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Brain Drain, Education Subsidy and the Bhagwati Tax

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Abstract

An early view, associated with the Bhagwati tax, is that skilled migration – i.e., a brain drain – has a negative impact on migrants' source countries. A more recent view is that a brain drain generates a brain gain which can have a positive impact on source countries. This view is based on a model where education generates a positive externality. I examine whether, despite opposite results, the two approaches are compatible. Some main findings are: i) Under an open economy and an optimal education subsidy (given education's positive externality), with equal government weights for emigrants and residents, education is higher than under closed economy, with ambiguous impact on welfare; ii) Under a smaller government weight for emigrants than for residents, education and welfare are lower than under equal weights; iii) The Bhagwati tax benefit is related to political economy considerations, i.e., an optimal reduction in the education subsidy might be hard to achieve (as the education bureaucracy and parents' and teachers' organizations are likely to oppose it), so that an excessively high subsidy could be compensated by a higher tax. Thus, the two instruments are policy complements; and iv) Proposals for collecting the Bhagwati tax are presented.

JEL classification

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Keywords

brain drain, brain gain, Bhagwati tax, education subsidy, welfare

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1. Introduction

The literature's view on the impact of the brain drain – or skilled (tertiary educated) migration – on migrants' source countries has evolved over time. Early studies (e.g., Grubel and Scott 1966; Bhagwati 1972, Bhagwati and Hamada 1974, 1982) viewed it essentially as negative, resulting in a decline in education level – or a loss of human capital – and a decline in its positive externalities, in the subsidies paid for skilled migrants' education, and in their net contributions to government revenue (taxes paid minus the value of public services used).[1] This led Bhagwati (1972) to propose that skilled migrants pay a tax – known as the 'Bhagwati tax' – on the income earned in the host country and transfer it to their source country as compensation for these losses.

Interest in the issue has reemerged in the last three decades as skilled migration to the OECD has grown much faster than unskilled migration. Docquier and Marfouk (2006) show the former was over four times the latter in 1990-2000 (63.7 percent vs. 14.4 percent, respectively). And the 2010/11 skilled migration rate exceeded the unskilled rate in 95 percent (138 of 145) of developing source countries with available data (UN-OECD Report 2013). The skilled share of OECD immigrants is also significantly higher than that of OECD natives, e.g., college graduates accounted for 31 percent of US-born adults and 48 percent of US immigrants in 2011-2015 (Batalova and Fix 2017).[2]

The renewed interest in brain drain-related issues has led to a series of studies over the last two decades showing that, given the higher return on education in the North than in the South, South-

[1] Though they recognized the brain drain benefits (e.g., remittances, increased trade, etc.), they viewed its net impact as reducing source countries' welfare.

[2] Two major reasons for the brain drain's rapid growth are the increase in the number of host countries with skill-selective immigration policies – such as the points system – and the globalization of the market for talent (ILO 2006).

North migration prospects raise education's expected return and hence raise its level, i.e., it generates a brain gain (e.g., Mountford 1997; Vidal, 1998; Beine et al. 2001, 2008; etc.). Beine et al. (2008) find that countries with low (high) human capital levels and brain drain rates experienced a net brain gain (drain), with a net brain drain for a majority of developing countries but a net brain gain for developing countries as a whole (due to a brain gain in the larger countries). This led the authors – and much of the recent literature – to a more optimistic view of the brain drain.[3]

This paper combines and early approach to the brain drain and the Bhagwati tax on the one hand, and the brain-drain-induced brain gain and optimal education subsidy under a positive education externality on the other. A welfare-maximizing government would provide an education subsidy in order for individuals to select the optimal education level, given the externality. I solve for the optimal subsidy under a closed and open host country immigration policy and examine the Bhagwati tax's welfare impact as well as its relationship to the education subsidy. Having an alternative policy available to respond to changes in circumstances should be useful in the case where the education subsidy cannot be easily adjusted, for instance due to political constraints. [4]

The remainder of the paper is organized as follows. Section 2 presents some information on public expenditures on education and emigrants' education level, and Section 3 does so for the Bhagwati tax. Section 4 presents the model. Section 5 solves for the optimal level of education, welfare and

[3] A recent study (Schiff 2018, 2020) finds that a net brain gain's welfare impact on source countries' residents is ambiguous or negative in most scenarios considered. This article deals with the source country population as a whole.
[4] Note that, rather than set immigration policy, the General Agreement on Trade in Services (GATS) regulates the *temporary* movement of people (Mode IV) for service supply, aiming to reduce barriers like visa/work permit hurdles, with most commitments focused on high-skilled workers like corporate transferees, allowing limited stays for specific services under country-specific schedules. Thus, GATS' Mode IV deals with *trade* in services. It seeks to streamline the movement for service providers, focusing on market access, non-discrimination, and national treatment for service supply, impacting labor mobility as a trade-facilitating mechanism. One option is to exchange Mode IV access by skilled labor from developed to developing countries, in exchange for access by low-skilled labor from developing to developed countries.

education subsidy in the absence of the Bhagwati tax, with Section 5.1 (5.2) doing so under a closed (open) economy. The welfare impact of the Bhagwati tax and its relationship to the optimal education subsidy is examined in Section 6. Section 6.1 (6.2) assumes migrants' value is equal to (smaller than) residents' value for the government. Section 7 presents a summary of the main results obtained, and Section 8 concludes. The Appendix presents two proposals regarding the collection of the Bhagwati tax.

2. Public Expenditures on Education

This section provides information on public expenditures on education and migrants' education level for India and compares it to the cases of Mexico and China. Note that different sources give different figures, so that those presented here are approximate figures.

India has the world's largest number of emigrants, followed by Mexico and China. Total education subsidies in India for both central and state governments amounted to around $270 to $300 billion – or around 4.1 to 4.6 percent of GDP in fiscal year 2024-2025, with the vast majority coming from state governments. The number of students in the same year amounted to 293 million. Thus, the subsidy per student amounted to about $900 to $1000.

Mexico's subsidy per student is about $3600, or 3.6 to 4 times the level in India. The fact that Mexico's per capita GDP is about $14,000, or 5.2 times India's level of $2,700, implies that India's public expenditures on education amount to a larger share of GDP than those of Mexico. This is likely related to the fact that India's emigrants have a significantly higher education level than Mexico's emigrants, with China somewhere between the two.

Indian emigrants' level of education is the world's highest. The majority of its emigrants in the US, Canada and the UK have a bachelor's degree or more. And around 80 percent of its emigrants residing in the US who are at least 25 years of age – 17 percent of whom reside in the US – have a bachelor's degree or more, which is about twice the figure for US-born individuals. The recent figure for China's emigrants in the US – 28 percent of whom reside in the US – is 53 percent, while the recent figure for Mexican emigrants – 97 percent of whom reside in the US – is 19 percent (and about 50 percent of them lack a high-school education).

The fact that the number of Indian emigrants is the world's largest and their level of education is the world's highest implies that the issue of educational subsidies is particularly relevant for India.

3. The Bhagwati Tax

According to Wilson (2007), the original plan was to levy the Bhagwati tax on skilled migrants' income earned in the host countries. Thus, host countries' authorities would have to be involved, likely leading to a number of problems. Wilson (2007) states: "It became apparent that enormous practical difficulties would be encountered in the implementation of such a tax ..." [5] Bhagwati (1979) then proposed that developing countries collect the tax using a US-type "global tax system," i.e., a tax on worldwide income. Two proposals regarding the collection of the Bhagwati tax are presented in the Appendix.

The US is the only country that taxes its non-resident citizens on a lifelong basis, and at the same rate as resident ones, i.e., it taxes all its citizens – irrespective of where they live – on their worldwide income. Citizens abroad can deduct the taxes paid in the country of residence – and in

[5] In the US, involving the IRS in its collection would likely be unconstitutional as it would discriminate against aliens.

other foreign countries where they earn income (e.g., on rental properties) – from the taxes paid to the US government. China has a similar tax system as the US.

Other countries have a different system, for instance in the definition of residents for tax purposes – such as the length of time people living abroad continue to be considered tax-residents. If they are considered to be tax-residents, they are taxed on their worldwide income. Those who are considered to be non-residents for tax purposes only pay taxes on the income earned in their own country rather than on their worldwide income, as is the case in the US. Countries that treat tax-residents and non-tax-residents differently include Australia, Belgium, Canada, Denmark, France, Japan, Sweden, the Netherlands, and more. A similar system prevails in some developing countries, namely Argentina, Chile, Mexico and South Africa.

4. Model

The "points system", which has prevailed in Australia, Canada and the UK for a number of years, places a great importance on education, with immigration probability increasing with applicants' education level. Other countries where a share of the immigrants is selected on the basis of educational attainment include Germany, France and the US (Marshall 2011).

For simplicity's sake, individuals are assumed to be homogeneous, live and work for one period, and invest in education at the start of the period.[6] Denote the country of origin (destination) by

[6] Under homogeneity, a brain drain under a points system raises the average level of education (H), i.e., it induces a net brain gain (or beneficial brain drain) in the absence of intervention. Its impact on average education consists of two parts: an incentive impact, and the brain drain impact per se. The possibility of skilled emigration raises the incentive to acquire education and generates a brain gain ex ante, i.e., before emigration takes place. Second, the brain drain itself has no impact on average education since migrants and residents (the non-migrants) are identical. Under intervention, whether a brain drain raises H depends on whether the government values residents as much as or more than emigrants (see Section 4). For an analysis of brain and ability drain under heterogeneous ability, see Schiff (2017).

"0" ("d"), income of source country residents (migrants) by y_0 (y_d), expected income by y, migration probability by $p \in [0, 1)$, human capital by $h > 0$, its average by H (with $h = H$), and consumption by c. Individuals are risk-neutral and select h to maximize expected utility $u = u(c)$, where u rises monotonically with c, i.e., $\frac{\partial u}{\partial c} > 0$. Given that solutions for h that maximize c also maximize u, I assume for simplicity that $u = c$, $c > 0$.

Average education, H, generates a positive externality, γH, $\gamma > 0$. Residents' income is $y_0 = \alpha_0 h + \gamma H$ ($\alpha_0 > \gamma > 0$), and migrants' income is $y_\mathrm{d} = \alpha_\mathrm{d} h$ ($\alpha_\mathrm{d} > \alpha_0 + \gamma$).[7] Expected income is $y = (1-p)y_0 + py_\mathrm{d} = (1-p)(\alpha_0 h + \gamma H) + p\alpha_\mathrm{d} h$.

Empirical evidence has shown that investment in education exhibits diminishing returns. Hence, as y_0 and y_d are linear in h, I assume the education cost, C, is quadratic in h, namely $C = \frac{h^2}{2}$. With an education subsidy equal to a share, s, of $\frac{h^2}{2}$, the private cost is $C(s) = (1-s)\frac{h^2}{2}$. Assume the government also levies a Bhagwati tax at rate t on emigrants' income. Then, consumption is $c = (1-p)(\alpha_0 h + \gamma H) + p\alpha_d(1-t)h - \frac{(1-s)h^2}{2} - T$, where $T \gtrless 0$ is a budget-neutral lump-sum tax or subsidy, i.e., it is equal to the difference between the education subsidy outlays and the revenue from the Bhagwati tax.

As mentioned earlier, under the points system, immigration probability p increases with h. Thus, assume $p = \pi h, \pi > 0$. Then, $c = (1-\pi h)(\alpha_0 h + \gamma H) + (\pi h)\alpha_d(1-t)h - \frac{(1-s)h^2}{2} - T$, or:

[7] For simplicity, assume migration is not large enough relative to the host country's population to generate externalities.

$$c = \gamma H + (\alpha_0 - \pi\gamma H)h + \left[\pi(\alpha_d(1-t) - \alpha_0) - \tfrac{1-s}{2}\right]h^2 - T. \quad (1)$$

The government maximizes an objective function, G, which differs from c in (1) in three ways. First, the government internalizes the education externality γH. Second, emigrants' weight in G is $0 \leq 1-\beta \leq 1$, rather than 1. Third, given budget-neutrality, the education subsidy, Bhagwati tax and lump-sum amount T do not enter G. Thus, $G = (1-\pi h)(\alpha_0 + \gamma)h + (\pi h)(1-\beta)\alpha_d h - \frac{h^2}{2}$, or:

$$G = (\alpha_0 + \gamma)h + \left[\pi(\alpha_d(1-\beta) - \alpha_0 - \gamma) - \tfrac{1}{2}\right]h^2. \quad (2)$$

Equations (1) and (2) constitute the basis for the analysis that follows.

Note that the residents' well-being is likely to matter more to the government than that of emigrants, i.e., it is likely that $1-\beta < 1$ (or $\beta > 0$). Residents who are dissatisfied with the government's performance can voice their dissatisfaction and pressure the government through various means, many of which are not available to emigrants. These include voting (which emigrants from some 70 developing source countries cannot do, including important ones such as India and the Philippines), demonstrations, strikes, civil disobedience, and even violent action. Moreover, the effectiveness of government policies is likely to be greater with respect to its impact on residents' behavior than on that of emigrants.

5. Education Subsidy

This section focuses on the education subsidy and abstracts from the Bhagwati tax, which is examined in Section 6. Thus, $t = 0$ in this section. Section 5.1 examines the issue of optimal subsidy under a closed economy and Section 5.2 does so under an open economy.

5.1. Closed Economy

Under a closed economy, $\pi = 0$. In the absence of intervention, (1) becomes $c = \alpha_0 h + \gamma H - \frac{h^2}{2}$. Individuals select education level h to maximize c. Denoting closed-economy variables by subscript "v," the solutions for h and c are:

$$h_c = \alpha_0,\ c_c = \alpha_0\left(\frac{\alpha_0}{2} + \gamma\right). \tag{3}$$

The government maximizes (2), or $G = (\alpha_0 + \gamma)h - \frac{h^2}{2}$ in this case. The solutions for h and G are:

$$h_{Gc} = \alpha_0 + \gamma = h_c + \gamma > h_c,\ G_c = \frac{(\alpha_0+\gamma)^2}{2} = c_c + \frac{\gamma^2}{2} > c_c. \tag{4}$$

The optimal intervention is an education subsidy, which raises welfare, and which is determined as follows. With the subsidy, $c = \alpha_0 h + \gamma H - \frac{(1-s)h^2}{2} - T$. Maximizing c, $h_{sc} = \frac{\alpha_0}{1-s}$. Setting $h_{sc} = h_{Gc} = \alpha_0 + \gamma$, solutions for s and c are:

$$s_c = \frac{\gamma}{\alpha_0 + \gamma},\ c_{sc} = G_c > c_c, \tag{5}$$

i.e., the subsidy rate is equal to the education externality effect γ on h_{Gc} relative to its total effect.

5.2. Open Economy

The "open economy" refers to the host or destination country, which is open to immigration. Section 3.2.1 examines the case of equal weights for residents and migrants in the government's objective function, and Section 3.2.2 assumes a larger weight for residents.

5.2.1. Equal weights for residents and migrants

In the absence of intervention, equation (1) is $c = \gamma H + (\alpha_0 - \pi\gamma H)h + \left[\pi(\alpha_d - \alpha_0) - \frac{1}{2}\right]h^2$. Denote variables by subscript "a" in this case. Then, $h_a = \frac{\alpha_0 - \pi\gamma H}{\phi}$, where $\phi = 1 - 2\pi(\alpha_d - \alpha_0)$.

The second-order condition for a maximum is $\frac{\partial^2 c}{\partial h^2} = 2\left[\pi(\alpha_d - \alpha_0) - \frac{1}{2}\right] < 0$, or $\phi > 0$. Recalling that $H = h$ under homogeneity, we have:

$$h_a = \frac{\alpha_0}{\phi_a} > h_c, c_a = \frac{\alpha_0}{\phi_a}\left[\frac{\alpha_0}{2} + \gamma\left(1 - \frac{\pi\alpha_0}{2\phi_a}\right)\right] \gtrless c_c,^{8}\ \phi_a = 1 - 2\pi\left(\alpha_d - \alpha_0 - \frac{\gamma}{2}\right) > 0.^{9} \qquad (6)$$

Thus, under homogeneity and *no* intervention, a brain drain has a positive (ambiguous) impact on education (welfare). The reason for a positive education impact is provided in footnote 6.

With an open economy and equal weights for residents and emigrants, $G = (\alpha_0 + \gamma)h + \left[\pi(\alpha_d - \alpha_0 - \gamma) - \frac{1}{2}\right]h^2$. Solutions for h and G are:

$$h_{Ga} = \frac{\alpha_0+\gamma}{\phi_{Ga}} > h_{Gc}, G_a = \frac{(\alpha_0+\gamma)^2}{2\phi_{Ga}} = c_{sa} > G_c = c_{sc}, \phi_{Ga} = 1 - 2\pi(\alpha_d - \alpha_0 - \gamma), \qquad (7)$$

with $0 < \phi_{Ga} < 1$, and $\phi_{Ga} = \phi_a + \pi\gamma > 0$ is the second-order condition for a maximum.

Thus, *optimal* education and welfare are greater under an open than under a closed economy. The government can raise h_a to the social optimum, h_{Ga}, by subsidizing education at the rate s_a. Then, from (1), $h_{sa} = \frac{\alpha_0}{\phi_{sa}}$, $\phi_{sa} = 1 - s_a - 2\pi\left(\alpha_d - \alpha_0 - \frac{\gamma}{2}\right) = \phi_{Ga} - s_a - \pi\gamma$.

Setting $h_{sa} = h_{Ga}$, or $\frac{\alpha_0}{\phi_{sa}} = \frac{\alpha_0+\gamma}{\phi_{Ga}}$, we have:

[8] Welfare is defined as the *expected* consumption level, and its (expected) change as the economy opens up is ambiguous and identical for the source country residents and emigrants. On the other hand, migrants' actual (ex-post) welfare change is unambiguously positive, while that for residents (or non-migrants) is ambiguous under a positive education externality (see Schiff 2018a, and Schiff 2020).

[9] $\phi_a > 0$ because $\phi_a = \phi + \pi\gamma$, and $\phi = 1 - 2\pi(\alpha_d - \alpha_0) > 0$.

$$s_a = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - \pi\gamma > 0,^{10}\ s_a < s_c,\ c_{sa} = G_a. \quad (8)$$

From (5), $s_c = \frac{\gamma}{\alpha_0+\gamma}$. Thus, $s_a = s_c - \left[\frac{\gamma}{\alpha_0+\gamma}(1-\phi_{Ga}) + \pi\gamma\right] < s_c$, i.e., the optimal subsidy is smaller under an open than under a closed economy. The reason is that the source country's entire native population benefits from the externality under a closed economy but not under an open one. In the latter case, the externality only benefits the resident population and is lost for the emigrants.

Reducing the source country's education subsidy from s_c to s_a following the host country's opening up to migration may not be politically easy because parents' and teachers' organizations and the education authorities are likely to challenge attempts to do so. This has important implications for the Bhagwati tax, as shown in Section 4.

5.2.2. Larger weight for residents than for migrants

Assume migrants' weight in the government's objective function, G_β, is $1-\beta$, $\beta \in (0,1]$, with G_β given by (2) and $c = \gamma H + (\alpha_0 - \pi\gamma H)h + \left[\pi(\alpha_d - \alpha_0) - \frac{1-s_\beta}{2}\right]h^2 - T$. Individuals maximize c, taking s_β as given. Hence:

$$h_\beta = \frac{\alpha_0}{\phi_{s_\beta}};\ \phi_{s_\beta} = 1 - s_\beta - 2\pi\left(\alpha_d - \alpha_0 - \frac{\gamma}{2}\right) = \phi_{Ga} - s_\beta - \pi\gamma. \quad (9)$$

Maximizing G_β gives:

$$h_{G_\beta} = \frac{\alpha_0+\gamma}{\phi_{G_\beta}},\ \phi_{G_\beta} = 1 - 2\pi[(1-\beta)\alpha_d - \alpha_0 - \gamma] = \phi_{s_\beta} + s_\beta + 2\pi\alpha_d\beta + \pi\gamma. \quad (10)$$

[10] Since $p_{Ga} = \pi h_{Ga} = \frac{\pi(\alpha_0+\gamma)}{\phi_{Ga}}$, we have $s_a = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - \pi\gamma = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga}(1-p_{Ga}) > 0$.

Setting $h_\beta = h_{G_\beta}$, or $\frac{\alpha_0}{\phi_\beta} = \frac{\alpha_0+\gamma}{\phi_{G_\beta}}$, we have

$$s_\beta = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - \pi\gamma - \frac{2\pi\alpha_d\alpha_0\beta}{\alpha_0+\gamma} = s_a - \frac{2\pi\alpha_d\alpha_0\beta}{\alpha_0+\gamma} < s_a,\ \frac{\partial s_\beta}{\partial\beta} < 0. \quad (11)$$

Thus, when migrants' weight in G is smaller than that of residents (i.e., $1-\beta < 1$), the optimal subsidy is smaller than under equal weights ($1-\beta = 1$ or $\beta = 0$). Welfare in this case is:

$$G_\beta = c_{s_\beta} = \frac{(\alpha_0+\gamma)^2}{2(\phi_{Ga}+2\pi\beta\alpha_d)} < G_a = c_{sa}. \quad (12)$$

Thus, optimal welfare is lower when the government values migrants less than residents ($\beta > 0$).

6. Bhagwati Tax

This section incorporates the Bhagwati tax in the analysis. Section 6.1 assumes migrants' weight in the government's objective function is equal to that for residents and Section 6.2 assumes migrants' weight is smaller than that for residents.

6.1. Equal Weights for Residents and Migrants

Assume now that the government has an additional policy instrument, namely the Bhagwati tax, t, levied on the income $y_d = \alpha_d h$ earned in the host country, i.e., the tax is equal to $t\alpha_d h$.

In this case, c is given by equation (1) and the solution for h is:

$$h_t = \frac{\alpha_0}{\phi_t},\ \phi_t = 1 - s_t - 2\pi\left[\alpha_d(1-t) - \alpha_0 - \frac{\gamma}{2}\right]. \quad (13)$$

Setting $h_t = h_{Ga}$, or $\frac{\alpha_0}{\phi_t} = \frac{\alpha_0+\gamma}{\phi_{Ga}}$ (see (7)), and noting that $\phi_t = \phi_{Ga} + 2\pi\alpha_d t - s_t - \pi\gamma$, it follows that the relationship between s_t and t is:

$$s_t = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - \pi\gamma + 2\pi\alpha_d t = s_a + 2\pi\alpha_d t > 0. \quad (14)$$

Equation (14) shows that, ceteris paribus, an increase (decrease) in the Bhagwati tax implies an increase (decrease) in the optimal education subsidy, with $\frac{\partial s_t}{\partial t} = 2\pi\alpha_d > 0$. The latter implies that the increase in the optimal tax needed to compensate for an excessively high subsidy (once the host country opens up to migration) is smaller, the larger is the degree of openness to migration π and the wealthier is the host country. The same applies to the case where emigrants are valued less than residents by the government – see equation (18) below. Also note that $t > 0 \Rightarrow s_t > s_a$.

Under a closed economy, the optimal subsidy is $s_c = \frac{\gamma}{\alpha_0 + \gamma}$, while the optimal subsidy under an open economy when $t = 0$ is $s_a = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - \pi\gamma < s_c$. Thus, in the absence of a Bhagwati tax, the optimal education subsidy declines when the host country opens up to skilled immigrants, and a possible solution would thus be to reduce the optimal subsidy from s_c to s_a.

In other words, the optimum can be obtained by setting the Bhagwati tax t at the level $t = 0$ and the education subsidy s_t at the level $s_t = s_a$. Thus, the Bhagwati-tax instrument is not required in order for the economy to reach its theoretical optimum, which is attained with an optimal subsidy $s_t = s_a$. Alternatively, the optimum can be obtained by setting $t > 0$ and $s_t = s_a + 2\pi\alpha_d t > s_a$.

The availability of the Bhagwati-type tax instrument is likely to be beneficial for political economy reasons as it is likely to be politically easier to levy a tax on skilled emigrants – especially if emigrants' weight in the government's objective function is smaller than residents' weight – than to reduce the education subsidy. The reason is that education is likely to be seen as a right and

reducing the education subsidy is likely to be resisted by parents' and teachers' organizations, and by the department of education. I turn to this issue in Section 6.2.

6.2. Smaller Migrant than Resident Weight

Assume the weight of emigrants in the government's objective function G is equal to $\mu = 1 - \beta$, $\beta \in [0, 1]$, and that of residents is 1. Then G is given by equation (2) and the solution is:

$$h_{G\beta} = \frac{\alpha_0+\gamma}{\phi_{G\beta}} < h_{Ga},\ G_\beta = \frac{(\alpha_0+\gamma)^2}{2\phi_{G\beta}} < G_a,\ \phi_{G\beta} = 1 - 2\pi[(1-\beta)\alpha_d - \alpha_0 - \gamma], \quad (15)$$

with $\phi_{G\beta} = \phi_{Ga} + 2\pi\beta\alpha_d > \phi_{Ga}$ explaining the inequalities in (15), and h_{Ga} and G_a given in (7).

Comparing solutions for h and G in (15) with those for the closed economy (given in (7)), we have:

$$1 - \beta \gtrless \frac{\alpha_0+\gamma}{\alpha_d} \Leftrightarrow \phi_{G\beta} \lesseqgtr 1 \Leftrightarrow h_{G\beta} \gtrless h_{Gc} \Leftrightarrow G_\beta \gtrless G_c. \quad (16)$$

Thus, whether education and welfare are higher or lower in this case than under a closed economy depends on the value of β and is ambiguous in general. In the case where the government only takes residents' welfare into account ($1 - \beta = 0$), $0 < \frac{\alpha_0+\gamma}{\alpha_d}$ and $\phi_{G\beta} = 1 + 2\pi(\alpha_0 + \gamma) > 1$, so that $h_{G\beta} < h_{Gc}$ and $G_\beta < G_c$, i.e., education and welfare are lower than under a closed economy. Alternatively, if the government values emigrants and residents equally, we have $1 - \beta = 1$, and $1 > \frac{\alpha_0+\gamma}{\alpha_d}$, so that $h_{G\beta} > h_{Gc}$ and $G_\beta > G_c$.

From (6), the private solution for $c = (\alpha_0 - \pi\gamma H)h + \gamma H + \left[\pi(\alpha_d - \alpha_0) - \frac{1-s}{2}\right]h^2 - T$ is $h_{sa} = \frac{\alpha_0}{\phi_{sa}}$, where $\phi_{sa} = 1 - s_{sa} - 2\pi\left(\alpha_d - \alpha_0 - \frac{\gamma}{2}\right)$. Setting $h_{sa} = h_{G\beta}$, and noting that $\phi_{sa} = \phi_{G\beta} - s_{sa} - 2\pi\beta\alpha_d - \pi\gamma$, the optimal subsidy is:

$$s_\beta = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{G\beta} - 2\pi\beta\alpha_d - \pi\gamma. \quad (17)$$

As noted above, $\phi_{G\beta} = \phi_{Ga} + 2\pi\beta\alpha_d$, so that $s_\beta = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{Ga} - 2\pi\beta\alpha_d\left(\frac{\alpha_0}{\alpha_0+\gamma}\right) - \pi\gamma = s_a - 2\pi\beta\alpha_d\left(\frac{\alpha_0}{\alpha_0+\gamma}\right)$. Thus, $s_\beta < s_a$. The optimal subsidy is smaller in this case because part of the native population will emigrate, and since the government values migrants less than residents, subsidizing their education is considered less valuable. Note that the gap $s_a - s_\beta$ is largest for $\beta = 1$, or $1 - \beta = 0$, i.e., when migrants' welfare does not enter the government's objective function.

Assume now the Bhagwati tax is available to the government. Then:

$$s_{t\beta} - 2\pi\alpha_d t_\beta = \left(\frac{\gamma}{\alpha_0+\gamma}\right)\phi_{G\beta} - 2\pi\beta\alpha_d - \pi\gamma = s_\beta.^{11} \quad (18)$$

Since $s_\beta < s_a$, it follows that for any given subsidy level $s_{t\beta} = s_t$, including for a subsidy fixed at the closed-economy level, we have: $t_\beta = \frac{s_{t\beta}-s_\beta}{2\pi\alpha_d} > t = \frac{s_{t\beta}-s_a}{2\pi\alpha_d} = t_\beta - \frac{\beta\alpha_0}{\alpha_0+\gamma}$. Thus, as expected, the optimal Bhagwati tax under any given education subsidy is higher when the government values emigrants less than residents than when it values them equally.

Moreover, the smaller the emigrants' weight or, equivalently, the larger is β, the higher is the Bhagwati tax (for a given subsidy level), i.e., the greater the difference between the optimal Bhagwati tax t_β and the tax t when emigrants' and residents' weight are equal. The (average of the range of) Gemini AI figures reported indicate that skilled labor earnings in India vs. the US is about $1/10$ and the cost of living index in the US vs. India is about $1/3.5$, so the India-to-US real income ratio is about $1/3$. A lower emigrant weight, i.e., $1 - \beta < 1/3$, implies $\beta > 2/3$.

[11] Derivation of this result is similar to that of equation (14).

Acemoglu and Angrist (2000) find the external return of education equal to approximately one half of the private return, implying that $\alpha_0/(\alpha_0+\gamma) = 2/3$. This implies that $\beta\alpha_0/(\alpha_0+\gamma) > 4/9$. Thus, the optimal Bhagwati tax t_β when the government weight is larger for residents than for emigrants would be larger than the optimal Bhagwati tax under equal government weights of residents and emigrants by at least 44 percent.

The early literature was concerned with the impact of the brain drain on the welfare of source country *residents*. In other words, it was concerned with the case where $1-\beta = 0$. This is precisely the case where $t_\beta = t + \frac{\beta\alpha_0}{\alpha_0+\gamma} = t + \frac{\alpha_0}{\alpha_0+\gamma}$ is largest, i.e., where the optimal Bhagwati tax is highest.

7. Main Results

This section summarizes the main results obtained from the preceding analysis.

1. Under a closed economy, education and welfare are higher in the case of an optimal subsidy than in its absence.
2. Under an open economy and an optimal subsidy, with equal weights for emigrants and residents in the government's objective function, education is higher than under the closed economy, while welfare may be higher or lower.
3. Under an open economy and an optimal subsidy, with a smaller weight for the source country's emigrants than for its residents, education and welfare are lower than under equal weights for both.
4. Under the Bhagwati tax (which implies an open economy) and an optimal subsidy, education and welfare are the same as in the absence of the tax, both when emigrants are valued equally or less than residents of the source country.

5. The benefit of the Bhagwati tax is essentially related to political economy considerations, namely that an optimal reduction in the education subsidy following an opening up to migration would likely be hard to achieve, and an excessively high subsidy could be compensated by a higher tax. Thus, the two instruments are policy complements.
6. The increase in the optimal Bhagwati tax needed to compensate for an excessively high subsidy (after the country opens up to migration) is smaller, the higher is the degree of openness to migration, π, and the wealthier is the host country.

8. Conclusion

This paper developed a skilled migration model where education generates a positive externality in order to examine the impact on education and welfare of a change from a closed economy to one open to skilled migration or brain drain, deriving brain drain's impact on education, welfare, the optimal education subsidy, and a combination of the education subsidy and Bhagwati tax, when residents' (emigrants') weight in the government's objective function is 1 $(1-\beta)$.

I found that:

i) education, welfare and the subsidy are higher (lower) under an open than under a closed economy when $1-\beta$ is larger (smaller) than the ratio of source-to-host countries' income, i.e., the likelihood that opening the host country to migration improves education and welfare rises as migrants' weight in the government's objective function increases, and they are larger when the government values migrants and residents equally;

ii) the optimal subsidy and the Bhagwati tax are positively related, i.e., they are policy complements (for given parameter values); and

iii) the optimal tax increases with β and reaches a maximum at $\beta = 1$, i.e., the tax increases as the importance of the emigrants in the government's objective function declines.

These findings led to two implications and proposals for collecting the tax:

1. A second policy instrument should prove useful, especially if there are constraints in making changes in one of them as circumstances change. For instance, opening up the host country's economy implies a lower optimal subsidy, and the option of raising the tax would be beneficial if, as is the case in most countries, education is viewed as a right, with parents' and teachers' organizations and the education ministry and bureaucracy making it politically difficult to reduce the subsidy. Thus, a subsidy that is higher than its optimal level requires a higher Bhagwati tax, and the change in the latter increases with the host country's degree of openness to migration and with its per capita income.

2. The early literature focused entirely on resident welfare (where $\beta = 1$), which is precisely where the Bhagwati tax is highest; and

3. Finally, proposals for collecting the tax were presented (see the Appendix).

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References

Acemoglu, Daron and Joshua Angrist. 2000. "How Large Are Human-Capital Externalities? Evidence from Compulsory Schooling Laws." *NBER Macroeconomics Annual*, Vol. 15: 9-59.

Batalova, Jeanne and Michael Fix. 2017. "Immigrants and the New Brain Gain: Ways to Leverage Rising Educational Attainment." Migration Policy Institute. Washington, DC (June).

Beine, Michel, Frédéric Docquier and Hillel Rapoport. 2001. "Brain drain and economic growth: theory and evidence." *Journal of Development Economics* 64 (1): 275–89.

Beine, Michel, Frédéric Docquier and Hillel Rapoport. 2008. "Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers." *Economic Journal* 118 (528): 631-652.

Bhagwati, Jagdish N. 1972. "The United States in the Nixon Era: The End of Innocence." *Daedalus*.

Bhagwati, Jagdish N. and Koichi Hamada. 1974. "The brain drain, international integration of markets for professionals and unemployment: A theoretical analysis." *Journal of Development Economics* 1 (1): 19-42.

Bhagwati, Jagdish N. and Koichi Hamada. 1982. "Tax Policy in the Presence of Emigration." *Journal of Public Economics* 18: 291-317.

Docquier, Frédéric and Abdeslam Marfouk. 2006. "International Migration by Educational Attainment, 1990-2000." In Ç. Özden and M. Schiff, eds. *International Migration, Brain Drain and Remittances*. New York: Palgrave Macmillan.

Grubel, Herbert B. and Anthony D. Scott. 1966. "The International Flow of Human Capital." *American Economic Review* 56 (1/2): 268-274 (March).

ILO. 2006. "International Labour Migration and Development: The ILO Perspective." 61st Session of the General Assembly High-Level Dialogue on International Migration and Development, New York (14-15 Sept). International Labour Office, Geneva.

Lesperance, David S. 2016. "Why don't other countries beside the US tax the foreign income of non-resident citizens?" (Feb. 16). *https://www.quora.com/Why-dont-other-countries-beside-the-US-tax-the-foreign-income-of-non-resident-citizens.*

Marshall, R. 2011. "Value-Added Immigration: Lessons for the United States from Canada, Australia, and the United Kingdom." Washington, DC: Economic Policy Institute.

Mountford, A. 1997. "Can a brain drain be good for growth in the source economy?" *Journal of Development Economics* 53 (2): 287–303.

Schiff, Maurice. 2017. "Ability Drain: Size, Impact, and Comparison with Brain Drain under Alternative Immigration Policies." 2017. *Journal of Population Economics* 30 (4): 1337-1354 (July).

Schiff, Maurice. 2018. "Beneficial Brain Drain and Non-Migrants' Welfare." IZA Discussion Paper No. 11483 (April).

_____. 2020. "Beneficial Brain Drain and Non-Migrants' Welfare." *Revue d'économie du développement* 28 (2): 5-29 (in French).

UN-OECD. 2013. *World Migration in Figures. A joint contribution by UN-DESA and the OECD to the United Nations High-Level Dialogue on Migration and Development* (3-4 October).

Vidal, Jean-Paul. 1998. "The effect of emigration on human capital formation." *Journal of Population Economics* 11 (4): 589-600.

Wilson, John D. 2007. "Taxing the brain drain: A reassessment of the Bhagwati proposal." In *Trade, Globalization and Poverty* (pp. 254-262). Routledge Taylor & Francis Group.

Appendix

Section 3 presents some information on the Bhagwati tax. In this appendix, I propose two complementary enforcement mechanisms for collecting the Bhagwati tax. The government establishes a policy whereby, in order to start a university education, individuals or their family must sign a contract that stipulates that if they emigrate at some point in the future, they must transfer back to the government of their home country a specified share of their income (for a specified period of time). The problem is how to enforce compliance with the terms of the contract.

The first proposal entails agreements with the students' families. An important share of developing countries' university students still comes from relatively well-to-do families and the government would have each student's family sign a contract whereby it would pay the tax if the student emigrated and failed to make the agreed-upon payments, with the family's assets serving as collateral.[12]

The second proposal is related to the fact that in the US, involving the IRS in the collection of the Bhagwati tax would likely be unconstitutional as it would discriminate against aliens. The alternative would be for the migrants' source country to enter into a contract with the host country so that if individuals emigrated at some point after their studies and failed to pay the agreed-upon tax, the source country government could take them to court in the host country. Given that most skilled migrants live in about ten advanced countries, it might be worth examining the feasibility of such an agreement. Once established, the host country government would not have to be directly involved in the execution of the policy.

[12] The government might consider expanding the proposal by allowing migrants who do not return to their home country to provide education or other services instead of the agreed-upon payments.