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**Globalisation and Wages in OECD Economies:
Linking Theory with Evidence**

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Globalisation and Wages in OECD Economies: Linking Theory with Evidence

Noel Gaston and Douglas Nelson

In the last decade, over 100 papers have been produced studying the link between increased economic openness and the returns to labour in the OECD economies. Not surprisingly, there have also been a number of fine surveys of this literature.¹ In addition to incorporating results from some of the more recent studies; our main goal is to focus particularly on two main questions that have received smaller consideration in the previous surveys: the implications of recent research on political economy for discussion of the openness-wages or openness-employment link; and the implications of imperfectly competitive markets.

We begin with a review of the main trade theoretic framework for evaluating the relationship between international trade and wages, the Heckscher-Ohlin-Samuelson (HOS) model, and current research using that framework as a basis for empirical research. We focus in particular on the trade theorist's main lever for evaluating the link between trade and wages: the Stolper-Samuelson theorem. In that section we also raise the question of the role played by the expectations of professional economists with respect to the use that public officials would make of certain classes of conclusion on our evaluation and framing of research on the link between openness and labour market performance. In section II we consider the relationship between

¹Prominent among these are: Bhagwati and Dehejia (1994); Deardorff and Hakura (1994); Burtless (1995); Baldwin (1995); Richardson (1995), OECD (1997). In addition, the recent books by Wood (1994) and Lawrence (1996) contain extensive critical discussions of this literature. In an appendix to this paper we provide a review of current results on labour market conditions in OECD countries.

current theoretical and empirical research on the political economy of trade policy for these questions. In that section we conclude that, while the HOS framework provides a framework for thinking about the long-run effects of trade on labour-markets, current concerns are driven by relationships that are not generally captured by a long-run, perfectly competitive model. In particular, we argue that useful models of the medium-run must be based on more detailed information about labour markets. Thus, the third section reviews the more empirically and institutionally rich research by labour economists on the link between international trade and labour markets. This leads us, in section IV, to examine a variety of theoretical frameworks that have been used to incorporate plausible sorts of labour-market microstructure. There we discover, not surprisingly, that highly general results are not available. Thus, the final substantive section turns to a brief discussion of implications for further research.

I. HOS, FPE, and Stolper-Samuelson: A Pedagogical Paradox

Unlike Antony at the grave of Caesar, we come to praise modern trade theory, not to bury it. For well over a decade one of us has been teaching trade theory to undergraduate and graduate students. One of the great pleasures of teaching in this field is the extraordinary number of fine texts and surveys by the giants who built the field: Robert Baldwin, Jagdish Bhagwati, Richard Caves, John Chipman, Max Corden, Alan Deardorff, Avinash Dixit, Wilfred Ethier, Harry Johnson, Ronald Jones, Murray Kemp, Peter Kenen, Paul Krugman, James Markusen, Robert Mundell, Victor Norman, Ivor Pearce, Dave Richardson, T.N. Srinivasan, Jaroslav Vanek, and

Alan Woodland.² Each and every one of these treats the factor endowment theory as central to understanding international trade and its effects. More often than not it is first among equals—simply *the* modern theory. Furthermore, each and every one of these, following the great example of the founder of modern trade theory Paul Samuelson, stresses the importance of low dimensionality formal theory for understanding the theory and its implications. We know the assumptions of the Heckscher-Ohlin-Samuelson (HOS) model, they can be repeated mantra-like:

1. Behavioural/Institutional assumptions
 - a. Rational behaviour by households and firms
 - b. Complete, perfectly competitive markets
 - c. Two countries
 - d. Balanced trade
2. Both countries possess *identical tastes* that can be represented by identical systems of (homothetic) community indifference curves.
3. Each country is endowed with fixed quantities of *two factors of production* (usually called labour (L) and human capital (H)).³
 - a. Factors are assumed to be of *uniform quality*.
 - b. Factors are assumed to be *perfectly mobile between sectors*.
 - c. Factors are assumed to be *perfectly immobile between countries*.
4. There are *two goods*
 - a. Both countries share the same technological opportunities.
 - b. Each good requires strictly positive inputs of both L and H to be produced in positive quantities
 - c. These production functions are linear homogeneous, twice

²Interestingly, the only name that is glaringly missing from this list is Paul Samuelson himself, but given his efforts in undergraduate text writing for the field of economics as a whole, and his efforts in creating modern trade theory, perhaps we should not be surprised.

³Actually, they are usually called labour and capital in pedagogical treatments, but in the literature on trade and wages, the convention is to focus on labour and human capital because of concerns for the deterioration in unskilled wages relative to skilled wages.

differentiable, and strictly concave.

5. *Factor-intensity*: At all relevant factor prices, it will be assumed that one of the goods is always human capital intensive relative to the other. Letting a_{ij} be the input of factor i needed to produce one unit of good j :⁴

$$\frac{a_{H1}}{a_{L1}} > \frac{a_{H2}}{a_{L2}}.$$

6. *Factor-Abundance*: One of the countries is taken to be relatively more richly endowed with human capital than the other. Letting a “bar” denote a fixed endowment and a “star” denote the Foreign country, this is:

$$\frac{\bar{H}}{\bar{L}} > \frac{\bar{H}^*}{\bar{L}^*}.$$

7. International trade in goods is costless.

These are strong assumptions, but with them we have created the minimally complex general equilibrium model with both inter-sectoral and intra-sectoral (i.e. inter-factoral) effects.

Furthermore, we have isolated the relationship between factor-intensity and factor-endowment as the basis of trade and, because most of us (and certainly the distinguished list of proponents of modern trade theory at the beginning of this paragraph) take this to be empirically central, we have a certain confidence in the predictions of this model as a starting point for our intuition about the causes and effects of international trade.

These predictions are usually presented as the four main theorems of modern trade theory: the Heckscher-Ohlin theorem (comparative advantage); the factor-price equalization theorem; the Rybczynski theorem (output effect of endowment change); and the Stolper-Samuelson theorem

⁴Throughout this paper the set of factors is denoted M , a characteristic element is i ; the set of commodities is denoted N , a characteristic element is denoted j . Where there are more than two elements in these sets, i can range from 1 to m and j can range from 1 to n .

(factor-price consequences of commodity-price change). The confidence with which trade economists believe that the HOS model captures something fundamental about the forces driving international trade was reflected in the widespread distress with which the Leontief paradox was met. A weak result would not surprise anyone, the model is, after all, extremely simple, but a finding that was apparently both strong and the reverse of the prediction was widely seen as trouble. Forty-some years later, the modal position among trade economists is that factor-endowments play an essential role in determining trade flows, but that many other factors are also important. That is, there is weak empirical support for a very strong model. Our confidence in the factor-endowments account may be bowed, but it is certainly unbroken. Furthermore, our faith in the HOS version of that model as an intuition generator and an expository tool is also unbroken.

Now, one of the wonderful things about formal theory is the way that it focuses the mind on implications. We buy the HOS model's prediction of trade patterns (the HO theorem) as a plausible account of part of the story of why nations trade the things that they do. But that means that we should buy, to the same extent, the predictions contained in the factor-price equalization and Stolper-Samuelson theorems. Thus, it is something of a surprise to read one of the giants of modern trade theory, who has worked tirelessly to develop and exposit the HOS theory, making the following claim:

If we look at the assumptions that underlie the FPE theorem, it becomes immediately obvious that they are extraordinarily demanding. Few would find the theorem compelling as a guide to thinking about the real world if only they were familiar with these assumptions—without which the iron hand of the FPE on real wages in the US unskilled cannot be taken seriously. (Bhagwati and Dehejia, 1994, pg. 42).

Note the implication of this claim: because the assumptions of the HOS model are “extraordinarily demanding”, we should not use the HOS model “as a guide to thinking about the real world”.

Bhagwati’s logic suggests that we reject not only the FPE theorem, but also the Heckscher-Ohlin, Stolper-Samuelson, and Rybczynski theorems as well. Carried to its extreme, this logic suggests that we forego all forms of systematic reasoning, because all systematic reasoning must rely on clear (and thus restrictive) assumption structures.⁵ Since trade theory is, in fact, supposed to act precisely as a “guide to thinking about the real world”, if we are to take Bhagwati’s statement at face value, it comes to nothing less than the assertion that the entire list of giants (including himself) has been perpetrating a fraud on several generations of students (to say nothing of the generations of university administrations that have been induced to provide premium salaries to departments full of economists).

So what is going on here? To squeeze the metaphor of the first paragraph of this section a bit harder, Bhagwati is Brutus, not Antony, not Cassius: for fear of the consequences of letting legitimate trade theoretic logic go to far, he is willing to participate in its murder. This is not ambition, Jagdish *is* an honorable man. The introductory section of the essay from which the above quotation is drawn provides the context: Bhagwati fears that HOS model will be turned from perfectly reasonable, and certainly useful, purposes to providing support for arguments against trade liberalization. This fear, like that of Marcus Junius Brutus, has led him to turn on the great instrument that he has spent a long and distinguished professional career constructing. Without going too far down this road, let us simply assert our judgement that the conclusions of

⁵Those who doubt the seriousness of this assertion need only consult the Sonnenschein-Debreu-Mantel results on the structure of excess demand correspondences under the general (but still highly restrictive) assumptions of the Arrow-Debreu-McKenzie models.

economic theory are extremely unlikely to provide much in the way of motivation or cover for politicians bent on providing protection for their constituents. Nor is any theorem, however compelling, likely to stampede an unsuspecting public into a protectionist frenzy. Given that judgement, we are loath to surrender the magnificent edifice of trade theoretic reasoning in the HOS mode on the very low probability event that it might be used to provide cover for political scoundrels.

Instead, it seems more useful to ask: just what are the lessons of HOS theory for the relationship between contemporary trade and wages? Somewhat paradoxically, this is a road down which Bhagwati precedes us. But first, the road. Under the assumptions listed above, we are able to derive:

Stolper-Samuelson Theorem: An increase in the relative price of one of the goods will raise the return to the factor used intensively in the production of that good, relative to all other prices, and lower the return to the other factor, relative to all other prices.

As many others before us have done, we illustrate this result with the Lerner-Pearce diagram: into H - L space we project the unit-value isoquants for each of the two goods. Since the unit isoquant gives all combinations of H and L that can produce one physical unit of output, and since that unit sells for a price P_j , then we divide by P_j to scale the quantity back to \$1 worth of output at the given price. With price equal to cost under constant returns and competitive markets, each isoquant must be tangent to the \$1 isocost line.⁶ Thus the equilibrium is illustrated in figure 1. Note, in particular the representation of the assumption that production of good 1 is human capital intensive relative to good 2.

⁶The isocost line gives all combinations of H and L that can be purchased for \$1 at relative factor prices given by the slope: $1 = rH + wL$ or $H = 1/r - w/r L$. Note that w is the payment per unit labor (“wage”) and r the payment per unit human capital (“rental”).

–figure 1 about here–

Suppose we consider an archetypal OECD economy, taken to be relatively abundant in H (and thus an exporter of good 1). Now consider a reduction in protection, and assume for now that the country is economically small. Since the L -intensive good 2 is importable, the result is a fall in the price of good 2, represented by an outward shift in the unit value isoquant for good 2. As illustrated, if good 2 is to be produced in the new equilibrium, the w/r ratio must fall to permit a tangency for both unit isoquants. This is the friends and enemies part of the Stolper-Samuelson theorem: each factor has a good that is a friend and a good that is an enemy.⁷ In this case, good 1 is a friend to H and an enemy to L ; good 2 is a friend to L and an enemy to H . The other part of the theorem asserts a magnification effect: that the factor-price changes are magnified relative to the commodity-price changes.⁸ We can see the magnification effect by recognizing that the intercepts of the isocost line give $1/r$ and $1/w$. Thus, the fact that the new H -intercept is below the initial intercept implies that r has risen and, since the price of good 1 is unchanged and that of good 2 has fallen, this implies an increase in the real wage (i.e. a magnification). Similarly, since the new L -intercept is to the right of the old one implies that w has fallen. Furthermore, since the

⁷A good is a friend to a factor if an increase in its price causes an increase in the factor's price, and an enemy if an increase in its price causes a decrease in the factor's price. This terminology is essentially that of Jones and Schienkman (1977).

⁸As Jones (1965) makes clear, this is a function of the fact, derived from zero profits and cost minimization, that the proportional change in a commodity price must be a distributive share weighted average of the proportional changes in factor prices: $\hat{p}_j = \theta_{Lj} \hat{w} + \theta_{Kj} \hat{r}$ —where θ_{ij} is the distributive share of factor i in sector j , and “hat” denote proportional changes. As a result, commodity-price changes must be bound between factor-price changes. So, given perfect factor mobility and the factor-intensity assumption, a change in relative commodity prices must result in one factor-price increasing by more than the largest price change and the other by less than the smallest commodity price change.

distance $B'-B''$ is equal to the proportional increase in price, and the wage has actually fallen by $A'-B'$, the reduction in the wage is a magnification of the fall in the price of good 2. Using hats to denote proportional changes, we have:

$$\hat{r} > \hat{p}_1 (= 0) > \hat{p}_2 > \hat{w}. \quad (1)$$

The Stolper-Samuelson theorem is one of the jewels in the crown of trade theory (in fact, shamelessly shifting metaphors, it is arguably the Koh-I-noor diamond). As Stolper and Samuelson point out in their original contribution, this result provides much needed clarity in the discussion of the relationship between trade (via its effect on relative commodity prices) and income distribution. There is no refuge in obscure references to index number problems or equally obscure (but unspecified) general equilibrium effects. As long as factors are distributed unequally among households, changes in international conditions that affect relative prices will result in changes in income distribution. To whatever extent we believe that the HO theorem captures the fundamental relationship between endowments and trade, to that same extent we must believe that the Stolper-Samuelson theorem captures the fundamental effect of trade on the income distribution. Since we have argued to this point that that part of the profession specializing in the study of international trade believes rather strongly in the factor endowment model, the next step is to ask how this model organizes contemporary research on the empirical issue of the relationship between trade and wages.

One obvious first use of the HOS model, and the Stolper-Samuelson theorem in particular, in current discussions of the relationship between trade and wages, involves simple auditing of logic. The motivation for much of the discussion is the suspicious simultaneity of various changes

in trading conditions with a deterioration in the relative wages of unskilled workers (see the appendix for details). However, at the same time, there have also been significant technological changes (in particular, the widespread adoption of computer technology) and major shocks to the magnitude and pattern of government demand (i.e. the 1980s boom in military spending). The well-known properties of the HOS model can be exploited to examine the relationships between these various phenomena. Particularly good examples of this are Baldwin (1995), Deardorff and Hakura (1994), and Krugman (1995b). None of these papers presents original empirical work, but all make substantial contributions by providing a simple, clear framework within which to evaluate existing empirical work. Since the stylized fact that the Stolper-Samuelson theorem is supposed to rationalize is a fall in the wage of unskilled labour relative to that of skilled labour, the HOS model implies several specific checks: whether the relative commodity prices changed in the way required by the theorem (i.e. an increase in the relative price of skill-intensive goods); and whether all (i.e. both) sectors become more unskilled labour-intensive (as they must with fixed factor-endowments and unchanged technology). Early papers by trade economists evaluated these checks finding that neither of these conditions are satisfied (Bhagwati 1991 a&b; Lawrence and Slaughter, 1993). While Stolper-Samuelson effects might well be operative, at least at the level of aggregation necessary to ask the question in its pure 2×2 form, the evidence suggests that other factors must be dominating them.

The empirical element of the Bhagwati\Lawrence-Slaughter analysis uses solid trade theoretic foundations and simple (i.e. back-of-the-envelope) calculations taking that framework seriously to make a very useful point. An alternative approach to back-of-the-envelope calculating is to use a computable general equilibrium (CGE) envelope. Krugman (1995a) and

Lawrence and Evans (1996) do precisely this: they evaluate the effects of trade changes in low-dimensional CGE models which are, broadly speaking, benchmarked to the US case, concluding that the effect of plausible levels of trade with developing countries would be small (but negative) and swamped by positive effects.⁹ In the context of a much larger CGE model, Burfisher, Robinson and Thierfelder (1994) find similarly small effects of liberalized trade with Mexico in the context of the North American Free Trade Agreement (NAFTA).¹⁰ Using a perfect substitutes/perfect competition structure with Leontief production functions, benchmarked to 1967 U.S. data, Hartigan and Tower (1982) provide evidence that a reduction in trade barriers would raise the returns to capital (i.e. they conclude that U.S. tariffs protect capital).¹¹ However, since most large-scale CGE models incorporate imperfectly competitive elements, they fairly uniformly find that increased trade yields increased real wages for labour.¹²

With the exception of the large-scale CGE work mentioned in the previous paragraph, all of the work we have mentioned so far “treats the theory seriously” by keeping the dimensionality to the canonical two goods and two factors. As with the literature on the Leontief paradox, a

⁹Krugman uses a 2×2 model of a conventional sort, Lawrence and Evans use a two-factor, 3 good model, in which one of the goods is non-traded.

¹⁰Note, however, that since Mexican prices do most of the adjusting (due to Mexico’s small size relative to the U.S.), there are virtually no Stolper-Samuelson effects in the U.S.

¹¹This peculiar result is essentially equivalent to the Leontief paradox. While there is some dispute on the matter, most econometric work seems to suggest that the overall structure of US protection provides protection to unskilled workers. Deardorff and Haveman (1995) find a similar sort of result from looking at the effect of current administered protection on poverty. Their result turns on the existence of labour rents in protected sectors, and inter-regional factor-immobility, in a Cairnes-type specific factors model.

¹²Brown (1994) provides a particularly clear discussion of these issues. We return to these issues in the discussion of imperfect competition.

natural response to the paradox of no-Stolper-Samuelson effects is to increase the dimensionality and use the analytical structure to provide a theoretically well-grounded estimating equation. A small number of papers do precisely this: Baldwin and Cain (1997); Leamer (1996); Krueger (1997); and Feenstra and Hanson (1997). All of these use an m -factor \times n -good decomposition of the relationship between proportional changes in unit costs and proportional changes in factor-prices based on the theoretical work of Jones (1965).¹³ The empirical implementation of this decomposition for good j ($\in N$) is:

$$\hat{p}_j = \sum_{i \in M} q_{ij} \hat{w}_i + \epsilon_j, \quad (2)$$

where ϵ is a normally distributed random error term. Baldwin and Cain regress commodity-price changes on factor-shares (θ_{ij}) to derive predicted changes in factor-prices. These predictions are then compared to observed factor-price changes. Where the observed factor-price changes are not consistent with the Stolper-Samuelson predictions, Baldwin and Cain ask if the observed patterns are consistent with technological explanations based on additional data not included in regressions (2).¹⁴ Their conclusion is that, except for the least skilled category (workers who did not finish high school), “increased imports of manufactured product intensively using less educated labor, by itself cannot explain the observed increase in wage inequality in the 1980s and

¹³We have already presented the result and its logic at equation (1). The original development of the empirical application of this decomposition can be found in Baldwin and Hilton (1984), who used this framework to predict trade flows between pairs of countries.

¹⁴These additional data are: 1) the ratio among industries of the output of goods intensive in the use of highly-educated labour to the output of goods intensive in less-educated labour; 2) the within-industry ratio of the use in production of highly-educated to less-educated labour; and 3) the ratio among industries of (exports minus imports)/(output minus [exports + imports]).

1990s among all groups of workers with more education compared with less education” (Baldwin and Cain, pg. 42). On the other hand, they conclude that “biased technical progress that is saving of the use of less educated labor and is more rapid in some manufacturing sectors intensive in the use of highly educated labor could have been the main force operating to decrease the relative wages of the 1-11 education group and to widen the gap between the 12 and 13+ education groups in manufacturing” (pg. 43). Interestingly, Krueger (1997) finds a much closer match between predicted and actual factor-price changes.

Leamer (1996) and Feenstra and Hanson (1997) adopt a related strategy that is also based on a regression framework like that in equation (2), but extend the framework to explicitly incorporate technological change. Leamer’s strategy is to use data on technological change and an explicit assumption about the pass-through of a fixed proportion of that change to lower prices. Leamer concludes (pg. 30), like Baldwin and Cain, that technological change dominated price changes in the 1980s but that the reverse was true for the 1970s. Extending their research programme of incorporating the effects of outsourcing, Feenstra and Hanson decompose their measure of technological change into components due to high-technology equipment and outsourcing.¹⁵ Under an assumption of exogenous commodity prices and exogenous sector-specific wage differentials, Feenstra and Hanson find that outsourcing plays a large (though not precisely estimated) role in generating wage inequality. However, under pass-through assumptions like those in Leamer, technological change (computers) dominates other effects.

An alternative explicitly general equilibrium-based approach exploits the well-known

¹⁵See Feenstra and Hanson (1996 a and b) for development of their analysis and preliminary empirical results.

derivative properties of GNP functions to evaluate Stolper-Samuelson effects.¹⁶ In a very interesting recent paper, Harrigan and Balaban (1997) estimate a translog GNP function for the US for 1963-1991, for $M = \{\text{High School Dropouts, High School Graduates, College Graduates, Capital}\}$ and $N = \{\text{Non-traded Skill-Intensive, Non-traded Unskilled-Intensive, Traded Skill-Intensive, Traded Unskilled-Intensive}\}$.¹⁷ As with the Jones-Baldwin approach, the GNP function approach allows Harrigan and Balaban to explicitly incorporate the effects of price changes (Stolper-Samuelson effects), endowment changes, and technology changes in a single econometric framework. This paper provides suggestive evidence that all three of these effects played a role in generating the increased inequality that emerged in the 1980s.¹⁸

¹⁶Recall that the GNP function is defined as: $G(p, z) \equiv \max_y \{p \cdot y: y \in Y(z)\}$, where z is the vector of factor endowments and $Y(z)$ is the feasible production set. Diewert (1974, sections 3 and 4) develops the properties of this function, its representation by flexible functional forms, and its application to international trade theory. In particular we have the relevant derivative property that: $w(p, z) = D_z G(p, z)$. Thus, the Stolper-Samuelson derivatives are given by $D_p w(p, z) = D_{pz} G(p, z)$. A useful fact, that has been exploited by Leamer (1993, section 6), is that, if the GNP function is twice differentiable, the Stolper-Samuelson derivatives are equal to the relevant Rybczynski derivatives—the Hessian matrix of G [i.e. $D^2 G(\cdot)$] is symmetric [i.e. $G_{ji}(\cdot) = G_{ij}(\cdot), \forall i \in M \text{ and } j \in N$]. This fact, which follows from Young's theorem, is usually called Samuelson's reciprocity conditions.

¹⁷Burgess (1976) and Kohli (1991) pursue the same agenda with lower dimensional (i.e. 2 \times 2) models, but are not specifically interested in wage inequality. Burgess, does, however, present evidence that the US tariff protects labour. Kohli provides an excellent discussion of all aspects of this type of research. A recent paper by Harrigan (1997) is closely related. This paper also estimates a flexible functional form GNP function, but uses the information to evaluate the relative effects of factor endowments (the Rybczynski derivatives) and technological difference in explaining trade flows.

¹⁸In contrast to the conclusions of Baldwin and Cain, the effect of technological change was found to be considerably smaller in magnitude than the Stolper-Samuelson and endowment effects. However, the Harrigan/Balaban framework assumes Hicks neutral technological change, where Baldwin and Cain argue that only biased change is consistent with the pattern of observed

We can surely agree that the factor-endowment model (HO broadly speaking) contains a considerable element of truth about the economic foundations of international trading relations, and we can surely also agree that the textbook 2×2 version clearly expresses that truth in its clearest form, and finally, we can surely all agree that, whatever degree of truth is captured by the model is conveyed in precisely equal measure to each and every one of the four main theorems of that model. In an environment characterized by large changes in international trading conditions, it would be truly shocking if Stolper-Samuelson effects were not part of any story about changing income distribution. But at a time when there have also been large changes in technology, government spending and labour market institutions, it would be equally shocking if those did not also matter. One of the signal virtues of simple general equilibrium modeling is that we are able to talk coherently about the ways, plausible and otherwise, that these phenomena might interact. Because of the complex ways in which these phenomena interact, it is almost surely impossible to convincingly isolate one or another effect. This unfortunate fact, however, should not lead us to turn away from the very real virtues of simple trade theoretic models for thinking about the world. There are certainly large differences of opinion with respect to empirical priors, detailed modeling strategy, and results between Edward Leamer, Paul Krugman, Robert Lawrence, and James Harrigan. However, thanks to their common use of well-specified general equilibrium models in the HOS family, we are quite clear on the sources of their disagreement. Furthermore, surely as a result of their use of a common framework, this particular branch of the literature on the relationship between trade and wages is characterized by increasing theoretical clarity and empirical progressivity. From a social scientific point of view, one could hardly ask for more.

factor-price changes.

II. The Political-Economy Paradox

Twenty years ago, Steve Magee (1978) had an exceptionally clever notion for “Three Simple Tests of the Stolper-Samuelson Theorem”. The basic idea was to use the political behaviour of rational agents to determine the adjustments induced by changes in trading conditions. After tabulating the public lobbying behaviour of economic agents (i.e. representatives of firms and unions), Magee found that firms and unions (i.e. capital and labour) tend to lobby together—a result consistent with the Cairnes non-competing groups model and inconsistent with the apparent predictions of the Stolper-Samuelson theorem. Where Magee framed the analysis as a test of competing models (based on the assumption that agents are fully intertemporally rational), we think it is fair to say that most political-economy analysts now take this result to say not that the economy is in fact characterized by non-competing groups of factors defined in terms of industry location, but that agents condition their political behaviour on short-run calculation.¹⁹

For our purposes, there are two important lessons from Magee’s work: economic agents believe that there are income distribution effects from trade policy (and thus trade) that are non-trivial in magnitude; and over some significant time period, these effects are seen in terms of quite imperfect factor mobility. The first point is virtually self-explanatory: if economic agents are economically rational, and if political action is costly, then such agents will only pursue attempts

¹⁹This result has been directly replicated in Nelson and Wasley (1989) and provided with more compelling support by Grossman and Levinsohn (1989). The latter paper uses an event study methodology to evaluate market responses to trade shocks, finding that the market responds in a way more consistent with short-run than long-run trade models. Thus, the fact that agents condition even market behaviour on short-run calculation would seem to provide strong support for the notion that political behaviour is also taken in response to short-run effects.

to affect trade policy if they expect significant income distribution effects. At least for an economist, the best evidence in the world that something exists is that a lot of people are willing to pay money to pursue it. Thus, with reference to the concerns of the previous section, the extensive history of political action on trade policy provides strong, *prima facie* evidence in favor of the presence of trade-induced income distribution effects. This, of course, is the paradox: like most trade economists, Bhagwati has deployed political-economy reasoning to explain trade policy, but this recent work seems to deny the existence of precisely the economic phenomena that make the political behaviour in the earlier work explicable.²⁰

We might move some way toward unpacking this paradox by focusing on the second point, and Magee's central result: the political behaviour of economic agents suggests that any long-run adjustment to trade shocks only occurs after a considerable period—we might not be dead in this long run, but we'll all be a lot older. Suppose we start with a framework whose long-run equilibrium is HOS, and denote as the short-run a period in which no factors are mobile (the Cairnes model) and as the medium-run a period characterized by imperfect and asymmetric factor-mobility.²¹ If we assume sufficient sectoral factor-price flexibility to ensure full-employment, the short-run analysis is quite straightforward. Again, consider a trade-induced decrease in the price of *L*-intensive good 2, with no change in the price of the other good. Since factors are

²⁰In fact, Bhagwati is one of the most prominent proponents and practitioners of political-economy reasoning to trade policy. Many of his important contributions are collected in sections I and II of Bhagwati (1996). It is a bit unfair to single out Bhagwati, since virtually every trade economist makes political-economy arguments of precisely this sort. Every undergraduate international economics textbook contains them.

²¹See Caves (1960, Chapter 3, section I) for a brief survey and useful discussion of the earlier literature on specific-factors and non-competing groups.

intersectorally immobile and fully employed, their marginal products are unchanged so relative returns are unchanged. Thus, both factor-prices fall in the same proportion as the commodity-price. If household income is generated from a single factor invested in a single sector, and households consume strictly positive quantities of each commodity, real incomes of all factors in sector 1 increase while those in sector 2 fall.

$$\hat{p}_1 = \hat{w}_1 = \hat{r}_1 = 0 > \hat{p}_2 = \hat{w}_2 = \hat{r}_2. \quad (3)$$

This is certainly sufficient to induce the pattern of lobbying on trade legislation observed by Magee.²²

Where the short- and long-run analyses under competitive conditions are straightforward, when we turn to the medium run it is more difficult to say what is the appropriate formal characterization. The essential element is obviously asymmetric factor mobility, but, just as obviously, there are a wide range of such asymmetries. One of the simplest, and most widely studied of these medium-run models is the Ricardo-Viner model.²³ In this model, the medium-run is characterized as a period in which one factor is fully mobile and the other is completely immobile. This model has proved to be an extremely valuable tool in applied (not computational) general equilibrium analysis, joining the Ricardian and HOS models as textbook models. For the application to the analysis of the link between trade and wages, though, we face a difficult

²²Also see Baldwin (1984a) for a model with sector-specific capital in which sector-specific labour skills generates Cairnes-type non-competing group political behaviour.

²³The clearest presentation of this model is Jones (1971). The characterization of the model as a short-run model is most completely developed in papers by Mayer (1974), Mussa (1974), and Neary (1978). Also see Hill and Mendez (1983) for a useful presentation of more general asymmetric mobility models.

problem of assigning empirical categories of worker to the theoretical categories.²⁴ If we stick with our categories of skilled and unskilled labour, which will we treat as mobile in the medium term, and which as immobile? None of the standard skill categories (i.e. job classification and educational attainment) bear any obvious relationship to the economically relevant category of sector-specificity: certainly very unskilled labour is completely mobile across sectors (e.g. custodial jobs); similarly many intermediate skills are virtually completely portable (book keeping, running office machinery, etc.); and similarly for highly skilled jobs (the entire profession of management consulting is based on this premise). Nonetheless, with the possible exception of the lowest skill category, all of these categories also contain substantial elements of sector-specificity (or even firm-specificity). While recognizing this difficulty, we now assume that the medium term is the period in which unskilled labour (L) is immobile and skilled labour (H) is mobile. Abstracting from the most unskilled labour, the idea is that skilled labour has portable skills while unskilled labour acquires sector-specific skills through an unmodelled training process.²⁵

–Figure 2 about here–

The canonical representation of the Ricardo-Viner model, due to Mussa (1974), plots the value marginal product curves for the mobile factor against the total endowment of the mobile factor, as in figure 2. In initial equilibrium, OA units of skilled labour are allocated to production in sector 1 and AS units to production in sector 2, the common equilibrium wage for skilled

²⁴This problem does not arise in either the short- or long-run models, since factors are treated symmetrically (i.e. either they are all immobile or they are all mobile).

²⁵In equilibrium, unskilled labour receives its value marginal product, but the productivity of its sector-specific skills are zero in the other sector. Thus, the return to unskilled labour is a rent.

labour (r) is set by perfect competition and free intersectoral mobility. Since integrating under a marginal product curve gives total product, subtracting the total payment to labour identifies the triangular areas above the skilled-wage line as total payment to sector-specific unskilled labour. Now suppose that, either as a result of reduced protection at Home or changed production conditions abroad, the price of importable good 2 falls. This shifts the skilled-labour value marginal product curve for sector 2 down, resulting in: a fall in the allocation of skilled labour to sector 2 (from SA to SB) and, thus, a fall in the output of good 2; an increase in the allocation of skilled labour to sector 1 and an increase in the output of good 1; and a lower equilibrium wage (r'). It is clear that the triangle representing total return to unskilled labour in sector 1 has increased in size and, since there has been no change in the allocation of unskilled labour to that sector, we know that the return per unit of unskilled labour in that sector has increased relative to both product prices (i.e. the unchanged price of good 1 and the price of good 2 which has fallen). To establish the remaining effects on real factor-returns, consider the short-run in which the skilled-labour allocation remains fixed at A. We have already noted that in this case the wage of skilled labour and the rental on immobile unskilled labour must change in the same proportion as the price. That is, at A (with the wage at r'') we have $\hat{p} = \hat{r} = \hat{w}_2$. As skilled labour leaves sector 2 the marginal product of the remaining units rises and the economy-wide wage equalizes at r' . That is, the proportional change in the wage of skilled labour is bound between the two price changes (this is the “neoclassical ambiguity” of Ruffin and Jones [1977]). Similarly, the triangular area formed relative to r' and V_2' must be smaller than that formed relative to r'' and V_2' , so the rental rate on unskilled labour in sector 2 has fallen relative to both prices. Together, these give Jones’ (1971) result that:

$$\hat{w}_1 > \hat{p}_1 (= 0) > \hat{r} > \hat{p}_2 > \hat{w}_2. \quad (4)$$

The implications of this analysis for interpreting empirical findings on the link between trade and wages are quite clear. Depending on the relative sizes of the two sectors and the unskilled labour shares in each sector, the medium-term effect of the trade shock on the average return to unskilled labour could be positive or negative.²⁶ However, as Mayer (1974), Mussa (1974), and Neary (1978) have all stressed, if skilled and unskilled labour are fixed endowments that are both fully mobile in the long-run, then we should eventually observe the Stolper-Samuelson pattern given in (1).²⁷

The implication of empirical results like those of Magee and Grossman-Levinsohn on the relationship between trade and wages is that if we are looking for Stolper-Samuelson effects with contemporaneous data on relative commodity-prices and relative factor-prices, we have probably misspecified the empirical model. That is, the short-run relationships between commodity-price shocks and factor-price adjustments are systematically different from the long-run relationships. The story of U.S. trade policy in the 1960s and 1970s is a story about sizable liberalization. The Kennedy Round and the Tokyo Round involved large reductions in total protection. Since these reductions were accomplished via reciprocal reductions in protection, protection fell both at home

²⁶That is, even though we have assumed sector 2 to be unskilled labour intensive relative to sector 1, if the sector 1 (the sector in which this trading economy has a comparative advantage) has a sufficiently large share of total output, the total unskilled labour employment in sector 1 could easily be larger than that in sector 2.

²⁷A particularly clear graphical exposition of the adjustment process is found in Neary (1978). Jones (1997) develops the analysis of technological change for the RV model with particular reference to trade-wage linkages.

and in our trading partners. To whatever extent trade is endowment-based, both of these should have resulted in price reductions for, presumably labour intensive, import-competing goods. Furthermore, at least as far as these import-competing producers were concerned, the 1960s and 1970s were a period in which the administered protection mechanism was not working.²⁸

The relevant empirical research here relates to the *structure* of protection. Here the results are fairly clear:

“[T]he various empirical tests indicate that industries receiving the greatest protection (and the lowest duty cuts during multilateral trade negotiations) are ones in which the workers tend to be unskilled, low-paid, older, and live in rural areas. These industries are also characterized by a large number of workers, a high labour-output coefficient, a small number of firms, slow growth, a high import penetration ratio, and historically high levels of protection.” (Baldwin, 1984b, pg. 581)²⁹

Following the empirical arguments of, for example, Hufbauer and Chilas (1974) and standard political-economy reasoning, and painting with a broad brush, we might interpret this as saying that the largest reductions in protection occurred in sectors characterized by intra-industry trade, i.e. sectors in which adjustment costs would be lowest. There were lower, but still positive, cuts in high adjustment cost sectors, but the cuts were such that the structure of protection has remained more-or-less the same (at lower levels across all sectors). If we suppose that price changes in the low-adjustment cost sectors are small (since there are increasing imports and exports) and that price changes are larger (even for lower reductions in protection) in the high-adjustment cost sector, and that exportables prices rise, we have the basis for long-run Stolper-

²⁸See Destler (1986) or Nivola (1993).

²⁹Rodrik (1995) provides essentially the same conclusion.

Samuelson effects.³⁰ If we also suppose, consistent with the implication of political-economy research that adjustment to the long-run equilibrium takes a long time, it is entirely possible that the liberalizations of the 1960s and 1970s played a substantial role in the deterioration of unskilled wages in the 1980s. Furthermore, we can only begin to determine now if the increased protection of the 1980s has produced reduced rates of relative unskilled wage decline in the late-1990s.

It should be clear that, if we drop the simplifying assumption of perfectly competitive markets for H and L , there are a variety of intermediate equilibria and adjustment paths—many involving unemployment. The centrality of unemployment to the analysis of the relationship between trade and labour markets is suggested by another application of the political economy argument we have been developing in this section: virtually all studies of the macro-political economy of protection find that unemployment and/or changes in unemployment are significantly, and positively, related to protection. As we shall see in the next two sections, there is considerable evidence that trade affects employment—though not always in ways that are consistent with general equilibrium in perfectly competitive markets. Of course, whether increasing globalization and more liberalized trade are actually associated with higher or lower wages, divergent wage outcomes for particular groups of workers, and more importantly, the role that these various factors play, *must* ultimately be empirical issues. This suggests sizable gains from examining the detailed empirical results and professional judgement on labour market micro-structure that are the main line of contemporary labour economics.

³⁰It is provocative, though far from dispositive, that low average wages were positively associated with the (then Treasury's) less than fair value determination, but insignificantly (though negatively) in the ITC's injury determination. Since two positives are necessary for a final affirmative determination, this suggests that low-wage labour was not particularly well served by administered protection prior to the 1980s.

III. Econometrics and Institutions: Labour Economists on the Labour Market Effects of Globalisation

At least as a first cut, labour economists tend to couch their discussion of wage or earnings developments in terms of labour supply and demand for the different types of labour in the different sectors of an economy (Katz and Murphy, 1992; Murphy and Welch, 1992). This partial equilibrium analysis permits a much greater focus on institutional detail than a general equilibrium analysis.³¹ For example, most early explanations for the increase in the skill premium or college wage premium relied on investigating the net increase in the demand and supply of skilled or college-trained workers. It was a fruitful exercise in the investigation of U.S. earnings inequality because the fact that skilled employment had grown faster than unskilled employment effectively ruled out supply-side changes as the dominant factor in growing U.S. earnings dispersion. This understandably focused attention on the relative demand for skilled and educated workers, with the implication that the labour supply of educated workers is relatively inelastic; so that the increased supply of skilled workers had been overwhelmed by increases in the demand for them (Levy and Murnane, 1992). Changes in the relative demand for labour, reflected by the changing composition of product demand brought about, for example, by falling trade barriers and the Reagan boom in military spending, and changes in the factor-mix driven by skill-biased technical change have been the leading demand-side explanations.

While the search for common factors in the trend of increasing earnings inequality has

³¹Justification for this approach, rather than a comparative institutional analysis, is provided by the similar patterns of change in the structure of earnings inequality across countries which suggest a set of similar factors in operation.

primarily focused on the relative demand for workers, explanations for cross-national differences in labour earnings outcomes have increasingly resorted to comparative institutional analysis. For example, DiNardo and Lemieux (1997) conclude that the greater deunionization of the workforce in the United States relative to Canada can explain much of the difference in male earnings inequality between the two countries. (This differs from earlier studies that tended to dismiss the role of deunionization, because in a similar fashion to deindustrialization in the U.S., the related process of deunionization had been ongoing since the 1950s.)

The role played by globalization on the labour markets of developed countries has been particularly fertile ground for research during a time when international trade liberalization has proceeded relatively rapidly and concerns about imports from low-skill labour abundant developing economies have been prominent. While many commentators have pointed to the fact that much of the earnings dispersion appears to have occurred *within* narrowly defined occupational groupings as well as *within* rather than between industry sectors to diminish the importance of trade effects on the labour market, such a conclusion may be hastily drawn, as we discuss in the following sections.³² In fact, some authors, using quite different methodologies, have found significant labour market effects attributable to increasing import penetration. In addition, strict adherence to the ubiquitous skill-biased technological change explanation for increasing wage inequality seems foolhardy in view of the continued increase in earnings inequality in just two countries (the U.S. and the U.K., appendix section 3, “Stop Press”) and

³²The summary of the proceedings at a recent conference on earnings trends in the United States revealed the following ‘consensus:’ *"On average, the group [of conference participants] attributed 60 percent of the increase in dispersion to technological change, 10 percent to international trade, and 30 percent to other factors such as immigration, the low minimum wage, and changes in corporate wage-setting institutions."* (Klitgaard and Posen (1995, p.34)).

reversal of inequality in many more OECD countries. Is it the case that technological changes are now affecting just these two countries?

Given the current state of theory and data, it seems a virtually impossible task to convincingly disentangle the roles of technical change and international trade on the labour market. For example, globalization may lower the costs of diffusing new technology and encourage capital for labour as well as skilled for unskilled labour substitution (Johnson and Stafford, 1993). More speculatively, the rate of technical progress may be an endogenous response to the need to maintain competitiveness in a global marketplace. The same argument can obviously be made about deunionization and the decentralization of wage bargaining and increasing global competition.

Furthermore, since countries with similar standards of living and economic development will generally have access to labour and capital of similar quality, it is quite likely that the magnitude and nature of any technical change will also be similar. In fact, Katz, *et al.* (1995) have argued that this must also be true for any changes on the demand-side, since EU countries were also affected by import penetration from countries abundant in skilled labour. Given this similarity in aggregate endowment, technology, and shocks, it seems quite natural to investigate the different institutional forces operating in each country to explain cross-country differences in the trends and structure earnings dispersion. In the United Kingdom and the United States, deunionization has been a significant labour market development, in economies in which structures are already relatively decentralized (see Layard *et al.*, 1994; H. Katz, 1993). Naturally, these changes are not independent of growing international competition (Freeman and Gibbons, 1995). In Australia, a country that has recently implemented a number of labour market reforms

to decentralize its traditionally centralized form of wage bargaining (termed “Enterprise Bargaining”), the argument made by employer groups has been that such changes were inevitable because of the need to maintain international competitiveness. (Interestingly, the Australian union movement has generally supported these work place reforms.)

A related labour market development that has attracted widespread attention when comparing developed countries is the unemployment experiences of the countries in question. The general perception is that countries with the narrowest earnings structures and lowest increases in earnings dispersion have experienced the largest increases in unemployment rates. In the United States, the growing earnings inequality seems to have brought with it lower unemployment rates. Some U.S. commentators point to Europe’s relatively high welfare ‘net’ to explain why displaced European low-skill workers may not respond by acquiring the skills or education necessary to become re-employed.³³ On the other hand, some European commentators have argued that emulating the United States along any inequality-unemployment ‘trade-off’ relationship would be socially unacceptable in Europe.

Nickell and Bell (1996) have argued that the broad-brush view of aggregate unemployment rates rising faster in countries that were willing to accept higher unemployment rates for the least skilled in order to keep low-skilled wages falling to market levels is extremely misleading. They offer two major pieces of evidence. First, countries with the smallest increases in inequality do not seem to have experienced the largest increases in their aggregate rates of unemployment. In particular, unemployment did not rise faster in those countries with the most

³³For example, see Krugman (1994)

centralized labour markets. Second, the unemployment rates of the least-skilled did not rise faster than the unemployment rates of the more-skilled.

In thinking about the kinds of complexity involved here, it is useful to recall that the United Kingdom experienced increases in earnings inequality equivalent to that for the United States. However, they did not enjoy the quid pro quo on the unemployment front. The U.K. unemployment rate was lower than 10 percent for the period 1988-91 only. Unlike the United States, unemployment was higher at the end of the 1980s than at the beginning in the United Kingdom (Schmitt, 1995). On the other hand, Blau and Kahn's (1996) finding of the relatively smaller compression at the bottom of the earnings distribution in the United States relative to other countries is significant in that, for the United Kingdom, the least-skilled tended to be disproportionately represented amongst the growing number of the unemployed (Schmitt, 1995). Hence, a more accurate characterization may be that there is a link between the unemployment problem and wage compression at the lower extremes of the income distribution, rather than with wage inequality, per se. Once again, the labour market circumstances in which low-skill, less-experienced, or poorly-educated workers and more-skilled, experienced, or well-educated workers find themselves in are likely to be extremely different.

The effects of globalization on the labour market

Recent research on the effects of globalization on the labour market has produced mixed and, at times, controversial results. The purpose of this sub-section is to highlight what we consider to be some of the more important findings and implications from the research on the

labour market effects of international trade.³⁴

Rising import penetration and wages: Rising import penetration from developing countries has been identified by some authors as a major contributor to the falling real wages and earnings experienced by certain groups of workers during the 1980s, a time when the U.S. trade balance turned significantly negative. Other researchers have found insignificant effects of trade on earnings inequality. Burtless (1995) provides a balanced survey of the research of the main protagonists.

As noted in the appendix, for all workers, average real earnings were constant during the 1980s. However, the real wages and earnings for certain groups of workers fell considerably—young, less-experienced workers, less-educated workers, blacks, and male workers (see Bound and Johnson, 1991, 1992; and Murphy and Welch, 1992). MacPherson and Stewart (1990) found that increased import penetration was associated with a substantial decline in the union-nonunion wage differential. This seems to be consistent with the finding that the wages of union workers are far more sensitive to demand shocks than are the wages of their nonunion counterparts (Freeman and Katz, 1991; Gaston and Trefler, 1994b, 1995).

Murphy and Welch (1991) found that increased net imports in manufacturing were associated with widened skill differentials. Borjas and Ramey (1994 a & b) find that U.S. earnings inequality, from 1963 to 1988, and the durable goods trade deficit are cointegrated (i.e.,

³⁴One common criticism by trade economists of the early research on this question was the tendency to treat changes in trade volumes as an exogenous shock to an essentially partial equilibrium labour market when, at least in principle, trade volumes, distribution of employment among sectors, and wages are all endogenously determined (at least in standard trade models). As a result, it is probably best to try to think of these studies as being about the effect of exogenous changes in trade barriers.

they have the same long-run trend). Also, Leamer (1993) and Wood (1994) argue that freer trade, especially with less developed countries, will adversely affect the low wage workers.

As a corollary, import penetration into the U.S. economy was seen by some authors to have produced significant wage and employment cuts for goods-producing workers. In addition, the effects were apparently larger than those that would result if imports replace domestic production dollar-for-dollar (Abowd and Lemieux, 1991). Each of these findings seems to contrast with the earlier research which invariably pointed to extremely small wage and employment effects attributable to imports. Dickens (1988) surveys many of the earlier studies of the effects of trade on employment. In particular, accounting, input-output, and general equilibrium studies identified minuscule employment impacts. For example, Grossman (1987) found that jobs or earnings losses, that could be attributed to import competition, were extremely small (except in one industry -- radios and TVs -- where competition from abroad was severe on both employment and wages).

The agenda for labour economists has generally been to explain exactly how international trade actually affected the determination of wages and employment in our economies. When an economy is experiencing rapidly increasing import penetration, are trade 'shocks' manifested primarily as employment or wage adjustments? How are the rents from a market intervention or high levels of trade protection shared? Which groups or types of workers are most affected by import competition or are most affected by lower trade barriers and globalization? Under what circumstances do workers receive rents in the form of higher wages or lower trade-related displacement or unemployment probabilities? In fact, is it true that workers in heavily-protected and import-impacted industries receive higher wages than do their counterparts in unprotected,

export-oriented industries?

For the present purposes, most important is how international “shocks” are likely to affect different types of workers. As Topel (1997) reminds us, if trade shifts the economy towards the production of more skill-intensive goods, the elasticity of substitution between skilled and unskilled labour is crucial. If substitutability is low or extremely sluggish, then even a small change in import penetration could have large effects on wages. If substitution is easy, trade is an improbable cause of the rising inequality between skilled and less-skilled workers.

Some of the largest estimates of the effects of imports on wages have been derived by authors studying the labour content of trade (Murphy and Welch, 1991; Borjas, *et al.*, 1992; Wood, 1994). They have focused on the growth of the unskilled labour force that effectively takes place as trade with unskilled labour-abundant developing countries increases. For labour economists, these types of studies have the advantage of being methodologically similar to investigating the impact of immigration of low-skill workers on the wages and employment outcomes of native workers. This relatively ‘recent’ literature is driven by concerns similar to those that stimulated interest in the effects of trade on the labour market. Also similar is the variation in the estimated impacts that immigration has on local labour markets, with the largest estimated (adverse) labour market impacts also derived from ‘factor-proportion analyses’ (e.g., Borjas, *et al.*, 1996).

These factor content studies have been vigorously attacked by trade theorists, as not being well-grounded in general equilibrium trade theory (Deardorff and Hakura, 1994). It has been pointed out, for example, that the factor content of trade approach may be more suited to studying the Factor Price Equalization theorem, than the Stolper-Samuelson Theorem – which is

the “right” theorem for studying the impact of globalization on wages (Leamer, 1994). However, as Leamer (1996b) and Baldwin and Cain (1997) point out, these criticisms do not completely negate the value of the findings from the factor content of trade studies but simply qualify their interpretation.³⁵ Specifically, the factor-content studies do seem to have established the *prima facie* plausibility of claims that labour markets outcomes have been affected by international trade – the precise channels through which this occurs is clearly an open question though.

Wage responses to trade have also been analyzed using macroeconomic and computable general equilibrium models (e.g., Deardorff and Stern, 1986 and Brown and Stern, 1989); however, such studies in no way obviate the need for econometric work and do not exploit the micro-labour market data that are necessary to disentangle the effects of individual and industry characteristics on the wage determination process. That is, neither type of model uses the data that are essential when addressing questions that focus upon the effects of trade characteristics on wages and employment.

If we take seriously the evidence for a negative relationship between imports and wages and couple this with the widely-held belief that much of a worker’s human capital is industry- or job-specific and that trade-displaced workers may have difficulty moving to new jobs or different industries, we are led to the view that shocks to domestic production can cause significant economic hardship to employees affected by a movement towards freer trade. Kruse (1988) estimated that a worker who is displaced from an industry facing high growth rates in import

³⁵Leamer and Baldwin/Cain both draw on a result due to Deardorff and Staiger (1988) that provides conditions under which changes in the factor-content of trade are informative about relative changes in factor-prices.

penetration suffers a median unemployment spell of 30 months. The worker also changes occupations with probability 0.88 and changes industries with probability 0.89. Averaging over all causes of displacement Podgursky and Swaim (1987) cited similar magnitudes. Hamermesh (1987) put the present-value of firm-specific capital at about one half of one year's earnings. Topel (1991) estimated that 10 years of current job tenure (i.e., firm-specific capital) raises the wage of the typical male worker in the United States by over 25 percent.³⁶

The evidence on the relationship between import prices and wages is not as striking. In fact, it is not obvious whether lower import prices should translate to higher or lower demand for labour (particularly, across all industries), although the presumption has been that decreasing import prices leads to decreases in demand. Revenga (1992) and Grossman (1987) interpret their results as supporting the view that higher import prices lead to lower wages.

One problem with the majority of this research is the use of average industry wages rather than individuals' wages or wage premia. An industry wage premium is that portion of a worker's wage which cannot be explained by his individual characteristics such as human capital, demographics, or occupation, but which is explained by his industry of affiliation. When the focus is upon the labour market, such controls are essential in order to allow for the high variation across industries in the distribution of worker characteristics. For example, recent research has tended to highlight the fact that the industries most affected by increasing import penetration tend to employ proportionately greater numbers of black, less-educated, and less-skilled workers. It is therefore essential to control for these as well as other individual characteristics before attributing

³⁶Jacobson (1992, p.7) notes that “*Unfortunately for the NAFTA, the highest concentration of high-tenure workers is in trade-sensitive durable manufacturing industries.*”

low wages to high levels of import penetration. In other words, it is possible that using average industry wages exaggerates the negative effect of imports on wages.

Employment effects: One of the reasons why the investigation of the wage effects of import penetration for different groups of workers is important is that wage responsiveness to trade shocks will affect the number of jobs lost. If wages are not particularly responsive, it may be that lowering employment levels is the margin along which employers adjust their total labour costs to increased global competition. Alternatively, falling wages may restore industry competitiveness and buffer employment losses.

Since the early- to mid-1980s, there has been concern that the United States may be losing its high-wage, high value-added manufacturing jobs overseas (e.g., Dickens and Lang, 1987). The earlier labour economists' studies of the employment effects of trade flows tend to corroborate the finding that rising import penetration adversely affects the U.S. labour market. On the other hand, Abowd and Freeman (1991) argued that the massive declines in manufacturing industry employment levels means that fewer workers are now exposed to international competition than was previously the case. In addition, Dickens (1988, p.78) noted that "*it appears that trade is eliminating low-wage jobs and creating relatively high-wage jobs.*" However, the deteriorating wage experience for certain groups of workers, as is noted in the appendix, must temper such sanguine views.

We might also note that it is contentious whether high or low wages are a feature of the industry, as predicted by certain efficiency wage models, for instance, or whether high wages are due to unobserved worker sorting that attracts high-productivity workers to high-wage industries. If high wages are an industry characteristic or high wages attach to good jobs then globalization

and labour reallocation may be less worrisome: losing jobs in low-wage industries amounts to raising average wages. On the other hand, if high wages reflect the high unobserved quality of workers employed in these industries, then globalization is a real concern. As low-quality workers are forced to switch from their low-wage industries, they will either lower both productivity and wages in their destination industries; or if they are unable to relocate to high-wage industries, they may face long durations of unemployment.

A few other points of interest are as follows. Freeman and Katz (1991) note that employment adjustments tend to be the dominant adjustment factor in the labour market. Both trade flows and import prices have a more pronounced impact on employment than on wages. However, union workers tend to make greater wage adjustments than their nonunion counterparts, in part because nonunion wages are closer to competitive levels. The latter finding is also suggestive of a wage-employment trade off for union workers (Gaston and Trefler, 1995).

Overall, increased trade flows in the United States have been associated with increased employment in high-wage manufacturing industries relative to low-wage manufacturing industries. Generally speaking, exporters pay high wages to more productive workers and have higher employment growth (Bernard and Jensen, 1995, 1997). U.S. export industries are high-wage industries, while manufacturing imports generally come from industries that pay low wages. Autos and steel are high-wage industries that face high import penetration, but they are somewhat atypical (Katz and Summers, 1989). A growing consensus seems to be that it is the low-wage portion of the U.S. manufacturing industry that is most affected by increased import penetration. The debate naturally enough is about the size of the impacts.

Less indirect evidence: The wage-trade barrier relationship

Specific findings from labour market studies that have examined the relationship between wages and trade protection are surprisingly sparse. Several conclusions have emerged from studies that do not directly examine the effects of trade barriers and have been reviewed in far greater detail elsewhere (Gaston and Trefler, 1994a). Some of the more prominent findings for the present purposes are as follows. First, there is a pronounced asymmetry between the wage and employment effects of international trade and protection: employment is much more sensitive to international conditions than are wages (Gaston and Trefler, 1997). Second, workers in unprotected, export-oriented industries earn higher wages than do their counterparts in heavily-protected, import-competing industries. In terms of wage premia, high wage industries tend to be net exporters shielded by little or no tariff protection (Gaston and Trefler, 1994b). A recent study indicates that strong shifts in the relative demand for skilled workers at plants in export industries can explain a large portion of the increasing wage gap between skilled and unskilled workers (Bernard and Jensen, 1997). In fact, Bernard and Jensen (1997) find that the employment and wage effects are so concentrated within “exporting firms” that a clear implication is that researchers who conclude that the recent increases in the wage gap are attributable to technology ‘shocks’ may be seriously mistaken.

The latter observation is particularly interesting in that the elimination of trade barriers, or increased globalization, by forcing workers to reallocate into less protected industries, may actually benefit the least-skilled union members. However, this must be balanced against the fact that these are likely to be the workers who experience the most difficulty finding new jobs. Hence, the primary short-run costs and potential long-run benefits of the elimination of protection rest on the shoulders of less-skilled workers. If these short-run costs are large due to the length

and uncertainty of job search then this may explain why unions would be so vociferous in their opposition to freer trade.

The labour market perspective seems to add much to our current understanding of the effects of globalization on the labour market. First, the effects of lower trade barriers are certainly not uniform across workers. The costs and benefits of increased globalization for workers are likely to be highly unequal. Union and nonunion status is also extremely important (Gaston and Trefler, 1995). Occupational skill category also seems to be very important. For example, less-skilled union members are the ones that are most affected by tariff reductions and skilled union members are the most affected by the export-promoting features of the Free Trade Agreements. A benefit of the labour research, despite its perceived inconsistency with the tenets of the textbook HOS model, is that it has provided an alternative, very empirical, perspective on the likely winners and losers from increased globalization.

Secondly, the labour market perspective has provided insights for the endogenous political economy literature. For example, including average wage levels in protection equations is likely to lead to misleading conclusions. The union status of industries, occupational and skill composition, the degree to which workers are willing to trade-off lower wages for employment gains, and more generally, the manner in which wages and employment are determined is likely to be important in policy-makers' determination of levels of protection.

Thirdly, labour market studies supply some important "stylized facts." There is an overall misunderstanding about the effects of globalization and, in particular, falling trade barriers on labour market outcomes. Some of this misunderstanding may stem from misplaced faith in naive versions of Heckscher-Ohlin models. For similar reasons, labour economists have moved away

from the perfectly competitive paradigm. There are substantial impediments to factor mobility and a well-documented and stable interindustry wage structure. That is, there are high-wage and low-wage industries. Rents from policy interventions are not evenly shared. The state of labour market competition in the medium and shorter terms is crucial. Whether rents are shared as both employment and wage increases is seriously doubtful, particularly given the policy-makers' preference for protecting low-wage, low-skill worker, import-sensitive industries. Labour market studies have provided some insight into the reasons why particular types of worker (unionists, for example) oppose free trade so vigorously. This helps us focus attention on the channels through which trade barriers and trade flows affect labour market outcomes.

The foundation for Borjas and Ramey's (1994b, 1995) argument that import penetration has a large impact on workers in manufacturing goods industries is imperfect product market competition. Specifically, workers in highly-concentrated manufacturing industries receive substantial wage premiums through rent-sharing. Durable manufacturing is heavily concentrated and import penetration reduces the rents in this industry, although this need not be confined to import penetration, per se. The other crucial element of the Borjas and Ramey story is that durable goods manufacturing industries provide relatively high wage employment for relatively less-educated workers. Affected workers leave and push down the equilibrium wage for similarly skilled workers in the more competitive sectors of the economy.³⁷

The labour market is internationalized more than ever before – it is now highly sensitive to

³⁷Abowd and Lemieux (1993) have qualitatively similar findings. They find that negotiated wage settlements for a sample of Canadian firms are affected by quasi-rents per worker. In turn, the quasi-rents are sensitive to changes in import and export prices.

international shocks. The key issue that must be acknowledged is that some types of worker are more exposed to the globalizing process than others. This is also important from the perspective of wage determination, per se, where “international” variables seem to be just as important as conventionally considered “domestic” variables, (Karoly and Klerman, 1994; Gaston and Trefler, 1995).

The few econometric studies of the impact of the recent Free Trade Agreements on the labour market come closest to providing the most appropriate natural experiment of the topic of this Conference: *What is the Effect of Globalization on Labour Market Outcomes?* Gaston and Trefler (1997) investigated the wage and employment developments after the passage of the Canada-U.S. Free Trade Agreement (FTA) and examined the reasons behind the devastating employment losses in Canada’s manufacturing industries coinciding with, and in the period following, the passage of the FTA. They found that the FTA did appear to have contributed somewhat to the adverse employment experience. After the tariff reductions have been fully implemented, they estimate that Canadian employment in the tradeables sector will have been reduced by 2.7 percent and earnings will have been reduced by 0.3 percent.

The effects of the recession and the appreciating Canadian dollar were very severe. In fact, the severity and the timing of the latter effects were such as to make it virtually impossible to discern the effects of FTA. While the employment declines in manufacturing industries can only be described as dramatic, there was also a similar pattern of decline ongoing in U.S. manufacturing industries. There seems to be ongoing structural adjustment occurring in both countries. In general, this involves a shift away from low value-added towards higher value-added industries, and from manufacturing to services. They also found that wage and

employment declines were quite dissimilar across the United States and Canada, reflecting significant differences in the way in which wages and employment are determined and the degree of labour market regulation and unionization in the two countries. This is an important observation, for it explains, to some extent, the huge Canadian job losses – Canadian wages and earnings were extremely inflexible in view of the recession and FTA.

This section has created a strong presumption that, at least in the politically-relevant short- and medium-run, labour market adjustment is far from perfect. As a result, it is of considerable importance to consider models with explicit labour-market microstructure that permit equilibrium unemployment. Among the prominent contenders here are: implicit contract models; efficiency wage models; search models; and labour bargaining models. These models, all based on plausible assumptions about such micro-structure, yield a wide variety of relationships between relative commodity-prices and relative factor-prices; between trade and unemployment; as well as equilibrium wage differentials for identical workers.

Section I argued that there are good reasons to presume that Stolper-Samuelson effects exist, and that they have played some part in the deterioration of the wages of unskilled labour relative to the wages of skilled labour. There are, however, also good reasons for expecting other factors to have played a significant role as well, and we have seen that sorting out the relative orders of magnitude of these effects in a convincing way may well be impossible. In addition to the problems in a frictionless world, the main argument of sections II and III has been that there is both direct and indirect (i.e. political-economic) evidence that trade-induced labour-market effects are significant, but that the HOS framework may be inappropriate for understanding what drives these political pressures. We will see, in section IV, that HOS-type models can be enriched to

incorporate a variety of plausible labour-market microstructures, but that these generate a wide range of possible positive and normative implications.

IV. Imperfect Markets, Trade, and Labour Market Outcomes³⁸

As we saw in section I, the Stolper-Samuelson theorem states that lower import prices or lower trade barriers for labour-intensive import-competing industries produces lower real wages.³⁹ Because the HOS model, from which the Stolper-Samuelson theorem is derived, is a long-run model of a perfectly competitive economy, wages are taken to be equalized across sectors. Thus, the Stolper-Samuelson theorem does not address an economy in which inter-sectoral (to say nothing of intra-sectoral) wage differentials play an important role. To make any headway in an examination of the impact of globalization on labour markets, at least in the politically relevant short to medium-term, we must therefore be willing to entertain theories that permit labour to be imperfectly mobile.

Labour economists rationalize costly worker mobility and the apparent attachment of workers to particular firms, industries, or even locations in a variety of ways. Attachment to jobs for more senior, high tenure workers may result from the accumulation of *firm-specific* human

³⁸Magee (1976) provides a comprehensive survey and analysis of the earlier literature on factor-market distortions from a trade theoretic perspective. A convenient textbook treatment can be found in Bhagwati and Srinivasan (1983, cptrs. 21-23). Davidson (1990) presents an un- to date survey of models with equilibrium unemployment, presented in a framework that allows easy comparison with full-employment trade models.

³⁹This is a perfect-competition, full-employment model, so there are no effects on the level of employment. Furthermore, as Stolper and Samuelson (1941) made clear nearly 60 years ago, and as the Bhagwati/Lawrence-Slaughter critique emphasizes, this is possible *because* both industries become more *labour-intensive*.

capital. Evidence for this phenomenon seems incontrovertible in view of the substantial literature on the costs of worker dislocation (Jacobson *et al.*, 1993). More recent, and perhaps somewhat controversial, is the evidence for the existence of a “wage curve” indicating a stable inverse relationship between wages and unemployment in local labour markets (Blanchflower and Oswald, 1994). Such a relationship is not predicted by the undergraduate textbook treatment of perfectly competitive labour markets where the supply blade of Marshall’s scissors instantaneously responds to any sectoral shifts. If, as agglomeration models suggest, tradable goods industries are also regionally-concentrated, then it may be inappropriate to model trade-affected local labour markets as being perfectly competitive. The empirical findings of Karoly and Klerman (1994), Borjas and Ramey (1995), and Bernard and Jensen (1997) can be viewed from this perspective.

Blanchflower and Oswald (1994) offer three alternative theoretical explanations for their empirical ‘law’ governing unemployment and wages – implicit contract models, efficiency wage models, and bargaining models. In the first class of models, at least, the immobility of labour is not inefficient. Employers offer probability of (un)employment and wage contracts that fully compensate workers for the amenity value of working in particular regions. In the case of the efficiency wage models, workers receive premium wages, i.e., wages in excess of the market-clearing wage, which among other things may encourage greater worker effort, discourage malfeasant behaviour, and induce greater worker loyalty and attachment (Krueger and Summers, 1988). As a possible rationale for the Wage Curve, the existence of high levels of local unemployment attenuates the need for premium wages. Another implication of this class of models is that a reduction in worker rents brought about by external ‘shocks’ may have no effect

on the wage and employment outcomes for workers not ‘fortunate’ enough to work in ‘good’ efficiency wage jobs. In this sense, efficiency wage models are closely related to models of dual labour markets (Bulow and Summers, 1986). In other words, the economy’s labour market may comprise ‘segmented’ local labour markets, each of which are effectively shielded from economic developments in the others. Depending on the characteristics of workers working in ‘good’ versus ‘bad’ jobs, it should then come as no surprise that wage and employment experiences become more diverse as national economies globalize.

In the context of a 2-good \times 2-factor model with firm-specific uncertainty in one of the sectors, Matusz (1985) develops a model in which implicit contracts substitute for a missing insurance market—i.e. workers in the risky sector are unable to insure against consumption risk due to unemployment.⁴⁰ In addition to generating an equilibrium with an inter-sectoral wage differential and equilibrium unemployment, Matusz demonstrates that the Stolper-Samuelson theorem may not hold.

In one of the most prominent efficiency wage models an intersectoral differential is part of a worker control regime that involves paying a premium wage to reduce shirking—workers caught shirking are fired and must suffer a period of unemployment (Shapiro and Stiglitz, 1984). Models of trade for economies with this sort of efficiency wage have been extensively studied for their welfare effects (especially relative to various arguments for trade policy).⁴¹ For our purposes, the

⁴⁰In related work, Matusz (1986) examines the link between trade and unemployment with firm-specific uncertainty in a Ricardian model, while Fernandez (1992) examines aggregate uncertainty in a Ricardo-Viner model.

⁴¹For characterizations of involuntary unemployment and welfare analysis in an open economy, efficiency wage model see Brecher (1992) and Brecher and Choudhri (1994). In related work, Matusz (1996) analyzes an Ethier-type division of labour model with efficiency

most directly relevant paper is by Matusz (1994). Consider a model with the HOS structure developed above, extended to include efficiency wages in both sectors such that the equilibrium unskilled wage in the human-capital-intensive sector exceeds that in the unskilled labour-intensive sector (i.e. $w_1 > w_2$).⁴² In a model of this sort, Matusz shows that the Stolper-Samuelson theorem holds (i.e. an increase in the relative price of the unskilled labour-intensive good raises the real wage of unskilled labour in both sectors) and that employment is increasing in the relative price of the unskilled labour-intensive good. In this framework, as Matusz emphasizes, changes in relative commodity-prices have effects on both the *composition* and *level* of employment and unskilled wages. Thus, for example, an improvement in the terms-of-trade (caused by an exogenous fall in the price of the importable good) increases output in the exportable sector (good 1), increasing employment of unskilled labour in the sector paying a higher wage to unskilled labour (the composition effect). However, economy-wide the Stolper-Samuelson effect produces increased inequality of wages between skilled and unskilled workers, which is associated with an increase in unemployment.

Open economy search models have also been extensively investigated in an important series of papers by Carl Davidson, Lawrence Martin, and Steven Matusz (DMM, 1987, 1988, 1991, 1994, 1996).⁴³ In these models, production in at least one sector requires that a human capitalist and a labourer must form a match (this process of job search is represented by a search

wages. Alternative motivations for efficiency wages in open economies have also been considered: fairness constraints are considered by Agell and Lundborg (1995); and adverse selection has been considered by Clemenz (1995).

⁴²Human capital is perfectly mobile between sectors, so the return to H is equalized between sectors.

⁴³Also see the closely related work of Hosios (1990) and Fields and Grinols (1991).

technology). Since searching takes time, and firms break up stochastically, these models are characterized by equilibrium unemployment. DMM (1987) demonstrate that, as a result of matching-related externalities, equilibrium is characterized by an inefficient output mix (specifically that output of the matching sector is too low).⁴⁴ In addition, the equilibrium allocation of factors to the search sector is also inefficient. DMM (1988, 1991) develop the comparative static properties of this model in some detail. In particular, they demonstrate that the Stolper-Samuelson relationships need not hold in their search model. In addition, they demonstrate that, as a result of the inter- and intra-sectoral effects, changes in trading conditions (e.g. trade policy) can affect the equilibrium in a variety of ways. DMM (1994) develop the intertemporal implications of their framework for the case of an overlapping generations economy, finding intertemporal inefficiencies.

In the final class of models we consider that relies explicitly on labour market imperfections, unions with collective bargaining may be able to extract part of the rents from production (Gaston and Trefler, 1995). In turn, these rents may fluctuate with external shocks, such as an increase in import penetration that may be associated with a reduction in trade barriers. In the well-known McDonald and Solow (1981) model, the impact of globalization is complicated, because trade-affected workers may opt for lower wages (lower union rents) as a trade-off for a lower probability of layoff (Lawrence and Lawrence, 1985; Gaston and Trefler

⁴⁴This result follows from the fact that DMM assume that revenue from production in the search sector is divided among factors according to the Nash bargaining solution, essentially an equal division rule. Hosios (1990) develops a model involving efficient bargaining that is not characterized by this inefficiency. See DMM (1996) for a discussion of these issues.

1995).⁴⁵ In Grossman (1984) senior workers push for higher wages and junior workers push for the low wages that prevent layoffs. The impact of global shocks on wages therefore depends upon the seniority-structure of the union.

A simple bargaining model illustrates the main points (Gaston and Trefler, 1995). Let w be wages, r be the reservation wage, e be the probability of employment, $U(w)$ be utility, $eU(w) + (1 - e)U(r)$ be the risk-averse union's expected utility. Profits are $R(e,x) - we$, where $R(e,x)$ is the revenue function and x is an exogenous shock that affects the firm's 'competitiveness.' The set of efficient contracts $\{w(x), e(x)\}$ is given by the 'contract curve:'

$$w - R_e(e, x) = \frac{U(w) - U(r)}{U_w(w)} > 0, \quad (5)$$

where subscripts denote partial derivatives with transparent meanings. Eqn.(5) is standard in the bargaining literature. It reveals that wages are higher than the marginal revenue product of labour, i.e., wages are *not* on the labour demand curve. Further, assuming that the firm's disagreement outcome is zero profits and that the fraction a indexes the relative bargaining strength of workers and employers, we also have

$$w = \frac{aR(e, x)}{e} + (1 - a)R_e(e, x). \quad (6)$$

Therefore, the negotiated wage is simply the weighted average of the average revenue product of labour and the marginal revenue product of labour. If firms operated without union presence, $a =$

⁴⁵This model is extended to a simple general equilibrium context in: McDonald and Solow (1985), Ellis and Fender (1985, 1987), and Yip (1988).

0 and the usual competitive equilibrium condition would obtain. A particularly simple example considered by a number of authors is that of risk-neutral unions and with the production technology exhibiting constant returns to scale. In this case, Eqn.(5) implies $R_e(e,x) = r$ and Eqn.(6) implies

$$w = r + ar(x^{-1} - 1), \quad (7)$$

where x is the ratio of the marginal revenue product to the average net revenue product of labour, and measures the elasticity of net revenue with respect to employment. Labour market rents therefore depend on the extent of competition. That is, rents, $(w - r) \rightarrow 0$ as the industry becomes more competitive ($x \rightarrow 1$). Eqn.(3) forms the basis for recent studies of the impact of exogenous trade or import price shocks on wages (Abowd and Lemieux, 1991, 1993; Borjas and Ramey, 1994b, 1995). The theoretical insight is simply that adverse shocks reduce quasi-rents in trade-affected sectors.

The implication for economy-wide wage inequality depends on what happens to the labour displaced from trade-affected sectors and the nature of labour market competition in sectors to which the displaced move to. If less-skilled workers, who because of their lack of accumulated skills are laid off by employers in preference to skilled workers (LIFO), spill over into more competitive sectors, the wages of competing (less-skilled) labour are bid downwards. The skilled-unskilled wage gap increases both because less-educated workers remaining in the high rent sector earn lower wages and because of the adverse spillover effect on the wages of workers in the low rent sector. If displaced workers spillover into sectors in which minimum wages bind for

unskilled or less-skilled workers or sectors in which unions restrict labour supply, then unemployment rises.

Yet another channel through which global shocks could affect wages appears in international trade models with imperfectly competitive product markets (e.g., Brander and Krugman, 1983). With imperfect competition, falling trade barriers and increasing international trade affect the strategic interaction between firms thus affecting firm performance and wages. This channel is especially interesting for it provides reasons why falling levels of protection may have an effect on wages that is independent of how protection affects trade levels (Gaston and Trefler, 1994b). Thus, protection may have an effect on industry performance, worker productivity, and industry wages that is far more complicated than what is captured by export- and import-induced shifts in product demand. This of course, is at the heart of the trade-theorists' complaint about simple labour market approaches to examining trade impacts on the labour market (e.g. Deardorff and Hakura (1994)). Once again, we feel these criticisms are unwarranted as simple extensions to the template model considered above can readily accommodate the endogeneity of trade flows. Of course, this implies that neither levels of imports nor exports are no longer direct determinants of wages.

We now accommodate the endogeneity of trade flows by explicitly introducing a foreign firm into the analysis. The following is a simplified version of the strategic trade model appearing in Gaston and Trefler (1995). The approach parallels work done by Brander and Spencer (1988) and Mezzetti and Dinopoulos (1991). Consider two firms producing for the domestic market, a

domestic firm with output q and a foreign firm with output y .⁴⁶ The foreign firm has profits $R(y,q) - wy - ty$, where $R(y,q)$ is the revenue function, w is the exogenous foreign wage, and t is the domestic tariff which the foreign firm pays. The foreign firm may also produce for the foreign market, although this side of the firm's activities is ignored. The domestic firm has profits $R(q,y) - wq$, where $R(q,y)$ is revenues and w is the wage. We assume that $e = q$, so that employment and output are the same. Marginal revenue is assumed positive and increasing for both firms. For simplicity, assume preferences for the domestic union display risk neutrality.

The domestic firm bargains with the union over wage-output contracts. The set of efficient contracts $\{w(t), q(t)\}$ is given by

$$R_q(q, y) = r. \tag{8}$$

Similarly to the exogenous trade case we have

$$w = \frac{aR(q, y)}{q} + (1 - a)r. \tag{9}$$

The first-order condition for the foreign firm is $R_y(y,q) = w + t$.

Gaston and Trefler (1995) show that the effects of tariff reductions on wages, employment, and output depend in part on whether y is a strategic substitute or strategic complement for q . In particular, if y and q are strategic substitutes, then domestic employment

⁴⁶ Dowrick and Spencer (1994) consider the case of many foreign and domestic firms. We have not attempted to capture this important feature, nor the features of the market which may have lead to the presence of only two firms.

falls, but the impact of tariff reductions on wages is indeterminate. In the case of strategic complements, then wages fall with more liberalized trade and it is the impact on employment that is indeterminate. However, as with the case of exogenous trade, the impact on the total wage bill, w_e or wq , varies positively with the tariff change.

Considerable insight is gained by considering a simple parametric example with a risk-neutral union, no product differentiation, and a linear demand curve for the homogeneous good. (Note that under these assumptions q and y are strategic substitutes – what most commentators would consider the more pertinent case to consider when examining the potentially adverse effects of import-competition on the domestic labour market.) Let $p(q,y) = d_0 - d_1(q + y)$ be the industry demand schedule, where d_0 and d_1 are positive constants. From Eqn.(5) and the optimality conditions it is straightforward to show that

$$\frac{dw}{dt} = -ad_1 \left(\frac{dq}{dt} + \frac{dy}{dt} \right) = -ad_1 \left(\frac{1}{3d_1} - \frac{2}{3d_1} \right) = \frac{a}{3}. \quad (10)$$

More liberalized trade (lower t) will therefore lower wages and employment in the affected sectors, with the same consequences for wages in non-trade affected competitive sectors observed in connection with exogenous trade shock models. The other interesting insight from endogenizing trade in this way is that the impact on wages is more severe the *greater* is the import penetration from abroad stimulated by the tariff reduction and the *smaller* is the domestic production and employment response. This emphasizes the importance of investigating whether it is wages or employment levels that are more responsive to globalization. In turn, note that the wage effect is also affected by a , the union bargaining strength parameter. The nature of wage

and employment determination and the extent of rent-sharing in trade-affected industries *should be* pivotal in any study investigating the global and trade impacts on labour. For instance, it is clear that the correlation between changes in import penetration and changing wages depends crucially on a (i.e., $dw/dt(dy/dt)^{-1} = -ad_1/2$). Overall, however, note that allowing for endogenous trade does *not* radically change the insights from the exogenous trade shock/imperfect competitive labour market bargaining models.

Even after we have characterized the medium-run in a 2-sector framework, the mapping from the formalism to the data is difficult. Consider our sketch of the Ricardo-Viner model. We assumed that each sector produces with mobile labour and sector-specific human capital. The justification for this is that human capital is arguably lost when its owner leaves the sector in which it was acquired. Unfortunately, there are (at least) two broad types of human capital, that which is intersectorally portable (computer skills, accounting skills, welding skills) and that which is sector- or even firm-specific. It is the latter type that is best modeled by the Ricardo-Viner model as presented above. In the absence of detailed personal knowledge about workers, the best proxy for the this type of human capital is probably time on the job or job tenure. If we are dealing with the first type of human capital, we would do better to treat labour as the specific-factor in the RV framework. Whether we use education categories or job categories, it is not clear that we are using empirical categories with any particular relationship to medium-run theoretical categories. Similarly, we have seen that various plausible specifications of labour-market microstructure yield a wide variety of possible results. However, identifying the relevant model for analysis, and the allocation of sectors and factors to their roles in the theory, based on feasible levels of disaggregation is at least as difficult as in the case of the RV model.

V. Conclusions

Several conclusions stand out from this survey of theoretical and empirical research on the relationship between international trade and labour market conditions. First, with respect to the long-run relationship between trade and wages (Stolper-Samuelson effects, broadly speaking), our evaluation is that, under the standards of evidence that have long obtained with respect to the Heckscher-Ohlin theorem, there is a fairly strong presumption in favor of the claim that Stolper-Samuelson effects have played a significant role in the evolution of wage differentials between skilled and unskilled workers. However, this conclusion strikes us as virtually orthogonal to the political manifestations of current concerns about the trade-wages link. As we stress in section II, the Stolper-Samuelson theorem is a long-run relationship and there is strong evidence that quite short-run economic forces drive the political activity of economic agents. Given the evidence that the transition from the short- to the long-run involves the passage of a considerable period of time, we argued that an understanding of the economic structures and forces dominating the medium-term are essential to constructing and evaluating empirical work on these topics as well as to drawing coherent normative conclusions. Research by labour economists is rich in precisely the kind of empirical and institutional detail essential to an understanding of these medium-term factors. Unfortunately, though not surprisingly, even a brief consideration of models with explicit labour-market microstructure leads quickly to the conclusion that considerably more research is needed that seeks to explicitly integrate the characteristic approaches of trade and labour economists.

We note in closing that, although we have focussed on the relationship between commodity trade and labour market outcomes, migration and foreign direct investment (FDI) have labour market effects that, at least in the short- and medium-run, may dwarf the effects of trade. That is, where trade shocks have complicated, and somewhat indirect, relations to wages and employment, direct factor imports should affect factor markets immediately and directly. This is already a long paper, so we simply note that there are large literatures on both of these important topics. Borjas (1994) provides an up to date survey of many of the issues involved in the economics of migration. In a widely cited series of papers, Borjas, Freeman, and Katz (1992, 1997) have begun to develop an integrated analysis of the relative effects of trade and migration on wages.⁴⁷ They conclude that, with the exception of high school dropouts, the effects of immigration and trade have not been large enough to account for more than a small part of widening wage inequality. However, since this part of the labour force was only 19% of the labour force in 1980, declining to 10% in 1992, it is hard to imagine that large effects on this group were driving the trends toward increased wage inequality observed in the 1980s.

The effects of foreign direct investment are harder to gauge.⁴⁸ As capital, or bundles of capital and human capital, the analysis of FDI has all the same problems that plague attempts to relate labour migration to labour market effects. However, FDI involves two additional difficulties. First, FDI generally involves changes in competitive conditions in commodity markets

⁴⁷This work is based on factor-content, and thus is prone to all the standard criticisms of that methodology. On the other hand, these are the first attempts to even begin to deal empirically with orders of magnitude in the context of a single methodology.

⁴⁸ Caves (1996) surveys earlier research, while Graham and Krugman (1989), Lipsey (1994), Slaughter (1995), Brainard and Riker (1997) and Riker and Brainard (1997) are more recent references.

as well as endowment effects. The two standard models of FDI both treat multinationals as firms with some kind of competitive advantage that permits them to enter foreign markets. This sort of shock to a domestic market must surely have labour market effects, at least in the short- to medium-term. Second, as Krugman (1995) points out and Brainard (1997) examines in detail, modern FDI is to a considerable extent about reconfiguring the global division of labour (“slicing up the value added chain”). While Feenstra and Hanson (1996 a&b, 1997b) have begun to examine this problem in detail, it is clear that we are still very much at the beginning of understanding the relationships between FDI, trade and wages. For example, since FDI redefines the products in trade, it is not at all clear how standard trade theoretic comparative statics are affected (except in models of the Krugman-Ethier sort).

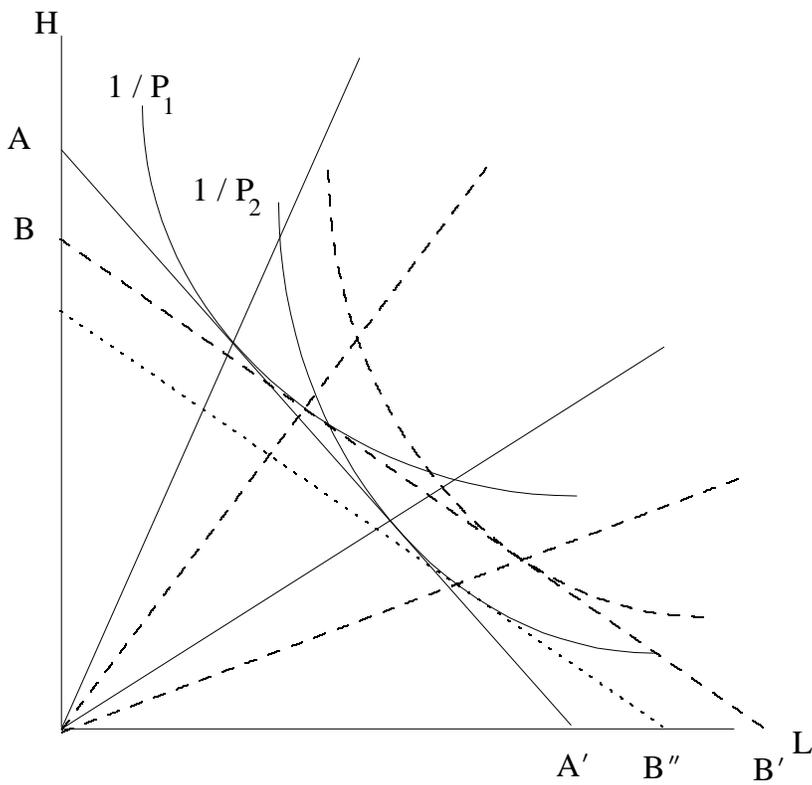


Figure 1: The Stolper-Samuelson Theorem in the Lerner-Pearce Diagram
 Reducing protection in the unskilled labour (L)-intensive sector (2) causes a fall in P_2 and, thus, an outward shift in the unit-value isoquant. For production of both goods to be feasible, both unit value isoquants must be tangent to the unit isocost, so the wage must fall relative to the rental (the w/r ratio, given by the slope of the equilibrium unit isocost, falls from AA' to BB'). As a result, both sectors become more L-intensive.

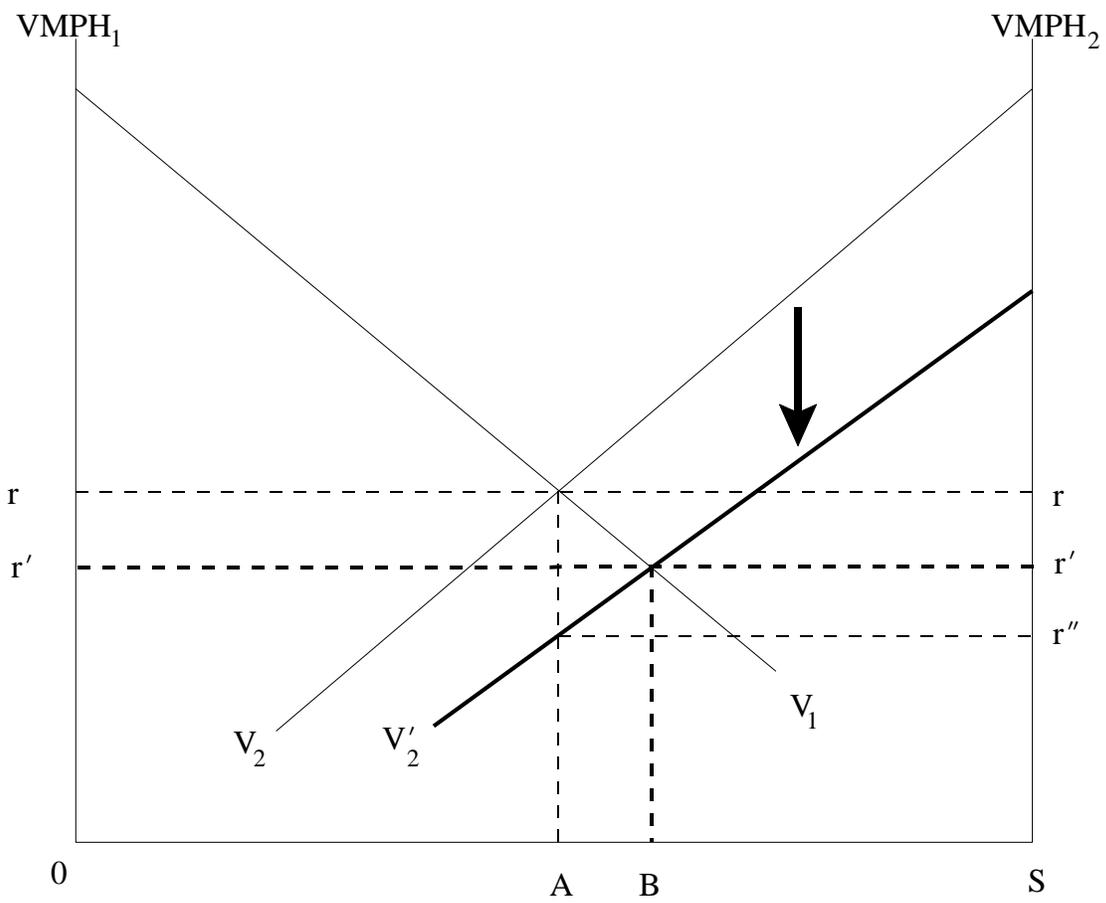


Figure 2: Income distribution in the Ricardo-Viner Model

Appendix

Recent Trends in Trade, Wages and Employment for OECD Countries

While the distribution of income and labour earnings has no doubt been of some interest for both social commentators and economists since the days of Adam Smith, the growth of earnings inequality in many Western countries since the 1980's has intensified the research effort into its underlying causes. In this section, we list some of the key features that have stimulated the frenzy of research activity and heated debate on both sides of the Atlantic. The facts, for the United States in particular, are currently so widely accepted that they have even made their way into undergraduate labour economics textbooks (e.g., Ehrenberg and Smith, 1996). The controversy lies in the explanations for the trends, with globalization and international trade (with developing countries, in particular) the most controversially culpable.

'Accepted' labour market facts

1. The United States

For the United States, the following summarizes the 'facts' for male workers in the 1980s.

- a. Aggregate real wage growth was extremely flat during the 1980s, in all likelihood reflecting the slowdown in rates of productivity growth (Kosters, 1994). However, this apparent stability masked the fact that the real earnings of workers at the upper reaches of the earnings distribution grew, while the real earnings of low-paid workers fell. Low-income men suffered reductions in their relative and absolute income (Gottschalk, 1997).
- b. The rise in relative earnings dispersion is attributable to increases in relative wages rather than relative changes in hours of work. Annual hours of work changed hardly at all for full-time, full-year workers during the 1980s. Hence, the earnings outcomes for low-paid workers cannot be attributed to a decline in their hours of work.
- c. Similarly, there was no overall conversion of full-year, full-time jobs to either part-year or part-time jobs. Part-time employment in the lowest-paying occupations actually fell. The least-skilled experienced declines in their employment rates (Gottschalk, 1997).
- d. One of the more notable changes has been the increase in the return to human capital investment, specifically, the earnings 'premium' for college-educated workers rose. This occurred despite the fact that there were greater numbers with a college degree (Gottschalk, 1997). Similarly, there were sharp increases in the returns to skill, although skill intensity increased at the same time that the skill premium did (Gottschalk and Smeeding, 1997). The

real earnings of less-educated workers actually fell.

- e. There has also been an increase in the premium for labour market experience (i.e., higher returns for acquired firm-specific human capital). The increase dates back to the mid-1970s (Davis, 1992).
- f. However, most of the increase in inequality is not due to increased returns for years of schooling and years of labour market experience (Juhn *et al.*, 1993).
- g. There has been growth in the residual variance of earnings or increased in premiums for unmeasured worker characteristics (Gottschalk, 1997).
- h. Earnings became more dispersed *within* narrowly-defined human capital groups, e.g., for age cohorts and for levels of educational attainment (Berman *et al.*, 1994). Specifically, inequality among observationally similar workers increased (Davis, 1992). There was greater earnings and job instability for workers with a given set of observable characteristics (Gottschalk, 1997).
- i. Year-to-year earnings for all workers became more unstable (Gottschalk and Moffitt, 1994).
- j. Skilled employment rose faster than unskilled employment during the 1980s.
- k. The level of earnings inequality experienced during the 1980s was *not* unprecedented. Earnings inequality was high from the Civil War until World War I, after a period of falling inequality, it rose again until the eve of World War II. Possibly due to the existence of wage and price controls, and the growth of trade unions after the War, inequality again fell (the “Great Compression”). The increase in earnings inequality during the 1980s returned earnings inequality to its 1939 level (Goldin and Margo, 1992).

2. *The OECD economies*

The following mainly draws from Davis, 1992; OECD, 1993; Kusters, 1994; and Gottschalk, 1997.

- a. Most OECD economies experienced increased inequality in labour earnings during the 1980s. There were considerable differences in these developments across countries, however. For example, the timing of the increases was far from uniform.
- b. Two countries experienced large increases (the United States and the United Kingdom); some

countries experienced moderate increases in inequality (e.g., Canada, Australia, and Israel); some countries experienced small increases (e.g., Scandinavian countries, the Netherlands, France, and Japan); and a (very) few countries experienced slight reductions or increases (most notably Germany).

- c. Levels of earnings dispersion (for 'full-year' workers) were highest in the United States and Canada. This mainly reflected the lower 'floors' in those countries. For example, the U.S. (German) worker at the 10th percentile of the earnings distribution earned 34% (51%) of the U.S. median earnings (Gottschalk and Smeeding, 1997). Sweden, Australia, and the United Kingdom are examples of countries with intermediate levels of inequality. The least unequal countries were the Netherlands and Germany.
- d. Generally speaking, there is a good deal more wage compression, measured by 50-10 log wage differentials for instance, in countries with centralized wage-bargaining structures, strong union movements, and higher minimum wages, e.g., France (Davis, 1992). Interestingly, compared to the United States the 90-10 log wage differential is much smaller in other countries, but the 90-50 differential is quite similar (Blau and Kahn, 1996).
- e. Comparing the 1970s and 1980s, experience premiums increased and, with the exception of the Netherlands and Japan, premiums for more-educated workers increased.
- f. Increased earnings dispersion has not been the result of shifts in employment from manufacturing to services. For the countries that witnessed increases in earnings dispersion, the phenomenon was observed within narrowly-defined industries across the entire economy.
- g. The United States was the only country that experienced increases in inequality at all its dimensions, i.e., between education and experience groups and within groups (Gottschalk, 1997).
- h. As for the distribution of employment, compared to high-skill workers, the employment-population ratios are higher for lower-skilled workers in the United States (Blau and Kahn, 1996).

3. *Stop press*

The following are the developments for the 1990s (mainly drawn from OECD, 1996).

- a. Only the United States and the United Kingdom have continued to experience a rapid rise in earnings inequality. Canada, Finland, and Germany have experienced declines in earnings inequality.

- b. The incidence of low-paid jobs is highest in the countries with the greatest earnings inequality. In the United States, a quarter of all full-time workers earn less than two-thirds of median earnings compared with 7 percent or less in Belgium, Finland, and Sweden.
- c. Higher rates of unionization and collective bargaining tend to be associated with a lower incidence of low-paid employment. In the United States, deunionization can explain about a third of the increased earnings inequality for male workers, the minimum wage affects mainly female workers (Fortin and Lemieux, 1997).
- d. Measures of wage centralization are negatively associated with wage dispersion (Blau and Kahn, 1996).
- e. Countries with higher cross-sectional earnings inequality do not necessarily have greater relative earnings mobility (Gottschalk and Smeeding, 1997).

Overall, how do we characterize these developments, at least in broad-brush? First, an obvious reason for the renewed intensity of interest in issues dealing with the distribution of earnings is that it does not appear that increases in earnings inequality have been offset by higher average earnings. The bottom has not been dragged up, in fact there have been absolute declines in earnings at the bottom of the earnings distribution (most notably the United States). The factors operating at the extremes of the earnings distribution also appear to be very different. The last point about earnings mobility also suggests a non-trivial degree of permanence to the changing structure of the distribution of earnings. Apparently, it is not a simple matter of young, inexperienced, and poorly-paid workers accumulating more human capital as they age moving steadily up the rungs of the earnings pecking order.

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