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WAGE FAIRNESS AND INTERNATIONAL TRADE THEORY AND POLICY

by

Jonas Agell and Per Lundborg

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paid by firms. Standard efficiency wage models of this positive relation between wages and labor productivity include the adverse selection, shirking and labor turnover models. However, a growing body of literature also emphasizes the potential importance of "noneconomic" factors relating to fairness and social norms; see e.g. Akerlof (1982), Johnson and Layard (1986), Akerlof and Yellen (1990), Blinder and Choi (1990) and Solow (1990). The distinguishing characteristic of the fair wage–effort approach is an emphasis on the negative incentive effects produced by unjust pay patterns. If workers feel that they get less paid than they ought to, work morale and efficiency deteriorate. We pursue this line of thought, and introduce a version of the fair wage–effort model of Akerlof and Yellen into the standard Heckscher–Ohlin model.

Although the fair wage–effort hypothesis comes in different forms, they all have two building blocks in common. The first is the assumption that workers have some latitude in determining work effort, implying that the production technology allows some variation in work effort. The second is the presumption that effort crucially depends on the relationship between the actual wage and workers' view of a fair wage. If the actual wage falls short of the fair wage, workers supply less effort. If the fair wage exceeds the market clearing one, involuntary unemployment may occur.

Clearly, to turn this common sense idea into more than a tautology, we also need a model of norm formation in the labor market. According to the fair wage–effort hypothesis, workers' perception of a fair treatment is based on a comparison with various reference groups. At the simplest level, workers may compare their own compensation with that obtained by similar groups, consisting of coworkers in the same firm (Akerlof and Yellen, 1990) or of comparable workers in other firms (Summers, 1988).

At a general level, the fair wage may also depend on the compensation obtained by more or less dissimilar production factors. Such inter–group comparisons may actually explain a number of stylized facts observed in labor markets. Allowing the fair wage of unskilled workers to depend on the compensation of skilled workers may explain empirical findings of pay compression across skill groups (Akerlof and Yellen, 1990). Furthermore, should the fair wage depend on the returns accruing to capital owners, the popular notion that wages largely depend on profits and firms' ability to pay makes perfect sense. This is in agreement with the findings of e.g. Krueger and Summers (1987, 1988) that industry wage premiums are correlated with industry profits. In short, bad morale and low productivity may occur if the relative returns to capital and labor deviate from workers' notion of a fair functional distribution of income.[2)] Such ideological considerations are likely to differ considerably across countries and may well change over time. Finally, particularly in agrarian economies in the less developed parts of the world, the fair wage could well depend on the returns to land owners. Indeed, much of the struggle for egalitarianism in for instance Latin America has its roots in concerns for the functional distribution of income in the rural areas. Such fair wage considerations are also consistent with poor utilization of the labor force on this continent.

Adding social norms and notions of fairness to the familiar technology and endowment parameters of the basic Heckscher–Ohlin model generates several new results. Even if countries share the same technology and have similar factor endowments, market wages will in general not equalize across trading countries. Furthermore, there is no longer any simple relation between measures of factor abundance and trade patterns. Trade policy may lead to changes in effort and unemployment such that a country may shift from being abundant in one factor to being abundant in the other.

Due to differences in institutions and in industrial and labor market relations across countries, fairness considerations may well be more important in some countries than in others. For example, in the more egalitarian and union influenced economies in Europe social norms are likely to differ from those in the USA and other less egalitarian societies. We use the model to show how such differences in social norms may explain why terms of trade shocks produce nonuniform adjustments in real wages and unemployment across otherwise similar countries. We also draw conclusions concerning the gains from trade in the presence of social norms. We find that in some cases the gains from trade are magnified while in other losses from trade may occur. Finally, our analysis also lends some support to the laymen view of tariff policy as a way of "protecting jobs". Indeed, in countries where fairness considerations are important, properly devised tariff policy produces an increase in overall employment.

In the next section we formulate our model of the fair wage–effort relationship, and in the subsequent section we embed it in the simple two–by–two Heckscher–Ohlin model. Section 4 explores the implications for international patterns of factor prices and of unemployment. Section 5 turns to the link between trade patterns and measures of factor abundance, and explores the potential gains (losses) from trade. Section 6 examines tariff policies to combat involuntary unemployment, and a concluding section sums up the main findings.

2. A Fair Wage Model.

To allow for a general representation of fairness, we consider a two sector economy using labor, L, and some other production factor, Q, as primary inputs. We may think of Q as representing some additional labor category, capital or land. The preceding arguments then suggest a fair wage–effort relationship of the form

$$e = e(\frac{w_i}{w}, \frac{w_i}{q_i}, u), \tag{2.1}$$

where e is the supply of effort of the representative worker in firm i.[3] We assume effort to be homogeneous of degree zero in absolute factor returns; what matters for the conception of fairness is relative factor returns. Effort depends positively on the wage in firm i relative to the average wage level in the economy, w_i/w. Effort also depends positively on the wage w_i relative to the compensation q_i of the other, "dissimilar", production factor employed by the firm. This argument implies that workers are concerned with the firm's spending of its total value added. To the individual firm, aggregate unemployment, u, operates as an exogenous shift factor; for given factor return ratios, an increase in the unemployment rate provides the representative firm with a windfall effort gain. A similar link between effort and unemployment appears in a number of efficiency wage models. In a fair wage setting, we may think of a high unemployment rate as making workers more "grateful" to be employed, which improves work morale and effort.

To ensure an interior solution of the implied efficiency wage problem of the firm, we assume that e is negative whenever w_i is zero. Also, a unique optimum wage requires effort to be a continuous strictly concave function of its first two arguments; i.e. $e_{11}, e_{22} < 0$. For analytical convenience we will sometimes assume that the effort function is separable in its three arguments; i.e. $e_{12} = e_{13} = e_{23} = 0$.

Equation (2.1) is crucial to the firm's optimization problem. We assume that firms in either sector face the same effort function e, and that they set wages so as to minimize the effective wage cost per worker, $v_i \equiv w_i/e$. Also, if the other factor, Q, is perfectly mobile, q_i will equal the economy–wide return q to the factor in question. Formally, we have the optimization problem

$$\text{(2.2)} \qquad \underset{w_i}{\mathrm{Min}}\; v_i = w_i / e(\tfrac{w_i}{w}, \tfrac{w_i}{q}, u),$$

subject to

$$\text{(2.3)} \qquad e < 0 \text{ for } w_i = 0.$$

Solving (2.2) gives the first order condition $e - w_i(e_1\frac{1}{w} + e_2\frac{1}{q}) = 0$, which can be rewritten as:

$$\text{(2.4)} \qquad \epsilon_1 + \epsilon_2 = 1.$$

The optimal wage is set such that the elasticities of the effort function with respect to w_i/w and w_i/q, i.e. ϵ_1 and ϵ_2, sum to unity.

With homogeneous labor the relative wage w_i/w becomes unity in equilibrium. The effort function then reduces to

$$e = e(1, \frac{w}{q}, u), \tag{2.5}$$

where w is the economy–wide wage set so as to fulfill (2.4), given q and u.

Many efficiency wage models imply a strikingly simple determination of the equilibrium unemployment rate. Consider a conventional effort function of the form $e(w_i/w, u)$. Repeating the steps followed above, we obtain the traditional Solow condition $\epsilon_1=1$ (Solow, 1979). With w_i/w equal to unity, the traditional Solow condition then directly determines unemployment. However, when effort and work norms depend on the functional distribution of income no such simple procedure is possible. Our modified Solow condition (2.4) defines the equilibrium unemployment rate as conditioned on the prevailing factor price ratio w/q. As a consequence, the determination of the unemployment rate now enters as an integral part of the standard walrasian resource allocation problem.

3. Social Norms in the Simple Two Sector Model.

We next introduce the equilibrium effort function (2.5) and the modified Solow condition (2.4) into a general equilibrium model in which two goods are produced in quantities X and Y. While the overall supply of factors, labor L and Q, is fixed, both factors are fully mobile across sectors. Firms in both production sectors are perfectly competitive in the markets for outputs and factor Q, but set wages according to (2.4). For each sector we assume linearly homogeneous production functions into which Q_i and labor in efficiency units, E_i, enter as arguments:

$$X = F_x(E_x, Q_x) \tag{3.1}$$

$$Y = F_y(E_y, Q_y). \tag{3.2}$$

We have $E_i \equiv e(1, w/q, u)L_i$, where L_i is the amount of labor used in sector i. Note that although the overall number of workers L is fixed, total labor supply in efficiency units, E^S=e(..)L, is endogenous.

The dual total cost functions C_x and C_y to the production functions become:

$$C_x = C_x(\tfrac{w}{e}, q)X \tag{3.4}$$

$$C_y = C_y(\tfrac{w}{e}, q)Y, \tag{3.5}$$

where the arguments of the minimum unit cost function C_i are the prices of Q and labor in efficiency units.4) Assuming that C_i is twice differentiable, we obtain the equilibrium conditions in factor markets:

$$C_{Ex}X + C_{Ey}Y = eL(1-u) \tag{3.6}$$

$$C_{Qx}X + C_{Qy}Y = Q, \tag{3.7}$$

where C_{Qx}, C_{Qy}, C_{Ex}, and C_{Ey} are the derivatives of the minimum unit cost function in the two sectors with respect to (effective) factor prices. The LHS of (3.6) thus specifies total demand for effective labor units of production sectors; the RHS defines the effective labor supply as the total labor supply corrected for the unemployment rate and multiplied by the economy–wide effort level.

Perfect competition in output markets implies:

(3.8) $$P_x = C_x(\frac{w}{e}, q)$$

(3.9) $$P_y = C_y(\frac{w}{e}, q),$$

where P_x and P_y are the domestic producer prices of X and Y.

Eqs. (3.8) and (3.9) immediately suggest a modified factor price equalization theorem. Countries sharing the same technology (i.e. having the same unit cost functions) and engaging in free commodity trade will end up with the same absolute factor prices in effective terms. However, market wages w will typically not equalize across trading countries. Any given effective price of labor w/e can thus be achieved by a combination of either a high wage and a high effort, or a low wage and a low effort. As discussed in greater detail below, the pattern of market wages and effort established across countries then ultimately depends on the prevailing social norms in labor markets. The empirical implications are obvious. In testing the factor price equalization in absolute terms, observable market wages should be corrected for differences in effort across countries.

For later use we also introduce some policy parameters:

(3.10) $$P_x = P_x^* T_x$$

(3.11) $$P_y = P_y^* T_y,$$

where P_i^* is the world market price of good i, and T_i is one plus an ad valorem tariff.

The structure of our general equilibrium model allowing for social norms in the labor market is described by eqs. (2.4), (2.5) and (3.6) through (3.11). As commodity prices are given our model has a simple recursive structure. Given P_x and P_y, we solve eqs. (3.8) and (3.9) for the effective factor prices $v \equiv w/e$ and q. Combining eqs. (2.4), (2.5) and the definition of v, we then have three equations determining u, w and e. With effort and unemployment rate thus determined the RHS of (3.6) becomes exogenous. As the input coefficients C_{ij} only depend on the given ratio of effective factor prices, v/q, eqs. (3.6) and (3.7) finally determine commodity outputs X and Y.

With the modified Solow condition the unemployment rate depends on the prevailing terms of trade. However, with a standard Solow condition this is no longer true; unemployment and effort are then determined directly from the curvature of the effort function, and independently of commodity prices.

4. Factor Price Patterns, Unemployment and Terms of Trade Shocks.

At a formal level our model is closely related to the basic Heckscher–Ohlin model. At given output prices both models have similar recursive structures, implying a first stage solution for factor prices, and a second stage solution for quantity variables conditional on the factor price ratio. As a consequence, we may conjecture that some results in the theory of international trade carry over to our model.

This is indeed the case. As already noted, eqs. (3.8) and (3.9) imply a modified factor price equalization theorem in terms of q and the effective wage v=w/e. Furthermore, straightforward manipulations of (3.8) and (3.9), following Jones (1965), yield

(4.1) $$\hat{P}_x = \theta_{Ex}\hat{v} + \theta_{Qx}\hat{q}$$

(4.2) $$\hat{P}_y = \theta_{Ey}\hat{v} + \theta_{Qy}\hat{q},$$

where a circumflex indicates the percentage change in a variable, such that e.g. $\hat{X}$= dX/X. Further, $\theta_{Ei} = wC_{Ei}/eP_i$ is the share of effective labor cost in producing commodity i, and $\theta_{Qi} = qC_{Qi}/P_i$ is the cost share of factor Q. Note that $\theta_{Ei}+\theta_{Qi}=1$.

Assuming that the X–sector is intensive in the use of effective labor ($\theta_{Ex}>\theta_{Ey}$), we obtain:

(4.3) $$\hat{v} > \hat{P}_x > \hat{P}_y > \hat{q}.$$

This is of course nothing but the magnification effect of Jones (1965), though defined in terms of the effective wage v rather than in terms of the market wage w. Also, supposing $\hat{P}_y$ is zero we obtain the Stolper–Samuelson theorem: $\hat{v} > \hat{P}_x > 0 > \hat{q}$. An increase in the price of X increases the return to the factor used intensively in X and lowers the return to the other factor.

This is where the similarities end. What we observe in real world data is market, and not effective, wages. To explore how given changes in output prices affect the market wage w we have to examine the equations relating to the efficiency wage relationship in some detail. It is then useful to start with a modified version of the factor price equalization theorem in relative terms. Consider given changes $\hat{P}_x$ and $\hat{P}_y$ in commodity prices. Eqs. (4.1) and (4.2) then imply

(4.4) $$\hat{v} - \hat{q} = \frac{1}{\theta}(\hat{P}_x - \hat{P}_y),$$

where $\theta = \theta_{Ex} - \theta_{Ey}$. When countries share the same technology, the same value of θ applies to all trading countries, and effective factor price ratios change in tandem.

By definition,

(4.5) $$\hat{v} \equiv \hat{w} - \hat{e},$$

which simply shows combinations of effort and the market wage consistent with a given change in the price of effective labor. To find a decomposition of $\hat{v}$ consistent with our efficiency wage model we invoke (2.4) and (2.5). Differentiating the equilibrium effort function yields

$$\hat{e} = \epsilon_2(\hat{w} - \hat{q}) + \epsilon_3\hat{u}, \tag{4.6}$$

where $\epsilon_3 > 0$ is the elasticity of effort with respect to the unemployment rate.

Consider the case of a separable effort function. Assuming a symmetric equilibrium where w_i=w, we may then manipulate our modified Solow condition (2.4) to obtain a relation between relative factor price changes and the rate of change in unemployment:

$$\hat{w} - \hat{q} = a\hat{u}, \tag{4.7}$$

where $a = -\epsilon_3/\epsilon_2\epsilon_{22}$, and $\epsilon_{22} = -(w/q)(e_{22}/e_2)$. Eq. (4.7) defines a wage setting rule: For given changes in u and q, (4.7) gives the change in w chosen by a representative firm minimizing its effective labor cost. The coefficient a measures the sensitivity of wages to changes in aggregate unemployment. By the concavity of the effort function, we have that $e_{22}<0$, implying that $\epsilon_{22}>0$, and hence that a<0. Our wage setting rule thus defines a negative relation between $\hat{w}$ and $\hat{u}$.

An important parameter in the following is the elasticity ϵ_{22}. It measures the concavity of the effort function with respect to w/q. In economic terms, we may think of ϵ_{22} as measuring the rate at which workers become satiated with fairness. When ϵ_{22} is small, the effort function is close to linear, and marginal effort e_2 is a slowly declining function of w/q; when ϵ_{22} is large, e_2 declines rapidly with w/q.

Combining eqs. (4.4) – (4.7), we obtain the following reduced form expression for the change in market wages:

$$\hat{w} - \hat{q} = \frac{b}{\theta}(\hat{P}_x - \hat{P}_y), \tag{4.8}$$

where $b = 1/[1 + \epsilon_2(\epsilon_{22} - 1)]$. Since $0<\epsilon_2<1$, from (2.4), and $\epsilon_{22}>0$, b is larger than zero.

For any given value of ϵ_2, we also note that b is a monotonically decreasing function of ϵ_{22}, with a value of unity when $\epsilon_{22}=1$.

Eq. (4.8) links changes in relative factor prices in market terms to changes in commodity prices. If sector X is relatively intensive in effective labor, $\theta>0$. Comparing (4.4) and (4.8) we see that an increase in P_x relative to P_y then must increase both effective and market wages. With $\epsilon_{22}<1$, b becomes greater than unity, and the market wage increases more than the effective wage. In terms of the market wage we thus obtain a "magnified magnification" effect. This added boost to the market wage simply reflects an increase in equilibrium effort and hence in labor productivity. Combining (4.6) and (4.7), we obtain

$$\hat{e} = \epsilon_2(1-\epsilon_{22})(\hat{w} - \hat{q}). \tag{4.9}$$

This relation shows the net effect on effort of an increase in w/q once we allow for induced changes in equilibrium unemployment. From (4.7) we have that unemployment unambiguously decreases with increases in w/q, which tends to decrease effort. With a moderately concave effort function ($\epsilon_{22}<1$) the positive impact effect on effort of an increase in w/q always dominates the negative effort effect of the induced decrease in unemployment. However, with a highly concave effort function ($\epsilon_{22}>1$), the negative unemployment effect dominates, and equilibrium effort decreases with increases in w/q. As a consequence, the increase in the effective wage must now exceed the increase in the market wage.

In the special case when the same fair wage–effort relationship applies to all trading countries, our model has strong and counterfactual implications. From (4.7), (4.8) and (4.9) it is clear that market wages, unemployment and effort then will evolve in an identical manner across trading countries. However, when social norms and fairness conceptions differ across countries, so will the relevant effort elasticities. Obviously, wages, effort and unemployment rates then develop in a nonuniform manner across trading countries.

Differences in institutions and in industrial and labor market relations are likely to make fairness considerations more important in some economies than in others. For example, in the more egalitarian and union influenced economies in Europe social norms in labor markets should differ from those in the USA and other less egalitarian societies. At least in principle, such differences in social norms may explain why terms of trade shocks produce nonuniform adjustments in real wages and unemployment across countries.

To formalize this vague intuition, we first note that absolute factor price equalization always holds in terms of $\hat{q}$. As a consequence, we may view (4.8) as a country–specific wage equation, linking the development of real market wages to changes in exogenous terms of trade. Now, consider two prototype countries. Our benchmark country, Americana, has a labor market where no interest is paid to the relative compensation of dissimilar factor owners. The factor price ratio w/q is absent from the effort function, and the standard Solow condition ($\epsilon_1=1$) applies. In this conventional efficiency wage story, both effort and unemployment are determined by the curvature of the effort function and independently of commodity prices. Comparing (4.4) and (4.8), it is easy to see that b in Americana, b_a, becomes unity: Holding effort constant, a given change in the effective wage must translate into an equivalent change in the market wage. Americana is obviously a very close relative of the textbook Heckscher–Ohlin country. As effort and unemployment are exogenous to eqs. (3.6) – (3.9), all the standard results apply.

In the second prototype country, Europana, the struggle over functional income shares runs high. As the renumeration of the dissimilar production factor Q does affect workers' conception of a fair treatment, the modified Solow condition (2.4) applies, and b_e is generally different from unity. As b_e, $b_a>0$, we conclude from (4.8) that market wages in Europana and Americana move in the same direction in response to changes in terms of trade.

However, the magnitude of the adjustments in real wages typically differ between countries. A straightforward implication of many standard efficiency wage models is real wage rigidity at the firm or industry level. With a highly concave effort function in Europana this result carries over to an international setting. With $\epsilon_{22}>1$, b_e is less than unity, and wages in Europana are less volatile than wages in Americana. However, with $\epsilon_{22}<1$, b_e is greater than unity, and wages in Europana become more flexible than wages in Americana. In this latter case, the morale effects on effort from inequities in the functional distribution of income magnify the wage response to terms of trade changes.

Conventional economic analysis of domestic adjustments to adverse external shocks often identify insufficient flexibility of real wages as a prime reason for unemployment. Our analysis suggests otherwise. Consider a decrease in P_x, the price of the labor intensive good, relative to P_y. In Americana the market wage falls according to the basic Stolper–Samuelson mechanism, while effort and unemployment remain unchanged. In Europana, the wage adjustment may be more or less pronounced than that in Americana, depending on the curvature of the effort function. The important observation is that in either case the fall in real wages comes hand in hand with an increase in unemployment. Combining (4.7) and (4.8), we thus obtain the unemployment change in Europana as

$$\hat{u}_e = (b_e/a_e)\,\frac{1}{\theta}\,(\hat{P}_x-\hat{P}_y), \tag{4.10}$$

where b_e/a_e is always negative.

In the presence of incentive effects from inequities in the functional distribution of income, any decrease in real wages, be it large or small, is harmful to labor productivity. To restore competitiveness and reconcile domestic factor prices with the prevailing terms of trade, effort must somehow recover. In the absence of government intervention, this can only be accomplished by an effort eliciting increase in unemployment. From this perspective, rationalizing the diverse macroeconomic performance of various countries in terms of different degrees of real wage flexibility is potentially misleading. When social norms differ across countries, there is no simple link between unemployment performance and flexibility of real wages.[5)]

5. Trade Patterns, Production Possibilities and Losses from Trade.

With constant output prices, effort and unemployment are constant, and due to the recursive structure of the model the traditional Rybczynski effect applies. Holding prices fixed, eqs. (3.6) and (3.7) are formally identical to the corresponding Heckscher–Ohlin factor market equations. Hence:

$$\hat{X} > \hat{L} > \hat{Q} > \hat{Y}. \tag{5.1}$$

With the X–sector being intensive in effective labor, a faster expansion in the supply of labor than in the supply of Q produces stronger asymmetric changes in outputs.

A major difference to the Heckscher–Ohlin model appears when we analyze the link between trade patterns and commodity prices. As output prices change, so will unemployment, effort and the overall supply of labor in efficiency units. This supply effect is, of course, absent in the standard model.

Totally differentiating $E=e(1,w/q,u)L(1-u)$ yields $\hat{E} = \epsilon_2(\hat{w}-\hat{q}) + (\epsilon_3-u/(1-u))\hat{u}$. Invoking (4.8) and (4.10) we then obtain

$$\hat{E} = \frac{1}{\theta}\frac{b}{a}\left[\epsilon_3\left(1-\frac{1}{\epsilon_{22}}\right)-\frac{u}{1-u}\right](\hat{P}_x-\hat{P}_y). \tag{5.2}$$

Define $g = (b/a)[\epsilon_3(1-\epsilon_{22}^{-1}) - u/(1-u)]$, which in general cannot be signed. On the one hand, an increase in P_x/P_y raises w/q which tends to stimulate effort and raise E. On the other hand, the relative price increase also lowers unemployment which tends to lower effort and E. We also note that a sufficient condition for a price increase to raise E is that $\epsilon_{22}<1$; with $\epsilon_{22}=1$ and full employment E is unchanged. Clearly, one reason why ϵ_{22} is crucial in our model is this effect on E.

Equation (5.2) implies that terms of trade changes may give rise to factor abundance reversals. As E is endogenous in our model, a country abundantly endowed with labor E (factor Q) may find itself abundantly endowed with factor Q (labor E) after changes in prices have taken place. For such reversals to occur social norms must differ between countries. As we cannot uniquely classify countries into E–abundant or Q–abundant for all output prices, there is no simple way of inferring trade patterns from a given autarky equilibrium.[6)]

To further explore the link between effective labor supplies and output prices, consider Figure 1. Assume a relative price level $P=P_x/P_y$ which will give rise to a certain amount of labor in efficiency units E.[7)] Given the level E and the stock of factor Q we can draw a transformation curve T(E,Q) conditional on the given relative price level P. Point A is the tangency point of the price line and the transformation curve when labor supply is fixed at E.

Assume now a higher price ratio P'>P which, if g>0, will yield a larger supply of efficient labor, $E^{'}>E$ according to (5.2) above. We then draw a conditional transformation curve holding prices and hence labor supply fixed at $E^{'}$, denoted $T'(E^{'},Q)$, noting that X is intensive in efficient labor. Attaching the price line P' to this new transformation line we obtain a new point A'. Repeating this procedure and combining the points A, A', A''..., we obtain a locus that defines the production possibilities[8)] $\ell\ell_{g>0}$ as prices and labor supplies change.

Things will be different if g<0, as a price increase now means that effective labor supply falls. Repeating the same procedure as above, but for g<0, we can derive the production possibilities frontier $\ell\ell_{g<0}$, as in Figure 2.

Both production possibilities frontiers are concave to the origin. For the case g>0, for any point on the frontier, a price increase will always increase X relative to Y. When g<0, however, a deviation from the standard results may occur. In this case, an increase in the price of X relative to Y will always lower Y but may also lower X. This can be inferred from Figure 2. For the sake of completeness we can derive the following relation between relative output changes and price changes:[9)]

$$\theta\lambda(\hat{X}-\hat{Y})= (\delta_E+\delta_Q+g)(\hat{P}_x-\hat{P}_y), \tag{5.3}$$

where $\delta_E=\lambda_{Ex}\theta_{Qx}\sigma_x+\lambda_{Ey}\theta_{Qy}\sigma_y$ and $\delta_Q=\lambda_{Qx}\theta_{Ex}\sigma_x+\lambda_{Qy}\theta_{Ey}\sigma_y$ determine the percentage savings in factor i (i=E,Q) at a one percent increase in the price of that factor. σ_x and σ_y are the elasticities of substitution between capital and efficient labor in sector X and Y. Furthermore, $\lambda=\lambda_{Ex}-\lambda_{Qx}$, where $\lambda_{Ex}=C_{Ex}X/e(L-U)$ is the share of efficient labor in X, and the other λ's are defined accordingly. With g=0, (5.3) reduces to the traditional Heckscher–Ohlin result.

The effects of trade on welfare in terms of consumption can easily be inferred from our figures. As in traditional models, abandoning autarky implies a consumption effect, represented by a move along the price line to the highest indifference curve, and a production effect, represented by a move along the transformation curve. Besides that, we must here also consider the shift from one price contingent transformation curve to another. This added production effect, due to incentive effects from changes in the functional distribution of income, may magnify or counteract the gains from trade.

Consider again Figure 1, implying that g>0, and assume that A'' is the autarky point. In the Heckscher–Ohlin model, trade (at relative price P', assumed lower than the autarky price) would imply that production took place at A''' and consumption at B'''. However, as the conditional transformation curve shifts inwards, with the new production point A' (obtained by the lowered labor supply E'), consumption takes place at B'. As drawn here, consumption at B' implies a lower level of welfare than consumption at autarky A''.

Should trade imply a relative price such that the effective supply of labor increases, the gains from trade would be magnified. The necessary and sufficient conditions for magnified gains from trade are that $g>0$ and that P rises, or that $g<0$ and that P falls, when autarky is abandoned. A necessary condition for losses from trade to occur is that $g>0$ and P falls, or that $g<0$ and P rises. The sufficient condition is that the standard positive welfare effects of moving along a given transformation curve are smaller than the negative ones implied by the inward shift of the transformation curve.

6. Tariff Policies to Reduce Involuntary Unemployment.

Assume that the government imposes a tariff on commodity X. Assuming a tariff increase and constant world market prices, we obtain from (3.10) and (4.10):

$$\hat{u} = \frac{b}{a\theta}\hat{T}_x. \tag{6.1}$$

Since $a<0$ and $b>0$, an increase in the tariff on the labor intensive (Q–intensive) good will always lower (raise) unemployment. This is, of course, what we should expect; tariff policies work for the same reason that an increase in P_x/P_y lowers unemployment. Factor prices w/q always move in the opposite direction to unemployment, and since the Stolper–Samuelson theorem implies that a tariff on X favors the factor used intensively in X–production, it follows that equilibrium unemployment decreases.[10] However, with a standard efficiency wage formulation tariff policy has no effects on the unemployment rate. In our prototype country Americana the standard Solow condition applies, and effort and unemployment are determined directly from the curvature of the effort function and independently of prices and tariffs.

From a welfare point of view, the issue is how much unemployment to eliminate. In general, full employment may not be desirable, since our model suggests a latent conflict between employment and production. As the tariff is raised and employment rises, workers may on net withdraw effort. On the one hand the tariff raises w/q so that effort rises, but on the other it also lowers the unemployment rate which lowers effort. With a large enough fall in effort total production may fall despite higher employment.

7. Conclusions.

Adding social norms and fair wage considerations to the Heckscher–Ohlin model casts new light on a number of issues in international economics. The nonequalization of market wages across countries, the absence of a simple relation between measures of factor abundance and international trade patterns, and the diverse response of different countries to terms of trade changes, are phenomena which derive from social norms in the labor market. In the presence of social norms, we also noted that losses from trade may occur. From a policy point of view, we also obtained some support for the popular view of tariffs as a way of fighting unemployment – when workers' fairness conceptions depend on the compensation of the other domestic production factor, protection of the labor intensive production sector increases overall employment.

Needless to say, the results should be interpreted with care. Most of our new results go through only when workers' justice norms also depend on the functional distribution of income. While such inter–group comparisons may rationalize a number of stylized facts observed in labor markets, the empirical evidence on incentive effects from inequities in the functional distribution of income can hardly be called conclusive. Furthermore, any model based on social norms in the labor market is bound to be difficult to implement empirically. Social norms are elusive, and they are likely to differ both across countries and across different time periods. Finally, while we have touched on various policy issues, we have only analyzed welfare in terms of consumption effects. Without explicit expressions for the utility of workers in the presence of norms of fairness, it is of course impossible to proceed beyond that. As a consequence, we should be very careful about making policy prescriptions in general, and advocating protective trade policies in particular.

NOTES

1. Davidson, Martin and Matusz (1988) introduce search (i.e. voluntary) unemployment into a two–sector model and discuss among other things the Stolper–Samuelson theorem.

2. For a formal treatment of this case, see Agell and Lundborg (1991).

3. It is easy to provide some microeconomic underpinnings for this postulated effort function. Using the partial gift exchange model of Akerlof (1982), Agell and Lundborg (1991) show how an effort function of the form (2.1) can be derived for a representative worker maximizing a utility function separable in effort and commodity arguments.

4. Here a note of caution is in order. With wage setting firms we might expect that the effective price of labor should be "maximized out" of the cost function. In our model, however, this is not the case. As in all conventional efficiency wage models, our representative firm can be viewed as solving a two–stage optimization problem. In the first stage the firm sets an efficient wage minimizing unit labor costs. In the second stage, the firm determines optimal labor demands, taking the effective wage as a predetermined variable. As we now deal with this latter aspect of firm behavior, the effective wage does appear in the cost function.

5. However, if we compare the volatility of real wages and unemployment in two countries where w/q matters, (i.e. two europanean countries) a more standard pattern obtains. If only ϵ_{22} differs across the two countries, and since b is monotonically decreasing in ϵ_{22}, given terms of trade fluctuations cause the wage to be more volatile in the country with the lowest value of ϵ_{22}. At the same time, from (4.10) it is easy to see that the volatility of unemployment increases in ϵ_{22}.

6. Of course, this result applies to any trade model with variable factor endowments.

7. We disregard the possibility of multiple solutions by assuming the existence of a (at least locally) monotonous relation between P_x/P_y and E.

8. We use the term production possibilities frontier in an unorthodox way. If workers would supply maximum effort at any price, obviously it would be possible to produce

outside $\ell\ell$. However, given the fairness conceptions in the labor market, $\ell\ell$ defines the combinations of X and Y which are possible to reach. As the economy cannot produce outside $\ell\ell$, we call it a production possibilities frontier.

9. Totally differentiating (3.6) and (3.7), invoking (4.8) and (4.10), and some manipulations yield (5.3).

10. Are there other ways to fight unemployment in our model? In principle, any policy that distributes income from factor Q to labor L will affect unemployment and effort incentives. Interpreting Q as capital, our model suggests that profit sharing schemes reduce unemployment, but for very different reasons from those of Weitzman (1984).

REFERENCES

Agell, J. and P. Lundborg, (1991): "Fair Wages, Involuntary Unemployment and Tax Policy in the Simple General Equilibrium Model", forthcoming in Journal of Public Economics.

Akerlof, G.A.; (1982): "Labor Contracts as Partial Gift Exchange", Quarterly Journal of Economics 97, 543–569.

—— and J. L. Yellen, (1990): "The Fair Wage–Effort Hypothesis and Unemployment", The Quarterly Journal of Economics 105, 255–284,

Batra, R. N. and H. Beladi, (1990): "Pattern of Trade between Underemployed Economies", Economica 57, 485–493.

Blinder, A. S. and D. H. Choi, (1990): "A Shred of Evidence on Theories of Wage Stickiness", Quarterly Journal of Economics 105, 1003–1015.

Copeland, B.R. (1989): "Efficiency Wages in a Ricardian Model of International Trade", Journal of International Economics 27, 221–244,

Davidson, C., L. Martin and S. Matusz (1988): "The Structure of Simple General Equilibrium Models with Frictional Unemployment", Journal of Political Economy 96, 1267–1293.

Johnson G. E. and P. R. G. Layard (1986): "The Natural Rate of Unemployment: Explanation and Policy", Chapter 16 in Handbook of Labor Economics, vol. 2, (editors O. R. Ashenfelter and P. R. G. Layard), North–Holland.

Jones, R.W., (1965): "The Structure of Simple General Equilibrium Models", Journal of Political Economy 73, 557–572.

Krueger, A. B. and L.H. Summers, (1987): "Reflections on Inter–industry Wage Structure" in Lang and Leonard (eds.), Unemployment and the Structure of Labor Markets, Basil Blackwell: New York and Oxford.

———— and L.H. Summers, (1988): "Efficiency Wages and the Inter–industry Wage Structure", Econometrica 56, 259–293.

Solow, R., (1979): "Another Possible Source of Wage Stickiness", Journal of Macroeconomics 1, 79–82.

Solow, R., (1990): The Labor Market as a Social Institution, Basil Blackwell.

Summers, L. H. (1988): "Relative Wages, Efficiency Wages and Keynesian Unemployment", American Economic Review 78, 383–388.

Weitzman, M. L. (1984): The Share Economy, Harvard University Press.

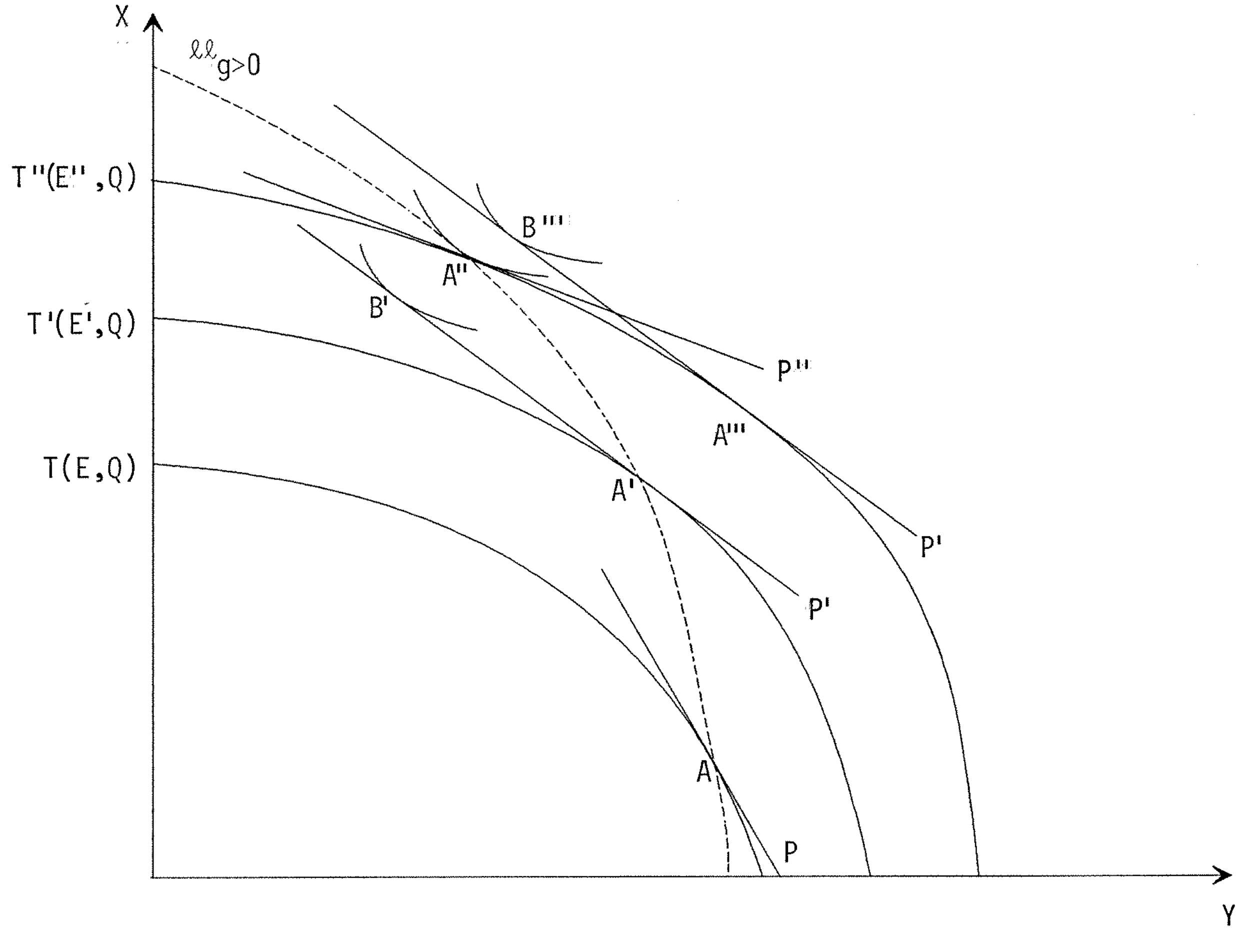

Fig. 1 Production Possibilities as g>0

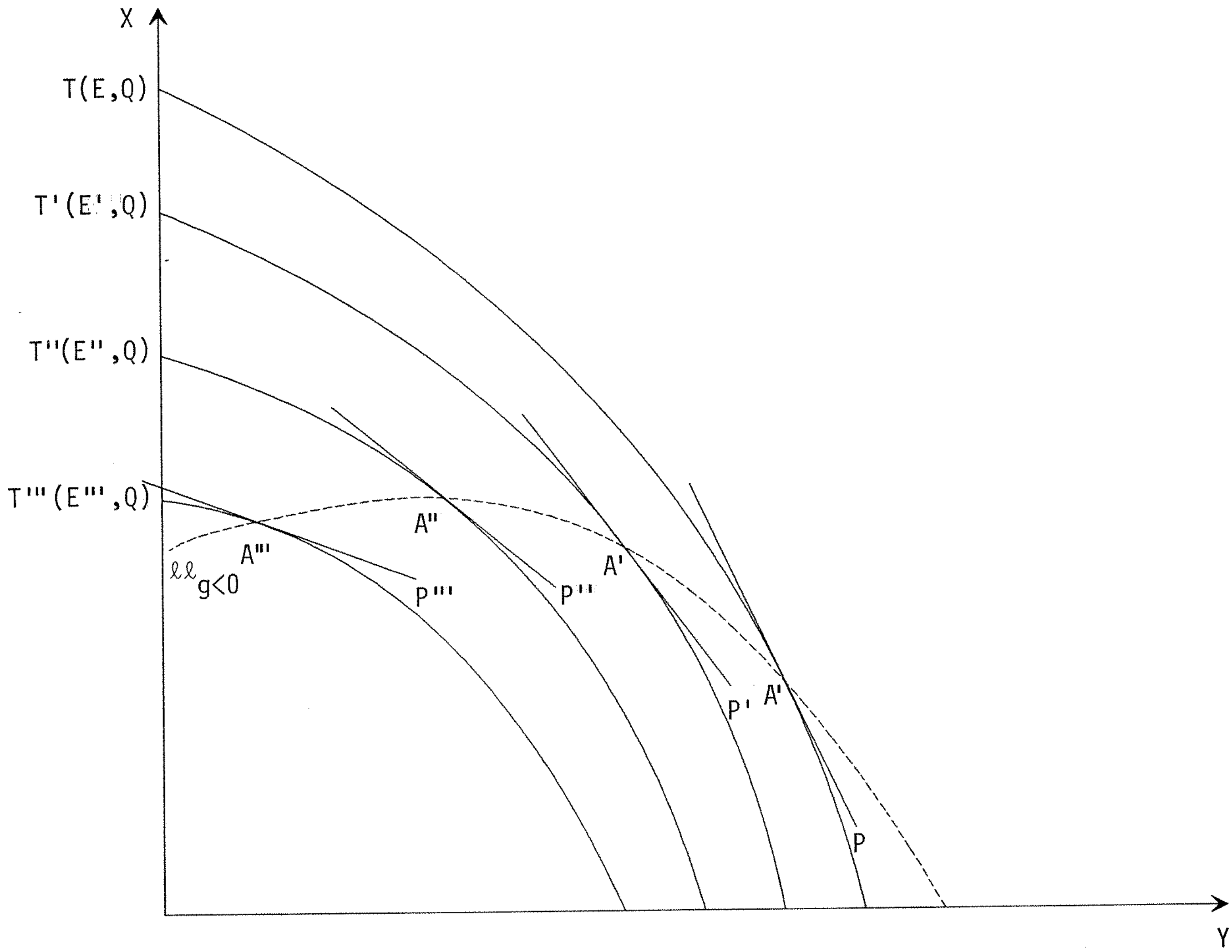

Fig. 2 Production Possibilities as g<0