CREDIT Research Paper

No. 09/02

Migration, Remittances and Competition in International Labour Market

by

Mehdi M. Chowdhury

Abstract

Remittances are considered as an important component of GDP in many developing countries. In order to increase remittance inflows many countries are now actively involved in labour export and thereby competing with other labour exporting countries in the international market. In this paper we have conceptualised the competition by proposing a model where two countries export labour to a third country. The third country imposes differential tax rates on the income of foreign workers. We have explored the process of imposition of tax rates by importing country and found that tax burden is higher for the country with higher labour endowment.

JEL Classification: F22; F24; O15; L13

Keywords: International Migration; Remittances; Migration Tax; Oligopolistic Competition

July 2009

Centre for Research in Economic Development and International Trade, University of Nottingham

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Outline

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Acknowledgements

The Author is grateful to his supervisor Professor Indraneel Dasgupta, Durham University (formerly Associate Professor and Reader, University of Nottingham). Helpful comments by Dr. Udo Kreickemeier, Associate Professor and Dr. Arijit Mukherjee, Associate Professor and Reader at the University of Nottingham are greatly acknowledged.

1. Introduction

International movement of labour force has become a common issue of debates and policy discussions of twenty first century economics. Many countries now extensively depend on foreign labour force or the income received from labour force working abroad. It has been estimated that about 180 million or 3 percent of the population of world now live in counties where they were not born (Özden and Schiff 2006, page 1). Adding the offspring and second generation of migrants, the percentage of population living outside of home or the country of origin would be much higher. These migrants are now considered as an important source of foreign currency and foreign investment in many countries especially in developing countries. Accumulated over 1990s, officially reported remittances to developing countries have been 17 percent higher than official development assistances and were equal to 44 per cent of total FDI (Haas 2005).

International migration nevertheless is a sensitive issue because of conflicting and mixed opinions of public, policy makers and other stakeholders. The conflicts arise because of interlinkage of beneficial and detrimental effects of migration. For example, from the perspective of sending country, migration is considered as detrimental if migration constitutes a large fraction of skilled manpower and beneficial if the country receives foreign currency in the form of remittances. But remittances can come from migration of skilled people as well as from the migration of unskilled people. This conflict apparently can be resolved by measuring cost and benefit of migration to find which one is bigger. But such measurement is a mammoth task given the number of countries in the world, the number of skills and the volume of migrant population. On the other hand, in receiving countries, people reckon migration as beneficial when it fills up the shortage of skilled and unskilled manpower. But they also fear that migration may adversely affect the wage level and employment opportunity of natives. In addition migrants often become permanent residents and induce changes in social and cultural characteristics of receiving countries. One much cited example in this regard is German Guest Worker programme of 1960-70s which helped to rebuild the country after the World War II but later on many migrants became permanent resident.

In this paper we focus on the remittance sending aspect of migration. Most tangible benefit of international migration comes through remittances. The studies are

indicating that remittances, though not the only means, may have important roles to play in the process of economic development (Taylor 2006, Ghosh 2006, Hass 2005). Moreover the importance of remittances as a source of foreign currency can not be ignored. Migration has the capability of increasing a country's supply of foreign currency within a short period of time through remittances. In some developing countries remittance inflows are as high as one tenth of the Gross Domestic Product (Philippines 10.62%, Lebanon 20.31%, Guatemala 11.96%, El Salvador 17.78% Source: World Development Indicators 2008). The importance given to remittances is observed in the efforts of developing countries to send people to work abroad. Through their efforts, developing countries are engaging in competition with each other in international labour market. We often found references of such competition in government reports or newspaper articles. There is however little or no discussion in economic literature about competition of countries in international labour market.

In the paper we develop and work out with a model where two countries export labour to a third country, thereby face competition from each other. Migration and remittances here are viewed as multilateral issue involving three parties instead of a bilateral one involving two parties. In this sense the paper is close to recent emphasis of international bodies on multilateral negotiation in international migration. This way of viewing migration is quite recent phenomenon, though multilateral cooperation in migration trafficking, irregular migration etc. has been observed through the activities of Regional Consultative Processes (Thouez and Channac 2005). Cooperation has also been practised in the "Managed Migration" project of Caribbean Nurses Organisation and Pan American Health Association (Buchan et. al. 2005) which tried to balance between the individuals' right to migrate and the regions need to keep sufficient number of health workers.

It is obvious that countries are facing competition from each other in international labour market and it is affecting the benefits they receive. This issue carries immense importance to the economic welfare of related countries. However references and discussions in this regard are not ready available and to a certain extent lack clarity. In the IOMs publication 'Labour Migration in Asia', references of such competition have been given a number of times without any detailed discussion on the nature of such competition (IOM 2003). Most important source so far to have idea about the competition is perhaps the newspaper articles. Such as when following a demonstration in front of Bangladesh High Commission in mid 2007, Malaysia

decided to stop importing workers from Bangladesh, Bangladeshi newspapers published news of deep concern on the possibility of shift of labour market to other less developed Asian countries. These types of articles are published in Bangladeshi newspaper from time to time. Further hints about ongoing competition among stakeholders can be obtained by studying the bilateral migration agreements and/or labour recruitment procedures of contractual/temporary migrant workers. One example is Canada's Seasonal Agricultural Workers Programme which has two different bilateral agreements with Mexico and Caribbean countries for temporary migration of agricultural labour. In 2001, Canada for the first time decided to meet the two counterparts together to negotiate wage related issues but agricultural employers in Canada objected fearing increase of bargaining power of workers (Verma 2003, page 60). Similar tendency is observed in Asia. Here labour importing countries are reluctant to enter into agreements as foreign labour recruitment is regarded as a private matter though the true reason can be easily attributed to the large pool of unskilled labour in Asian region. As mentioned by Go (2006) bilateral agreement in Asia is rather an exception than rule. IOM report on labour market in Asia (IOM 2003) has several times (e.g. page 21, 39, 73) mentioned that the competition among stakeholders is severely undermining the bargaining power of the countries as the countries require to balance between 'Promotion' of overseas employment and 'Protection' of migrants. Receiving countries are in this regard is probably more organised. In Middle East Saudi Arabia, Kuwait, Oman, Bahrain, UAE and Qatar together have formed GULF Cooperation Council (GCC) that addresses the demand for migrant labour as well as to their requirement to control and management of migrant population. They follow a system called Kafala system in which all migrants need sponsorship from a permanent resident of Gulf (Longva 1999). There exists no such coalition of labour sending countries in Gulf. Recently Philippines raised the minimum wage of housemaid to 400 dollars which caused a 50% drop in demand (Source: Migrants Right 2008). As reported, India also attempted to do so. Thus the labour sending countries in Gulf probably set their policies unilaterally, which may adversely affect on the welfare of all labour sending countries.

The competition among the sending countries has not attracted attention of the mainstream economic literature. The analysis of migration and remittances in the literature is mainly unilateral or bilateral. A substantial number of studies have tried

to identify the determinants of migration and in most concise form reason of migration can be attributed to wage differential between sending and receiving regions. Among other determinants of migration one may state of improvement of standard of living, family reunion, safety and security etc. They do not usually take remittances into account. However in 'New Economics of Migration' migration is similar to a portfolio investment by family where the risk of depending on single labour market is reduced by diversification. Remittances in this regard can be viewed as an outcome of implicit contact with families staying behind (Rotte and Volger 1998).

Within the trade theoretic models, labour is a factor of production along with capital, thus movement of any of them should have consequences on the income of both factors. This was the main point of the brain drain literature around sixties. Grubel and Scott (1966) argued against the view that migration of skilled individual is detrimental for those who left behind stating that in market economy where persons are paid in accordance to their marginal products; emigrants remove both their contributions of national output and income that give them the claim of share so that others' income remain unchanged. The effect of emigration of skilled individual will only appear as short run adjustment cost or market failure. Another influential paper is Bhagwati and Hamada (1974) that introduced model with distortion by reckoning that wage of high skilled individual of a developing country can be higher and fixed above the market clearing wage. They showed that when the country educates more people and a part of the educated people can migrate, national income always decreases.

The recent papers on brain drain issue are viewing the gains differently. They are rather emphasising on the 'Brain Gain' from skilled individuals' migration instead of 'Brain Drain'. Stark and Wang (2002) can be considered as one of the most influential representatives of recent generation papers that argued that as individuals do not internalise the positive externalities of education thus there is a need to subsidise education in order to form socially optimum level of human capital. The prospect of migration can induce individuals to form the socially desirable optimum level of human capital and will have equal effect of an education subsidy.

Hence there are models that dealt with potential economic benefit of migration; some of them also incorporated the possibility of return migration (Stark et. al. 1997). The issue of remittances has not received much attention in this regards. But in

practical sense, remittances are by no way independent from skilled migration and human capital formation. Countries are now realising that skilled people can be a better source of remittances thereby establishing agencies to give training to potential migrants (for example Philippines).

Realisation of importance of remittances has culminated in the direct involvement of countries to send people to work in foreign countries. As already mentioned, in this paper we have conceptualised it by proposing a model where two countries export labour to a third country. In the paper, the countries allow international migration for the benefit they receive. The sending countries receive remittances, which increase national income. The receiving country increases the national output by using more labour in production. Thus in principle sending country will try to send as much labour as possible and receiving country will accept as much as possible to maximise national output. We have added a bit more to this story of migration. First the benefit of a sending country does not entirely depend on its own willingness to send people aboard. Other countries may also try to export labour in order to receive remittances. The competition among countries drives wage rate and employment opportunity of migrants down. On the other hand, receiving country may not only aim to increase the national output, rather its objectives may reflect the interest of special group such as workers or capitalists. Workers may try to keep migration low to have high wage rate. The capitalists may want to import more migrant workers at low wage rate in order to maximise profit. These different and conflicting objectives of different stakeholders of migration altogether determine the benefit of migration for sending and receiving countries. Our aim will be to look at the different policy stands of countries given potential benefit of migration and competition among stakeholders.

In the model the two countries involve in Cournot type quantity competition to export labour to a third country. The importing country acts as Stackelberg leader as it foresees the willingness of courtiers to export labour and designs policies according to its objectives. The idea of the model to some extent came from Chau and Kanbur (2006) that modelled the competition between two Southern countries in labour standard and showed that Northern importing countries can rip off the benefit by increased tax rate. Instead of labour standard, we have assumed that the countries compete by sending labour. The model however has been greatly simplified by assuming fixed international prices of goods. It is also to be noted that the structure of the model is similar to the models of strategic trade especially of Brander and

Spencer (1985). A few papers have incorporates import tax in Brander-Spencer framework. The paper is structurally similar to them, in particular, Hwang and Mai (1991).

The organisation of the paper is as follows. In the section two of the paper we have proposed the basic assumptions and structure of the model. Third section has looked at the comparative static properties of the model. The fourth section discusses the determinants of migration tax by country of immigration. Possibility of collusion has been analysed in fifth section. Conclusions are provided in last section.

2. The Model

The structure of the model is as follows-

2.1 Basic Assumptions

The basic assumptions of the model are-

a. There are three open economies C, I and U producing two internationally traded goods - X_1 and X_2.
b. Prices of goods are fixed. p is the price of X_1 with respect to price of X_2, i.e. $p = \frac{P_1}{P_2}$.
c. Labour endowment is fixed, denoted by $\bar{L}_i$ for country $i \in \{C, I\}$ and $\bar{L}_u$ for country U.

2.2 Technology and Production in $i \in \{C, I\}$:

We assume that production of X_1 in $i \in \{C, I\}$ is depicted by the following function-

$$X_{i1} = a_1 L_{i1} - \frac{b_1}{2} L_{i1}^2$$

where $X_{i,1}$ denotes the amount of X_1 produced in $i \in \{C, I\}$, L_{i1} is total amount of labour used in production of X_1, a_1 and b_1 are coefficients. Differentiating with respect to L_{i1}, marginal product of labour in sector X_1 is obtained as $a_1 - b_1 L_{i1}$. Therefore MP_L varies between a_1 and $a_1 - b_1 \overline{L_i}$.

The production of X_2 is given as-

$$X_{i2} = a_2 L_{i2}$$

where a_2 is the amount of labour required to produce one unit of X_2 and L_{i2} is the amount of labour used for production of X_2. Differentiating with respect to L_{i2}, the MP_L is obtained as a_2.

Hence, country $i \in \{C, I\}$ switches labour from X_1 to X_2 if the value of marginal product of labour in X_1 is greater than the value of marginal product of labour in X_2. that is, iff -

$$a_2 < p(a_1 - b_1 L_{i1})$$

Or, $p > \dfrac{a_2}{a_1 - b_1 L_{i1}}$

Let us assume that $p > \dfrac{a_2}{a_1 - b_1 \overline{L_i}}$

Thus with trade $i \in \{C, I\}$ necessarily specialises in producing X_1. Without migration the workers of $i \in \{C, I\}$ therefore receives wage-

$$w_i = p(a_1 - b_1 \overline{L_i})$$

2.3 Production and Technology in Country U

Assume that country U has linear production technology for X_1, which is written as-

$$X_{u1} = a_{u1}L_{u1}$$

where L_{u1} is the amount of labour used and a_{u1} is the coefficient. By differentiating with respect to L_{u1}, we get the marginal product of labour as a_{u1}. On the other hand production in sector X_2 is defined by the following function-

$$X_{u2} = a_{u2}L_{u2} - \frac{b_{u2}}{2}L_{u2}^2$$

where L_{u2} is the amount of labour used in production of X_2 in U. Again by differentiating with respect to L_{u2} we get the marginal product of labour in country U as $(a_{u2} - b_{u2}L_{u2})$. Thus marginal product varies between a_{u2} and $(a_{u2} - b_{u2}\overline{L}_u)$. Country U will specialise in production of X_2 iff-

$$(a_{u2} - b_{u2}\overline{L}_u) > pa_{u1}$$

Let us assume that, $(a_{u2} - b_{u2}\overline{L}_u) > pa_{u1}$. U therefore specialises in production of X_2. Without migration, the workers of U receives wage-

$$\overline{w}_u = a_{u2} - b_{u2}\overline{L}_u$$

2.4 Migration between Country i and U

In the previous sections we have defined the conditions under which country i specialises in production in good X_1 and country U specialises in production of good X_2. In this section we will consider that labour can move from one country to another country. For this purpose the mechanism of such movement is needed to be defined. In this paper we assume that the governments of sending countries control migration thus they act in way that maximises national income. The governments decide how many workers they want to send to the third country and in return receive remittances. The national income is calculated by adding the output produced within the country with the remittances received. This assumption may seem unlikely at first look but largely captures the pattern of unskilled/low skilled labour migration observed in developing countries.

Let us consider the alternatives mechanism. First alternative is to assume free migration that is people can move freely without any restriction of sending and receiving countries. In reality this is an exception rather than the rule. Except for a few regions such as 'European Union' people are not allowed freely migrate to another country. In some countries people are not even allowed to emigrate freely. This restriction can come in the form of direct control such as restriction to leave without permission or indirect control like non-issuance of passport. In countries and region where free migration is allowed the present structure is obviously not valid.

Second alternative is to assume that receiving countries impose quota on migration. The 'Brain Drain' literature is based on this assumption (Schiff 2006 for references and counter arguments). But this quota is appropriate mainly for the high skilled migration. Example of quota is HB-1 visa system in USA or recent German Green Card system (Kolb 2005). Most developed countries now-a-days also exercising point based migration system for screening high skilled people. Migration of low or unskilled people takes a different path. They are usually recruited by 'recruiting agencies' or through intergovernmental agreements. Governments of exporting countries play not just passive role but participate actively to facilitate migration. The bilateral migration agreements observed world wide depict direct involvement and interest of governments in this issue. In Canada's Agricultural Workers' Programme, Canada mentions yearly demand to respective government

authorities of Mexico and Caribbean countries. In reply Mexican and Caribbean governments facilitate recruitment according to the Canadian requirement (Verma 2003). Within the framework of WTO, Mode 4 of GATS allows for movement of natural persons in the form of service trade. However Mode 4 does not allow for free movement or job search by a natural person in the country of work. Intergovernmental negotiation within GATS certainly implies direct interest of governments in migration issues.

Another argument could be that though the governments may have direct interest, it is the individual migrants who decide whether they want to migrate or not. This argument cannot be ignored. In reply it can be said that there is a long tradition of considering migration as a household decision where it is actually the individual members of households who migrate. There is definitely a tension regarding this matter between households and individual members. The individual members' special characteristics are surely important for households in deciding whether they are going to invest by sending a particular member aboard or not. Just considering migration as a household decision does not capture this tension. Nonetheless, government is a much bigger institution than household and there is no need to hide that by assuming governments to have the full control of migration, we are missing the interactions between government and individual/household. What we can argue is that the assumption of government controlled migration will allow us to capture a significant fraction of international migration and relevant policy issues of many developing countries.

We therefore assume following national income equation for sending countries-

$$Y_i = p(a_1(\bar{L}_i - L_{i2}) - \frac{b_1}{2}(\bar{L}_i - L_{i2})^2) + (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - T_i)L_{i2} \qquad (1)$$

where –

Y_i = National income of i.

L_{i2} = Migrants from country i to country U.

T_i = Tax imposed by country U on migrants of country i.

L_{C2} = Migrants from country C to country U.

L_{I2} = Migrants from country I to country U .

As can be observed, the above equation has two components. The first part is the output produced within the country. The second part is the remittances send by workers working in U . The remittances are nothing but wage multiplied by total migrant workers. It is also assumed that migrants send the entire wage back to home country. In reality migrants do keep some income in country of immigration, buy properties or make investments. Here we are considering temporary migration and there is no reason for temporary migrants to keep income in the country of immigration. The assumption of full repatriation of income will allow us to capture temporariness of migration as well as will make analysis simpler.

It is also assumed that receiving country imposes tax on the income of migrants. This tax reflects the fact that in many parts of the world, migrants must pay tax but may not receive the benefit in return. Immigration tax is a controversial and debatable issue in the economics of public sector. A common misconception prevailing is that immigrants receive all the benefits but do not pay equal amount of tax which leads to higher amount of tax burden on the natives. Razin and Sadka (2002) has showed that as low income migration grows, median voters may prefer low tax rates in a fear of leakage of tax revenue to low income migrants. This approach of using the concept of median voters is highly questionable. As mentioned by (Leibfritz et. al. 2003) tax revenue and distribution is a dynamic process. For example young immigrants who are now going to school can be regarded as using up significant among of public contribution. But when they will grow up they will contribute to public revenue by paying tax. Similarly those who are now paying tax may at a later period of life get higher return through pension. Another study showed that since 1980s the average skill of immigrants has increased compared to the average skill of native population (Jasso et. al. 1998). If it is assumed that immigrants are paid according to the skill level, the income tax contribution of immigrants should also be higher. Another misconception is that illegal migrants do not pay tax but consume all the public services such as road, transportation, medical services etc. But in reality illegal migrants do pay tax, a simple example of which is consumption tax like VAT. In addition many illegal migrants by cars, houses, involve in businesses which have significant contribution in tax revenue. Many illegal immigrants obtain counterfeit tax identification numbers and may pay income tax (Lipman 2006, 2009) higher than

other low income earners. It is not unlikely that some illegal immigrants receive social benefit using counterfeit documents. Thus before providing final comments it must be properly understood whether migrants in reality pay higher or lower tax compared to the benefit they receive in return. Temporary migrants in this regard are likely to be the net losers. Within the short period of stay it is not possible for them to bring family and children, thus they are excluded from receiving the health and schooling benefit received by permanent migrants' family. But they are subject to payment of all type of taxes as applicable to permanent residents.

In the model we are considering temporary migration allowing full repatriation the earnings back to home country. The receiving country as usual imposes tax which is redistributed to the natives. When forming the strategy, the sending countries therefore take the tax rates into consideration. The objective of country i then is to maximise national income with respect to L_{i2}. Both countries assume that other country will keep the number of migrant labour same. Differentiating with respect to L_{i2} and setting the derivative equal to zero following two reaction functions for country C and I are obtained-

$$(pb_1 + 2b_{u2})L_{C2} = -p(a_1 - b_1\bar{L}_C) + (a_{u2} - b_{u2}\bar{L}_u) - T_C - b_{u2}L_{I2} \qquad (1.1)$$

$$(pb_1 + 2b_{u2})L_{I2} = -p(a_1 - b_1\bar{L}_I) + (a_{u2} - b_{u2}\bar{L}_u) - T_I - b_{u2}L_{C2} \qquad (1.2)$$

The two equations can be solved for L_{C2} and L_{I2}. The sufficient condition for maximisation is that second derivative is negative is also satisfied as-

$$\frac{\partial^2 Y_i}{\partial L_{i2}^2} = -pb_1 - 2b_{u2} < 0$$

The cross partial derivative is negative as-

$$\frac{\partial^2 Y_i}{\partial L_{i2}\partial L_{j2}} = -b_{u2} < 0 \qquad \text{where } i \neq j$$

The smaller cross partial derivatives show the country's income responds more to change of its own labour export. Smaller cross partial derivatives also ensure that the solutions are stable as we shall see below.

2.5 Solutions and Stability

Equation (1.1) and (1.2) can be written in matrix form as-

$$\begin{bmatrix} pb_1 + 2b_{u2} & b_{u2} \\ \delta b_{u2} & pb_1 + 2b_{u2} \end{bmatrix} \begin{bmatrix} L_{C2} \\ L_{I2} \end{bmatrix} = \begin{bmatrix} -p(a_1 - b_1\bar{L_C}) + (a_{u2} - b_{u2}\bar{L_u}) - T_C \\ -p(a_1 - b_1\bar{L_I}) + (a_{u2} - b_{u2}\bar{L_u}) - T_I \end{bmatrix}$$

Let Z be the matrix of coefficients. The determinant is $Z = pb_1(pb_1 + 4b_{u2}) + 3(b_{u2})^2$, thus determinant is positive and inverse exists. Applying Cramer's rule the following solutions are obtained-

$$L_{C2} = Z^{-1}(B_C(pb_1 + 2b_{u2}) - B_I b_{u2}) \qquad (1.1.1)$$

and,

$$L_{I2} = Z^{-1}(B_I(pb_1 + 2b_{u2}) - B_C b_{u2}) \qquad (1.2.1)$$

where,

$$B_i = -p(a_1 - b_1\bar{L_i}) + (a_{u2} - b_{u2}\bar{L_u}) - T_i$$

From the two solutions it is not possible to identify which country exports more labour. It depends on the amount of initial labour endowments and the tax rates. In later sections we shall see how tax rates are imposed by country U.

The negative second order condition coupled with positive determinant is sufficient to find that the solutions are stable. Following Martin (1995) suppose that the countries are exporting (L_{C2}, L_{I2}) amount in the neighbourhood of (L^*_{C2}, L^*_{I2}), the equilibrium labour export. In each period t, labour is adjusted by k_i amount such that-

$$\frac{dL_{i2}}{dt} = k_i \frac{\partial Y_i(L_{C2}, L_{I2})}{\partial L_{i2}}$$

Let $i = C$ .Taking linear approximation around (L^*_{C2}, L^*_{I2}) we get-

$$\frac{dL_{C2}}{dt} = k_C \frac{\partial Y_C(L^*_{C2}, L^*_{I2})}{\partial L_{C2}} + k_C[\frac{\partial^2 Y_C(L^*_{C2}, L^*_{I2})}{\partial L^2_{C2}}(L^*_{C2} - L_{C2}) + \frac{\partial^2 Y_C(L^*_{C2}, L^*_{I2})}{\partial L_{C2}\partial L_{I2}}(L^*_{I2} - L_{I2})]$$

Similarly supposing $i = I$ we obtain-

$$\frac{dL_{I2}}{dt} = k_I \frac{\partial Y_I(L^*_{C2}, L^*_{I2})}{\partial L_{I2}} + k_I[\frac{\partial^2 Y_I(L^*_{C2}, L^*_{I2})}{\partial L^2_{I2}}(L^*_{I2} - L_{I2}) + \frac{\partial^2 Y_I(L^*_{C2}, L^*_{I2})}{\partial L_{I2}\partial L_{C2}}(L^*_{C2} - L_{C2})]$$

The first terms of right hand side of both equations are zero by first order condition. Rewriting the equations in matrix form we get-

$$\begin{bmatrix} \frac{dL_{C2}}{dt} \\ \frac{dL_{I2}}{dt} \end{bmatrix} = \begin{bmatrix} k_C & 0 \\ 0 & k_I \end{bmatrix} \begin{bmatrix} \frac{\partial^2 Y_C(L^*_{C2}, L^*_{I2})}{\partial L^2_{C2}} & \frac{\partial^2 Y_C(L^*_{C2}, L^*_{I2})}{\partial L_{C2}\partial L_{I2}} \\ \frac{\partial^2 Y_I(L^*_{C2}, L^*_{I2})}{\partial L_{C2}\partial L_{I2}} & \frac{\partial^2 Y_I(L^*_{C2}, L^*_{I2})}{\partial L^2_{I2}} \end{bmatrix} \begin{bmatrix} L^*_{C2} - L_{C2} \\ L^*_{I2} - L_{I2} \end{bmatrix}$$

Stability requires that the Jacobin matrix has negative trace and positive determinant. From the second order conditions we have already found that $\frac{\partial^2 Y_i}{\partial L^2_{i2}} < 0$ which implies that the trace or sum of diagonal elements is negative. By substituting from previous calculations the determinant is obtained as-

$$\begin{bmatrix} -pb_1 - 2b_{u2} & -b_{u2} \\ -b_{u2} & -pb_1 - 2b_{u2} \end{bmatrix} = pb_1(pb_1 + 4b_{u2}) + 3(b_{u2})^2$$

As the determinant is positive and trace is negative, the equilibrium is stable.

3. Comparative Statics

In this section we are interested to see how change in the tax policy by U affects the income and labour export of i. It will be convenient to describe the comparative static results first and then to show how there were derived. The results are described in proposition format.

Proposition 1: If tax rate (T_i) for one country increases then labour export from that country decreases but labour export from other country increases. Total labour export decreases.

Assume that only tax rate for country i has been changed. Differentiating the reaction functions of equation (1.1) and (1.2) with respect to T_i we get-

$$(pb_1 + 2b_{u2})\frac{\partial L_{i2}}{\partial T_i} + b_{u2}\frac{\partial L_{j2}}{\partial T_i} = -1$$

$$b_{u2}\frac{\partial L_{i2}}{\partial T_i} + (pb_1 + 2b_{u2})\frac{\partial L_{j2}}{\partial T_i} = 0$$

From the equations, the solutions obtained are-

$$\frac{\partial L_{i2}}{\partial T_i} = -Z^{-1}(pb_1 + 2b_{u2}) < 0$$

and,

$$\frac{\partial L_{j2}}{\partial T_i} = Z^{-1}b_{u2} > 0$$

Therefore if the tax rate for a country is increased by U then labour export from that country decreases but labour export from the other country increases. Adding the two we get-

$$\frac{\partial L_{i2}}{\partial T_i} + \frac{\partial L_{j2}}{\partial T_i} = -Z^{-1}(pb_1 + b_{u2}) < 0$$

Thus overall labour export by the two countries decreases.

Proposition 2: Increase of tax rate for one country reduces national income of that country and increases income of other country.

The income equation of country C is-

$$Y_C = p(a_1(\bar{L}_C - L_{C2}) - \frac{b_1}{2}(\bar{L}_C - L_{C2})^2) + (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - T_C)L_{C2}$$

Differentiating with respect to T_C and setting the derivative equal to zero we get-

$$\frac{\partial Y_C}{\partial T_C} = [-p(a_1 - b_1(\bar{L}_C - L_{C2})) + (a_{u2} - b_{u2}(\bar{L}_u + 2L_{C2} + L_{I2}) - T_C)]\frac{\partial L_{C2}}{\partial T_C} - b_{u2}L_{C2}\frac{\partial L_{I2}}{\partial T_C} - L_{C2} = 0$$

First order condition of equation (1.1) implies that the first term of the expression is zero. Therefore we obtain-

$$\frac{\partial Y_C}{\partial T_C} = -b_{u2}L_{C2}\frac{\partial L_{I2}}{\partial T_C} - L_{C2} < 0$$

For country I the national income equation is-

$$Y_I = p(a_1(\bar{L}_I - L_{I2}) - \frac{b_1}{2}(\bar{L}_I - L_{I2})^2) + (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - T_I)L_{I2}$$

Differentiating with respect to T_C and setting the derivative equal to zero we get-

$$\frac{\partial Y_I}{\partial T_C} = [-p(a_1 - b_1(\bar{L}_I - L_{I2})) + (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + 2L_{I2}) - T_I)]\frac{\partial L_{I2}}{\partial T_C} - b_{u2}L_{I2}\frac{\partial L_{C2}}{\partial T_C} = 0$$

As the first term of the expression is equal to zero we get-

$$\frac{\partial Y_I}{\partial T_C} = -b_{u2}L_{I2}\frac{\partial L_{C2}}{\partial T_C} > 0$$

Consequently, national income of C decreases and national income of I increases as T_C increases.

Proposition 3: Increase in the tax rate reduces the migrant labour supply and the income of country U **.**

The proof of the proposition is straight forward. Let us write the national income equation of U as-

$$Y_U = [a_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - \frac{b_{u2}}{2}(\bar{L}_u + L_{C2} + L_{I2})^2]$$

By differentiating with respect to T_C we get-

$$\frac{\partial Y_U}{\partial T_C} = [a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2})](\frac{\partial L_{C2}}{\partial T_C} + \frac{\partial L_{I2}}{\partial T_C}) < 0$$

We have already found that increased tax rate reduces migrant labour supply. Therefore total output of the country must fall.

4. Determination of Tax Rates

The last proposition is simple and straight forward but is not trivial. It brings us to the first stage of game. That is why and how country U imposes tax. Our assumption here is that the receiving country has it on own objectives and some objectives may require imposition of positive tax rates. We will discuss them in the following four cases:

Case 1: U **wants to maximise national output.**

It follows straight from proposition 3 that country U should impose zero tax rate in order to maximise national output.

Case 2: U wants to maximise national income plus the total tax revenue.

Country U can also aim to maximise the total income of residents. It implies that U maximises the total national output plus tax revenue deducing wages given to migrants. Thus there is a redistribution of a part of income of the migrants to the residents of U. The objective function in this case is written in following manner-

$$Y_U = [a_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - \frac{b_{u2}}{2}(\bar{L}_u + L_{C2} + L_{I2})^2] - [a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - T_C]L_{C2}$$
$$- [a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}) - T_I]L_{I2}$$

In the above equation we have deducted the wages remitted by migrants from national output of the country. Here we are interested to know if the country is going to impose positive tax rates or not. Unfortunately the calculation of this equation turns out to be more complicated than as initially appears. Even when we assume that two countries have same labour endowment the result is not clear. After differentiating with T_C and assuming $\bar{L}_C = \bar{L}_I = \bar{L}$ we obtain-

$$\frac{\partial Y_U}{\partial T_C} = Z^{-1}[(\Theta - 2(pb_1 + 2b_{u2})T_C + (\Theta + 2b_{u2})T_I + H]$$

where,

$$H = -\Theta\Psi - p(a_1 - b_1\bar{L})(pb_1 + b_{u2}) + (a_{u2} - b_{u2}\bar{L}_U)(pb_1 + b_{u2})$$

$$\Psi = 2(a_{u2} - b_{u2}\bar{L}_u) - p(a_1 - b_1\bar{L}) - p(a_1 - b_1\bar{L}) > 0$$

and, $\Theta = b_{u2}Z^{-1}(pb_1 + b_{u2})^2 > 0$

As can be seen it is not possible to say anything about the sign of H as Ψ is positive. Similarly sign of $\Theta - 2(pb_1 + 2b_{u2})$ is also indeterminate. If we look at the second order condition it turns out to be-

$$\frac{\partial Y_U{}^2}{\partial^2 T_C} = Z^{-1}[b_{u2}Z^{-1}(pb_1 + b_{u2})^2 - 2(pb_1 + 2b_{u2})]$$

Again the sign of second order condition is undetermined. In order to simplify we may assume that the tax rates are initially zero. Now by differentiating with respect to T_C and after necessary calculation we get-

$$\frac{\partial Y_U}{\partial T_C} = b_{u2}(L_{I2} + L_{C2})(\frac{dL_{C2}}{\partial T_C} + \frac{\partial L_{I2}}{\partial T_C}) < 0$$

Hence the national income decreases as tax is imposed. The negative derivate implies that the best tax rate is zero tax rate in order to maximise income of the residents of the country. The result is a bit surprising but it implies that zero tax is giving a local optimum. We may conclude that the objective of maximising the income of residents of country does not give clear cut reason for imposing positive tax rates.

Case 3: U **wants to maximise the total income of the domestic workers.**

U may aim to maximise the income of domestic workers. Normally it is thought that domestic workers income that is wage rate is highest when there is no migration. Though wage is highest, the income of the workers may not as in our model foreign workers pay tax which is distributed among the local residents. Wage plus tax can be higher than the wage rate without migration.

Thus here we are pointing to the discriminatory benefit of tax. As pointed out already temporary workers may face strong discrimination in term of tax benefit. Many countries provide special social security benefit, where foreign workers pay significant contribution through tax but are not eligible to receive benefit in return. One example of it is 500 pound grant (for job seekers) given by UK government on child birth. This grant is likely to keep prices of baby products high. Foreign nationals, though paying taxes, are not eligible for the grant but they are purchasing from the same market where prices are artificially high because of the grant. Another benefit of local residents comes through low market prices of sectors where foreign

workers work. Foreign unskilled workers mainly work in low income jobs like agriculture, food processing, cleaning etc. Foreign workers participation in these sectors helps to keep prices low, thereby real income of local workers high.

How participation of foreign workers in food sector is keeping the prices low and its impact on income and poverty level of country of immigration is a very important issue to discuss. But in this paper we are only considering the redistribution effects of tax revenue. Thus the government of U maximises the following function-

$$Y_{LU} = (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}))\bar{L}_u + T_C L_{C2} + T_I L_{I2}$$

As shown in the above equation, U now maximises the sum of wage and tax revenues. Assuming T_C and T_I are zero, by differentiating with respect to T_C we get-

$$\frac{\partial Y_{LU}}{\partial T_C} = -b_{u2}\bar{L}_u\left(\frac{\partial L_{C2}}{\partial T_C} + \frac{\partial L_{I2}}{\partial T_C}\right) > 0$$

Thus imposition of tax increases the income of workers when tax rate is zero. Hence the government will impose positive tax in order to maximise income of domestic labour. To find the optimal rates of taxes, we differentiate the equation with respect to T_C and T_I and set the derivatives equal to zero as-

$$\frac{\partial Y_{LU}}{\partial T_C} = -b_{u2}\bar{L}_u\left(\frac{\partial L_{C2}}{\partial T_C} + \frac{\partial L_{I2}}{\partial T_C}\right) + L_{C2} + T_C\frac{\partial L_{C2}}{\partial T_C} + T_I\frac{\partial L_{I2}}{\partial T_C} = 0 \qquad \text{assumes } \partial T_I = 0$$

and

$$\frac{\partial Y_{LU}}{\partial T_I} = -b_{u2}\bar{L}_u\left(\frac{\partial L_{C2}}{\partial T_I} + \frac{\partial L_{I2}}{\partial T_I}\right) + L_{I2} + T_C\frac{\partial L_{C2}}{\partial T_I} + T_I\frac{\partial L_{I2}}{\partial T_I} = 0 \qquad \text{assumes } \partial T_C = 0$$

The second order condition is satisfied as-

$$\frac{(\partial Y_{LU})^2}{\partial^2 T_i} = -2Z^{-1}(pb_1 + 2b_{u2}) < 0$$

where- $Z = pb_1(pb_1 + 4b_{u2}) + 3(b_{u2})^2$

The solutions of the above two equations are a bit tedious but we finally get surprisingly simple result that is-

$$T_C = \frac{1}{2}(a_{u2} - p(a_1 - b_1\bar{L}_C) > 0$$

$$T_I = \frac{1}{2}(a_{u2} - p(a_1 - b_1\bar{L}_I) > 0$$

From the two equations it can be seen that the country with more labour endowment pays more tax, the country endowed with less labour pays less tax. We are now in a position to see which country sends more labour to U. By substituting T_C and T_I in equation (1.1.1) and (1.2.1) and after necessary calculation we get-

$$L_{C2} - L_{I2} = \frac{1}{2Z} pb_1(\bar{L}_C - \bar{L}_I)(pb_1 + 3b_{u2})$$

If $\bar{L}_C > \bar{L}_I$ then the sign of equation is positive. That is $\bar{L}_C > \bar{L}_I$ implies that Country C pays more tax and exports more labour. There is a very simple intuitive explanation. The workers of labour endowed country receive low wage in home country. Thus the difference between wages received in U and own country is higher for the country with greater labour endowment. U can extract higher rent by charging higher tax rate.

Below we show that the country with more labour endowment has lower tax elasticity of labour demand. Thus the receiving country finds it better to increase tax rate of the country with higher labour endowment. Let us write η_{Ti} as tax elasticity of demand defined as-

$$\eta_{Ti} = \frac{\frac{\partial(\bar{L}_i - L_{i2})}{\partial T_i}}{\frac{(\bar{L}_i - L_{i2})}{T_i}} = -\frac{\partial L_{i2}}{\partial T_i} \cdot \frac{T_i}{(\bar{L}_i - L_{i2})}$$

Therefore,

$$\eta_{Ti} = Z^{-1}(pb_1 + 2b_{u2}).\frac{T_C}{\overline{L}_C}$$

Assume that the tax rates are initially the same, thus the country with higher labour endowment has lower elasticity. If tax rate is changed by U , the country with higher labour endowment responses less to the change of tax rate.

Here we may point to the similarity of our model with Brander-Spencer analysis (Brander and Spencer 1985). Brander and Spencer proposed a similar model where two countries export goods to a third country. They analysed the strategies of setting up of optimum export tax/subsidy of exporting country. In importing country there is however no incentive to impose import tax as commodities are identical. In reality the importing countries do imposes discriminatory tax rates to allow preferential access of some countries commodity. Imposition of import tax in the country of destination has been tackled by Gatsois (1991), Hwang and Mai (1991), Horiba and Tsutsui (2000) and Liao and Wong (2006). In general it is found that if the country practices discriminatory tariff policy, then tariff rate is higher for the most cost efficient exporter. It is not an exception in our model too. Here the most cost efficient sending country (opportunity cost of migration is low) send more migrants and receive higher tax burden. It may be questioned that if such discriminatory tax policy is observed in reality. As already discussed migrants do pay taxes in many forms. But such taxes should be same for all type of migrants. To find out discriminatory tax rates one needs to look at conditions attached to entry and social security benefits. Analysis of such differential tax rates is not readily available. But it is well known that similar to differential tariff regime, the migrants from different country faces different type of entry cost to access the labour market of host country. Similar to differential tariff regimes, the labour importing countries are now willing to enter into different bilateral migration agreements with different countries (Winters 2005) to target specific skills from specific countries. The agreements obviously set different opportunity costs of migration for workers of different countries.

Case 4: U maximises a weighted average of capitalists' income and earnings of domestic workers, plus total tax revenue

Country U may want to maximise a weighted average of workers and capitalists income. We can therefore write the income equation as-

$$\pi_U = (1-\theta)(Y_U - (a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}))(\bar{L}_u + L_{C2} + L_{I2}))$$
$$+ \theta(a_{u2} - b_{u2}(\bar{L}_u + L_{C2} + L_{I2}))\bar{L}_u + T_C L_{C2} + T_I L_{I2}$$

where $1 \leq \theta \leq 0$ is the weight.

After differentiating and necessary calculation we obtain-

$$\frac{\partial \pi_U}{\partial T_C} = (1-\theta)b_{u2}L_{u2}\Phi - \theta b_{u2}\Phi\bar{L}_u + L_{C2} + T_C\frac{\partial L_{C2}}{\partial T_C} + T_I\frac{\partial L_{I2}}{\partial T_C} = 0$$

And,

$$\frac{\partial \pi_U}{\partial T_I} = (1-\theta)b_{u2}L_{u2}\Phi - \theta b_{u2}\Phi\bar{L}_u + L_{I2} + T_C\frac{\partial L_{C2}}{\partial T_I} + T_I\frac{\partial L_{I2}}{\partial T_I} = 0$$

where, $L_{u2} = \bar{L}_u + L_{C2} + L_{I2}$ and $\Phi = \frac{\partial L_{i2}}{\partial T_i} + \frac{\partial L_{j2}}{\partial T_i}$. The solutions of the equations are quite tedious as we need to replace L_{C2} and L_{I2} with the solutions obtained in equation (1.1.1) and (1.2.1). However it can be seen that unlike case 3, imposing tax may not always be welfare improving thus interior solution may not exist. Assuming interior solutions exist we get the solution of the equations as-

$$T_i = M^{-1}(pb_1 + b_{u2})[T_{\theta i} - 2(1-\theta)b_{u2}\Psi - 4(1-\theta)b_{u2}\bar{L}_u(pb_1 + 3b_{u2}) - pb_1b_{u2}(\bar{L}_i - \bar{L}_j)(1-\theta)]$$

where-

$$M = 4(1-\theta)b_{u2}(pb_1 + b_{u2})\Phi(pb_1 + 3b_{u2}) + 4((pb_1)^2 + 2pb_1b_{u2} + (b_{u2})^2)$$

$$T_{\theta i} = 2(a_{u2} - p(a_1 - b_1\bar{L}_i))(pb_1 + 3b_{u2})$$

$$\Phi = (\frac{\partial L_{i2}}{\partial T_i} + \frac{\partial L_{j2}}{\partial T_i})$$

$$\Psi = 2(a_{u2} - b_{u2}\bar{L}_u) - p(a_1 - b_1\bar{L}_C) - p(a_1 - b_1\bar{L}_I)$$

The solution at first sight seems quite complex but if $\theta = 1$, the solution is the one obtained in case 3 and the tax rate is highest. If the value of θ falls tax rate decreases. It is most clear when $\bar{L}_i = \bar{L}_j$. Even when $\bar{L}_i \neq \bar{L}_j$, by further calculation it is revealed that tax rates fall as the weight θ falls. It cannot however be said which country pays more tax just by looking at the solution. By deducting both equations we obtain-

$$T_C - T_I = M^{-1}((pb_1 + b_{u2}))[2pb_1(\bar{L}_C - \bar{L}_I)(2pb_1(pb_1 + b_{u2})(pb_1 + 3b_{u2}) - 2pb_1b_{u2}(1-\theta))]$$

The equation shows that the tax rate again depends on the labour endowment and the country with higher labour endowment pays higher tax rate. As $\theta < 1$ we have $2pb_1(pb_1 + b_{u2})(pb_1 + 3b_{u2}) > 2pb_1b_{u2}(1-\theta)$. Thus $T_C > T_I$ if $\bar{L}_C > \bar{L}_I$. The finding is consistent with case 3 where we have found that the country with higher labour endowment has higher tax burden.

5. Collusion by Two Countries

Suppose that two countries collude together to control labour export to U. Two countries go for equal split of optimal labour export that maximises their joint income. Let $L*$ is that optimal labour export and $\frac{L*}{2}$ is the amount exported by both countries. As both counties collude together to send equal amount of labour, the tax rate imposed by the third country must be same e.g. $T = T_i = T_j$ For simplicity let us also assume that the labour endowment of both countries are same that is $\bar{L} = L_i = L_j$. Therefore we have following maximisation problem-

$$Y_C + Y_I = p(a_1(\bar{L} - \frac{L*}{2}) - \frac{b_1}{2}(\bar{L} - \frac{L*}{2})^2) + p(a_1(\bar{L} - \frac{L*}{2}) - \frac{b_1}{2}(\bar{L} - \frac{L*}{2})^2)$$
$$+ (a_{u2} - b_{u2}(\bar{L_u} + L*))L* - TL*$$

By differentiating with respect to $L*$ and setting the derivative equal to zero we get-

$$L* = \{ -p(a_1 - 2b_1\bar{L}) + (a_{u2} - b_{u2}\bar{L}_u) - T \} / (pb_1 + 2b_{u2})$$

Therefore-

$$\frac{\partial L*}{\partial T_i} = \frac{\partial L*}{\partial T_j} = -\frac{1}{(pb_1 + 2b_{u2})}$$

U sets tax rates given the collusion by both countries. Assume that the objective of U is to maximise the income of domestic workers as in Case 3. The first order condition obtained for the case is-

$$\frac{dY_{LU}}{dT} = -b_{u2}\bar{L}_U\left(\frac{\partial L*}{\partial T}\right) + L* + T\left(\frac{\partial L*}{\partial T}\right) = 0$$

By solving-

$$T = \frac{1}{2}[a_{u2} - p(a_1 - 2b_1\bar{L})]$$

Looking at the solutions of case 3 it can be seen that the receiving country has responded to the collusion by increasing tax rate. It is however not clear if the total tax payment is higher in case of collusion compared to the no collusion case as can be seen from following two equations-

With collusion

$$TL* = \frac{1}{2}[a_{u2} - p(a_1 - 2b_1\bar{L})]\{\frac{1}{2}a_{u2} - b_{u2}\bar{L}_u + \frac{3}{2}[p(a_1 - 2b_1\bar{L}]\} / (pb_1 + 2b_{u2})$$

Without collusion

$$TL = [\frac{1}{2}(a_{u2} - p(a_1 - b_1\bar{L})][2(a_{u2} - b_{u2}\bar{L}_U)(pb_1 + 3b_{u2}) - p(a_1 - b_1\bar{L})(pb_1 + b_{u2}) - a_{u2}pb_1]$$

It is hard to tell from the equation if the countries together pay more tax or not. Obviously the collusion is sensible when the incomes of the countries are higher.

6. Conclusions

In this paper we have developed a model where two countries compete for exporting labour to a third country. The concept of competition and cooperation is still a new idea in international migration. International bodies are encouraging and facilitating dialogues between countries in international migration issues. These dialogues may in near future pave the way for globalised consensus on migration.

In order to understand how international migration works it is important to realise the interests of different stakeholders of migration. Our paper could be useful to shed some light on this issue. In our model two countries aim to maximise national income by sending workers to a third country. The third country designs migration policy according to its national objectives. The importing country resorts to discriminatory tax policy in order to maximise income. The exporting countries can resort to collusion by jointly controlling labour export. But this collusion is so far not observed in the activities of developing countries. On the other hand importing countries are forming groups to jointly manage and control immigration. Joint management of migrants by Kafala system in Gulf and point based migration system followed by some developed countries can be cited as examples of migration collaboration by importing countries.

International migration serves two fold purposes. It can improve the income and help to reduce poverty level of poor developing countries. In developed countries it is important to fill shortage of manpower. But developed and rich countries restrictive migration policy is limiting the benefit of migration. The developing countries on the other hand only tend to emphasis on remittances and not realising how their unilateral labour export policy is limiting the potential benefit of migration and leading to higher exploitation. The benefit of international migration is a multilateral issue

involving all labour exporting and importing countries. Such realisation is required for any future initiative leading to linking migration and economic development.

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