to P_a .

$$\begin{aligned} a_{22} &= -1 \\ b_{11} &= -1 \\ b_{21} &= 0 \\ b_{12} &= -c_s(1-v_s)P_a F_2 - (1-\alpha)/a [(1-c_s v_s)P_a F_2] \\ b_{22} &= 0 \\ b_{13} &= 0 \\ b_{23} &= - \frac{1}{1-\beta} (q) \frac{\beta}{1-\beta} [(1+g)\bar{w}(Q_I/Q_F)^\phi] - \frac{1}{1-\beta} \end{aligned}$$

The trace of the Jacobian will be found to be negative and the determinant positive, $J > 0$, as long as the Marshall-Lerner conditions prevail ($c_s(1-v_s)F(1+\gamma) + 1-\alpha)P - \pi_a M_2 - M > 0$). This is sufficient to ensure the stability of equilibrium in the model.

A. The impact of autonomous expenditure (G) expansion in the North

$$\frac{dQ_I}{dG} = \frac{1}{|J|} > 0 \quad (12)$$

$$\frac{dP_a}{dG} = \frac{a_{21}}{|J|} < 0 \quad (13)$$

In order to obtain dR/dG we refer back to (8), bearing in mind that (9) has been inserted in it and solve for R

$$R = [(1-c_s v_s)F(P_a, \theta) - M(Q_I, P_a)]/a \quad (8')$$

We take the total derivate of (8') with respect to G , this yields:

$$\frac{dR}{dG} = \left[\frac{(1-c_s v_s)F_1 - M_2}{a} \right] \frac{dP_a}{dG} - \frac{M_1}{a} \frac{dQ_I}{dG} \quad (14)$$

Thus, $dR/dG < 0$, using (12) and (13).

The first two results can be depicted in Q_I, P_a space. We first derive an AD curve depicting equilibrium in the Northern goods market. From (11):

$$\frac{dQ_I}{dP_a}|_{AD} = - \frac{a_{12}}{a_{11}} > 0 \quad (15)$$

We derive a RWR curve depicting supply and real wage behaviour in the North:

$$\frac{dQ_I}{dP_a}|_{RWR} = - \frac{a_{22}}{a_{21}} < 0$$

In Figure 1, the rise in G shifts AD to AD' along RWR, implying a higher level of output, Q_I and a lower level of the (Southern) terms of trade, P_a at B.

The effect of an increase in autonomous expenditure, G , in the North is to boost aggregate demand in that region. This excess demand, however, will only be supplied by firms in the North, if the real product wage to them falls, i.e. P_I rises relative to W from (3). Workers will resist a decline in their living standards. They can be compensated for any rise in P_I required by Northern firms, by a decline in Southern prices, P_a , so as to keep their li-

ving standards intact. Hence the equilibrium terms of trade, P_a , decline, as more output, Q_I is supplied in the North. Residual expenditure in the South will have declined, the South unambiguously loses, just as the North unambiguously gains. Output and employment decline in the South, and the reverse occurs in the North. Northern workers are better off, as more of them are employed at the fixed real wage; while employment declines in the South, as well as a decline in residual expenditure on investment and basic needs. Thus, there is a complete absence of worker solidarity across North and South in this case.

Arguably, an overall feature of the post-war period in the international economy, is a steady decline in the Southern terms of trade (with brief upturns), as well as a gradual increase in autonomous or government expenditure in the North.² The North has been able to benefit from unprecedented growth rates in its standard of living. Expansion in the North, in this manner has also managed to avoid class conflict, reconciling conflicting objectives of workers and capitalists aided by the flexibility of the South, as long as the Southern terms of trade adjust downwards. The greater economic power of the North, and its ability to influence the Southern terms of trade (via demand), ensures this most important aspect of 'unequal exchange' between North and South. It is interesting to note that in the absence of real wage resistance in the North, say if the North had fixed money wages, instead; autonomous demand expansion would have benefited the South via improved terms of trade. 'Global Keynesianism' suggested by the Brandt (1980) commission could have worked in the absence of real wage resistance, as both regions would have gained.

B. Productivity improvements in the South

A once for all increase in productivity is caused by an increase in θ , the shift parameter in (9). Its reverse can be construed as a (negative) supply shock:

$$\frac{dQ_I}{d\theta} = \frac{P_a F_2 [(1-c_s v_s)/a - (1-c_s)]}{|J|} > 0 \quad (17)$$

as $c_s > 1$ and $F_2 > 0$.

$$\frac{dP_a}{d\theta} = \frac{a_{21} P_a F_2 [(1-c_s v_s)/a - (1-c_s)]}{|J|} < 0 \quad (18)$$

as $a_{21} < 0$.

$$\frac{dR}{d\theta} = \frac{1}{a} [(1-c_s v_s)^{F_2} + ((1-c_s v_s)^{F_1 - M_2}) \frac{dP_a}{d\theta} - M_1 \frac{dQ_I}{d\theta}] \quad (19)$$

$dR/d\theta$ will be found to be positive. The final outcome in figure 1 at B is once more applicable in this case.

The productivity improvement in the South raises income, Q_A , in that region - causing a greater demand for Northern goods, *Northern income*, Q_I , increases, because of the presence of *spare capacity and the export multiplier* in that region. The terms of trade, P_a , however, decline. This is the standard result, due originally to Prebisch (1950). Residual expenditure, R , however rises in the South.

The Prebischian result as stated in Bacha is not fully borne out by our model. The North gains not merely from an improvement in its terms of trade, but also via a beneficial aggregate demand effect originating in the export multiplier. The South loses, from a decline in her terms of trade as in Prebisch (1950) and Bacha (1978), consequently, output and employment decline in that region. However, the initial rise in output in the South, means that residual expenditure on basic needs and investment increases. This is going to *increase* welfare although not raising employment. We are unable to make unambiguous judgements about Southern welfare, after a productivity improvement in that region, in our model. An (implicit) weighting system will be necessary to measure the loss caused by falling terms of trade; against the rise in welfare due to rising R .

C. Productivity improvements in the North

A rise in labour productivity in the North is measured by an increase in the output-labour ratio, q .

$$\frac{dQ_I}{dq} = \frac{-a_{12} b_{23}}{|J|} > 0 \quad (20)$$

$$aw \ a_{12} > 0; \ b_{23} < 0$$

$$\frac{dP_a}{dq} = \frac{a_{11} b_{23}}{|J|} > 0 \quad (21)$$

$$as \ a_{11} < 0.$$

$$\frac{dR}{dq} = \frac{1}{a} [(1-c_s v_s) F_1 - M_2] \frac{dP_a}{dq} - M_1 \cdot \frac{dQ_1}{dq}] \quad (22)$$

which are using (20) and (21) turns out as:

$$= \frac{b_{23}}{a|J|} [M_1 \{ (Q_1 - A - G)/P_a + A_2 - F_Y (1-c_s) \} + (1-A_1) \{ M_2 - (1-c_s v_s) F_1 \}]$$

The sufficient conditions under which $dR/dq < 0$ are:

$$(1) \quad (Q_1 - A - G)/P_a > 0$$

$$(11) \quad |M_1| > |M_2 + F_1|$$

$$(111) \quad |A_2| > |1-A_1| \text{ or } |A_2 + A_1| > 1.$$

The reversal of conditions (ii) and (iii) will be necessary for $dR/dq > 0$.

An increase in labour productivity in the North, lowers costs of production to firms. Unlike models where there is full employment, the presence of unemployment in our case means that *employment increases* at the desired real wage rates and profit rates. The productivity improvement is not appropriated entirely by any particular group in the North, unlike in the Bacha/Emmanuel paradigms, as in our case the shares of wages and profits in total income remain unchanged. The welfare of Northern workers is enhanced, as more of them are employed at their targeted real wage. This raises aggregate demand and output in the North rises. From equations (3) and (6) describing supply behaviour in the North a rise in productivity, q , lowers Northern prices, P_1 or *increases* the *equilibrium* terms of trade, $P_a = P_A/P_1$, for every required level of profits and real wages. Thus, P_a rises in equilibrium. In figure 1 the rises in Q_1 and P_a are depicted diagrammatically by a rightward shift in the RWR curve to RWR' , along AD as Northern productivity increases. The final equilibrium is at C with higher Q_1 and P_a .

Residual expenditure in the South could fall under certain conditions: condition (i) implies that the North runs a trade balance surplus from equation (1) - this is an empirically plausible condition.

Condition (ii) emphasises that the effects reducing the Northern trade balance surplus should dominate. The rise in income, Q_1 raises Northern imports from the South via M_1 , the marginal propensity to import or the income effect. By contrast, the rise in P_a , discourage imports - the price ef-

fect via M_2 . Similarly, the rise in P_a , encourages imports - the price effect via M_2 . Similarly, the rise in P_a , encourages Southern imports (Northern exports) via F_1 . The first effect tends to reduce the Northern trade surplus, whereas the last two tend to raise it. If the trade balance reducing (M_1) effect dominates - then residual expenditure in the South will decline. Recall, that residual expenditure rises to clear the Southern goods market of *excess supply*. A fall in the Northern trade surplus implies excess demand for the Southern product; implying falling R .

Condition (iii) states that the Laursen-Metzler effect $A_2 = M(1 - \xi)$ needs to be large. A rise in P_a leads to a favourable Laursen-Metzler effect on Northern absorption. The greater is A_2 , the higher the rise in imports of the North, M , and the greater any reduction in its trade balance. Similar trade balance effects result from high values of A_1 , the marginal propensity to absorb (consume) as Q_1 rises.

The celebrated Prebischian result as re-stated in Bacha, says that productivity improvements in the North, benefit the South via improved terms of trade. This is certainly borne out by our model. Southern welfare, however, does not unequivocally rise in our model, as residual expenditure could decline. Our model is, therefore, more *ambivalent* about the fruits of Northern technical progress spilling over to the South.

In discussing the issue of (Emmanuelian) worker solidarity, the Bacha formalisation predicts the absence of benefits to Southern workers, when the fruits of technical progress are appropriated by Northern capitalists (profits). In our below full employment model, both classes in the North benefit from technical progress. The share of wages and profits in total income is unchanged. *Employment rises* in the North, and workers in that region benefit, but not at the expense of profit rates. In the South, employment will rise as its terms of trade improve; but welfare will also decline as residual expenditure falls, leaving the net result unclear. But, there is in this case an *element* of worker solidarity across the regions.

An increase in the desired level of real wages, by Northern workers, w , is like a negative productivity or supply shock. Analytically, the results are similar to those in (20)-(22) with signs *reversed*. In our case, unlike the Bacha/Emmanuel model, the rise in real wages is not at the expense of profit rates. It will lead to a *decline in employment* in the North. Although Northern workers in employment are better off, it is not clear that *workers as a group* will be better off, since some of them are unemployed. The Southern terms of trade decline, but residual expenditure may (or may not) rise. The fall in P_a , lowers Southern employment, but a rise in R raises it. If the employment reducing effects in the South dominate, one can argue, that worker solidarity across North to South does *not exist*, contrary to the predictions of Bacha (1978), but supportive of the postulates of Emmanuel (1972).

IV. Conclusions

We have attempted to re-examine some of the issues related to unequal exchange in the context of a North which has Keynesian unemployment and real wage resistance. We focus attention on Northern as well as Southern employment. Introducing autonomous demand expansion in the North, we find that it *unequivocally* disadvantages the South, while benefiting the North. Productivity improvements in the South, benefit the North as output and employment increase there. But the famous result of Prebisch (1950) as restated in Bacha, is not fully borne out by our model - although the Southern terms of trade decline, residual expenditure increases in that region. The other, equally famous result of Prebisch that Northern productivity improvements benefit the South, is only partially supported by our model in the same manner, as the Southern terms of trade rise, but residual expenditure is likely to fall. There is an element of worker solidarity across the regions, as more Northern workers are employed, and Southern employment could also increase. A rise in the desired real wage in the North will lead to a decline in employment in that region, although workers with jobs are better off. In the South, employment could also decline, at the going Southern wage rate. In a sense, worker solidarity is absent across the regions.

The main thrust of our paper is that the real unequal exchange emanates from the nature of Northern real wage (profit) resistance. The income shares of profits and wages can be kept constant, thus avoiding (Northern) internal class struggle as long as the greater Northern economic power can make the Southern terms of trade bear a major part of the burden of adjustment. The South can become effectively decoupled from the international trading system, as its terms of trade have to conform (in equilibrium) to the objectives of the North (workers and capitalists). This can be the case, even though the South fully participates in the international trading system, passively supplying the Northern market at the required terms of trade.

Finally, it should be noted that as the macroeconomic regime in the North and South change and evolve over the very long-run, the results of North-South interaction could alter.

NOTES

- 1 If we specify a profit function, π for Southern firms of the form:

$$\pi = \pi(P_A, W_S) \quad (A.1)$$

where W_S is the exogenous wage rate in the South. Under the usual assumptions about profit functions, homogeneity of degree 1, etc., the supply function for output is:

$$Q_A = \pi_{P_A} (\pi_{P_A} = \delta\pi/\delta P_A) \\ \text{or, } Q_A = \pi_{P_A}(P_A, W_S) \quad (A.2)$$

Similarly, the demand for labour, is from (A.1):

$$L_S = \pi_{W_S} (\pi_{W_S} = \delta\pi/\delta W_S) \quad (A.3)$$

The demand for labour and supply of output functions are homogenous of degree zero. We can re-write (A.2) (in terms of P_I) as:

$$Q_A = \pi_{P_A}(P_A/P_I, W/P_I) \quad (A.4)$$

We assume W/P_I to be fixed as in Bacha (1978, p.321). Thus:

$$Q_A = F(P_A) \quad (A.5)$$

to which we add a shift/productivity factor θ , from the production function, to obtain:

$$Q_A = F(P_A, \theta) \quad (9)$$

- 2 Government expenditure in the Keynesian North need not be entirely autonomous; it is still expansionary even if met by increased taxation, via the balanced budget multiplier.

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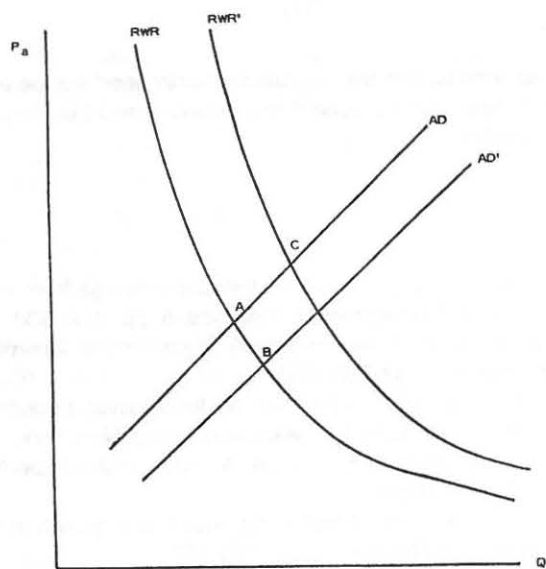


Figure 1

Fatih Birol, Sohbet Karbuz and Hayati Yildiz* AN ATTEMPT TO INTEGRATE ENVIRONMENTAL ISSUES IN FUTURE ELECTRICITY SUPPLY: IN THE CASE OF TURKEY

1. Introduction

Energy as a main input of production activity, plays a crucial role in every economy, particularly in that of developing economies. Empirical analysis show that there is a global interdependence between economic growth and energy consumption.

Only 15% of world primary commercial energy is used in developing countries¹ where 70% of the world population lives. Although this is a small share it is noteworthy that the requirements of these countries will increase at much faster rates than those of the rest of the world. There are several socioeconomic factors behind this expectation (Hoffmann, 1983):

- The developing countries are likely to maintain higher economic growth rates than the rest of the world.
- Rapid economic growth tends to be accompanied by increasing industrial production and urbanization.
- As income levels rise demand for various energy-consuming amenities (automobiles electric appliances etc.) increases.
- Substitution of commercial energy is likely to continue.

Increases in energy consumption are directly tied to increases in the GNP in Turkey. During the critical period of 1973 - 1988 when oil price shocks took place and a series of new economical measures² were introduced (January 24, 1980), the annual growth rates of the GNP and energy consumption were 4.7% and 4.9% respectively.

Electricity consumption on the other hand rose during this same period about two times faster noting an annual growth rate of 9.4%. The reasons for this spectacular increase in electricity consumption can be explained by the following socio-economic developments:

- The increasing share of electricity - intensive technologies in the industry sector.

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