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FACTOR MARKET LINKAGES IN A GLOBAL ECONOMY

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ABSTRACT

This paper considers linkages between national labour markets in a global economy, extending the existing analyses to the empirically important case where factor price equalization does not hold. Removing the assumption of factor price equalization allows the divergent wage experience as well as unemployment experience of Europe and America to be explained. Europe's minimum wage forces it out of the labour intensive industry, leaving it specialised in the skill intensive industry, and with a lower return to skill than America. Under these conditions the entry of labour intensive NICs into world markets pushes down American wages and alters its economic structure (which were unchanged under factor price equalization), and reduces European unemployment (which increased

I. Introduction

Our understanding of the adverse developments in European labour markets has been enhanced by the recent use of the trade theoretic technique of integrated equilibrium analysis. This has highlighted the importance of linkages between national factor markets in explaining patterns of wage inequality and unemployment across countries. Krugman (1995) suggested how changes elsewhere in the world might affect European unemployment even if goods prices remained the same. Davis (1998a;1998b) took this further, considering what types of changes in factor supplies and technology might generate the cross country patterns of wage inequality and unemployment. Perhaps the most striking of the implications is the way a European minimum wage supports American wages, so that Europe bears the unemployment burden of changes in factor endowments elsewhere in the world.

A significant limitation on this and some of the other related results is the assumption that all countries produce all goods and factor prices are equalised across the world. As Davis (1998a p491) points out "The major analytics have been derived in a framework in which America and Europe replicate an integrated equilibrium with factor price equalization. This contributes greatly to the transparency of the results ... However it also suggests an important respect in which additional inquiry is indicated. A key stylised fact we want to understand is the divergent relative wage experience of America and Europe". Davis (1998b p1616) comments that "using factor price equalization as a benchmark is justified by the great simplicity it yields to the analysis" but notes "the value of pursuing extensions to the present study in which local factor supplies do matter".

The present paper considers how European unemployment might be linked to the global economy, but in a framework where the integrated equilibrium is not replicated and factor price equalization breaks down. In this alternative framework factor supplies and minimum wages can affect patterns of specialisation and wages in different countries.

The paper is organised as follows. Section II discusses what happens in the absence of factor price equalization. Having described the global trading equilibrium with unemployment in the absence of

factor price equalization, section III reconsiders the consequences of factor accumulation in America and Europe, while section IV reconsiders the consequences of the entry of labour abundant NICs.

II. Equilibrium in the Absence of Factor Price Equalization

Assumptions and notation will follow Davis' integrated equilibrium analysis¹ - technology is constant returns to scale and the same across the world, preferences are identical and homothetic. There are two factors, labour L and skill H , with prices w^L and w^H , and two goods Y and X , the latter using skill relatively intensively. Subscripts ^A and ^E indicate American and European values of the variables, so for instance w^{LE} is the price of labour in Europe. The price of good Y is the numeraire, and p^X is the relative price of good X . The price of labour in Europe w^{LE} is fixed at w^* generating U^E unemployment of labour in Europe.

What happens if factor price equalization does not hold? There are several ways factor price equalization could break down, and here the breakdown will be come from the countries producing different goods because of different factor endowments and minimum wages². Beginning with a full employment equilibrium where both countries produce both goods, the imposition of the European minimum wage shuts down its labour intensive industry. Such an equilibrium without factor price equalization is summarised in figure 1. More detail what is going on in each countries factor and goods markets is given in the unit cost diagrams³ figures 2 and 3. America, in figure 2, with no minimum wage and endowment E continues to produce both goods, with factor prices given by the intersection of the zero profit curves. In America the factor usage vectors (which are normal to the unit cost curves and scaled by the outputs X^A and Y^A) sum to the endowment E and there is full employment. Although Europe is relatively well endowed with labour (following Davis 1998a -see

¹ Integrated equilibrium analysis builds on the parable of the angel in Samuelson (1949), and the standard treatments are Dixit and Norman (1980) and Helpman and Krugman (1985). Integrated equilibrium analysis identifies a non-empty set of partitions of the world endowment among countries that yield factor price equalisation. The size of this set of partitions which yield factor price equalisation relative to the set of all possible partitions is commonly interpreted as the likelihood of factor price equalisation. With a minimum wage and an assumption that factor price equalisation holds the factor price equalisation set in Davis (1998a p482 fig 2) indicates the likelihood of factor price equalisation.

² Davis (1998b) considers breakdowns of factor price equalization due to divergent evolution of European and American technologies, and Davis and Reeve (1999) divergent patterns of human capital accumulation.

³ The unit cost diagram is described more fully in Dixit and Norman (1980) or Woodland (1982).

figure 2 p482), its minimum wage shuts down its labour intensive industry Y, because firms in the Y industry make less than zero profits. This leaves Europe specialised in good X as shown in figure 3. Only good X can be produced with at least zero profits, and the factor usage vector will fall short of the endowment E and there is unemployment U^E .

The important point about this equilibrium is that Europe, with the fixed wage, has a lower return to skill than America. This outcome of unemployment and a lower skill differential in Europe corresponds to what we observe, and answers Davis' call for investigation of non factor price equalization cases that "matter most empirically" (1998a p491).

IV. Factor Accumulation in America and Europe

Having now characterised the equilibrium in the absence of factor price equalization, let us now reconsider the consequences of factor accumulation in America and Europe. Davis' showed that when factor price equalization holds "cross country differences in the composition or growth rates of the labour force will contribute nothing to an understanding of divergent wage trends"(p486) and "The fixed European minimum wage insulates America from all shocks caused by factor accumulation in Europe. But the reverse is not true. Factor accumulation in America has profound effects on Europe" (p486). Do these conclusions hold in the absence of factor price equalization?

Begin with the equilibrium shown in figure 1, and consider labour accumulation in America. This is represented by stretching the world endowment box horizontally from the American origin as in figure 4. At fixed goods prices the Rybczynski effect in America gives an increase in the output of the labour intensive good Y and a decrease in the output of good X. In the global economy model, however goods prices are not fixed. The decrease in world supply of good X drives up the price of good X, which by the American zero profit conditions pulls the American return to skill up and the American return to labour down, so that both American industries will use more labour intensive techniques. Note that since goods prices are changing there will be demand effects, and the higher price of good X will lower relative demand for good X, reinforcing the above effects on the American economy.

The effects on Europe are also shown in figure 4. The increase in the price of good X will increase the European return to skill by the zero profit condition for good X (the return to labour is fixed), so that more labour intensive techniques are used. Since the European endowment of skill is fully employed and more labour intensive techniques are being used European output of good X must rise and unemployment must fall. This is a striking result, and the exact opposite of the Davis result under factor price equalization that European unemployment rises one for one with American labour accumulation. It comes about because the minimum wage is allowed to influence the pattern of specialisation. The intuition for the result is that labour accumulation in America makes the skill intensive good in which Europe is specialised scarcer on world markets, inducing expansion of the specialised European economy.

Now consider the effects of labour accumulation in Europe without factor price equalization. As in the factor price equalization case, they are very simple - the additional labour increases European unemployment, leaving goods and factor prices unchanged, and having no impact on America. The contrast with the Davis result that where labour accumulates is irrelevant under factor price equalization is thus sharp. In the empirically important case where Europe's minimum wage wipes out its labour intensive industry, with consequently lower American wages and higher skill returns than Europe, we have seen that labour accumulation in American reduces European unemployment whereas labour accumulation in Europe increases it. Davis' irrelevance result does not generalize.

V. Entry of NICs

An important result of Davis paper was that, with unchanged wages, Europe bears the full burden of the entry of the NICs in the form of higher unemployment. As he points out "one reason that increased trade with the NICs may not account for falling wages in America is precisely that it does raise unemployment in Europe" (p485).

The entry of the NICs must have similar effect to increases in the endowment of labour considered in the previous section. It is assumed that the NICs have no minimum wage. For instance a (perhaps unlikely) case where the NICs entering world markets are relatively well endowed with labour, but

produce both goods and factor price equalization applies to the NICs/America subset of the world, would be formally identical to the case of labour accumulation in America considered by Davis.

A more empirically important case than either factor price equalization within the NICs/America subset or worldwide factor price equalization is where the NICs endowments are such that they are specialised in the labour intensive good Y, and have a lower wage than America, both of which have a lower wage than Europe's fixed wage⁴. Such a case is depicted in figure 5, which builds on figure 1, adding the NICs to the world endowment box at the American origin O^A . The endowments of America and the NICs are too dissimilar to support factor price equalization, and the NICs devote their entire endowment to producing good Y. Their entry into world markets increases the world supply of good Y, driving up the price of good X. In America the return to skill rises, the return to labour falls, firms use more labour intensive techniques, and to maintain full employment in America the output of good X must rise and the output of good Y must fall. In Europe the rise in the price of good X increases the return to skill, as well as the output of good X, and reduces unemployment. These results are the same as the results for skill accumulation in America, reinforcing the point that the effects of opening up trade with NICs depends on the underlying factor endowments they bring to the global economy. In contrast to the Davis results, entry of the NICs raises returns to skill in both Europe and America.

VI. Conclusion

The present analysis supports the overarching message of the recent work on European factor markets. As Davis (1998a p490) says "even when factor markets are strictly national, with idiosyncratic national features, they cannot be considered in isolation when goods markets are global". However, some specific results about the effects of factor accumulation and the entry of the NICs on American and European labour markets do not survive the relaxation of the assumption of worldwide factor price equalization. Although both the model assuming factor price equalization

⁴ The importance of the labour abundant new entrants into world markets producing a different set of goods to America and Europe, and using different factor proportions, has been emphasised by Wood (1994) and others in relation to the adverse factor market developments.

and the alternative model presented here are highly abstract, the case considered here of Europe's minimum wage shutting down its labour intensive industry and Europe having a lower skill premium than America would seem to be more relevant empirically, and thus of considerable interest to those seeking to understand the adverse developments in OECD factor markets within the global economy.

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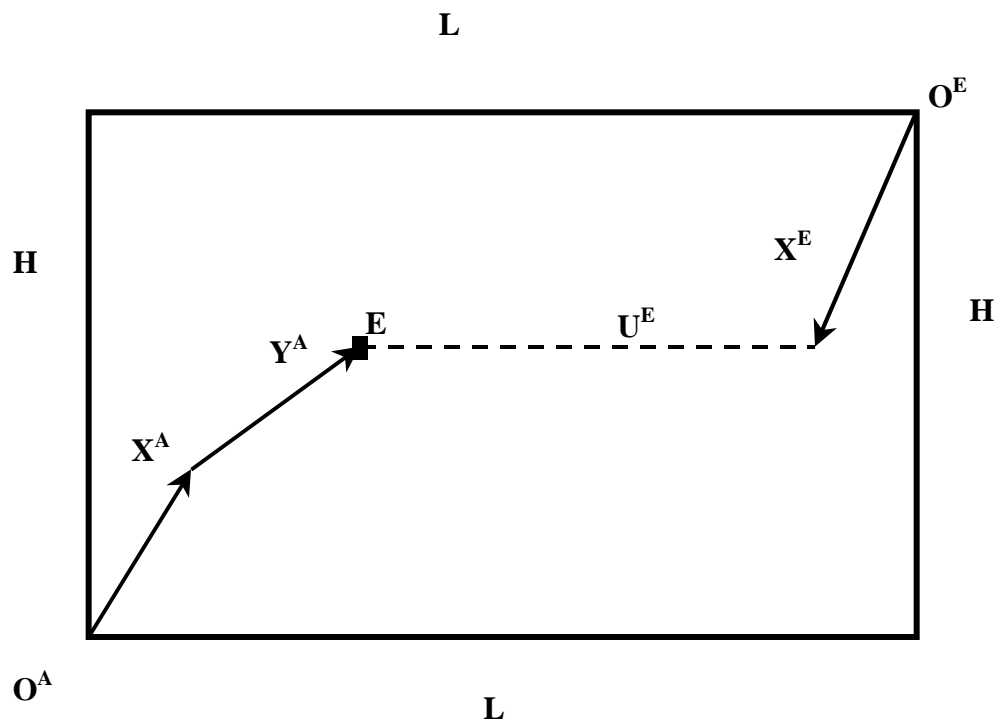


Figure 1 – World Equilibrium with Unemployment

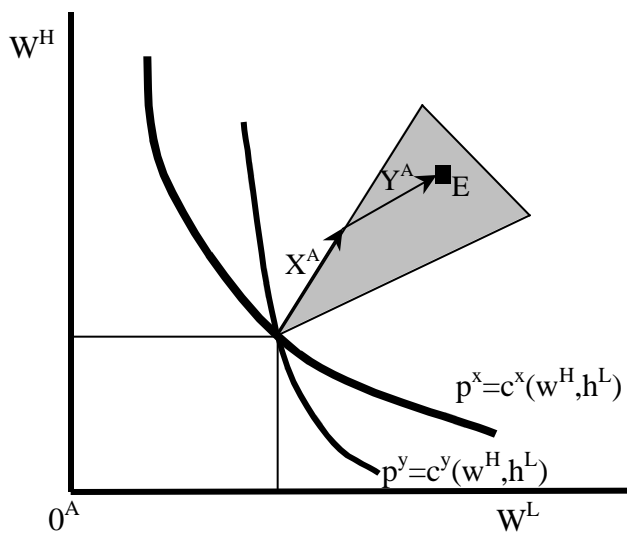


Figure 2 - American Equilibrium

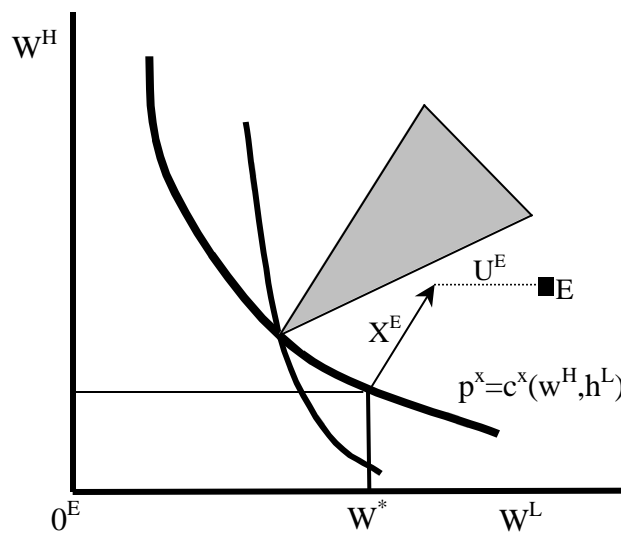


Figure 3 - European Equilibrium

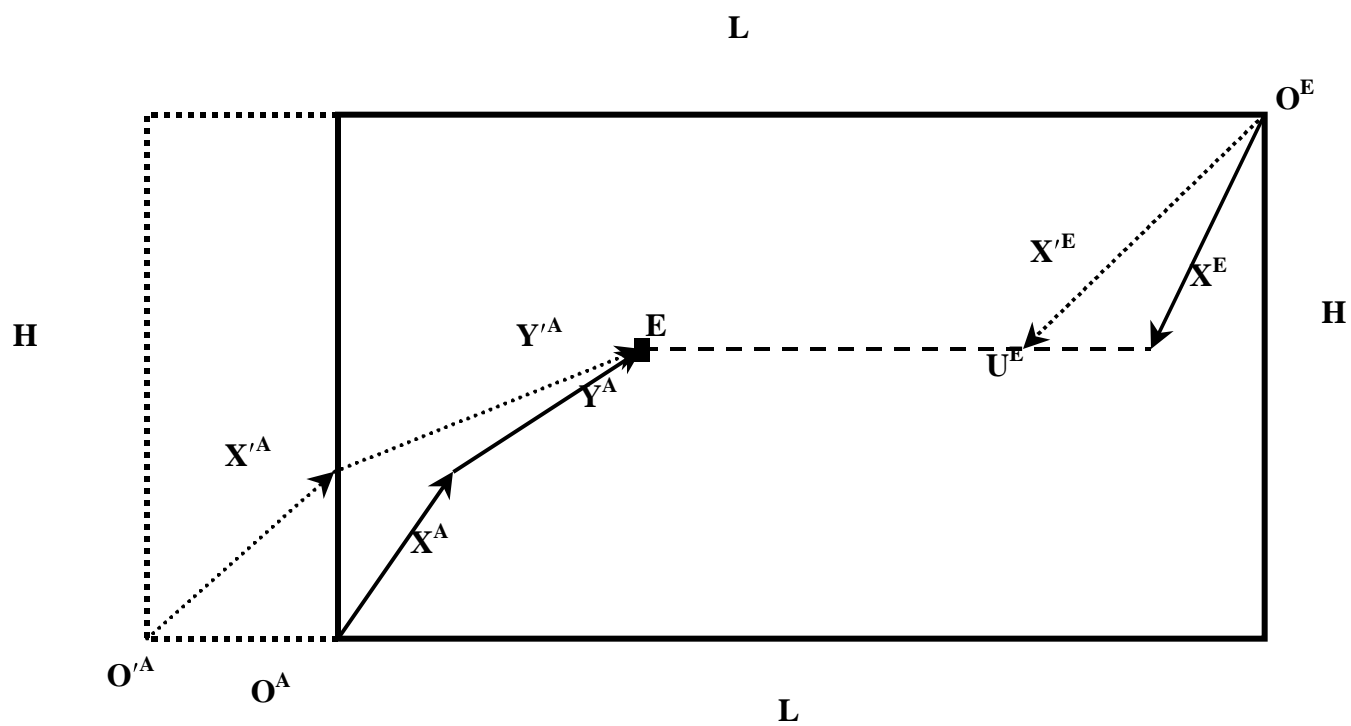


Figure 4 – Increase in American Labour Endowment

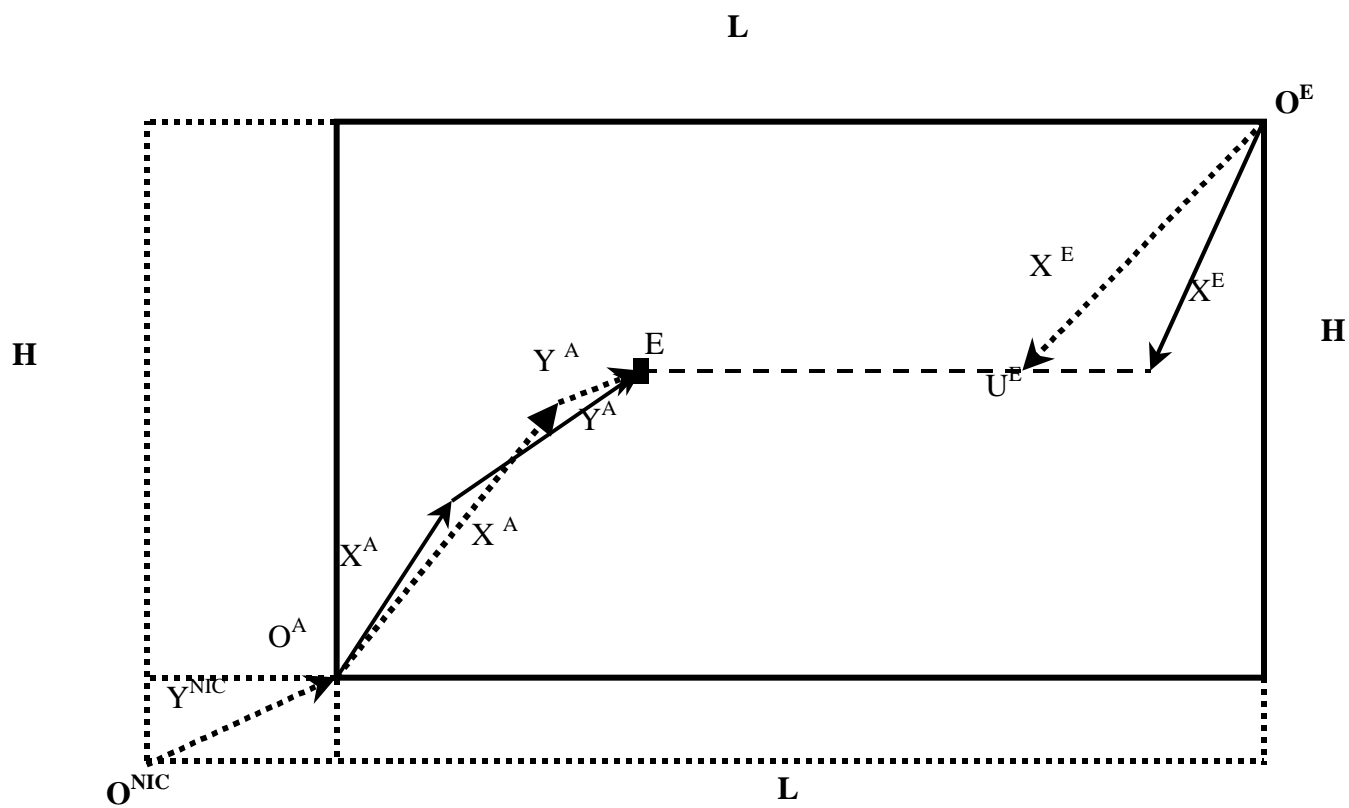


Figure 5 – Opening Trade with Labour Abundant NICs