DISCUSSION PAPER SERIES

No. 3380

FDI, INFRASTRUCTURE AND THE WELFARE EFFECTS OF LABOUR MIGRATION

Frank Barry

INTERNATIONAL TRADE

Centre for Economic Policy Research

www.cepr.org

Available online at: **www.cepr.org/pubs/dps/DP3380.asp**

ISSN 0265-8003

FDI, INFRASTRUCTURE AND THE WELFARE EFFECTS OF LABOUR MIGRATION

Frank Barry, University College Dublin

Discussion Paper No. 3380
May 2002

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

CEPR Discussion Paper No. 3380

May 2002

ABSTRACT

FDI, Infrastructure and the Welfare Effects of Labour Migration*

A model of a small open economy with open capital and labour markets is presented. Labour demand is based on capital mobility and increasing returns in production. Migration decisions are based on the relative attractiveness of regions in terms of the stock of infrastructure, including its tax cost and the degree of congestion, and the level of wages prevailing. Equilibria are not Pareto-efficient because individuals do not take account of the impact of their actions on the level of wages prevailing, the extent of the tax base to finance infrastructural provision, or the degree of congestion. The model generates new insights into a range of policy issues that surfaced over the course of the recent Irish boom.

JEL Classification: F21, F22 and H54
Keywords: foreign direct investment

Frank Barry
Department of Economics
University College Dublin
Arts/Commerce Building
Belfield
Dublin 4
REPUBLIC OF IRELAND
Tel: (353 1) 706 8239
Fax: (353 1) 283 0068
Email: frank.barry@ucd.ie

* Earlier drafts of this Paper were presented at the University of Nottingham conference on FDI and Economic Integration and at a CEPR workshop on the Labour Market Effects of FDI held at University College Dublin. Helpful discussions with Catia Montagna, Dermot Leahy, Peter Neary, Doug Nelson, Kristof Dascher and other participants are gratefully acknowledged, as is the financial support of the European Commission under contract number SERD-1999-000102. This Paper is produced as part of a CEPR research network on 'Labour Market Effects of European Foreign Investments', funded by the European Commission under the 'Improving the Human Research Potential and the Socio-Economic Knowledge Base' programme (Contract No: HPSE-CT-1999-00017).

Submitted 09 March 2002

Introduction

This paper presents a theoretical treatment of a number of policy issues that surfaced over the course of the recent Irish boom that brought income per head from below 70 percent of the EU average to near parity over the course of the 1990s.[1] The boom was driven by increased FDI inflows, led to substantial infrastructural congestion, and was facilitated and prolonged by government policies to encourage labour inflows from abroad.

To focus on this last point first, most theoretical and empirical discussions of labour inflow policy internationally focus on migrant skills. This is of less concern to us here than the question of when or whether it is optimal for government to respond to increased labour demand by encouraging labour inflows. The conventional analysis, outlined in Borjas (1995) for example, suggests that the initial population will benefit from labour inflows exactly as they would benefit from free trade; one factor will gain at the expense of the other, with aggregate gains exceeding aggregate losses.

There are a number of dimensions to the present story however which suggest that this conventional treatment is inadequate. The first concerns the ownership of the capital stock. If the capital stock is largely foreign-owned for example, the losses suffered by domestic labour will weigh more heavily in national welfare than the gains to foreign capital. In this case, under constant-returns production at least, there is little reason for the government to encourage labour inflows. If production takes place under increasing returns, on the other hand, there may be such a case; if the labour-demand function slopes upwards, labour inflows raise the wages of domestic workers also. The infrastructural issue complicates the question further however. Assume there is a large fixed-cost element to infrastructural provision. Labour inflows expand the tax base over which the fixed cost can be shared, and therefore benefit domestic workers still further. Congestion, however, when it arises, has the opposite effect.[2]

[1] These data use Irish GNP rather than GDP to exclude foreign-firm profits, and are evaluated at purchasing power parity standards.

[2] My treatment of infrastructure focuses on consumer welfare rather than productive efficiency. Highways, telecommunications and energy are generally modelled as impacting on the latter. The infrastructural congestion that arose in Ireland was in areas such as public transport, health, education

In order to deal with these issues, a model with several innovative features is constructed. All capital is assumed to be foreign-owned, capital flows are endogenous, and aggregate production, as in Haaland and Wooton (1999), exhibits increasing returns.[3] The paper is essentially concerned with peripheral or late-industrialising economies in which the dynamic sectors are likely to be foreign-owned, and these assumptions are designed to capture some important aspects of periphery-bound FDI.[4]

Infrastructure impacts on consumer welfare in two ways: its provision has a direct welfare effect, which diminishes with congestion, and the taxes necessary to finance it are welfare-reducing. Domestic welfare depends then on wages and on these infrastructural components.

The treatment of international labour mobility issues distinguishes between two groups of workers: one group has an automatic right to work in the economy under discussion (for EU countries this would include all EU citizens), while the other group can migrate inwards only upon the issuance of work visas by the authorities. There is assumed to be an unlimited supply of individuals in the latter group, resident in poorer non-EU countries.

The migration decisions of EU citizens are modelled using a "love of variety" approach. The proportion of their lives that individuals choose to spend in different locations (e.g. at home and abroad) is determined by the relative attractiveness of the locations. This combines in a useful way the two alternative modelling strategies typically adopted in the literature. In the most common (Harris-Todaro-type) approach, migration equalises utility across locations. This generates the overly restrictive result however that if the outside option remains constant nothing can

---

and the provision of serviced land for housing construction. This should arguably be modelled as impacting directly on the former.

[3] Markusen and Venables (1999) present a related model. Note also Gao (1999). Krugman and Venables (1990, 1995) have shown that as transport costs fall from very high to moderate levels periphery welfare can fall as the growing relative importance of scale economies causes industrial agglomeration at the core. Gao (1999) shows that attracting FDI provides a way out of this trap.

[4] See Barry, Gorg and Strobl (2001) on FDI-related agglomerations in Ireland for example.

affect individuals' welfare.[5] The alternative approach common in the literature is to assume population heterogeneity. In this case an increasing proportion of the population will consider migration as utility differences across locations increase; see e.g. Faini (1996) and Andersson and Forslid (2000). The drawback of the heterogeneity assumption is that it makes welfare analysis difficult. The approach adopted in the present paper maintains the representative agent assumption but is less restrictive than the Harris-Todaro treatment.

The model is developed in the next section of the paper, where the free-market equilibrium is shown not to be Pareto-efficient. The model is then applied to a number of policy issues. These are of particular relevance to the EU periphery countries, but have broader resonances also.

1. The Model

1.1 Model Structure

The model is developed in three stages. The first describes the structure of production and the international capital market; the second presents the assumptions on infrastructure, and the third details the labour-migration model.

The Structure of Production and the International Capital Market

There are two industries. One produces an internationally traded final good and the other produces a range of non-tradable intermediates. Labour is the only factor used in the production of intermediates. Letting X be the output of a representative firm in the intermediate-goods sector, and w the national wage, the cost function, with fixed and variable cost components, is:

$C(X) = (a+bX)w$

With monopolistic competition in intermediates, the price charged for each variety i is an identical fixed mark-up on marginal costs:

$q_i = q = \mu w$

where $\mu = [\sigma b/(\sigma-1)]$, and σ (>1) is the elasticity of demand for each intermediate-good variety.

[5] Issuing work visas for migrants from outside the EU to enter country i, for example, will simply

External economies related to the number of varieties in production, n, ensure that each firm's fixed cost declines as the number of varieties increases:

$a = A/n^{\lambda}$

where A is a positive constant and λ is assumed to lie between zero and one. Free entry and exit in the intermediate-goods industry then yields:

$X = A(\sigma-1)/ n^{\lambda} b$

Labour demand is:

(1) $L = n(a+bX) = \sigma A\, n^{1-\lambda}$

Final goods are internationally tradable, with prices determined abroad, and are produced under constant returns to scale using two factors of production: capital (which is foreign-owned and imported via FDI) and a CES bundle of intermediates. The price index for this CES bundle is:

(2) $Q = [\sum_i q_i^{1-\sigma}]^{1/(1-\sigma)} = n^{[1/(1-\sigma)]} q = n^{[1/(1-\sigma)]} \mu w$

Since the final good is produced under constant returns, the unit-cost function is

$p = c(r^*, Q)$

where r* is an exogenous required rate of return on capital. With the price of final goods and the return to capital determined abroad, the price index for intermediates is then also exogenously determined. Setting the total differential of Q to zero yields:

$n^{[1/(1-\sigma)]} dq = - [1/(1-\sigma)]\, n^{[\sigma/(1-\sigma)]} q\, dn$

which, since $\sigma > 1$, indicates a positive relationship between the cost of each individual variety, q, and the number of varieties n.[6]

Since the price of an intermediate is a mark-up on wages, this means the wage rate is increasing in n, while full employment ensures that the number of varieties increases with the size of the labour force. In the present case therefore, our model of

---

displace EU citizens without impinging on their welfare.

[6] Since the zero-profit condition implies that q equals average cost, and since a larger n reduces the fixed cost component, this might be thought to imply a negative relationship between n and q. This ignores the fact that output X and the wage rate w are also functions of n however.

increasing returns generates a positively sloped labour-demand function, as in Figure 1 below:

(3) $dL = dw \{(\sigma-1)(1-\lambda)\sigma\mu A n^{1-\lambda}/q\}$

Infrastructure

Infrastructure is modelled as an array of publicly-provided goods and services that influences real income directly. As in Harris (1995), our focus is on the fixed cost element of infrastructural provision. Infrastructure is "lumpy", so that some critical mass or population density is required before some new infrastructural project can be undertaken.[7] Once the population has reached critical mass, L*, the infrastructure is developed and welfare increases.

As the population expands beyond critical mass there are two effects. First, the tax base expands so that the per capita burden of financing the infrastructure falls, which raises utility.[8] Secondly, however, the infrastructure becomes increasingly congested, which reduces utility. It seems reasonable to posit that the impact on utility is inverse-U-shaped as the population expands: tax-base benefits arise before congestion does.[9]

Denoting the small open economy (SOE) under discussion by use of subscript i, and expressing these effects in monetary terms, the income from working in the SOE is:[10]

$y_i = l_i \{w_i + \beta(L_i-L_i^*) - \gamma(L_i-L_i^*)^2\}$

with

5) $\beta(L_i-L_i^*) - \gamma(L_i-L_i^*)^2 > 0$ for $L_i \geq L_i^*$, and 0 for $L_i < L_i^*$.

[7] Given earlier assumptions on capital ownership and increasing returns it is irrelevant whether critical mass is defined in terms of national income or population.

[8] To capture this effect we can assume that infrastructural construction, for reasons of tax smoothing or intergenerational equity, is debt financed

[9] The fact that infrastructure is held fixed means that the model is designed to depict the medium term rather than the long term. Whether congestion can outweigh the benefits of a larger economy in the increasing-returns case depends on the prevailing discount factor. The implicit assumption here is that the discount factor is high.

[10] Technically, expressing these effects in monetary terms entails assuming that the various elements of utility are additive and that marginal effects are constant. These undoubtedly strong assumptions yield the simple quadratic function in equation (4), allowing us avoid carrying around a number of extra terms which are of little significance to the issues at hand.

A Model of Labour Migration

Here we retain the representative agent assumption but assume a love of variety in terms of work locations. Given a fixed number of hours available for work, Ls, agents choose to work l_i hours in each of two locations – i.e. at home and abroad - in order to maximise

6) $$\sum_{i=1,2} l_i^{\theta}$$

where $\theta < 1$, and $\sum l_i = L^s$. As will be seen shortly, this way of modelling migration yields intuitively appealing welfare results.

1.2 The Model in Operation

Private Sector Behaviour

Assume the overall utility function is Cobb-Douglas with two arguments: income (which includes the imputed costs and benefits of public infrastructure), and the utility associated with the variety of locations in which one can work.

Individuals therefore choose l_i to maximise:

7) $$U = (y)^{\phi} (\sum_i l_i^{\theta})^{1-\phi}$$

where individuals have a choice of two locations, i and j (corresponding to home and abroad), in which they can choose to work, and where:

8) $$y = l_i [w_i + \beta(L-L^*) - \gamma(L-L^*)^2] + w_j l_j$$

In maximising utility individuals take as given the wage, the tax base and the degree of congestion.[11] The first order condition for utility maximisation is therefore:

9) $$[w_i - w_j + \beta(L-L^*) - \gamma(L-L^*)^2]$$
$$+ \quad (y/\sum l_i^{\theta}) [(1-\phi)/\phi] \theta [l_i^{\theta-1} - l_j^{\theta-1}] = 0$$

[11] Note also that the small open economy assumption allows us ignore the effects of possible SOE emigration on the tax base or degree of congestion abroad. The dropping of a number of the i-subscripts from equation (8) should not therefore cause confusion.

From the first order condition, taking into account the impact of L on congestion and the tax base, we derive the labour supply function as:

10) $dw_i \{ (\sum l_i^{\theta}/y)[\phi/(1-\phi)] [w_j (l_i + l_j)]\} =$

$-dl_i \{\Omega\}$

where $\Omega =$

$[1/(1-\phi)] \theta [l_i^{\theta-1} - l_j^{\theta-1}] [w_i - w_j + \beta(L-L^*) - \gamma(L-L^*)^2]$

$+ \theta(\theta-1) [l_i^{\theta-2} + l_j^{\theta-2}] y$

$+ [\beta - 2\gamma(L-L^*)] [(\sum l_i^{\theta}/y)[\phi/(1-\phi)] [w_j (l_i + l_j)] \}$

Stability requires that this slope be positive, (and thus $\Omega<0$), and greater than that of the labour-demand function, dw_i/dL, in equation (3). To see this, consider a random perturbation of wages, so that wages are initially above the equilibrium level. With short-side clearing, the actual labour force is as read off the labour-supply curve. This number of workers will not be offered the wages required to keep them in the country, and so outward migration results. Therefore we move down the labour-supply function towards equilibrium.

The Socially Efficient Equilibrium

There are several departures from Pareto efficiency in the equilibrium just described. The first is that individuals in making their labour supply decisions do not take their effects on the infrastructural variables into account. This consideration can go in either direction. It may lead to an inefficiently low level of population if the tax base is too low. Alternatively congestion may be excessive.

A further consideration arises given increasing returns in production, since individuals do not take into account the impact of their labour-supply decisions on the level of wages in the economy. Other things equal this leads to an inefficiently low level of population.

The first order condition for social efficiency is:

11) $[w_i - w_j + \beta(L-L^*) - \gamma(L-L^*)^2]$

$+ l_i [(dw_i/dl_i) + \beta - 2\gamma(L-L^*)]$

$+ (y/\sum l_i^{\theta}) [(1-\phi)/\phi] \theta [l_i^{\theta-1} - l_j^{\theta-1}] = 0$

Equation (11) differs from the private-sector outcome described in equation (9) in terms of the marginal effect of increased population on the infrastructure variable, $\beta - 2\gamma(L-L^*)$, which can be of either sign, and the effect on wages (dw_i/dl_i). The latter is positive given increasing returns. If these extra terms were to sum to zero, quite by chance, the unconstrained private outcome would yield social efficiency.

2. Policy Issues

2.1 The Single European Market, CEE Development and FDI Inflows

The first issue we wish to consider in the present model concerns the impact on country i of developments such as the introduction of the Single European Market (SEM) and the emergence of Central and Eastern European (CEE) economies as competitors for FDI.

The development of the SEM represents of course an episode of further trade liberalisation. How is this captured in the present model? In the analysis of Krugman and Venables (1990, 1995), whether periphery countries gain or lose depends in part on what happens their increasing-returns sectors, and these are known to be FDI-dominated. An important element of the effect then is whether these countries lose or gain FDI.

The effect on the SEM on FDI inflows is ambiguous a priori. Markusen (1998) argues for example that growth in effective market size tips the balance away from exporting and towards FDI, while Neary (2001) points out that reductions in inter-EU trade costs reduce the tariff-jumping incentive to set up more than one FDI plant in the EU, and so can lead to plant consolidation and a reduction in FDI. For Ireland, Spain and Portugal however, the impact of the SEM on FDI inflows is generally agreed to have been positive. Indeed, Barry, Bradley and Hannan (2001) argue that the most important impact of the SEM on the Irish economy was the stimulus it provided to increased FDI inflows.

Our model does not help us predict this, but it does allow us analyse the consequences. An increased FDI inflow can be modelled as a reduction in the rate of

return r* that multinational companies require to invest in these countries. In the present model a fall in r* raises the price of the CES bundle of intermediates, which raises either wages or the number of intermediate producers or both; in other words, it causes an upward shift of the labour-demand function, moving the equilibrium from point 1 to point 3 in Figure 1.[12]

** Figure 1 here **

Movement up the labour-supply curve represents an unambiguous improvement in welfare. Would the initial population be better off with or without this further increase in population however? The answer to this depends on whether the initial equilibrium labour force was above or below the socially efficient level. If above, then the increase in population *per se* reduces their welfare; if below, it increases it.

This result can be compared to the analysis of Dascher (2000), which is similar in a number of respects. In Dascher, indigenous households own land which immigrant households must purchase (for housing); migrants' utility cannot deviate from the level available elsewhere; production is CRS and there is no congestion. The equivalent SEM shock in his model raises labour-demand and wages, which is beneficial for the resident population. The resulting immigration then raises land prices, which benefits the initial population still further. In his model therefore immigration cannot but benefit the indigenous population, and has no effect on migrants' welfare. In the present model, by contrast, the fact of immigration tells us that migrant welfare has increased, while the initial population may gain or lose depending on the balance of effects that immigration causes.

The emergence of the CEE countries as competitor countries for FDI raises a similar set of issues. Evidence has already emerged of FDI flows being diverted away from Spain and Portugal towards the CEECs.[13] This will have the opposite effect to that analysed in the case of the SEM. Increased competition for FDI is equivalent to an

[12] To see this, we want to look at the impact of Q on w holding L constant (or vice versa) in equations 1 and 2.

[13] Braconier and Ekholm (2001) for example provide econometric evidence that Swedish affiliate expansion in CEE countries over the course of the 1990s came at the expense of affiliate activity in Southern Europe.

increase in the rate of return required by foreign companies to invest in existing EU member state i. Hence the labour-demand function for country i shifts down along the labour-supply function, the economy contracts, there is reduced immigration or increased emigration and an unambiguous welfare loss.[14]

2.2 Structural Funds

The EU Structural Funds programme essentially provides free infrastructure for the more peripheral EU economies. How is this shock implemented in the present model? By providing infrastructure without a required increase in taxes it raises the net benefit of the infrastructure, which is equivalent to an increase in the value of β in equation (4). To see how this impacts on labour supply, we find $dl_i/d\beta$ from the (private) first-order condition, holding w_i constant. This yields:

$$dl_i/d\beta = -(L-L^*)][(\sum l_i^{\theta}/y)[\phi/(1-\phi)][w_j(l_i + l_j)]/\Omega$$

which is positive (since Ω, as discussed before, is negative). The labour-supply function therefore shifts to the right in Figure 2, with a consequent unambiguous increase in utility.[15]

** Figure 2 here **

In the case of donated infrastructure, there is now no tax-base effect. Inward migration raises wages and generates congestion. Since one of the advantages of inward migration that we have recognised heretofore is missing, we are more likely to end up in the present case in an equilibrium with congestion.

Inward migration is therefore less desirable from the viewpoint of the initial population when the tax-base effect is removed, or when infrastructure has been paid for by concurrent taxation rather than by public debt.

---

[14] This effect would have to be offset against the benefits of increased trade with CEE countries, though Baldwin, Francois and Portes (1997) do not find these to be large for the existing EU periphery, and indeed find them to be negative for Portugal.

[15] The issue becomes more complicated when infrastructure, rather than impacting directly on welfare as is assumed here, is instead modelled as affecting production costs. Martin and Rogers (1995) show that in this case particular infrastructural developments in the periphery can cause industrial divergence rather than convergence. Bougheas et al. (2000) model the link between infrastructure, specialisation

2.3 Fiscal Policy Issues

One of the factors behind the Irish boom has been the progressive reduction in income taxation that supported the tri-partite national wage (or "social partnership") agreements of the period; Barry (2000). If one thinks of labour-market openness in the most basic terms, whereby the domestic after-tax wage is set by that available abroad, it is clear that this implies that all the benefits of income-tax reductions accrue to employers, generating substantial employment generation effects.

The EU Commission and ECOFIN, the council of finance ministers, were critical of the Irish government over the last two years of the boom for following an overly expansionary fiscal policy. The Irish government remained committed to the view however that continued tax reductions remained an important element in stimulating labour-supply increases. Barry and Fitz Gerald (2001) challenged this view by arguing that infrastructural congestion (reflected for example in an annual house-price inflation rate in Ireland of 10 percent over the course of the 1990s) had reduced the elasticity of labour supply.

They reported the following simulation results from a macroeconometric model of the Irish economy.

Table 1: Effects of a £500 million cut in income taxes

	Elastic labour supply curve		Rising labour supply curve with no migration	
Year	1	3	1	3
Consumer Prices	-0,01	-0,03	0,05	0,13
Gross Wage	-0,9	-1	0,35	0,35

Source: Barry and Fitz Gerald (2001)

The table suggests that in the past, when skilled labour was in elastic supply because of the openness of the labour market, the real incidence of tax cuts was on the business sector, leading to a fall in labour costs. With an inelastic supply of labour,

and long-run growth, but show that the relationship is non-monotonic when tax costs are taken into

on the other hand, (because infrastructural congestion working through high house prices stems the inflow of labour), tax cuts accrue to employees as an increase in disposable income, demand-side effects dominate supply-side effects, and the economy overheats.

This same point arises in the present model. Though labour supply here is less than perfectly elastic even without congestion (because our model of migration is equivalent to imperfect labour mobility), increased congestion reduces the employment effects of tax cuts.

To see this, define the w_i term encountered thus far as the gross wage. It is the net wage, $w_i - \tau$, that enters into the definition of income, y. This gives a slightly amended first-order condition determining individual behaviour, from which we find:

12) $$dl_i/d\tau = (\sum l_i^{\theta}/y^2)[\phi/(1-\phi)][w_j(l_i + l_j)] / \{\theta(\theta-1)[l_i^{\theta-2} + (L^s - l_i)^{\theta-2}] - (\theta^2/\phi\sum l_i^{\theta})[l_i^{\theta-1} - (L^s - l_i)^{\theta-1}]^2\} < 0$$

Thus tax cuts will indeed stimulate labour supply and raise employment.

We now want to ask what impact increased congestion will have on this. From equation (4), increased congestion can be modelled as an increase in the value of the parameter γ.

Denoting the denominator of the expression for $dl_i/d\tau$ as V, we find:

13) $$d(dl_i/d\tau)/d\gamma = \{2(L_i - L_i^*)^2/V\}[w_j(l_i + l_j)][\phi/(1-\phi)](\sum l_i^{\theta}/y^3)\, l_i$$

which is negative since $V<0$.

Since $dl_i/d\tau$ is itself negative, this result shows that $dl_i/d\tau$ approaches zero as congestion increases, as in the analysis of Barry and Fitz Gerald (2001). This result is depicted in Figure 3.

** Figure 3 here **

---

account.

2.4 Promoting Migration from Outside the EU

One final question which we ask of the model concerns the implications of issuing work visas to non-EU-nationals, as became the policy of the Irish government as it attempted to keep the boom going in the face of labour shortages. This was criticised by some commentators as reflecting a concern with national income growth per se rather than with growth in terms of income per capita.[16]

Our analysis suggests that other scenarios are also possible. The policy may be in labour's interest if production exhibits increasing returns, in which case a larger labour force can support higher wages. How is this to be balanced against the danger of further congestion however?

The answer depends on whether the initial labour force is greater or less than the efficient level. The response of the initial population (of EU citizens) will differ in the two cases. Whether they are better or worse off after the proposal has been implemented can be gauged from their response. If they are made worse off, their supply of labour to the SOE will decline; if better off, it will expand.

To analyse this policy, let $L_i = l_i + J$; i.e. the initial population (of EU citizens) which has the free choice to live and work in the SOE, plus the non-EU migrants J. We can assume, realistically, that non-EU migrants will avail of the offer to work in the SOE since the utility or income from working in their home economies can be taken to be substantially lower than in the SOE.

Differentiating the private first order condition, equation (9), with respect to J, noting that $dL_i/dJ = (dl_i/dJ) + 1$ and $dw_i/dJ = dw_i/dL_i\,[(dl_i/dJ) + 1]$, we find:

$$dl_i/dJ = -X/(X+Z)$$

where $X = (\sum l_i^{\theta}/y)\,[\phi/(1-\phi)]\,[w_j\,(l_i + l_j)]\,[\,(dw_i/dL_i) + \beta - 2\gamma(L-L^*)\,]$

and $Z =$

$$[1/(1-\phi)]\,\theta\,[l_i^{\theta-1} - l_j^{\theta-1}]\,[w_i - w_j + \beta(L-L^*) - \gamma(L-L^*)^2\,]$$
$$+ \theta(\theta-1)\,[l_i^{\theta-2} + l_j^{\theta-2}]\,y$$

[16] Recall that in the conventional analysis discussed in the introduction wages will be driven down but the loss to labour will be more than dominated by the increased returns to capital. From the viewpoint

The stability condition, which requires that the positive labour-supply function be more steeply sloped than the positive labour-demand function, requires that X+Z is negative. Therefore dl_i/dJ has the same sign as the externalities term: $(dw_i/dL_i) + \beta - 2\gamma(L-L^*)$.

It is immediately clear then that if we are already by chance at the social optimum, where $(dw_i/dl_i) + \beta - 2\gamma(L-L^*) = 0$, some marginal immigration from outside the EU will leave EU labour supply and welfare unchanged.[17]

If we are already above the socially efficient level of the labour force, in the sense that $(dw_i/dl_i) + \beta - 2\gamma(L-L^*) < 0$, then dl_i/dJ is negative (and less than one in absolute value). Bringing non-EU workers into the economy causes such congestion that EU citizens are literally crowded-out. The size of the labour-force nevertheless expands, and the welfare of EU citizens deteriorates.

For $(dw_i/dl_i) + \beta - 2\gamma(L-L^*)$ positive, the opposite effect occurs. In this case, bringing in workers from outside the EU moves us closer to the socially efficient equilibrium, expands the welfare of EU workers, and draws yet more EU workers to the SOE.

3. Concluding Comments

The model presented in the present paper is innovative in its formulation of how production structure, infrastructure and labour migration decisions interact. Most regional economies have open labour and capital markets. The present model focuses particularly on peripheral economies, which tend to depend on FDI to enable them to break into modern sectors where increasing returns prevail.

The model is then applied to a number of policy issues. To the extent that the Single Market allows the economy to attract more FDI, the economy expands and there is an unambiguous welfare improvement. Whether the initial population benefits from the

---

of labour this is unambiguously bad, and this may be the case for overall national welfare as well if a sufficiently high proportion of the capital stock is foreign-owned.

[17] I am of course ignoring welfare effects which may stem from cultural diversity etc., in order to focus narrowly on the economic issues involved.

increased immigration however is uncertain. The emergence of CEE countries as competitors for FDI produces the opposite effect.

Structural Funds allocations again lead to unambiguous welfare improvements and economic expansion. The immigration that results in this case however is more likely to produce an equilibrium in which congestion outweighs the benefits of an expanded population, because the tax-base effect, whereby the fixed cost of the infrastructure can be spread across a larger population, is inoperative in this case.

Congestion was also shown to reduce the elasticity of labour supply, as has been argued to have occurred over the course of the recent Irish boom. Tax cuts in an uncongested equilibrium can increase employment substantially, but the effects will be very much less when congestion prevails.

The final policy issue analysed concerned the consequences of the government issuing work visas to those without an automatic right to work in the country. If the economy were already in an equilibrium with congestion the increased immigration would crowd out initial workers, but by less than a ratio of one-to-one. The population would rise and the welfare of those initially resident in the economy would deteriorate. Even with free movement of labour (for EU citizens for example), the initial population size may nevertheless be sub-optimally low from a social efficiency point of view. If this is the case to begin with, issuing work visas to non-EU citizens, by moving us closer to the socially efficient equilibrium, yields an unambiguous welfare improvement and actually draws *yet more EU workers* endogenously into the country.

References

Andersson, F., and R. Forslid (2000) “What we cannot learn from the Irish experience: a fundamental asymmetry of asymmetric shocks”, unpublished ms., Lund University.

Baldwin, R., J. Francois and R. Portes (1997) “The Costs and Benefits of Eastern Enlargement: the Impact on the EU and Central Europe”, *Economic Policy,* April, 127-176.

Barry, F. (2000) “Convergence in not Automatic: Lessons from Ireland for Central and Eastern Europe”, *World Economy*, 23, 10, 1379-1394

Barry, F., J. Bradley and A. Hannan (2001) “The Single Market, The Structural Funds and Ireland's Recent Economic Growth, *Journal of Common Market Studies, 39, 3, 537-52.*

Barry, F., and J. Fitz Gerald (2001) "Irish Fiscal Policy in EMU and the Brussels-Dublin Controversy”, in *Fiscal Policy in EMU: Report of the Swedish Committee on Stabilization Policy in EMU,* Stockholm: Statens Offentliga Utredningar.

Barry, F., H. Görg and E. Strobl (2001) "Foreign Direct Investment, Agglomerations and Demonstration Effects: An Empirical Investigation", CEPR Discussion Paper 2907, available at: http://www.ucd.ie/~economic/workingpapers/2001.htm

Borjas, G. (1995) "The Economic Benefits from Immigration", *Journal of Economic Perspectives*, 9, 3-22.

Bougheas, S., P. Demetriades and T. Mamuneas (2000) “Infrastructure, Specialization and Economic Growth”, *Canadian Journal of Economics*, 33, 2, 506-522.

Braconier, H., and K. Ekholm (2001) “Foreign Direct Investment in Central and Eastern Europe: Employment Effects in the EU”, CEPR Working Paper 3052.

Dascher, K. (2000) "Trade, FDI and Congestion: The Small and Very Open Economy", CEPR Working Paper, 2526, available at: http://www.ucd.ie/~economic/workingpapers/2000.htm

Faini, R. (1996) "Increasing Returns, Migrations and Convergence", *Journal of Development Economics*, 49, 121-136.

Gao, T. (1999) “Economic Geography and Vertical Multinational Production”, *Journal of International Economics*, 48, 301-320.

Haaland, J., and I. Wooton (1999) “International Competition for Multinational Investment”, *Scandinavian Journal of Economics*, 101 (4), 631-649.

Harris, R. (1995) “Trade and Communication Costs”, *Canadian Journal of Economics*, 28, 46-75.

Krugman, P., and A. Venables (1990) “Integration and the Competitiveness of Peripheral Industry”, in Bliss and de Macedo, eds., *Unity with Diversity in the European Economy*, Cambridge: CUP.

Krugman, P., and A. Venables (1995) “Globalization and the Inequality of Nations”, *Quarterly Journal of Economics*, CX, 4, 857-880.

Markusen, J. (1998) Multinational Firms, Location and Trade, *World Economy*, 21 (6), 733-756.

Markusen, J., and A. Venables (1999) “Foreign Direct Investment as a Catalyst for Industrial Development”, *European Economic Review*, 43, 335-356.

Martin, P., and C. A. Rogers (1995) Industrial Location and Public Infrastructure, *Journal of International Economics*, 39, 335-51.

Neary, J. P. (2001) “Foreign Direct Investment and the Single Market”, Centre for Economic Research WP01/24, University College Dublin, available at: http://www.ucd.ie/~economic/staff/pneary/pdf/fdi.pdf

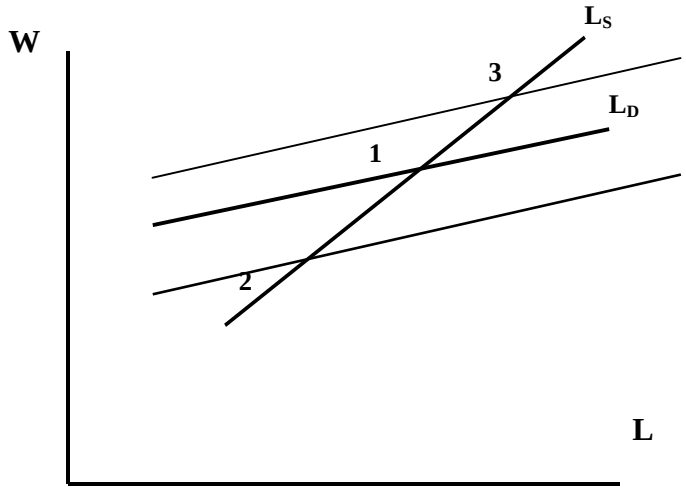

Figure 1:
Possible Effects of the Single Market and CEE competition for FDI on the EU Periphery

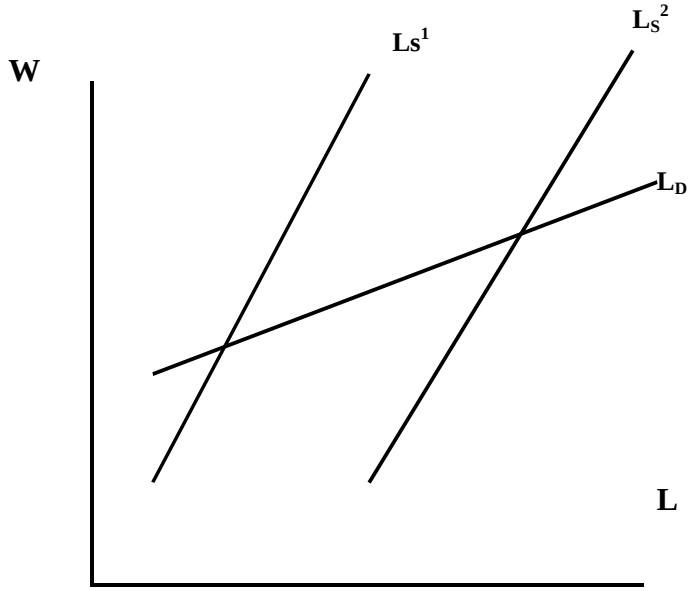

Figure 2: Effects of Structural Funds Programmes.

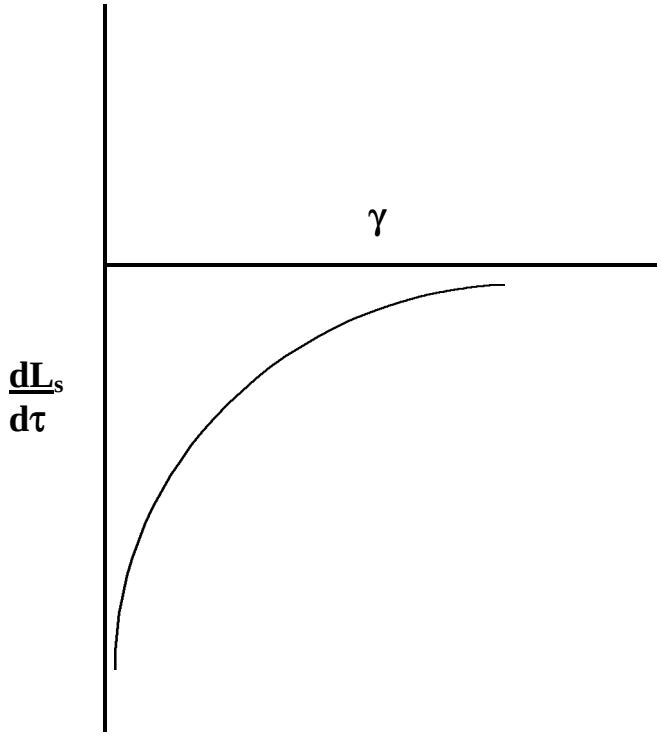

Figure 3: Impact of Congestion on the Efficacy of Tax Cuts