Is Direct FDI in Healthcare Desirable in a Developing Economy?

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Abstract: We develop a three-sector general equilibrium model and attempt to examine the impact of FDI in healthcare sector on the welfare and human capital stock of the economy. The greater the size of the healthcare sector the higher and better would be the medical facilities available to each member of the population. Better medical facilities must produce positive effects on workers' general health and productivity. The greater the size of the healthcare sector the higher is the efficiency of labour. There are two types of capital: capital of type K and capital of type N. While capital of type K is used in production of all the sectors of the economy, capital of type N is specific to the healthcare sector. Our analysis finds that an FDI of capital of type N although raises the human capital formation may lower social welfare. On the contrary, an inflow of foreign capital of type K is likely to be welfare-improving. Although these effects crucially hinge on different structural factors e.g. the degree of labour market imperfection, trade-related and technological factors these can at least question the desirability of allowing the entry of foreign capital in the healthcare sector directly.

Keywords: FDI, healthcare, developing economy, social welfare, human capital, general equilibrium.

JEL Classification: F18, O17, O33, Q56.

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1. Introduction

The General Agreement on Trade in Services (GATS) that transpired after the World Trade Organization (WTO) negotiations of 1994 has led to significant international developments in the service sector. Prior to the GATS, international trade essentially involved movements of goods since these can be stored and therefore transported (Woodward, 2002). While the global trade of services like banking, telecommunications and education has been growing rapidly, the impact of trade and foreign direct investment in an important service-oriented sector, the healthcare sector, in the post liberalization period has undergone a phenomenal change. GATS specifies four 'modes of supply': (i) 'cross-border supply', where the service, but neither producer or consumer, crosses a border (e.g. telemedicine); (ii) 'consumption abroad', where the consumer crosses a border to obtain a service (e.g. medical 'tourism'); (iii) 'commercial presence', where companies make FDI in the service sector of another economy (e.g. a foreign company investing in a domestic hospital); and (iv) 'temporary movement of service providers', where skilled workers move to other countries to work for a limited period (Smith, 2004). Of these, commercial presence is supposed to be the most critical (Sinclair and Grieshaber- Otto, 2002).

The healthcare sector has historically been publicly funded due to its vital role in the context of human development and the commitments of governments to provide universal access to health services at low cost. The GATS commitment dissuades the existence of public health services in both developing and developed countries by driving them to open up their service sectors to international trade. The healthcare system has experienced a transition towards creation of market payment and incentive systems in public provision (marketisation) and shift over time in the balance of assets between public and private through investment (privatization) (Semboja and Thirkildsen, 1995).

The healthcare sector in developing countries has expanded manifold and is expected to flourish even more due to growing population, increasing lifestyle related health

issues and thrust on medical tourism. The increased affordability of healthcare for consumers due to rising incomes and improving health insurance penetration is likely to transform into a highly dynamic sector. However, the public provision of health services considerably lags behind in these countries. According to recently released National Health Accounts (NHA) statistics in India, public health expenditure as a share of GDP increased from 0.96 per cent in 2004-05 to just 1.01 per cent in 2008-09 as compared to five per cent for high-income countries (Chanda, 2002). The public health sector is plagued by inefficiencies and lack of physical infrastructure. The mismatch between demand and supply of healthcare services and infrastructure has triggered the emergence of private participation in the provision of healthcare. For example, the private sector accounts for around 80 per cent of healthcare delivery in India. An estimated 60 per cent of hospitals, 75 per cent of dispensaries, and 80 per cent of all qualified doctors are in the private sector (Chanda, 2008).

In most of the developing countries, the healthcare sector lags behind international benchmarks for physical infrastructure and manpower and needs to scale up considerably in terms of the availability and quality of its physical infrastructure as well as human resources. Therefore, the growing potential of the sector coupled with the boost in privatisation of the sector and the huge infrastructure needs make investment in the healthcare sector a highly lucrative venture and have resulted in increased foreign players to enter the market.[1] Outreville (2007) identifies some of the determinants of foreign investment of the largest MNCs operating in the healthcare industry.

Evidence on the changing pattern and extent of foreign direct investment (FDI) in health care is erratic since it is difficult to distinguish health care investment from other service sector FDI (Fujita 2002). However, some anecdotal evidences suggest rising investment (Chanda 2002). The increase in substantial investment from Europe and the US into middle income countries in Latin America, Asia and higher income transition countries (Fujita, 2002; Waitzkin and Iriart, 2001) and the emergence of Asian based MNCs such as Singapore-based Parkway (Lethbridge, 2002) are

[1] However, there are important constraints like high cost involved in setting up hospitals, long gestation period and the relatively low returns on investment that may act as deterrence for healthcare sector as destinations for foreign investment.

indicative of augmented role cross country investment in healthcare. In India, reportedly at least 20 international players are competing for a share in the hospitals and medical devices segment; about 90 per cent of the demand in the hi-tech medical devices segment accounting for $770 million is met by imports from the US, Japan, and Germany (Chanda, 2008).

However, empirical evidence on the likely impact of FDI in health service is virtually non-existent. Most of the literature is analytical in nature, with an apparent polarization of views for and against FDI in the sector[2]. The proponents of liberalisation in healthcare assert that FDI provides an impetus to increase physical capacity and infrastructure development such as bed strength, number of speciality and super speciality centres, number of diagnostic centres. It acts as a catalyst in raising the standards and quality of healthcare, in spreading the impact of technological change on drugs and medical technology through market integration and in creating employment opportunities benefiting the health sector and the economy at large (Mackintosh, 2003).

On the other hand, it is argued that the opening up of health service to the international market will affect the universal rights to services that people experience in relation to public services like health. The use of commercial and business practices in the health sector make it vulnerable to being considered a business activity and so liable to the same requirements to open its services to competition (Lethbridge, 2003). The presence of foreign commercial firms with higher levels of pay and equipments may persuade personnel away from public facilities leading to an 'internal' brain drain (WHO, 2002; Mehmet 2002). Liberalisation of health provision, by allowing the better off to choose the private sector, may release public sector resources for the poor on the one hand and engender a 'two-tier' system, with high quality care for the rich and poor quality for the poor (Pollock and Price, 2000) on the other, reinforcing polarisation and stratification.

[2] See Smith (2004) for a detailed review of literature.

The impact of FDI depends on the structure of the healthcare market, that is, whether it is 'commercial'[3] or not (White and Collyer, 1998); the regulatory environment in healthcare (Lipson, 2001a,b) like standards of health care, establishments, professional accreditation and mutual recognition, cross-subsidization policies, pro-poor regulations, etc.; the status of the health sector in neighbouring countries, since it may also provide opportunities for more regional trade in health services via FDI, as evident the provision of hospital services across countries in South East Asia (Chanda, 2002; Janjararoen and Supakankunti, 2002).

Keeping in view the fact that foreign investment in healthcare has gained considerable momentum and it may generate both positive and negative effects, it is essential to formally investigate the effects on the welfare of the economy in a theoretical framework. However, theoretical literature regarding this aspect is nearly non-existent. The present paper develops a three-sector general equilibrium model and attempts to examine the impact of FDI in healthcare sector on the welfare and human capital stock of the economy. The greater the size of the healthcare sector the higher and better would be the medical facilities available to each member of the population. Better medical facilities must produce positive effects on workers' general health and productivity. It is, therefore, sensible to assume that the labour efficiency is higher, the greater is the size of the healthcare sector.[4] There are two types of capital: capital of type K and capital of type N. While capital of type K is used in production of all the sectors of the economy, capital of type N is specific to the healthcare sector. Our analysis finds that an FDI of capital of type N although raises the human capital formation may lower social welfare. On the contrary, an inflow of foreign capital of type K is likely to be welfare-improving. Although these effects crucially hinge on different structural factors e.g. the degree of labour market imperfection, trade-related and technological factors these can at least question the desirability of allowing the entry of foreign capital in the healthcare sector. Also these results have important

[3] 'Commercialisation' of health care refers to the increasing provision of health care services through market relationships to those able to pay; the associated investment in and production of those services for the purpose of cash income or profit; an increase in the extent to which health care finance is derived from payment systems based in individual payment or private insurance (Mackintosh, 2003).

[4] See also footnote 8 in this context.

policy implications for an overpopulated developing country with subsidized but inadequate medical facilities.

2. The Model

We consider a small open economy consisting of three sectors. Sector 1 produces an agricultural commodity (X_1) with labour (L) and capital of type K. Sector 2 uses labour and capital of type K to produce a manufacturing commodity (X_2). Sector 3 is the healthcare sector that uses labour and both types of capital to provide health services.[5] It is assumed that sector 1 is the export sector, sector 2 is the tariff-protected import-competing sector, and sector 3 is the service sector producing 'healthcare' that is non-traded[6] and consumed domestically. While labour is imperfectly mobile capital of type K is perfectly mobile between all the sectors of the economy. Capital of type N is specific to the healthcare sector and is entirely owned by foreign capitalists[7] so that the return from it is fully repatriated. All the factors of production are fully employed. It is sensible to assume that capital of type N (precision medical equipments) and labour are not substitutes in sector G so that $S^G_{NL} = S^G_{LN} = 0$. However, the two types of capital are substitutes to a very little extent so that $S^G_{NK}, S^G_{KN} > 0$ but very small. Workers in the agricultural sector earn competitive wage W, while the wage rates in the manufacturing and healthcare sectors W^* are institutionally determined, and $W^* > W$. Due to the assumption of a small economy, prices of commodities 1 and 2 are internationally given. As

[5] Capital of type N includes advanced and precision medical equipments like cardiac pacemakers and valves, defibrillators, and stents; electromedical therapeutic, monitoring, and imaging devices and apparatus; in vitro diagnostics; and implantable orthopedic and prosthetic devices and appliances. The United States, the European Union (EU), and Japan together account for about 90 percent of global production of medical devices, a lion's share of which comes to the developing countries with FDI in the healthcare sector (USITC 2007).

[6] Trade liberalization of health service is a prominent feature of GATS commitments. For example, medical tourism and aspects of e-health, including teleradiology, telediagnostics, telepathology have gained increased importance in recent years. However, this paper does not consider trade in health services.

[7] This is only a simplifying assumption. It may be intuitively checked that the qualitative results of the model remain unaltered even if the stock of capital of type N consists of both domestic and foreign capital which are perfect substitutes.

commodity (services) 3 is internationally non-traded its price is determined domestically by demand and supply forces. Production functions in sector 1 and in sector 2 exhibit constant returns to scale with diminishing marginal productivity to each factor. Commodity 1 is assumed to be the numeraire. As has been already discussed $S_{LN}^{G}, S_{NL}^{G} = 0$ and $S_{NK}^{G}, S_{KN}^{G} \cong 0$.

The following symbols will be used in the formal presentation of the model.
a_{Li} = labour-output ratio in the i th sector, $i = 1, 2, G$; a_{Ki} = capital of type K - output ratio in the i th sector, $i = 1, 2, G$; a_{NG} = capital of type N - output ratio in sector G; P_2 = exogenously given world price of good 2; t = ad-valorem tariff rate on the import of good 2; $P_2^* = P_2(1+t)$ = domestic or tariff inclusive price of commodity 2; P_G = endogenously determined domestic price of the service produced in sector G; W = competitive wage rate of labour (per efficiency unit of labour); W^* = institutionally determined wage rate of labour (per efficiency unit of labour); r = return to capital of type K; R = return to capital of type N; X_i = output level of the i th sector, $i = 1, 2, G$; L = labour endowment of the economy in physical units; K_D = amount of domestic stock of capital of type K; K_F = amount of foreign stock of capital of type K; K = aggregate stock of capital of type K (i.e. $K = K_D + K_F$); N = amount of capital stock of type N (foreign-owned); h = efficiency of a representative worker; s = ad-valorem rate of subsidy on the consumption of service G; $P_G^* = (1-s)P_G$ = effective/ subsidised consumer price of service G; z = lump-sum (exogenously given) subsidy on healthcare; Y = national income at domestic prices; θ_{ji} = distributive share of the j th input in the i th sector, i =1, 2, G; $j = L, K, N$; λ_{ji} = proportion of the j th input employed in the i th sector, i =1, 2, G; $j = L, K, N$; $S_{jk}{}^{i}$ = the degree of substitution between factors j and k in the i th sector, $i = 1, 2, G$ with $S_{jk}{}^{i} > 0$ for $j \neq k$ and $S_{jj}{}^{i} < 0$.; $m = P_2^*(\frac{\partial D_2}{\partial Y})$ = marginal propensity to consume commodity 2; $v = [(1+t)/\{1+t(1-m)] > 1$; M = is the volume of import of good 2; ^ = proportionate change, for example, $\hat{X}_1 = (dX_1 / X_1)$.

The general equilibrium is represented by the following set of equations.

$$Wa_{L1} + ra_{K1} = 1 \quad (1)$$

$$W^* a_{L2} + ra_{K2} = P_2(1+t) \quad (2)$$

$$W^* a_{LG} + ra_{KG} + Ra_{NG} = P_G \quad (3)$$

Equations (1) – (3) are the competitive industry equilibrium conditions in the three sectors.

The consumers receive a subsidy on the consumption of the healthcare services (commodity G) at the ad-valorem rate, s. So the effective price of commodity G that the consumers face is $P_G^* = P_G(1-s)$. This subsidy is financed by a portion of the tariff revenue earned by the government from the import of commodity 2.[8]

The efficiency of each worker is considered to be a positive function of the total health services produced[9] and is given by

$$h = h(X_G); h' > 0 \quad (4)$$

Hence the labour endowment in efficiency unit is given by

$$a_{L1}X_1 + a_{L2}X_2 + a_{LG}X_G = h(X_G)L \quad (5)$$

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[8] In the standard trade theory, it is usually assumed that the government collects the tariff revenue from the import of the importable commodity (commodity 2 in the present case) and pays it back to the consumers in a lump-sum manner. In this case, from the aggregate tariff revenue the government holds back z amount (exogenously fixed) for financing the health subsidy and the rest is transferred to the consumers in a non-distortionary fashion.

[9] It is assumed that the efficiency of a worker depends on his health condition. This is particularly true in the developing countries, where dearth of adequate medical facilities and infrastructure impinges severely on the health of workers, leading to deterioration in their efficiency or productivity. Therefore, an expansion in the healthcare sector is expected to raise their efficiency.

It should be pointed out at this stage that sector G uses $a_{LG}X_G$ efficiency units of labour apart from two types of capital in its production to produce X_G units of healthcare services. As production of commodity G raises the efficiency of each worker, this sector can be considered to be a supplier of labour input in efficiency unit. If X_G rises by one per cent sector G employs λ_{LG} per cent of the labour force additionally while it raises the labour force in efficiency unit by ε_G per cent in the margin, where $\varepsilon_G = (\frac{dh(.)}{dX_G}.\frac{X_G}{h(.)}) > 0$ is the elasticity of the labour efficiency function, $h(X_G)$, with respect to X_G. It is sensible to assume that sector G is a net supplier of labour input in efficiency unit which implies that $\lambda_{LG} < \varepsilon_G$.

Complete utilization of capital of types K and N can be expressed respectively as

$$a_{K1}X_1 + a_{K2}X_2 + a_{KG}X_G = K_D + K_F = K \tag{6}$$

$$a_{NG}X_G = N \tag{7}$$

Capital of either type K includes both domestic capital and foreign capital, which are perfect substitutes. Capital of type N is completely owned by foreign capitalists.[10] Foreign capital incomes of both types are fully repatriated.

The endogenously determined demand function for healthcare services is given by

$$\underset{(-)\ (+)}{D_G = D_G(P_G^*, Y)} \tag{8}$$

This implies that the demand for the healthcare services has the usual price and income effects.

The subsidy on healthcare (z) is financed by a portion of the tariff revenue earned by the government from the import of commodity 2 and is given by

$$sP_G D_G = z \tag{9}$$

[10] See footnote 7 in this context.

The demand function for the import commodity is given by

$$D_2 = D_2(P_2^*, Y) \quad (10)$$
$$(-)\ (+)$$

All commodities are normal goods with negative and positive own price and income elasticities of demand, respectively. Commodity G is a necessary good having a low own price elasticity of demand (in absolute terms). It does not depend on the relative price of commodity 2, P_2^*, so that the cross-price elasticity is zero. We make the simplifying assumption that the demands for the other two commodities do not depend on the relative price of commodity G i.e. $(\frac{\partial D_1}{\partial P_G^*}), (\frac{\partial D_2}{\partial P_G^*}) = 0$.[11] Commodities 1 and 2 are, however, gross substitutes implying $(\frac{\partial D_1}{\partial P_2^*}) > 0$.

The national income at domestic prices is given by

$$Y = X_1 + P_2^* X_2 + P_G X_G + tP_2(D_2 - X_2) - rK_F - RN - z \quad (11)$$

or equivalently,

$$Y = Wa_{L1}X_1 + W^*(h(X_G)L - a_{L1}X_1) + rK_D + tP_2(D_2 - X_2) - z \quad (11.1)$$

where $[tP_2(D_2 - X_2) - z]$ is the tariff revenue net of the subsidy on sector G which is transferred to the consumers in a lump-sum fashion.

Since the healthcare service is consumed domestically, its supply is circumscribed by its demand. Therefore, in equilibrium, we have

$$D_G = X_G \quad (12)$$

There are twelve endogenous variables, $W, r, R, P_G, s, h, X_1, X_2, X_G, D_G, D_2$ and Y that can be solved from the above twelve equations. r and W are obtained from equations

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[11] It may be verified that even if the demands for the other two commodities depend positively on P_G^*, implying commodities to be gross substitutes, all the results of the model continue to hold under an additional sufficient condition involving the term, $(\frac{\partial D_2}{\partial P_G^*})$. See footnote 13 and footnote 15 in this context.

(2) and (1) respectively. R is determined from equation (3) as a function of P_G. Then X_G is solved from equation (7) as a function of P_G. Plugging the value of X_G in equations ((5) and (6) and solving yield the values of X_1 and X_2. The value of Y is determined from solving equations (10) and (11.1). Substituting Y in equation (8) the value of D_G as a function of P_G is obtained. Finally, the value of P_G is determined from equation (12). Once P_G is known, the values of the other variables are also known. This is an indecomposable system, where the factor prices, except W and r, cannot be solved from the price system alone. Therefore, any change in the factor endowments affect factor prices, which in turn, affect the per unit input requirements, $a_{ji}s$ in each sector.

The demand side of the model is represented by a strictly quasi-concave social welfare function. Let V denote the social welfare that depends on the consumption of the output of the three sectors denoted by D_1, D_2 and D_G, and is depicted as

$$V = V(D_1, D_2, D_G) \tag{13}$$

The balance of trade equilibrium requires that

$$D_1 + P_2 D_2 = X_1 + P_2 X_2 - rK_F - RN \tag{14}$$

or equivalently,

$$D_1 + P_2^* D_2 + P_G^* D_G = X_1 + P_2^* X_2 + P_G X_G + tP_2(D_2 - X_2) - rK_F - RN - z \tag{14.1}$$

The volume of import of good 2 is given by the following equation.

$$M = D_2(P_2^*, P_G^*, Y) - X_2 \tag{15}$$

3. Comparative Static Exercises

In the present model where the efficiency of labour is determined endogenously by the magnitude of the healthcare sector, increase in the inflow of foreign capital of both types would raise the capital endowment of the economy leading to changes in factor prices, input coefficients and output composition. Any change in the size of the healthcare sector affects the labour efficiency, which in turn changes the labour

endowment in the economy measured in efficiency units. In this section, we examine the effects of foreign capital of both types on (i) the welfare of the economy in the presence of a concomitant change in labour endowment and (ii) the stock of human capital in the economy.

Human capital stock C can be expressed as the total labour endowment of the economy in efficiency units. Therefore,

$$C = h(X_G)L \tag{16}$$

3.1 Effects of inflow of capital of type K

In order to examine the effects of an inflow of capital of type K on the welfare and human capital stock of the economy, it is assumed that $\hat{K} > 0$, while all other parameters remain unchanged.

Differentiating Equations (1) – (3), (5) – (10), (11.1), (12), (13), (14.1), (15) and (16) the following results can be proved.[12]

$$\begin{aligned}
&\text{(i) } (\frac{\hat{P}_G}{\hat{K}}) > 0 \text{ iff } (W^* - W)a_{L2} > tP_2; \\
&\text{(ii) } (\frac{\hat{X}_1}{\hat{K}}) < 0 \text{; and, } (\frac{\hat{X}_2}{\hat{K}}) > 0 \text{; iff } (W^* - W)a_{L2} > tP_2 \\
&\text{(iii) } (\frac{\hat{X}_G}{\hat{K}}) = (-)(\frac{S^G_{NN}}{\theta_{NG}})(\frac{\hat{P}_G}{\hat{K}}) > 0 \text{ iff } (W^* - W)a_{L2} > tP_2; \\
&\text{(iv) } (\frac{1}{D_1})\frac{dV}{dK} > 0 \text{ if (a) } (W^* - W)a_{L2} \geq tP_2; \\
&\qquad\qquad \text{(b) } \theta_{NG}(v-1) + sS^G_{NN} \geq 0 \text{; and,} \\
&\text{(v) } \frac{dC}{dK} > 0 \text{ iff } (W^* - W)a_{L2} > tP_2
\end{aligned} \tag{17}$$

From (17) the following proposition can now be established.

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[12] The derivations and sufficient conditions can be obtained from the authors on request.

Proposition 1*: An inflow of foreign capital of type K leads to (i) an increase in the producer price of the healthcare services; (ii) an expansion of the health sector;(iii) an expansion (a contraction) of sector 2 (sector 1) and, (iv) an increase in human capital if and only if* $(W^* - W)a_{L2} > tP_2$. *Besides, inflows of this type of capital are welfare-improving if (a)* $(W^* - W)a_{L2} \geq tP_2$*; and, (b)* $\theta_{NG}(v-1) + sS_{NN}^G \geq 0$.[13]

From (17) the following corollaries readily follow.

Corollary 1: When $W^* = W$, that is, there is no labour market distortion, $(\frac{1}{D_1})\frac{dV}{dK} < 0$ if $\theta_{NG}(v-1) + sS_{NN}^G \geq 0$.

Corollary 2: When $t = 0$, that is, there is no tariff restriction, $(\frac{1}{D_1})\frac{dV}{dK} > 0$ if $\theta_{NG}(v-1) + sS_{NN}^G \geq 0$.

From ***corollary 1*** it entails that the presence of any labour market imperfection is a necessity for inflows of foreign capital of type K to be welfare improving. On the other hand, from ***corollary 2*** it is evident that in the absence of any tariff welfare improves if $\left|S_{NN}^G\right|$ is sufficiently small.

We can intuitively explain the results presented in proposition1 and corollaries 1 and 2 in the following fashion. Sector 1 and sector 2 together form a Heckscher-Ohlin sub-system (HOSS) as they use the same two inputs. Furthermore, given the return to capital of type N i.e. R, sector 2 and sector G also effectively form a HOSS. An inflow of capital of type K, leads to a contraction of sector 1 and an expansion of sector 2 following a Rybczynski effect as the latter sector is more intensive in the use of capital of type K than the former. Besides, sector G expands if $\left|S_{NN}^G\right|$ is sufficiently small. As sector 1 contracts, more labour (in efficiency unit) are now absorbed in the two higher wage-paying, unionized sectors (sector 2 and sector G). This is the labour

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[13] If all commodities are gross substitutes we have $(\frac{\partial D_2}{\partial P_G^*}) > 0$. It can be verified that the necessary and sufficient condition under which the results of proposition 1 are obtained does not change.

reallocation effect (LRE) that raises the aggregate wage income and works positively on social welfare. As the healthcare sector (sector G) expands it also raises the aggregate labour force in efficiency unit and hence increases the aggregate wage income given the output levels of the different sectors. This we call the labour endowment effect (LEE) which also works favourably on welfare. There is, however, an offsetting effect which is called the tariff revenue (TRE) which produces a negative effect on social welfare. As sector 2 expands it lowers the volume of import and hence the tariff revenue net of health subsidy which is transferred to the consumers in a non-distortionary manner. This, TRE, works negatively on welfare. As has been discussed previously, sector G must not fall sufficiently and lead to a decline in the labour force in efficiency unit adequately for welfare to improve. If the condition, $(\theta_{NG}(v-1)+sS_{NN}^{G})\geq 0,$ ensures that labour force does not fall sufficiently and the LEE is not adequately negative so that welfare deteriorates despite LRE dominates over the TRE. Given very limited substitutability between the two types of capital, R increases and a_{NG} rises, sector G can contract only if a_{NG} rises sufficiently. If $\left|S_{NN}^{G}\right|$ is very small, a_{NG} cannot adequately rise to bring about a fall in $X_G(=\frac{N}{a_{NG}})$. If the LRE is stronger relative to the TRE, $(W^{*}-W)a_{L2}>tP_2,$ and the net outcome of the three effects would be an improvement in social welfare.

An inflow of foreign capital of type K raises national welfare in two ways: (i) through an LRE; and (ii) an LEE provided $\left|S_{NN}^{G}\right|$ is sufficiently small. On the contrary, social welfare decreases following a TRE. Natinal welfare finally improves if the LRE is stronger than the TRE. If it happens, the demand for the healthcare services rises that pushes up its producer price, P_G. If P_G rises, sector G expands that raises the efficiency of each worker and hence the labour endowment of the economy in efficiency unit.

In the absence of any labour market distortions, the LRE is zero. So $(\frac{dP_G}{dK})<0$ if $(\theta_{NG}(v-1)+sS_{NN}^{G})\geq 0.$ Here $(\frac{dX_G}{dK})<0$ that implies that the LEE is negative. Welfare worsens following both negative TRE and negative LEE.

In the absence of any tariff restrictions, there is no negative TRE. So welfare improves if $(\theta_{NG}(v-1)+sS_{NN}^{G})\geq 0$.

3.2 Effects of inflow of foreign capital of type N

Let us now find out of the consequences of an inflow of foreign capital of type N which is specific to the health sector. In this case it is assumed that $\hat{N}>0$, while all other parameters remain unchanged.

Differentiating Equations (1) – (3), (5) – (13), (14.1), (15) and (16) once more the following results can be proved.[14]

$$
\begin{aligned}
&\text{(vi) } (\frac{\hat{P}_G}{\hat{N}})<0;\\
&\text{(vii) } (\frac{\hat{X}_G}{\hat{N}})=1-(\frac{S_{NN}^{G}}{\theta_{NG}})(\frac{\hat{P}_G}{\hat{N}})>0;\\
&\text{(viii) } (\frac{\hat{X}_1}{\hat{N}})<0 \text{; and } (\frac{\hat{X}_2}{\hat{N}})>0 \text{ and}\\
&\text{(ix) } \frac{dC}{dN}>0 \text{ if (i) } (W^{*}-W)a_{L2}\geq tP_2 \text{; and,}\\
&\qquad\qquad \text{(ii)} \left|S_{NN}^{G}\right|, S_{KN}^{G},\ S_{NK}^{G}\cong 0.\\
&\text{(x) } (\frac{1}{D_1})\frac{dV}{dN}<0 \text{ if (i) } (W^{*}-W)a_{L2}\geq tP_2\\
&\qquad\qquad\qquad \text{(ii)} \left|S_{NN}^{G}\right|, S_{KN}^{G},\ S_{NK}^{G}\cong 0 \text{; and,}\\
&\qquad\qquad\qquad \text{(iii)}\ \theta_{NG}(v-1)+sS_{NN}^{G}\geq 0
\end{aligned}
\qquad\qquad (18)
$$

These results can be summarized in terms of the following proposition.

Proposition 2*: An inflow of foreign capital of type N (specific to healthcare) lowers the producer price of the healthcare services, expands the health sector and raises*

[14] The derivations and sufficient conditions can be obtained from the authors on request.

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human capital if $(W^* - W)a_{L2} \geq tP_2$ *and* $\left|S_{NN}^G\right|$ *is small. It lowers the social welfare if additionally,* $\theta_{NG}(v-1) + sS_{NN}^G \geq 0$.[15]

The following corollary also follows from (18).

Corollary 3: In the absence of any tariff welfare unambiguously deteriorates following an inflow of foreign capital of type N.

Capital of type N is specific to sector G. If there occurs an inflow of this type of capital sector G expands. On the other hand, as N increases, R decreases and a_{NG} rises. This halts the expansion of sector G to some extent. However, if $\left|S_{NN}^G\right|$ is relatively small, X_G rises leading to a fall in its producer price given its demand. The expanding sector G requires more capital of type K which must come from the other two sectors leading to a Rybczynski type effect (RTE). Consequently, sector 2 contracts while sector 1 expands as the former sector is more intensive in the use of capital of type K vis-à-vis sector 1. If sector G expands the human capital formation gets a boost. Finally, national income at domestic prices rises due to an LEE and a positive TRE while it decreases owing to an LRE as the tariff-protected as the tariff –protected import-competing sector (sector 2) contracts. So there are three different effects on Y emanating due to three different reasons. The net effect would be a fall in social welfare subject to the sufficient conditions as mentioned in proposition 2.

4. Policy implications of results and concluding remarks:

The present paper develops a three-sector general equilibrium model and attempts to examine the impact of FDI in healthcare sector on the welfare and human capital stock of the economy. The consequences of two types of FDI have been considered here. Capital of type K is used in all the three sectors of the economy while capital of type N is solely used in the healthcare sector. In a developing country with formal and informal division of the labour market, due to an inflow of foreign capital of K type,

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[15] If commodities are gross substitutes the welfare result holds subject to the following two sufficient conditions: (i) $(W^* - W)a_{L2} \geq tP_2$; and, (ii) $X_G \geq tP_2 v(\frac{\partial D_2}{\partial P_G^*})$.

both the human capital formation and social welfare increase if the necessary and sufficient conditions that *(a)* $(W^* - W)a_{L2} \geq tP_2$*; and, (b)* $\theta_{NG}(v-1) + sS^G_{NN} \geq 0$ are satisfied. Policy implications that readily follow are not to go for labour market reform but to go for trade liberalization that lowers the tariff rates. These types of reforms fortify the possibility that the condition, $(W^* - W)a_{L2} \geq tP_2$, would be satisfied. On the contrary, owing to an inflow of foreign capital of N type (specific to sector G), social welfare deteriorates if $(W^* - W)a_{L2} \geq tP_2$. So trade liberalization raises the possibility for this kind of foreign capital inflows to be welfare worsening. These results are important because they can at least question the desirability of allowing foreign capital inflows in the healthcare directly, especially, when inflows of foreign capital (of K type) that go to all the sectors of the economy are likely to work favourably on twin economic objectives: maintaining high economic growth and improvement in human capital formation.

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