



Munich Personal RePEc Archive

**Sector-specific foreign direct investment,
factor market distortions and
non-immiserising growth**

Mukherjee, Soumyatanu

School of Economics, University of Nottingham

14 December 2013

Online at <https://mpra.ub.uni-muenchen.de/52214/>
MPRA Paper No. 52214, posted 16 Dec 2013 16:45 UTC

Sector-specific FDI, Factor Market Distortions and Non-immiserising Growth

Soumyatanu Mukherjee

Email – Soumyatanu.Mukherjee@nottingham.ac.uk.

School of Economics, University of Nottingham.

(This Draft – December 2013)

Extended Abstract:

This paper explores a 3×3 full-employment H-O-S model with tariff-protection in the capital-intensive import-competing sector and inflows of FDI (foreign direct investment) to an export sector (using foreign capital as a specific input) within the ‘foreign enclave’ of a small open developing economy; whereas there are labour market distortion in the domestic organised tariff-protected import-competing sector and capital market distortion in the domestic unorganised sector of this typical economy. I have considered implications of sector-specific foreign capital inflows on national income (or social welfare, crudely however) of the economy under two different scenarios: when entire income from foreign capital is fully repatriated back to the source country; and when supply of FDI is a positive function of net return to foreign capital in the recipient country, coupled with labour-augmenting type technology transfer. It is found that the possibility of non-immiserising growth improves in the presence of labour market distortion in the organised sector while credit market imperfection in the unorganised sector deteriorates it. However in the presence of technology transfer, existence of labour market distortion is no longer a necessary condition for obtaining such result due to foreign capital inflows to the foreign enclave of this small open developing economy. Existence of output-generated increasing returns in the sector within the foreign enclave will not alter our results; while under the second scenario it will enhance the possibility of non-immiserising growth by raising the tax-revenue from foreign capital income in the host country through increasing the rental to foreign capital. These results are counter-intuitive with respect to the existing theoretical results suggesting immiserising growth owing to sector-specific foreign capital inflows using 3×3 or 2×3 full-employment models without any linkages.

Keywords: Sector-specific FDI, Foreign Enclave, General Equilibrium, Labour Market Distortion, Technology Transfer.

JEL Classifications: F11; F12; F13; F16; F35; F66.

Acknowledgement:

This research is funded by an Economic and Social Research Council (ESRC), University of Nottingham Doctoral Training Centre (DTC) studentship (reference number ES/J500100/1). I am grateful to my supervisors, Professor Oliver Morrissey and Dr Markus Eberhardt; also to the participants attended my presentation in Nottingham School of Economics (NSE) Workshop on 20 November (2013) for their valuable suggestions and comments. The usual disclaimer applies.

1. Introduction:

There are a few theoretical studies which have carried out systematic investigation of the role of FDI directed to the foreign enclave (like an Export Processing Zone) in developing economies, using a hybrid of both Ricardo-Viner and HO structures. In a pioneering study, Hamada (1974) conducted an economic analysis of duty-free zones using a 2×2 Heckscher-Ohlin model. An interesting conclusion of that was: exogenous movement of foreign capital into the zone would lower the host country's welfare¹. Hamilton and Svensson (1982) extended Hamada's model to study welfare effects of capital inflow either into the zone or into the rest of the economy in the host country. The study showed that both types of capital inflow will lower host country's welfare. One crucial theoretical result in this context is that of Beladi and Marjit (1992) which showed inflow of FDI to the EPZ is bound to be immiserising: if (i) the corresponding theoretical set-up allows for a 3×3 full-employment model without any linkages (in terms of an intermediate input) (ii) this small-open developing economy is an importer of a capital-intensive commodity and (iii) this import-competing sector has tariff-protection.

Surprisingly, Chaudhuri (2001) was able to show using a 2×3 specific factor model that if the FDI inflow to the export sector is coupled with a technology-transfer, then even immiserisation would be the most plausible outcome².

- However commodity market distortion in the form of tariff-protection is not the only form of distortion the developing countries face. Labour market distortion in the form of unionised organised sector labour market and capital market distortion in the unorganised (informal) sector are the two most common distortions prevail in these countries. But none of these papers considered the possibility of having such distortions in factor market. Therefore, if we would incorporate labour market distortion in the organised sector and capital market distortion in the domestic unorganised (informal) sector within the basic 3 × 3 H-O-S Beladi-Marjit (1992) type structure, will it be possible to show that growth in foreign capital employed in a specific sector would plausibly lead to non-immiserising growth when inflow of foreign capital is (i) exogenous, with full repatriation of foreign capital income; (ii) endogenous with labour-augmenting type technology transfer (like in Chaudhuri (2001))?

¹ All of these papers have considered economy-wide national income as an indicator of economy's welfare. We shall also continue to consider the national income as a 'crude' indicator of economy's social welfare in this paper. It is true however that our consideration of national income (or per capita national income) as an indicator of welfare may sometimes be inappropriate, given the possibility of existence of high income inequality among different population-groups in the economy. In such cases the welfare measure of Sen (1974), defined as the per-capita income multiplied by one minus the Gini-coefficient of the income distribution, is an appropriate measure of welfare of the different groups of population. Keeping this limitation in mind we, however, continue to measure social welfare in terms of national income as our prime objective is not to focus on income inequality.

² It will be worthwhile to mention that Din (1994) and Yabuuchi (2000) tried to show that an inflow of foreign capital with full repatriation of foreign capital income to the EPZ may raise the national income of the economy in a 3-sector full employment model, if (i) there is no tariff-protection in the import-competing sector; (ii) one domestic sector produces non-traded intermediate input and there exist backward linkages through the use of that intermediary by the EPZ; (iii) Yabuuchi (2000) showed to hold this result for a traded intermediary, it is necessary to have increasing returns in the EPZ and at least in one of the two domestic sectors. So their models did not satisfy Beladi-Marjit (1992) conditions and moreover the import-competing sector was not protected. They showed welfare-amelioration owing to a sector-specific FDI inflow in an alternative framework.

2. The Model:

Consider a small open developing economy consisting of a domestic zone and a foreign enclave like export-processing zones (EPZ). Within the domestic zone, there are two sectors: sectors 1 and 3 are producing X_1 and X_3 using labour and domestic capital; while sector 2 is the import-competing sector of the economy, and is protected by an import tariff³. Labourers in sector 1 earn competitive wage while earning a unionised wage in sector 3. Sector 2 is exclusively within the EPZ producing X_2 using foreign capital as a specific input and labour. X_1 & X_2 are the exportable of the economy. Both sector 1 and sector 2 are in close vicinity and labour is perfectly mobile between these two sectors. So the workers who do not get a job in sector 3 will be absorbed either in sector 1 or in sector 2 at a competitive wage⁴. Now sector 1 (unorganised domestic sector) faces imperfection in credit market, with the return to domestic capital being higher than that in the organised import-competing sector (sector 3). In this world of final commodities, all goods are traded internationally and their prices are internationally given owing to small open economy assumption.

The following notations are used:

W = competitive informal wage rate for labour (L);

W^* = Unionised wage rate in domestic formal manufacturing sector;

r_D = rental to domestic capital (K_D) in sector 3;

$R_D = \rho r_D$; (with $\rho > 1$, ρ represents degree of capital market imperfection in sector 1) = rental to domestic capital in sector 1⁵

r_F = rental to foreign capital (K_F);

a_{ji} = amount of the j^{th} factor used to produce 1 unit of the i^{th} good. Note that $a_{ji} = a_{ij}(W, r_D)$ for $i = 1, 3$ and $j = L, K$. But $a_{j2} = a_{j2}(W, r_F; X_2)$ for $j = L, K$;

X_i = output of sector i ;

P_i = international price of good i ; ($i = 1, 2, 3$);

t = ad-valorem rate of tariff;

θ_{ji} = cost share of factor j in the production of good i ;

λ_{ji} = share of sector i in the total employment of factor j ;

³ We assume ad-valorem equivalence of any quantitative or other restrictions on imports, such as quotas.

⁴ Employment in sector 3 depends on the number of jobs available in this sector which in turn, depends on the level of production in this sector.

⁵ For details, see Chaudhuri (2003), Mukhopadhyay (2008) etc.

$\sigma_2 \left(= \frac{(\widehat{a_{K2}} - \widehat{a_{L2}})}{(\widehat{W} - \widehat{r_F})} > 0 \right)$ = elasticity of substitution between labour and foreign capital in sector 2;

Δ = proportional change.

Under perfect competition we have the usual zero-profit conditions (price-unit cost equality)

$$W a_{L1} + \rho r_D a_{K1} = P_1 \quad (1)$$

$$W a_{L2} + r_F a_{K2} = P_2 \quad (2)$$

$$W^* a_{L3} + r_D a_{K3} = P_3(1 + t) \quad (3)$$

Sector 3 faces a unionised labour market. Assuming that each firm of the organised sector has a separate labour union, the unionised wage function may be derived⁶ as a solution to the Nash-bargaining game between the representative firm and the representative union in the industry (Chaudhuri (2005, 2003), Norback (2001) etc.) which may be simplified as

$$W^* = \Phi(W, U) \quad (4)$$

Where U denotes bargaining strength of the labour unions in sector 3 and $\Phi(\cdot)$ obeys the following properties: $W^* = W$ for $U = 0$; and $W^* > W$ for $U > 0$; $\Phi_1, \Phi_2 > 0$. Therefore taking into account the fact that labour unions in sector 3 have at least some bargaining power over wages⁷, we can consider $W^* > W$. Using Equation (4), Equation (3) can be re-written as:

$$\Phi(W, U) a_{L3} + r_D a_{K3} = P_3(1 + t) \quad (3.1)$$

Full utilisation of domestic capital should imply:

$$a_{K1} X_1 + a_{K3} X_3 = K_D \quad (5)$$

Similarly, for foreign capital

$$a_{K2} X_2 = K_F \quad (6)$$

Full-employment condition for labour imply

$$a_{L1} X_1 + a_{L2} X_2 + a_{L3} X_3 = 1 \quad (7)$$

This full-employment in factor markets is ensured by perfect flexibility of factor prices.

We measure domestic welfare of the economy by national income at world prices, given by

⁶ This function is derived in Chaudhuri and Mukhopadhyay (2010).

⁷ Several empirical studies (such as Bhalotra (2002), Besley and Burgess (2004)) have noted that in India, organised workers in the large firms are often keeping wages higher than the supply price of labour due to strong labour regulations through collective bargaining (offer of negotiations, strikes etc.) and restricted mobility of the labour in the organised sectors through various labour laws (such as Industrial Disputes Act, 1947). This makes Indian policymakers, after the economic reform, to seriously think over to reformulate labour laws to curb union power so that unions' power to mark up wages over the supply of labour would decrease and as a consequence unionised wage would fall. Therefore, this assumption of existence of labour market distortion in the organised/formal sector seems relevant for developing countries like India. For similar treatment in theoretical models, see Mukherjee (2012, 2013) etc.

$$Y = W + (W^* - W)a_{L3}X_3 + r_D K_D + r_D a_{K1}X_1(\rho - 1) - tP_3X_3 \quad (8)$$

Let us consider here the case where entire income from foreign capital is completely repatriated back to the source country.

We have seven endogenous variables $W, W^*, r_D, r_F, X_1, X_2, X_3$ in this system. They are solved by Equations (1), (2), (3.1) and (4)-(7) for given parameters viz., internationally given commodity prices, the bargaining power of labour union (U) and the factor endowments.

Comparative Static – Welfare Effect of Growth in Foreign Capital Employed in EPZ⁸:

Without any loss of generality, we reasonably assume that the protected import-competing manufacturing sector (sector 3) is more capital-intensive relative to the informal agricultural sector (sector 1) in physical and value sense; i.e.,

$$\begin{aligned} \frac{a_{K3}}{a_{L3}} > \frac{a_{K1}}{a_{L1}} &\Leftrightarrow \lambda_{L1} \lambda_{K3} > \lambda_{L3} \lambda_{K1} \\ &\Leftrightarrow \theta_{L1} \theta_{K3} > \theta_{K1} \theta_{L3}. \end{aligned} \quad (9)$$

Comparative statics give the following results:

$$\left(\frac{dY}{dK_F} \right) = \left(\frac{[(W^* - W)a_{L3}X_3 - tP_3X_3]\{\lambda_{K1}\lambda_{L2}K_F\} - \{(\rho - 1)r_D a_{K1}X_1(\lambda_{K3}\lambda_{L2}K_F)\}}{|\lambda|} \right) \quad (10)$$

Due to the presence of labour-market imperfection in the organised sector, given that $U > 0$, we have $(W^* - W) > 0$. So from Equation (14) we can infer that $\left(\frac{dY}{dK_F} \right) > 0$ iff $((W^* - W)a_{L3}X_3\lambda_{K1}) > (tP_3X_3\lambda_{K1} + (\rho - 1)r_D a_{K1}X_1\lambda_{K3})$. So we can now make the following proposition:

Proposition 1. *Welfare of a small open developing economy may improve in the presence of protection in the domestic import-competing sector even when inflow of foreign capital (with full repatriation of its earnings) is directed to the foreign enclave iff $((W^* - W)a_{L3}X_3\lambda_{K1}) > (tP_3X_3\lambda_{K1} + (\rho - 1)r_D a_{K1}X_1\lambda_{K3})$. This result is robust irrespective of the presence of output-generated externalities in the EPZ.*

The intuition is quite straightforward: A foreign capital inflow will lead to increased labour demand by the EPZ, and therefore domestic zone must release labour which will create a Rybczynski effect in the domestic zone, following which the relatively labour-intensive sector in domestic zone, sector 1, will contract while the relatively capital-intensive sector 3 (the protected import-competing capital-intensive domestic sector) will expand. Note that because sector 1 and sector 3 constitute a perfectly decomposable Heckscher-Ohlin Sub-system (HOSS) where wage rate and rental to

⁸ Detailed calculations will be available from the authors on request.

domestic capital do not depend on factor endowments, this entire mechanism would leave wage rate and rental return to domestic capital unaltered.

Now expansion of the tariff-protected import-competing sector will increase the distortionary cost of tariff protection and thereby will reduce the economy's national income at world prices. We call it 'output effect'.

At the same time, as there is expansion of the higher wage-payer sector 3 at the cost of lower wage-payer sector 1, the aggregate wage-income rises by the 'labour reallocation effect'. This will have a positive impact on the national income.

On the other hand, presence of capital market distortion in sector 1 would lower the aggregate income from domestic capital since sector 1 is now contracting (which would lower the term $r_D a_{K1} X_1 (\rho - 1)$) and this would exert another downward pressure on economy's national income.

So among these three different forces, if and only if $((W^* - W) a_{L3} X_3 \lambda_{K1}) > (t P_3 X_3 \lambda_{K1} + (\rho - 1) r_D a_{K1} X_1 \lambda_{K3})$ real income of the economy improves. However the role of labour-market distortion appears to be crucial for non-immiserisation even in this case of sector-specific FDI inflow when foreign capital inflows exogenously raise the endowment of foreign capital in the economy, with full repatriation of foreign capital income to the source country. The lesser the degree of labour market imperfection in sector 3, the lesser will be the wage-gap between the two domestic sectors and therefore the lower would be the magnitude of the 'labour-reallocation effect'. And therefore in the absence of any labour-market distortion (due to labour market reform in the organised sector), we would have $W^* = W$ and our model would give the same result as that of Beladi-Marjit (1992); i.e., the standard immiserising result.

However if output-generated increasing returns would prevail in sector 2 in our model, since foreign capital is specific to the EPZ, it is expanding and due to the presence of external economies in this sector, this expansion generates a positive scale-effect which, given constant W , leads to an increase in equilibrium rental to foreign capital. Since foreign capital is becoming relatively dearer, producers in the EPZ will switch to more labour-intensive technique of production. This will call for more labour from the domestic zone, which will amplify the Rybczynski effect mentioned earlier and hence the effects on output-composition of the domestic zone.

MODEL B: Extended Framework Allowing Possibility of Technology Transfer with Endogeneity in Determination of FDI Inflow:

If FDI inflow takes place, the host country gets benefitted from the superior technical know-how and skills of the investing country. These new ideas lead to transfer of technology from the foreign producers to the citizens of the recipient country as a spillover effect on it, known as 'contagion hypothesis'⁹. Empirical evidences, such as Mansfield (1961, 1968), support also the fact that technology transfer in developing countries happens mainly through the FDI channel.

⁹ One can see, for example, Koizumi and Kopecky (1977, 1980), Findlay (1980).

Also the main motive behind the FDI by the multinational enterprises (MNEs) in the developing countries is that they get higher rate of return on their capital in these countries relative to the international market. So in line with Chaudhuri (2005), we also assume in this paper that supply of foreign capital in our small open economy is a positive function of the net rental to foreign capital in this recipient country. However we are now considering that CRS prevails in all the three sectors of the economy. This analysis may be viewed as an extension of Chaudhuri (2005). However our research question and set-up are different: he considered a 2×2 full-employment production structure where capital is perfectly mobile between sectors (so foreign capital was not specific input in that model) and he assumed perfect substitutability between domestic and foreign capital. So we are going to fill this research-gap by assuming that in a 3×3 production structure FDI is entering, by the means of reduction in tax-rate on foreign capital income, into the EPZ which uses foreign capital as a specific input; and the efficiency enhancement of labour is associated with the labour force employed in that sector.

Now we use some of the following additional symbols:

h = efficiency of each labourer;

b = ad-valorem rate of tax on income from foreign capital;

And as per our assumption

$$K_F = K_F\{r_F(1 - b)\} \quad K'_F(\cdot) > 0 \quad (15)$$

FDI inflow to sector 2 (foreign enclave) is now associated with efficiency gain of each worker employed in sector 2, given as:

$$h = h[K_F\{r_F(1 - b)\}] \quad h' > 0 \quad (16)$$

So the zero-profit condition for sector 2 now becomes:

$$Wh(\cdot)a_{L2} + r_F a_{K2} = P_2 \quad (17)$$

So full-employment condition for labour now becomes:

$$a_{L1}X_1 + h(\cdot)a_{L2}X_2 + a_{L3}X_3 = h[K_F\{r_F(1 - b)\}] \quad (18)$$

Where after normalising physical units of labour endowment to unity, $h(\cdot)$ becomes the efficiency units of labour endowment of the economy.

Full-utilisation condition for foreign capital now implies:

$$a_{K2}X_2 = K_F\{r_F(1 - b)\} \quad (19)$$

National income at world prices will now be expressed as:

$$Y = Wh(\cdot) + (W^* - W)a_{L3}X_3 + r_D K_D + r_D a_{K1}X_1(\rho - 1) + br_F K_F(\cdot) - tP_3X_3 \quad (20)$$

Where $br_F K_F(\cdot)$ is the tax revenue collected from the foreign capital income.

Note that now we have fully decomposable price system, where the factor prices, including rental to foreign capital (r_F), are determined in terms of internationally given commodity prices alone. So a foreign capital inflow to the export sector of the economy (i.e., the EPZ), brought about a reduction in the tax rate on foreign capital income, will not alter the factor prices faced by the competitive producers.

Now total differentiation of Equations (18), (5), (19) and (20) will give us the following results:

$$\widehat{X}_3 = -\frac{\lambda_{K1} br_F K'_F}{|\lambda|} \widehat{b} \left[\frac{h'(1-\lambda_{L2})}{h} - \frac{\lambda_{L2}}{K_F} \right] \quad (21)$$

$$\widehat{X}_1 = -\frac{\lambda_{K3} br_F K'_F}{|\lambda|} \widehat{b} \left[\frac{\lambda_{L2}}{K_F} - \frac{h'(1-\lambda_{L2})}{h} \right] \quad (22)$$

$$\frac{dY}{db} = -r_F [Wh'K'_F + (br_F K'_F - K_F(.))] - (r_F K'_F X_3 / |\lambda|) [\lambda_{K1} \{(W^* - W)a_{L3} - tP_3\} - (\rho - 1)r_D a_{K1} \lambda_{K3}] [\{(1 - \lambda_{L2})h'/h\} - (\lambda_{L2}/K_F)] \quad (23)$$

Where $|\lambda| = (\lambda_{L3} \lambda_{K1} - \lambda_{L1} \lambda_{K3}) < 0$ since we retain the assumption that sector 3 is relatively capital-intensive vis-à-vis sector 1 in value and physical sense.

Therefore, $(\widehat{X}_3/\widehat{b}) \lesseqgtr 0$ and $(\widehat{X}_1/\widehat{b}) \gtrless 0$ if $\{(1 - \lambda_{L2})h'/h\} \lesseqgtr (\lambda_{L2}/K_F)$ and $(dY/db) \leq 0$ if (i) $[\lambda_{K1} \{(W^* - W)a_{L3} - tP_3\} - (\rho - 1)r_D a_{K1} \lambda_{K3}] [\{(1 - \lambda_{L2})h'/h\} - (\lambda_{L2}/K_F)] \leq 0$ and/or (ii) $(br_F K'_F - K_F(.)) \geq 0$. This leads to the following proposition:

Proposition 2. *An FDI inflow to the EPZ brought about by a fall in the tax-rate on income from FDI may be beneficial for the recipient country if either/both of (i) and (ii) holds.*

Proof. Following an FDI inflow to sector 2 (EPZ), brought about by a tax-cut on foreign capital income, will raise the labour demand by this sector. But at the same time, it enhances efficiency of the workers tied to this sector, and raises the effective labour-endowment of the economy. Now the direction of the Rybczynski effect in the HOSS formed by the two domestic sectors – sector 1 and sector 3, will be depending on what will happen to the net demand for labour by the EPZ and thereby to the net availability of labour in the domestic zone. However the relatively capital-intensive protected import-competing formal sector will expand (contract) (does not change) according to the direction of this Rybczynski effect; i.e., if $\{(1 - \lambda_{L2})h'/h\} \lesseqgtr (\lambda_{L2}/K_F)$ ¹⁰. Therefore the distortionary cost of tariff-protection in the import-competing formal sector increases (falls) (remains unchanged). We call it the ‘output effect’ (of the formal sector).

Due to the presence of labour-market imperfection in the formal sector we have positive wage-differential between the two domestic sectors. Now given the effective labour endowment, the aggregate wage-income depends on the direction of change in output-composition in the domestic zone following a ‘labour-reallocation effect’. As the higher wage-paying formal sector expands

¹⁰ Note also that the direction of change in output-composition in the domestic zone will depend only on one Rybczynski effect in the domestic zone; which would be either in favour of the formal sector (when net availability of labour in the domestic zone decreases) or against the formal sector (when net availability of labour in the domestic zone increases) or there would not be any Rybczynski effect (when net availability of labour in the domestic zone does not change)!

(contracts) (remains unchanged) the aggregate wage-income of all labourers in the economy rises (falls) (remains same).

However the presence of credit market imperfection in sector 1 would impose a downward pressure on rental income from domestic capital if sector 1 contracts following the 'net' Rybczynski effect.

So the combination of the above three forces on welfare will be positive (zero) if and only if (i) holds.

Also the rise in the effective labour endowment of the economy implies another favourable impact on welfare, captured by the term $[-Wh'K'_F r_F db] > 0$.

And finally the FDI inflow took place by a fall in tax on income from FDI which would have a favourable impact (no impact) on economy-wide national income through the increase (no change) in tax-revenue if $(br_F K'_F - K_F(.)) > 0$ or $= 0$.

Proposition 2.1. *In our extended model, imperfection in the formal sector labour market is not necessary.*

Proof. It is true that this extension has an additional advantage over our earlier basic model: there may be an additional tax-revenue effect which may favourably impact national income. However even if we ignore this effect (i.e., consider the case when $br_F K'_F = K_F$) to compare the two models on an even footing, in the absence of any labour-market imperfection in the formal sector welfare may still improve: The efficiency gain in labour force engaged in sector 2 (due to the labour-augmenting nature of technology transfer) will make the direction of the Rybczynski effect in the domestic zone (i.e., within the HOSS) ambiguous. So even when the wage-gap between the two domestic sectors does not exist the distortionary cost of tariff-protection may fall (remain unchanged) and sector 1 may expand (remain unchanged) in case of which capital market imperfection in sector 1 may not work unfavourably on domestic income if net availability of labour in the domestic zone is positive (zero). On the top of that this efficiency gain in the labourers working in sector 2 will be transmitted to an increase in effective labour-endowment of the economy, which unambiguously improves Y . Even when the protected import-competing sector expands when net availability of labour in the domestic zone falls, domestic GDP may improve when the gain following the increase in effective labour-endowment more than offsets the combined negative impacts of fall in aggregate income from domestic capital (due to the presence of credit market imperfection in sector 1, which is contracting) and the increase in distortionary cost of tariff-protection¹¹.

¹¹ Note that these results would also hold even if we had IRS in sector 2: only due to IRS r_F would go up following FDI inflow to sector 2, which would lead to another round of fresh inflow of foreign capital, by raising the net return. As a result of increase in r_F producers would demand more labour from the domestic zone, while the efficiency gain in labour in sector 2 would reduce the net demand for labour in sector 2. So there will be another Rybczynski effect in the domestic zone. So now what would happen to the output-composition in the domestic zone, will really depend on the direction of the net Rybczynski effect (net of the 2 Rybczynski effects in the domestic zone: the first due to inflow of FDI by reduction in tax-rate, and the second is due to another round of FDI inflow brought about by a rise in r_F). The direction of change in welfare, would then also be ambiguous: however there will be positive impacts on tax-revenue collected from FDI income since r_F goes up which leads to further increase in K_F ; this will positively affect welfare.

Conclusions:

This analysis shows even in a 3×3 full-employment structure growth of foreign capital employed in an export sector may lead to welfare amelioration even when the economy is a net importer of the capital-intensive good. This result is in sharp contrast to Beladi and Marjit (1992). Also note that to obtain this result it is not necessary to have increasing returns in any of the sectors of the economy, nor it requires any linkages through the presence of intermediate inputs. Even in a 3×3 model with tradable final commodities and existence of CRS in all sectors, sector-specific FDI directed to the EPZ may fetch welfare improvement when certain degree of labour market distortion is present in the formal sector, while removal of distortion in the informal capital market enhances the possibility of non-immiserisation. This is a novel generalisation of Yabuuchi (2000) result. However when inflow of foreign capital entering the EPZ is associated with a labour-augmenting technology transfer this result may hold (contradiction with Chaudhuri (2001)) even without the presence of labour market distortion. This implies that government may adopt investment liberalization policy and a policy of labour market reform simultaneously in the presence of technology transfer.

References:

1. Beladi, H. and Marjit, S. (1992), 'Foreign capital and protectionism', *Canadian Journal of Economics* 25(1), pp. 233-238.
2. Besley, T. and Burgess, R. (2004), 'Can Labor Regulation Hinder Economic Performance? Evidence from India', *The Quarterly journal of economics* 119 (1), pp. 91-134.
3. Bhalotra, S. (2002), 'The Impact of Economic Liberalisation on Employment and wages in India', *ILO, Geneva*.
4. Chaudhuri, S. (2001), 'Foreign Capital Inflow, Technology Transfer, and National Income', *Pakistan Development Review* 40(1), pp. 49-56.
5. Chaudhuri, S. (2003), 'How and how far to liberalize a developing economy with informal sector and factor market distortions', *J. Int. Trade & Economic Development* 12(4), pp. 403-428.
5. Chaudhuri, S. (2005), 'Labour Market Distortion, Technology Transfer and Gainful Effects of Foreign Capital', *The Manchester School* 73(2), pp. 214-227.
6. Chaudhuri, S. and Mukhopadhyay, U. (2010), 'Revisiting the Informal Sector: A General Equilibrium Approach', *New York: Springer*, 33-35.
7. Din, M.-u. (1994), "Export Processing Zones and Backward Linkage," *Journal of Development Economics* 43, pp. 369-385.
8. Findlay, R. (1978). 'Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: a Simple Dynamic Model', *Quarterly Journal of Economics* 92, pp. 1-16.
9. Hamada, K. (1974), 'An Economic Analysis of the Duty Free Zone', *Journal of International Economics* 4, pp. 225-241.
10. Hamilton, C. and L. O. Svensson (1982), 'On the Welfare Effects of a 'Duty Free' Zone', *Journal of International Economics* 13, pp. 45-64.
11. Koizumi, T. and Kopecky, K. J. (1977), 'Economic Growth, Capital Movements and the International Transfer of Technical Knowledge', *Journal of International Economics* 7, pp. 45-65.

12. Koizumi, T. and Kopecky, K. J. (1980), 'Foreign direct investment, technology transfer and domestic employment effects', *Journal of International Economics* 10, pp. 1–20.
13. Mansfield, E. M. (1961), 'Technical Change and the Rate of Imitation', *Econometrica* 29, pp. 741–766.
14. Mansfield, E. M. (1968), *Industrial Research and Technological Innovation*, New York, Norton.
15. Mukherjee, S. (2012), 'Revisiting the Apparent Paradox: Foreign Capital Inflow, Welfare Amelioration and 'Jobless Growth' with Agricultural Dualism and Non-traded Intermediate Input'; *Journal of Economic Integration*, 27(1), pp. 123-133.
16. Mukherjee, S. (2013), 'Liberalization and 'Jobless Growth' - Some Extended Results'; forthcoming in *Journal of Economic Integration*.
17. Mukhopadhyay, U. (2008), 'Desirability and Sequence of Liberalization and Structural Reform Policies in a Model with Informal Sector', *Review of Urban & Regional Development Studies* 20(1), pp. 70-84.
18. Yabuuchi, S. (2000), 'Export Processing Zones, Backward Linkages, and Variable Returns to Scale', *Review of Development Economics* 4(3), pp. 268–278.