Globalization and Wage Inequalities: A Synthesis of Three Theories

By

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I. Introduction

Wage inequalities, both in developed and in developing countries, have changed substantially over the past few decades of rapid globalization. In some important respects, these changes are in line with the predictions of Heckscher-Ohlin theory: widening wage or unemployment gaps between skilled and unskilled workers in the North, and symmetrically narrowing gaps in parts of the South, particularly in East Asia in the 1960s and 1970s (Wood 1994). In other respects, however, the wage changes have diverged from these predictions. In the North, the widening of the wage gap between skilled and unskilled workers has slowed down, despite continued rapid growth of trade with the South (Anderson 2001a), but there has been a widening of inequalities among skilled workers, with strikingly large wage gains for a small minority at the top (Bernstein and Mishel 1997). In the South, wage inequalities rose in many countries in the 1980s and 1990s, most notably in middle-income Latin America (Robbins 1996; Wood 1997), but also in some low-income countries (UNCTAD 1997).

Various explanations of these 'anomalies' have been offered – some emphasizing forces other than globalization (reform of labour market institutions or exogenous technical change), others suggesting alternative channels through which the effects of globalization might flow.

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This paper is in the latter category. But rather than propounding another new globalization mechanism, its purpose is to argue that most observed changes in wage inequalities can be explained by a synthesis of three existing theories, put forward by three pairs of economists: Heckscher and Ohlin (H&O); Feenstra and Hanson (1996: F&H), and Tang and Wood (2000: T&W). Each of these theories on its own provides part of the story, but they can be stitched together to yield a whole which is considerably more than the sum of the parts.

Section II summarizes the argument and conclusions of T&W. Section III combines these with the insights of F&H. Section IV brings in the insights of H&O, and Section V concludes. None of the theories is described in detail, since this is available in the original papers – or, for H&O, in other sources. The emphasis instead is on the complementarities and interactions among their different insights.

II. Tang and Wood

T&W focus on the falling cost of moving know-how around the world. Cheaper travel and telecommunication, and improved institutions and policies, enable highly skilled workers who live in developed countries to co-operate more extensively in production with workers in developing countries, through frequent short visits by air, bridged by phone calls and faxes. Some of this co-operation occurs within transnational companies, but much know-how moves through other channels, especially supply contracts between independently owned firms. For example, Northern buyers provide technical and marketing expertise to Southern exporters of garments (Gereffi 1999). Similarly, African exporters of fresh vegetables are guided in crop selection, growing and packaging by UK supermarkets and importers (Dolan and Humphrey 2000).

The people who carry this sort of know-how in their heads, whom T&W call K-workers, are managers, entrepreneurs, designers, engineers and other top business professionals. They contribute to production partly by increasing the quantity of output, but mainly by improving its quality. Specifically, what K-workers know is how, at a practical level, to produce new and improved goods and services and to sell them in global markets. Their knowledge comes partly from education and training, but is usually more a matter of creativity, experience and connections, acquired from their genes, families and careers. Not least, the acquisition and maintenance of know-how requires frequent contact among K-workers, face-to-face as well as by telecommunication, as a result of which they are clustered in developed coun-

tries – and the T&W model assumes for simplicity that all K-workers live in the North.

K-workers can also provide services in the South, but at higher cost and lower efficiency than in the North. The main cost is wasted time, both while travelling and while working in the South, whose opportunity cost usually far exceeds air fares and hotel bills. Insofar as the work is done through telecommunication rather than travel, the main cost is likewise not the bills for phone calls, faxes and e-mail messages, but the extra time involved in distance-work, as compared with doing the same thing on the spot. T&W thus model 'co-operation costs' as the loss of some fraction, t, of the time of K-workers operating in the South, so that

$$K = K_N + (1 + t)\, K_S\,, \tag{1}$$

where K is the world supply of K-workers, K_N is time worked in the North, K_S is effective working time in the South and tK_S is wasted time. To compensate for this loss of time – that is, to yield the same net earnings as in the North – the price of K-worker services in the South must thus be $(1 + t)$ times greater than in the North.

All other workers, skilled and unskilled, are combined by T&W into a single category, L, which is divided in fixed proportions between the North and the South

$$L = L_N + L_S\,, \tag{2}$$

and whose members work only in the countries where they live. Co-operation costs cause the wages of L-workers to be lower in the South than in the North. In other words, because the services of K-workers cost more in the South, it can only be profitable to provide them in the South if co-operating L-workers cost less there. Conversely, Northern L-workers earn more than Southern L-workers because of their privileged access to production with K-workers (but by assumption they always earn less than K-workers).

Improvements in travel and communications facilities, and in institutions and policies, lower the wasted-time penalty on K-work in the South (that is, reduce the value of t), and thus induce a shift of K-work from the North to the South.[1] This raises the wages of K-workers, by

[1] A lower t also tends to raise the effective world supply of K-workers, by reducing the amount of time they waste. Thus in principle, more K-work in the South need not imply less K-work in the North, but in practice, as T&W show, it almost always does (see also note 3 below).

increasing the number of L-workers with whom they co-operate. It also raises the wages of Southern L-workers, by reducing the scarcity of K-work in the South. However, it lowers the wages of Northern L-workers, by increasing the scarcity of K-work in the North. A fall in co-operation costs in the T&W model thus has two distributional effects: inequality between Southern and most Northern workers falls; but inequality in the North between highly skilled and all other workers rises – consistent with the large wage gains at the top of the distribution mentioned above (some supportive econometric evidence is in Anderson 2001b).

Falling co-operation costs also alter the sectoral structure of employment in ways which provide links with the F&H and H&O models. In the T&W model, the North and the South both produce a single high-quality traded good (labelled A for advanced), which in principle could be a manufacture, a service or a primary product.[2] The A-good is produced by K-workers and L-workers with a standard constant-returns-to-scale technology. To pay for the necessary know-how from the North, the South must run a merchandise trade surplus equal to the cost of K-work in the South, including wasted time, namely $w_N^K(1 + t) K_S$, where w_N^K is the wage of K-workers in the North. The only other good in the T&W model is a low-quality tradable (labelled B for basic), produced in the South by L-workers alone. If co-operation costs were prohibitive, the South would produce only the B-good, and none of the A-good.

For the purposes of the present paper, it is convenient to make the B-good non-tradable – and quite realistic: the South's exports to the North consist mainly of goods whose production involves some Northern expertise. The B-sector is thus broadly defined – not just subsistence agriculture and other traditional and informal activities, but also modern-sector production of less than 'export quality' (so that the South pays for K-worker services entirely by exporting part of its output of the A-good). It is also convenient to introduce a second, non-tradable good in the North (labelled H for home), of high quality and produced with a technology identical – for simplicity – to that of the A-good. The South thus produces the low-quality B-good for local consumption, as well as the high-quality A-good both for local consumption and for export, while the North produces and consumes only high-quality (A and H) goods.

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[2] In practice, the division of any particular country's A-production between manufactures, services and primary products depends on its land-to-labour ratio (e.g. Mayer and Wood 2001), but for simplicity natural resources are omitted from the models in the present paper.

A reduction in co-operation costs shifts L-workers between the tradable A-sector and the non-tradable sector, both in the South and in the North – but in opposite directions (and by different mechanisms). In the South, the increased inflow of K-work from the North expands production in the A-sector, whose increased need for L-workers is met by a flow out of the B-sector.[3] This inter-sectoral movement can be summarized as

$$L_B = L_S - L_{AS}(t) \qquad dL_{AS}/dt < 0\,, \tag{3}$$

which just says that a fall in co-operation costs raises A-sector employment, L_{AS}, and (given the economy-wide labour supply) correspondingly lowers B-sector employment, L_B.

In the North, by contrast, a fall in co-operation costs shifts L-workers from the A-sector to the non-tradable H-sector. This is because the increased supply of K-work to the South is paid for by increased imports of the A-good from the South, which replace some Northern A-production. The share of the H-sector in Northern aggregate output thus rises, and with it the H-sector's share of employment, both of Northern K-work and of L-workers.[4] This process can be summarized as

$$L_H = L_N - L_{AN}(t) \qquad dL_{AN}/dt > 0\,, \tag{4}$$

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[3] This process, analyzed by T&W, is not altered qualitatively by making the B-sector non-tradable. It is damped by a decline in the relative price of the A-good (as its supply rises and that of the B-good falls), which requires a rise in the marginal physical product of L-work in the A-sector to keep its wage in line with the B-sector. This is achieved by a rise in the K/L ratio, which lowers the marginal product of K-work in the South and thus reduces (and in extreme cases reverses) the incentive for K-work to shift out of the North.

[4] It is assumed that the relative demand for A- and H-goods is income-inelastic (because both are of high quality). The assumption of identical technology in the A- and H-sectors ensures that the relative price of, and hence the relative demand for, A and H is not altered by the change in the relative wage of K-workers and L-workers (who account for the same shares of cost in each sector). With no change in C_{AN}/C_H (where C is consumption), but a rise in aggregate consumption, because the increased worldwide earnings of K-workers exceed the loss of wages by Northern L-workers, there must be a rise in C_H, which is equal to Q_H because H is non-tradable. Aggregate Northern output falls, however, because of the outflow of K-work (the widened gap between Northern aggregate consumption and output being met by increased imports of the A-good from the South), so that a rise in Q_H means that Q_{AN} and Q_{AN}/Q_H must fall. The assumption of identical technology further ensures that sectoral shares of total employment change in parallel with shares of total output (since factor shares and elasticities of substitution are the same in both sectors). Relaxing the assumption of identical technology would alter the size of the inter-sectoral shift in L-employment induced by any given fall in t, but except under extreme assumptions would not reverse its direction.

where L_H and L_{AN} are the numbers of L-workers in the H-sector and the A-sector respectively. The equation is similar to that for the South above, but the inter-sectoral movement is in the opposite direction. (A fuller account of the modifications to the T&W model needed to arrive at these results is available on request.)

III. Feenstra and Hanson

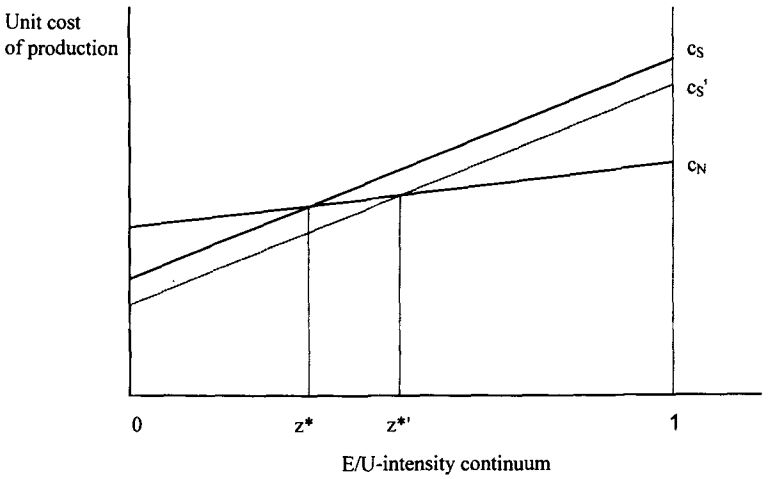
F&H focus on the effects of a shift of production from the North to the South in a model with two skill categories of labour. Their key insight is that such a shift could increase the relative demand for skilled labour in both regions. This section brings the F&H mechanism into the framework of the T&W model, but also shows that it could work in either direction in either region – not necessarily raising the relative demand for skilled labour, as F&H suppose.

1. Model Structure and Mechanism

The L-workers of the T&W model are now divided into medium-skilled workers (labelled E, for educated) and unskilled workers (labelled U). It is assumed, as in F&H, that the relative supply of E-workers (L^E/L^U) is higher, and their relative wage (w^E/w^U) lower, in the North than in the South. The production of the single A-good of the T&W model is now supposed, again following F&H, to involve the costless combination of many intermediate A-goods of varying E/U-intensity (F&H call the combination process 'assembly', but it might better be thought of as 'retailing'). The production of the intermediates requires inputs also of a third factor, labelled K, which in F&H refers to capital but here refers to know-how (the services of K-workers). For simplicity, all the intermediates are assumed to be equally K-intensive. The North has a comparative advantage in the more E/U-intensive ones, and the South in the less E/U-intensive ones, with two-way North-South trade on standard H&O lines.

F&H illustrate their model with a diagram similar to Figure 1, which shows how the unit cost of production varies among intermediate goods along the continuum of E/U intensity in the two regions. Costs rise with E/U-intensity in both regions (because $w^E/w^U > 1$), but the rise is faster in the South (the line c_S) than in the North (the line c_N), because w^E/w^U is higher in the South than in the North. For goods of low E/U-intensity, production is cheaper in the South (c_S is below c_N), and for goods of high E/U-intensity, production is cheaper in the North (c_S is above

Figure 1: *Feenstra and Hanson Diagram*



c_N), but for goods at some in-between level of E/U-intensity (z^*, where c_S intersects c_N), production costs are equal in the two regions. All goods to the left of z^* are therefore produced in the South, and all goods to the right of z^* are produced in the North, with part of the production of each region being exported to the other region.

F&H analyze the effects of an expansion of Southern output, relative to Northern output, induced by a fall in the cost of production in the South relative to the North, illustrated in Figure 1 by the downward shift of c_S to c_S'. This causes the dividing level of E/U-intensity to rise (from z^* to $z^{*\prime}$), which, as F&H stress, raises the average E/U-intensity of production in both regions. The reason is that the goods whose production moves from the North to the South were the least E/U-intensive ones in the North, but become the most E/U-intensive ones in the South. As a consequence, such a shift of production raises the demand for E-workers, relative to U-workers, both in the North and in the South. This outcome is different from the H&O story of the relative demand for E-workers moving in opposite directions in the two regions – up in the North, but down in the South.

In the F&H model, the decline in the relative cost of Southern production is explained by flows of capital, which lower the interest rate in the South relative to the North. The T&W model provides an alternative – and more generally plausible – explanation, namely reduction of co-operation costs. Improvements in travel and communications fa-

cilities lower the cost of K-work in the South relative to the North, reduce the cost of producing A-goods in the South, and increase the South's share of world A-output. When co-operation costs are high, only A-goods of low E/U intensity are produced in the South, because only in activities requiring many U-workers does the South's cost advantage in U-work outweigh its cost disadvantage in K-work. As co-operation costs fall, however, it becomes profitable to shift the production of increasingly E/U-intensive goods out of the North.

To bring the F&H mechanism into the T&W model, the inter-sectoral employment shift functions of Section II (equations 3 and 4) can be split in two. Thus in the North:

$$L_H^E = L_N^E - L_{AN}^E(t) \qquad dL_{AN}^E/dt > 0 \tag{5}$$

$$L_H^U = L_N^U - L_{AN}^U(t) \qquad dL_{AN}^U/dt > 0\,, \tag{6}$$

with reduction of co-operation costs lowering A-sector employment of both E-workers (L_{AN}^E) and U-workers (L_{AN}^U), and hence, given the economy-wide supply of each category of worker (L_N^E and L_N^U), raising employment of both categories in the non-tradable H-sector (L_H^E and L_H^U). Conversely, in the South, where, with similar notation:

$$L_B^E = L_S^E - L_{AS}^E(t) \qquad dL_{AS}^E/dt < 0 \tag{7}$$

$$L_B^U = L_S^U - L_{AS}^U(t) \qquad dL_{AS}^U/dt < 0\,. \tag{8}$$

Reduction of co-operation costs shifts employment of both categories of worker into the A-sector from the non-tradable B-sector. Moreover, although these inter-sectoral shifts are in opposite directions in the two regions, the effect of falling co-operation costs in both regions is to increase the E/U employment ratio in the A-sector, as emphasized by F&H.

It is convenient to assume (as F&H do) that each intermediate A-good is produced by E-workers and U-workers in some fixed proportion, unaffected by their relative wage, w^E/w^U. The relative employment of E-workers and U-workers in each region's A-sector thus depends only on the E/U-intensity range of intermediate goods produced, and hence on the level of co-operation costs. The employment of each category of worker in the non-tradable sector, given its economy-wide supply, is a residual.[5] The relative wage is then determined simply by the need to induce employers in the non-tradable sector to hire this residual mix of

[5] Inverting the usual treatment in H&O models, where the non-tradable sector has first claim on factor supplies and the residuals go to the tradable sector (e.g. Leamer 1998: 200–202).

workers: the higher the ratio of E-workers to U-workers it contains, the lower must be w^E/w^U. Assuming for simplicity that the demand functions in the non-tradable sectors are identical in the North and the South,[6] relative wages are thus given by

$$\frac{w_N^E}{w_N^U} = \varphi\left(\frac{L_H^E}{L_H^U}\right) \qquad \varphi' < 0 \tag{9}$$

$$\frac{w_S^E}{w_S^U} = \varphi\left(\frac{L_B^E}{L_B^U}\right) \qquad \varphi' < 0. \tag{10}$$

The asymmetric assumption that E-workers and U-workers are used in fixed proportions in the production of intermediate A-goods, but are substitutable for each other in the non-tradable sector, does not qualitatively affect the conclusions: if there were substitutability between E-workers and U-workers in A-production, the changes in relative wages would just be smaller. The magnitude (though not usually the direction) of the outcome is also affected by induced changes in product prices: in particular, changes in w^E/w^U alter the relative price of A- and H-goods in the North (because the two sectors generally differ in E/U-intensity) and hence affect the extent of the inter-sectoral employment shift.

2. Relative Wages in the North

Equations (5), (6), and (9) can be combined into a single expression for the North

$$\frac{w_N^E}{w_N^U} = \varphi\left(\frac{L_N^E - L_{AN}^E(t)}{L_N^U - L_{AN}^U(t)}\right), \tag{11}$$

which explains how falling co-operation costs affect the relative wage of E- and U-workers. Two effects are at work: reduction of t shifts employment in the North from the tradable A-sector to the non-tradable H-sector, and at the same time raises the ratio of E- to U-workers in the A-sector. Thus when the shrinkage of the A-sector begins (at a high level of t), the displaced workers are mainly U's, but as its shrinkage continues, with the production of more E/U-intensive A-intermediates being shifted from the North to the South, the share of E-workers

[6] This assumption could be relaxed, but only up to a point: a stronger 'taste' for non-tradable goods of high E/U-intensity in the North than in the South could outweigh the higher Northern E/U supply ratio and thus violate one of the basic assumptions of the present analysis, which is that w^E/w^U is lower in the North than in the South.

among those displaced rises. The marginal E/U ratio of the A-sector – among the workers just displaced at each level of t – is labelled z^* (as in Figure 1).

The effect of this displacement of labour on w_N^E/w_N^U depends on whether the marginal A-sector E/U ratio, z^*, is above or below the average E/U employment ratio in the H-sector, L_H^E/L_H^U (or z_H for short). If $z^* < z_H$, then w_N^E/w_N^U rises. In other words, because there is a smaller proportion of E's among displaced A-sector workers than in H-sector employment, the H-sector E/U employment ratio must fall, and to induce employers to hire relatively fewer E-workers, their relative wage must rise. Conversely, if $z^* > z_H$, then w_N^E/w_N^U falls. In other words, if there is a greater share of E's among displaced A-sector workers than in H-sector employment, the H-sector E/U employment ratio must rise, and hence the relative wage of E-workers has to fall.

Both cases may be relevant in practice. One interesting possibility is a sequence, with falling co-operation costs initially raising w_N^E/w_N^U, but subsequently lowering it. In 'phase 1', with $z^* < z_H$, the transfer of A-sector activities of low E/U intensity to the South increases wage inequality between E- and U-workers. However, z^* is rising, and z_H is falling, so that eventually the inequality may be reversed: the rising E/U ratio of the marginal workers displaced from the A-sector could meet the falling average E/U ratio of H-sector employment, bringing the economy into 'phase 2', in which $z^* > z_H$ and hence wage inequality between E- and U-workers declines.

Such a sequence is illustrated in Figure 2 – whose horizontal axis is reversed, so that falling co-operation costs correspond more intuitively with the passage of time. In addition to z^* (the marginal ratio in the A-sector) and z_H (the average ratio in the H-sector), the figure shows the average ratio in the A-sector, L_{AN}^E/L_{AN}^U (or z_{AN} for short). As co-operation costs fall, both z^* and z_{AN} rise, but the marginal ratio starts at a much lower level than the average, and rises faster than (though never overtakes) the average. The H-sector average is initially falling (phase 1), because it is above z^*, but eventually it meets the rising z^*, and from this point onwards it rises (phase 2).[7] This reversal of pressures on w_N^E/w_N^U is consistent with Anderson's (2001a) finding that in most Northern countries the relative position of unskilled workers stabilized or improved in the 1990s, after deteriorating in the 1980s.

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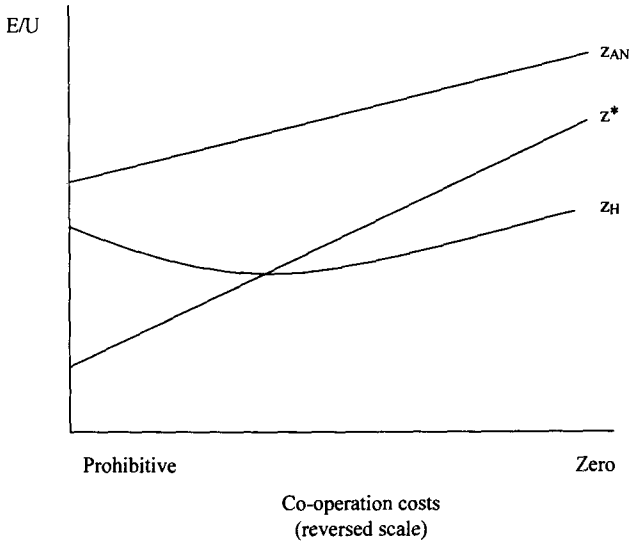
[7] Both z_{AN} and z_H can rise in phase 2, even though the economy-wide E/U supply ratio is fixed, because the more E/U-intensive A-sector is shrinking and the less E/U-intensive H-sector is expanding.

Figure 2: *Effects in the North of Falling Co-Operation Costs*



Neither phase necessarily occurs, and the outcome might vary among Northern countries, depending on their initial conditions. For example, if z^* (and hence z_{AN}) were initially above z_H, meaning that even the least E/U-intensive good in the A-sector was more E/U-intensive than the average in the H-sector (which is most unlikely), then there would be no phase 1, and w_N^E/w_N^U would decline over the full range of falling co-operation costs. Conversely, and more plausibly, z^* might never intersect z_H: if the shrinkage of the A-sector or the rise in its E/U-intensity were small, or if the H-sector were initially of high E/U intensity or large (so that the absorption of A-sector workers caused little fall in its E/U-intensity), then even if co-operation costs fell to zero, the marginal E/U ratio of displaced A-sector workers might remain below the H-sector average, and hence there would be no phase 2.

F&H suggest that a rise in z^* will always increase w_N^E/w_N^U – that if the tradable sector's product mix becomes more skill-intensive, then the relative wage of skilled workers is bound to rise. They overlook the possibility of the opposite outcome, because they do not explicitly model the rest of the economy (simply assuming the supplies of E- and U-workers to the A-sector to be wage-responsive). Sachs and Shatz (1996, 1998) suggest a model which includes a non-tradable sector, and in which shrinking unskilled employment in the tradable sector raises

w_N^E/w_N^U for exactly the same reason as in phase 1 above, namely that the skill intensity of the non-tradable sector has to fall in order to absorb the predominantly unskilled workers displaced from the tradable sector (by a shift of sector-specific capital to the South). But by assuming that the marginal skill ratio of the tradable sector is always below the average skill ratio of the non-tradable sector, they too miss the possibility of phase 2.

Changes in the wages of K-workers can now be brought back into the analysis. In the T&W model, falling co-operation costs widen the wage gap between highly skilled and less-skilled Northern workers, raising w_N^K/w_N^L. The same process operates when the L-category is divided between E-workers and U-workers: a fall in t tends to raise w_N^K/w_N^E and w_N^K/w_N^U by reducing the supply of K-work to the North, while the supplies of E-workers and U-workers in the North remain the same. However, because falls in t also change w_N^E/w_N^U, the position of K-workers does not necessarily improve relative to both the other two groups: increased demand for one of them could in principle more than offset the adverse supply-side shift. More specifically, in phase 1, when there is growing demand for E-workers relative to U-workers and w_N^E/w_N^U is rising, w_N^K/w_N^U is bound to rise, but w_N^K/w_N^E might either rise or fall, while in phase 2, when there is growing demand for U-workers relative to E-workers and w_N^E/w_N^U is falling, w_N^K/w_N^U could either rise or fall, but w_N^K/w_N^E is bound to rise (which is consistent with the evidence in Bernstein and Mishel 1997 of increasing inequality in the upper half of the US wage distribution during the 1990s).

3. Relative Wages in the South

Within the South, there is only one wage relativity to be considered – that between E- and U-workers (in the T&W model, there is no wage inequality in the South, since there is only one category of workers). The analysis of the effects of falling co-operation costs on this relative wage is similar to that in the North, but the results are different. The mechanism is described by an equation (combining equations 7, 8 and 10)

$$\frac{w_S^E}{w_S^U} = \varphi\left(\frac{L_S^E - L_{AS}^E(t)}{L_S^U - L_{AS}^U(t)}\right), \tag{12}$$

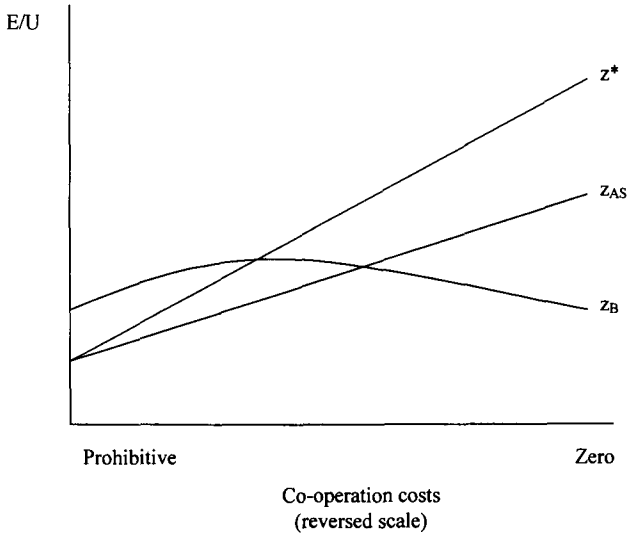
which looks almost identical to its Northern counterpart, but generates almost opposite outcomes. As in the North, falls in t raise the average E/U intensity of the A-sector, L_{AS}^E/L_{AS}^U (or z_{AS} for short). In the South,

however, this is associated with expansion (rather than contraction) of the A-sector, so that employment is shifting from the non-tradable sector to the tradable sector (rather than the other way, as in the North).

As in the North, the effect of this inter-sectoral transfer of employment on the relative wage depends on whether it raises the average E/U employment ratio in the non-tradable sector, z_B (in which case w_S^E/w_S^U must fall) or lowers it (in which case w_S^E/w_S^U must rise). And again, this depends on whether the marginal E/U employment ratio in the A-sector, z^*, is above or below z_B. But because the employment transfer is in the opposite direction to the North, so is the direction of its impact on z_B and the relative wage. If $z^* < z_B$, then the non-tradable sector is losing (rather than gaining) a disproportionate number of U-workers, so that its average E/U employment ratio must be rising, causing wage inequality to decrease. Conversely, if $z^* > z_B$, the non-tradable sector is being stripped disproportionately of E-workers, so that z_B must be falling and wage inequality increasing.

Also as in the North, there is the possibility of two phases, but in reversed sequence. This is illustrated in Figure 3, in which the z^* line is identical to that in the North (since the marginal activity is the same in both regions), but the – again more slowly rising – z_{AS} line lies below the z^* line rather than above it. The initial level of z_B is assumed to

Figure 3: *Effects in the South of Falling Co-Operation Costs*



be above the initial level of z_{AS}. In phase 1, as t falls (note that the horizontal axis is again reversed), the demand from the A-sector is initially mainly for U-workers, and hence pulls up z_B, so that wage inequality decreases (w_S^E/w_S^U declines), as in the East Asian 'little tigers' during the 1960s and 1970s (Wood 1994). But z^* rises faster than z_B, and eventually overtakes it, at which point phase 2 begins, with the A-sector's marginal recruits containing a ratio of E- to U-workers higher than the average in the B-sector, so that z_B is falling and wage inequality is increasing (w_S^E/w_S^U rises). Such a reversal of pressures could explain why the relative wages of unskilled workers ceased to rise or fell in three of the four little tigers during the 1980s (Wood 1994).

The relative lengths of the two phases may be more unequal than the diagram suggests. This depends on the speed of the rises in employment and in the E/U ratio in the A-sector, relative to the initial size of the B-sector (the larger B is, the less will z_B tend to rise, and so the sooner will phase 1 come to an end). It also depends on the initial level of z_B, which is determined by (and equal to) the economy-wide relative supply of E- and U-workers, L_S^E/L_S^U (since, with prohibitive co-operation costs, all employment is in the B-sector). Figure 3 suggests that the larger the South's relative supply of E-workers, and hence the higher the initial z_B, the more protracted will be the first phase of decreasing wage inequality, and vice versa. Cutting the other way, however, a higher L_S^E/L_S^U tends to lower the initial value of w_S^E/w_S^U, and hence to accelerate the transfer of A-sector activities from the North (making the z^* and z_{AS} lines steeper), which would shorten phase 1.[8]

As in the North, moreover, there might be only one phase – and unlike the North, in which the absence of phase 1 is most unlikely, either phase might be absent in the South, depending on the initial conditions of the country concerned. Thus if the E/U supply ratio were initially well above the marginal E/U intensity of the A-sector, which then rose slowly, and the B-sector remained large, z^* might stay below z_B even if co-operation costs fell to zero, so that there would be falling inequality throughout and no phase 2. On the other hand, if the E/U employment ratio of the least-E/U-intensive intermediate good in the A-sector were above the economy-wide E/U supply ratio (the initial level of z^* in Figure 3 were above that of z_B), as in a developing country with a low level of education, there would be no phase 1. The transfer of A-produc-

[8] To see this, consider Figure 1, in which the difference between the slopes of c_N and c_S depends on the North-South difference in w^E/w^U. A lower initial value of w_S^E/w_S^U would reduce the slope of c_S, so that a downward shift of given size in c_S, caused by a fall in co-operation costs, would cause more of a rightward shift of z^*.

tion from the North as a result of falling co-operation costs would thus increase wage inequality from the outset – which could explain why greater openness seems to have caused wage inequality to rise in some low-income countries (UNCTAD 1997).

In their analysis of the South, the original and crucial contribution of F&H is to show that more economic contact with the North might increase wage inequality, by raising the average skill intensity of the tradable-sector product mix, rather than decreasing it, as in the standard H&O model. However, just as in their analysis of the North, F&H overlook the possibility of the opposite outcome, because they model only the A-sector and not the rest of the economy. Their prediction of a rise in wage inequality applies only to phase 2, in which the tradable and non-tradable sectors compete more intensely for skilled than for unskilled labour. In phase 1, by contrast, competition is more intense for unskilled than for skilled labour, and falling co-operation costs reduce wage inequality – the same outcome as in the H&O model (albeit for a different reason).

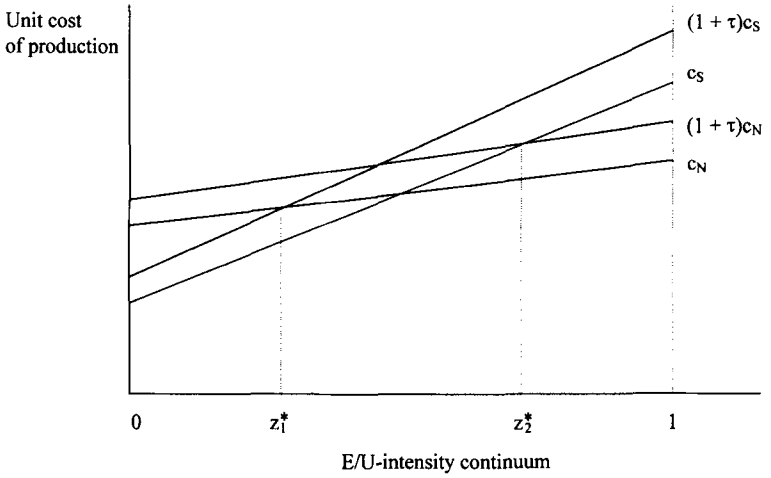
IV. Heckscher and Ohlin

The H&O model of the effects of globalization on wage inequalities focuses on falling barriers to trade – reduction of the many costs which make international transactions in goods more expensive than domestic transactions (freight, tariffs, differences in languages and legal systems, extra finance and insurance charges, and so on). This section brings falling trade barriers – all referred to by convention as 'transport costs' – into the combined T&W/F&H model of the previous section, in which changes in wage inequalities were caused purely by falling co-operation costs. Technically, co-operation costs are barriers to trade in the services of K-workers – a particular type of factor service – while transport costs are barriers to trade in goods and non-factor services (the latter having outputs such as tourism or construction which are produced by a combination of factors).

1. Transport Costs in the A-Sector

It is convenient to assume that the B-good and H-good remain non-tradable, and to focus on reductions in transport costs for A-sector intermediate goods. Figure 4 modifies Figure 1 to show the effect of transport costs, which are assumed to be a constant fraction, τ, of the cost of production. Each regional cost line is supplemented by a second, higher

Figure 4: *Feenstra and Hanson Diagram, with Transport Costs*



line, labelled $(1 + \tau)c$, which is the cost of goods delivered to the other region, while the original line refers to deliveries to the home region. There are thus two relevant intersections of the cost curves. The first is where $(1 + \tau)c_S$ cuts c_N: for all goods of E/U-intensity less than z_1^*, the South can deliver to the North at a cost below that of Northern production, and hence all such goods are produced in the South, with some of their output being exported to the North. The second is where c_S crosses $(1 + \tau)c_N$: for all goods of E/U-intensity greater than z_2^*, the North can deliver to the South at a cost below that of Southern production, and hence all such goods are produced in the North, with some of their output being exported to the South.

Between z_1^* and z_2^*, the cost of domestic production is below the delivered cost of imports from the other region. Goods in this range are thus produced in both regions and not traded between them. The length of the non-traded segment depends both on the size of τ and on the difference between the slopes of c_N and c_S, which reflects the difference in w^E/w^U and hence in production costs between the two regions – the more similar production costs are (the smaller the gap between c_N and c_S at each level of E/U-intensity), the greater the trade-reducing effect of a given level of transport costs is. If τ were big enough, the non-traded segment would occupy the whole continuum, and trade in A-goods would cease (whereas if τ were zero, this segment would vanish, as in the original F&H model).

The South's production spans the range of E/U-intensities between 0 and z_2^*, and the North's the range between z_1^* and 1, with the two ranges overlapping in the middle because of transport costs. Hence at any given level of co-operation costs, reduction of transport costs, by shrinking the non-traded overlap, increases the difference between the average E/U-intensity of production in the North and the South, by causing each region to become more specialized in goods towards one end of the continuum – the North's output becoming more E/U-intensive and the South's less E/U-intensive – in accordance with H&O principles. By contrast, the effect of falling co-operation costs, at any given level of transport costs, is to cause the E/U-intensity of the product mix to rise in both regions (with both z_1^* and z_2^* moving to the right, rather than towards each other, as with a fall in transport costs).

To incorporate the effects of falling transport costs into the model developed in Section III, the A-sector employment functions in both regions are modified by including the transport cost parameter, τ, as an additional argument:

$$L_{AN}^E = L_{AN}^E(t, \tau) \quad \partial L_{AN}^E/\partial t > 0 \quad \partial L_{AN}^E/\partial \tau < 0 \tag{13}$$

$$L_{AN}^U = L_{AN}^U(t, \tau) \quad \partial L_{AN}^U/\partial t > 0 \quad \partial L_{AN}^U/\partial \tau > 0 \tag{14}$$

$$L_{AS}^E = L_{AS}^E(t, \tau) \quad \partial L_{AS}^E/\partial t < 0 \quad \partial L_{AS}^E/\partial \tau > 0 \tag{15}$$

$$L_{AS}^U = L_{AS}^U(t, \tau) \quad \partial L_{AS}^U/\partial t < 0 \quad \partial L_{AS}^U/\partial \tau < 0\,. \tag{16}$$

The properties of these functions with respect to co-operation costs are the same as before: a fall in t lowers employment of both E- and U-workers in the North, raises employment of both E- and U-workers in the South, and increases the E/U employment ratio in both regions. The effects of falling transport costs on A-sector employment are in some respects similar to those of falling co-operation costs, but in other respects different.

In the North, falling transport costs increase employment of E-workers in the A-sector and decrease employment of U-workers, for the usual H&O reason (more production of skill-intensive goods for export and replacement of domestic production of labour-intensive goods by imports from the South). Falling transport costs thus raise the E/U employment ratio and are also likely to lower total A-sector employment ($L_{AN}^E + L_{AN}^U$), because U-workers are less productive than E-workers and thus tend to be displaced in greater numbers than additional E-workers are recruited. In both these respects – a rise in E/U and a fall in total employment – the result is similar to that of a fall in co-operation costs, and thus the effects of simultaneous falls in both sorts of cost would be

an amplified version of their separate effects. However, the effects on employment of E-workers conflict – a fall in transport costs raises L^E_{AN} but a fall in co-operation costs lowers it – so that the net effect on L^E_{AN} of falls in both sorts of cost is ambiguous (in contrast to the effect on L^U_{AN}, which is unambiguously negative).

In the South, the effects of falling transport costs are the opposite of those in the North – decreased employment of E-workers in the A-sector and increased employment of U-workers, again for the usual H&O reason (more production of labour-intensive goods for export and replacement of skill-intensive production by imports from the North). Falling transport costs thus reduce the E/U employment ratio in the A-sector, and also raise the overall level of A-sector employment ($L^E_{AS} + L^U_{AS}$). The latter effect is similar to that of a fall in co-operation costs, so that simultaneous falls in both sorts of cost would amplify the increase in total A-sector employment. However, the effects on the E/U ratio of falling transport costs (negative) and falling co-operation costs (positive) conflict, and so the net effect of falls in both sorts of cost is ambiguous. As in the North, it is the effect on employment of E-workers in particular that is uncertain, while the effect on employment of U-workers is clear (although in the South it is positive rather than negative).

2. Interaction of Transport Costs and Co-Operation Costs

The effects of falls in either transport costs or co-operation costs depend on the initial levels of both these variables. Clearly, the lower the initial level of each variable, the less room is there for it to fall further. Moreover, the effect of a fall in each variable depends on the initial level of the other variable.

The analysis of falling co-operation costs in Section III (like the F&H model) assumed a negligibly low level of transport costs. If transport costs were high, the outcome would be altered because much A-output would be non-traded. In particular, the South would produce A-goods covering a wider range of E/U intensities, so that falls in co-operation costs, though they would still shift A-production from the North to the South, would cause less change in the average E/U intensity of the sector in both regions (as can be seen from the limiting case in which the South produces the full range of A-intermediates, when shifts of production have no effect on the E/U composition of A-production). How this would alter the effect of falling co-operation costs on relative wages can be inferred by modifying Figures 2 and 3, in both of which the z^* line would start at a

higher level and slope upwards less steeply (in the limiting case, it would be horizontal in both regions at the initial level of z_{AN}).

In the North, this would damp the changes in wage inequality. Because the E/U ratio of workers displaced from the A-sector, z^*, would initially be less far below the average E/U ratio of the H-sector, z_H, movement of workers from the A-sector to the H-sector would cause less of a fall in z_H in phase 1, and correspondingly less of a rise in w_N^E/w_N^U. In phase 2, likewise, the more gradual rise in the E/U ratio of workers displaced from the A-sector would cause z_H to rise more slowly, and w_N^E/w_N^U to fall more slowly. Phase 1 might be either shortened (by the higher initial level of z^*) or lengthened (by the more gradual rise of z^*).

In the South, if the initial level of z^* were still below z_B, the changes in wage inequality would be damped, as in the North. In phase 1, the E/U ratio of workers recruited into the A-sector would start less far below the average E/U ratio of the B-sector, so that movement of workers from the B-sector into the A-sector would cause less of a rise in z_B and hence less of a fall in w_S^E/w_S^U. In phase 2, the more gradual rise in the E/U ratio of workers recruited into the A-sector would cause z_B to fall more slowly and w_S^E/w_S^U to rise more slowly. But the higher initial level of z^* would shorten phase 1, and would also reduce the probability of there being such a first phase of declining wage inequality: if transport costs raised the initial level of z^* above z_B, wage inequality in the South would rise from the outset. And if the initial level of z^* would have been above z_B anyway, transport costs would cause w_S^E/w_S^U to rise faster, at least to begin with (because z^* would start further above z_B).

Considering now how the impact of a fall in transport costs depends on the initial level of co-operation costs, the effects of falls in τ are smaller, the higher the level of t. In the extreme case of prohibitive co-operation costs, there would be no A-sector production in the South and thus, in the present model, falls in transport costs could have no effect on the structure of output in either region. The South would have nothing to sell that the North wanted to buy. Even at a high level of co-operation costs, although falls in τ would increase trade and change the structure of employment and relative wages, the effects would be small, because the Southern A-sector would be small. Conversely, the impact of falls in τ would be biggest if t were zero: with low co-operation costs, the Southern A-sector would be large, and thus trade-induced changes in the composition of its output could have a substantial effect on relative wages in both regions.

The assumption of negligible co-operation costs is similar to the standard assumption of H&O models that all countries have access to the same technology, whether or not they trade. In such models, the South is assumed, even in autarky (at a prohibitive level of τ) to be able to produce the full range of tradable goods, so that reduction of transport costs just changes the composition of tradable output, away from skill-intensive import substitutes and towards labour-intensive exports. This H&O assumption is often criticised, on the grounds that most developing countries lack the technical capacity and knowledge to produce many of the goods traded in world markets. The present model takes that criticism into account, but still allows the H&O mechanism to operate, by making the ability of the South to produce tradable goods (and hence the force of the H&O mechanism) depend on the level of co-operation costs.

3. Relative Wages in the North

The relative wage equation for E- and U-workers in the North, modified to include the effect of transport as well as co-operation costs, is

$$\frac{w_N^E}{w_N^U} = \varphi\left(\frac{L_N^E - L_{AN}^E(t,\tau)}{L_N^U - L_{AN}^U(t,\tau)}\right). \tag{17}$$

The effect of a fall in transport costs is straightforward. The A-sector hires more E-workers, drawing them from the H-sector, where employment of E-workers therefore falls, and conversely employment of U-workers falls in the A-sector and rises in the H-sector. The ratio of E- to U-workers employed in the H-sector thus falls, which causes the relative wage of E-workers to rise. This is the H&O result: falling barriers to trade raise the relative wage of skilled workers in the North.

The combined effects of falls in both transport costs and co-operation costs are harder to generalize about, because there are many different possible combinations of cost reductions in terms of sequence and magnitude – for example, a fall first mainly in transport costs, but later mainly in co-operation costs, or vice versa. However, the effects of both sorts of cost falling more or less in parallel from initially high levels can again be considered by reference back to Figure 2, describing the two-phase results of a fall in co-operation costs alone. An initially high level of transport costs does not qualitatively alter the figure, as explained above, but just reduces the size of the changes in relative wages caused by falling co-operation costs.

In phase 1, falling transport costs act in the same direction as falling co-operation costs, so that the combined effect of falls in t and τ is to make w_N^E/w_N^U rise faster than if only t were falling. In phase 2, however, the effect of falling co-operation costs is reversed, while falling transport costs continue to raise the demand for E-workers, so that w_N^E/w_N^U falls more slowly than if only t were falling. (This asymmetry could explain why the improvement in the relative position of Northern unskilled workers in the 1990s was smaller and less consistent than the worsening of their position in the 1980s: Anderson 2001a.) The addition of falling transport costs may also affect the relative lengths of phases 1 and 2, and indeed whether or not there is a phase 2, but it is not obvious whether phase 1 will be lengthened or shortened. Fewer E-workers are displaced from the A-sector, which slows the rise in z^* but also accelerates the fall in z_H, so that the two lines might intersect either sooner or later.

The effects on the relative wages of E- and U-workers of falls in co-operation costs and transport costs can thus vary, depending on the initial levels of these costs and their rates of decline, and on the initial relative sizes of the A- and H-sectors (which affects how much a fall in A-employment alters z_H). However, in qualitative terms, there are only two plausible outcomes of globalization in the North: that w_N^E/w_N^U will first rise and then fall, or that it will rise persistently. The possibility of this wage ratio falling from the outset, which was argued earlier to be most unlikely as a result of falling co-operation costs, seems even less likely when transport costs are also falling.

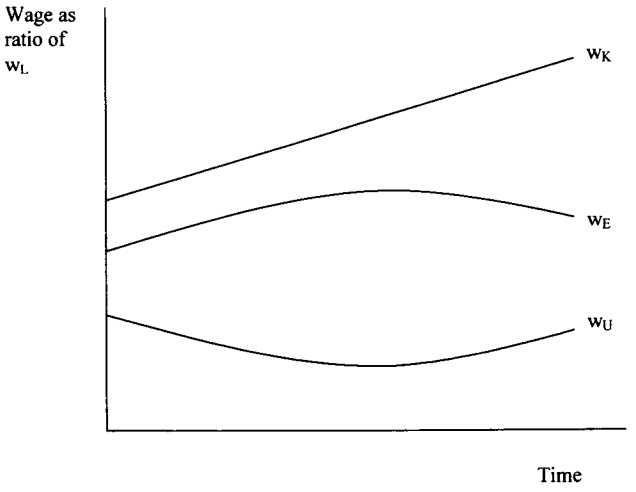
How a fall in transport costs affects wage inequality in the North between K-workers and E- and U-workers depends on whether it increases or reduces the amount of K-work in the North. A fall in τ raises the demand for K-work in Southern export production of A-goods of relatively low E/U-intensity (the z_1^* margin in figure 4 moves to the right), and thus tends to shift K-work out of the North. However, it also reduces the demand for K-work in Southern import-substituting production of A-goods of relatively high E/U-intensity (the z_2^* margin moves to the left), and thus tends to shift K-work back to the North. The net effect could go either way, but is likely to be small. The combined effect of falls in t and τ, like that of a fall in t alone, is thus usually to increase the wage of K-workers relative to the average wage of Northern E- and U-workers (that is, to raise w_N^K/w_N^L).[9]

[9] Tang and Wood (2000: equation 12) conclude that, when the South is a net exporter of the A-good, a fall in transport costs increases wage inequality in the North, but their model has only a single A-good.

Nor does the addition of falling transport costs to the model greatly alter the conclusions about changes in the wage of K-workers relative to E-workers and U-workers separately. As was explained in Section III, the effects of falling co-operation costs alone are somewhat ambiguous: in phase 1, when w_N^E/w_N^U is rising, w_N^K/w_N^E might either rise or fall, although w_N^K/w_N^U is bound to rise; while in phase 2, when w_N^E/w_N^U is falling, w_N^K/w_N^U could either rise or fall, although w_N^K/w_N^E is bound to rise. Falling transport costs, which in both phases raise the demand for E-workers relative to U-workers, in phase 1 amplify the rise in w_N^K/w_N^U but make it less likely that w_N^K/w_N^E rises, and in phase 2 diminish the rise in w_N^K/w_N^E but make it more likely that w_N^K/w_N^U also rises.

The predicted effects of globalization – falling co-operation costs and falling transport costs – on wage inequalities in the North are summarized in Figure 5, in which the wage rates of the three groups of workers – w_N^K, w_N^E and w_N^U – are expressed as ratios of w_N^L (a fixed, supply-weighted average of w_N^E and w_N^U), and the horizontal axis represents time. In phase 1, the wage gaps between E- and U-workers and between K- and U-workers widen, so that U-workers lose relative to both other groups, while what happens to the relative position of K-workers and E-workers is ambiguous. Thus wage inequality rises in the lower part of the skill distribution, but might either rise or fall in the

Figure 5: *Effects in the North of Falls in Transport and Co-Operation Costs*



upper part. In phase 2 (if and when it occurs), the wage gap between K- and E-workers widens, as probably does the gap between K- and U-workers, while the gap between E- and U-workers narrows, albeit less rapidly than it widened in phase 1, so that E-workers lose relative to both other groups. Wage inequality thus falls in the lower part of the distribution, but rises in the upper part. Interpreting phase 1 as the 1980s and phase 2 as the 1990s, this predicted pattern conforms reasonably closely with the evidence for the North in Bernstein and Mishel (1997) and Anderson (2001a).

4. Relative Wages in the South

The modified relative wage equation for E- and U-workers in the South is

$$\frac{w_S^E}{w_S^U} = \varphi\left(\frac{L_S^E - L_{AS}^E(t,\tau)}{L_S^U - L_{AS}^U(t,\tau)}\right). \tag{18}$$

The effect of a fall in transport costs is to reduce the relative wage of E-workers, which is the standard H&O result. E-workers are displaced from the A-sector to the B-sector, while U-workers are drawn from the B-sector into the A-sector. The ratio of E-workers to U-workers in the B-sector (the argument of the function in equation 18) thus rises, and to accommodate this change in skill mix, w_S^E/w_S^U has to fall.

The combined effect of falls in both transport costs and co-operation costs varies widely, depending not only on the size and sequence of the falls but also on the initial circumstances of the country concerned. Figure 6 distinguishes 24 cases, with eight sets of initial conditions (high and low values of t, τ and the economy-wide E/U supply ratio) and three sorts of cost reduction (falls in t, in τ and in both t and τ). The likely direction of change in wage inequality (w_S^E/w_S^U) in each case is shown by an arrow in the cell concerned, and the cells are numbered for ease of reference in the discussion below. It is convenient to start, as in the analysis of the North above, by considering what happens when both sorts of costs fall in parallel from initially high levels, referring back to Figure 3's description of the effects of falling co-operation costs alone, but allowing for the fact that initially high transport costs raise the initial level of z^* and reduce its slope. There are two possible sets of outcomes.

In the first set, which is suggestive of East Asian experience, the country has a relatively high E/U supply, and hence the initial level of z^* is below that of z_B. The immediate effect of falling co-operation costs

Figure 6: *Effect on Relative Wages in the South of Falls in Transport and Co-Operation Costs*

		Initial level of co-operation costs (t)						
		Low			High			
Initial level of transport costs (τ)	High	1 (↑)	2 (↓)	3 0	4 (↓↑)	5 (↓)	6 (↓↑)	Moderate E/U
		7 (↑)	8 ↓	9 ↓	10 ↑	11 (↓)	12 (↑)	Low E/U
	Low	13 ↑	14 (↓)	15 (↑)	16 ↓↑	17 0	18 ↓↑	Moderate E/U
		19 ↑	20 (↓)	21 (↑)	22 ↑	23 0	24 ↑	Low E/U
Fall in costs:		t	τ	t and τ	t	τ	t and τ	

Key (effect on w_S^E/w_S^U): ↑ = rise; ↓ = fall; ↓↑ = fall then rise; ( ) = small; 0 = negligible.

is thus to reduce wage inequality (cell 4). This tendency is damped by the high level of τ (and so of the E/U intensity of A-output), but it is reinforced by the falls in τ, which lower the E/U intensity of A-output, although this effect too is small, because the high t means that the A-sector is small (cell 5). So with falls in t and τ acting in the same direction, but not strongly, wage inequality gradually declines (cell 6). The reinforcement of falling t by falling τ also prolongs phase 1, postponing the time at which rising z^* catches up with falling z_B, possibly indefinitely. Moreover, if there eventually is a phase 2, the rise in wage inequality during that phase is lessened by the continuing falls in τ (cell 6 again).

In the second set of outcomes, the initial value of z^* (increased by the high level of τ) is above that of z_B, because the country has a relatively low E/U supply – as for example in most of South Asia, where literacy rates are much lower than in East Asia (Mayer and Wood 2001). The immediate effect of falling t is thus for wage inequality to rise, because the E/U ratio of the workers drawn into the A-sector is higher than the economy-wide E/U supply ratio (cell 10). Falling transport costs pull the other way, but not strongly, because of the initially high level of t and thus the small size of the A-sector (cell 11). The net outcome is thus a modest but continuing rise in wage inequality (cell 12) – as seems to have occurred in Bangladesh and India since their economies became more open, particularly during the 1990s.

The combined effect of falls in t and τ in both these cases is small because a high initial level of each kind of cost (without which it cannot fall much) lessens the impact of falls in the other kind. This interaction reduces the chances of globalization causing a large reduction in wage inequality in the South: a high t damps the inequality-reducing effects of falls in τ (the H&O mechanism); while a high τ decreases the probability of a phase 1 in which falling t would reduce inequality. A large fall in w_S^E/w_S^U thus occurs only in two cases. In one (cells 7–9), there is initially a high level of (and so a large fall in) τ, but low levels both of t (so a big A-sector) and of E/U supply (so a strong comparative advantage in A-goods of low E/U intensity): for example, a poorly educated country with initially restrictive trade policies but a liberal foreign investment regime. In the other case (cells 16–18), the initial conditions are a high level of (and so a large fall in) t, but a low level of τ and a high E/U supply ratio (so that z^* is initially below z_B): for example, a well-educated developing country which was initially open to trade but closed to foreign investment.

Even in the latter case, wage inequality would fall only for a while, but then increase, and with other combinations of initial conditions, globalization would cause a rise in inequality from the outset. Out of the total of 24 cells in the figure, the likely outcome is a rise in wage inequality in nine cells (though in five of them only a small effect), compared to eight cells in which it is a fall (in six cases small), and four in which there is first a fall and then a rise. In the remaining three cells, the effects are negligible. So there are somewhat more cases of increased inequality than of reduced inequality. In principle, the relative frequency of cells in this figure could be unrelated to the relative frequency of cases in the real world, but the survey of evidence in UNCTAD (1997) suggests that in practice, too, greater openness has increased inequality in developing countries more often than it has reduced inequality.

The models in this paper are of a two-country world, and hence the cases in Figure 6 refer to variation in the characteristics of the single Southern country. A fuller analysis would need to allow for the coexistence of Southern countries with different characteristics. For example, worldwide falls in τ would tend to reduce wage inequality more in Southern countries with low E/U supply ratios than in those with moderate E/U supply ratios, where more trade would displace activities both of low and of high E/U intensity (the net effect of which might be to raise wage inequality – as happened in middle-income Latin American countries in the 1980s and 1990s: Wood 1997). Similarly, worldwide falls in t might not cause phase 1 reductions in wage inequality in countries

with moderate E/U supply ratios, because activities of low E/U intensity would move from the North to countries with low E/U supply ratios (and thus the initial level of z^* would be higher in countries with higher z_B).

Moreover, for any given Southern country, more than one of the cases in Figure 6 may be relevant over time. In some of the cells, falling co-operation costs first reduce but later raise wage inequality. The opposite sequence would also be possible, if a fall in co-operation costs which raised inequality was followed by a fall in transport costs which had the opposite effect, as for example in a country which first pursued a policy of import-substituting industrialization through foreign investment, expanding its A-sector over a wide range of E/U intensities, but later liberalized its trade regime, so that its A-sector became more specialized in activities of low E/U intensity. A country could also go through more than two phases, either because of reversals of its own policies or because of changes in other countries (such as the opening to trade of China and other large low-income countries: Wood 1997).

V. Conclusions

The argument of this paper is that the varied effects of globalization – defined as reduction of the costs of all sorts of international transactions – on wage inequalities within developed and developing countries can be explained by combining three theoretical insights:

- Tang and Wood show how cheaper travel and communications, by enabling highly skilled Northern workers to co-operate more extensively with Southern workers, widen the wage gap between highly skilled workers and other Northern workers;
- Feenstra and Hanson show how the transfer of production activities from the North to the South, by increasing the skill intensity of output in both regions, tends to widen wage gaps between skilled and unskilled workers both in the North and in the South;
- Heckscher and Ohlin show how the reduction of barriers to trade, by causing production in both regions to become more specialized, tends to increase wage inequality in the North and to reduce wage inequality in the South.

These three insights, though seemingly unrelated and in some ways conflicting, turn out to be compatible and complementary. With some minor modifications to the models in which they were formulated, they can be fitted together into a single, synthetic theory.

The attraction of the synthesis is that it can explain far more of the observed changes in wage inequalities in recent decades than can any of the three theories individually. The H&O model can explain why inequality rose in the North and fell in parts of the South, but it cannot explain why the deterioration of the position of unskilled workers in the North has slowed, nor why inequality among skilled workers in the North has risen, nor why inequality has risen in some low-income Southern countries. The F&H model can explain why inequality rose in parts of the South as well as in the North, but not why it fell in other parts of the South. The T&W model can explain the rise in inequality among skilled workers in the North, but not the other changes in inequality in the North or in the South. The synthetic theory, however, can explain all these changes – and as consequences of globalization, without needing to bring in other forces such as exogenous changes in technology or labour market institutions.

In the North, the initial effect of falls in transport costs and co-operation costs is to widen the gap in wages (or with rigid wages, in unemployment rates) between unskilled workers and all skilled workers, by shifting some production from the North to the South and concentrating the remaining production on more skill-intensive activities. Both highly skilled and medium-skilled workers gain from this process, so that wage inequality among skilled workers may either rise or fall. Subsequent falls in co-operation costs shift more production to the South, but the activities which leave the North become increasingly skill-intensive, so that the transfer eventually lowers the demand more for medium-skilled than for unskilled workers, and the rise in inequality between these two groups goes into reverse. The relative wages of highly skilled workers continue to rise, though, so that wage inequality among skilled workers increases.

In the South, the effects of globalization on wage inequality vary widely, depending on the sequence and size of falls in transport and co-operation costs and on the initial conditions of the country concerned. For example, in a country with a lot of production involving Northern highly skilled workers, as a result of low co-operation costs, but with little education and little trade, a fall in transport costs would reduce inequality, for the reasons emphasized by H&O. However, if a poorly educated country started with little production of world-quality goods, a fall in co-operation costs would raise wage inequality, because the activities transferred from the North would be more skill-intensive than those in which workers were currently employed. A fall in co-operation costs would have different effects if the country were better-edu-

cated: activities shifted from the North initially would be less skill-intensive than other production, so that wage inequality would decline, but eventually would become more skill-intensive, causing wage inequality to rise again.

The greater explanatory power of the synthesis is bought at the price of an increase in the complexity of the theory. Moreover, of course, even the synthetic theory cannot pretend to be a complete explanation of recent changes in wage inequalities. It neglects important aspects of inequality – particularly wage gaps between countries – as well as important exogenous causes of changes in wage inequality within countries, particularly changes in labour supplies. It also omits many relevant features of the situation of particular countries, particularly, in the South, natural resources and infrastructure. However, it is hoped that the combination in this paper of three basic insights about the effects of globalization on wage inequalities will provide an improved basis for further research, both theoretical and empirical.

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Abstract: Globalization and Wage Inequalities: A Synthesis of Three Theories. – The theoretical insights of Heckscher and Ohlin, Feenstra and Hanson, and Tang and Wood provide a plausible explanation of the effects of globalization on wage inequalities in developed and developing countries. In combination, these three theories can explain, among other things, why inequality has fallen in some developing countries but risen in others. Improved travel and communications facilities raise the relative wages of highly skilled Northern workers, but in both the North and the South have mixed effects on wage gaps between medium-skilled and unskilled workers, sometimes reinforcing and sometimes offsetting the effects of falling barriers to trade. JEL no. F16