

# EVALUATING THE EFFECTS OF TAXING THE REMITTANCES OF SKILLED WORKERS ON CAPITAL ACCUMULATION AND AGGREGATE INCOME USING AN OVERLAPPING GENERATIONS MODEL<sup>1</sup>

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## ABSTRACT

*Labor migration has sizable economic impacts specifically to labor-sending countries such as the Philippines, which can alter the economy's production structure and redirect the country's comparative advantage. The exodus of highly trained professionals, without replacement, will lead to brain drain in a country with limited access to quality higher education especially if the education costs of these professionals have been subsidized by the state; hence, a substantial loss to society is incurred. Likewise, the training costs of replacements can be reasonably substantial and may cause the reduction of the productivity of workers left behind. Thus, this study developed an Overlapping Generations (OLG) Model on the Philippine context that will discuss the management of skilled labor migration and assessing the macroeconomic effects it entails. By hypothetically incorporating how a tax on the income of skilled migrant workers abroad specifically to those schooled in state universities and colleges (SUCs), as proposed by Bhagwati (1976), affects the macroeconomy, this study provides an insight on the efficacy of its implementation. Simulation results have shown that imposing the brain drain tax can enable the economy to achieve a higher steady state capital stock and steady state aggregate income paths on the condition that the government will not spend all the revenues from the brain drain tax on one generation.*

## INTRODUCTION

It has been established that labor migration has non-negligible economic impacts specifically to labor-sending countries such as the Philippines. It is because the labor-sending economy can be subjected to the incidence of brain drain and experience the ills and benefits of remittance flows. As explained by Mandelman & Zlate (2009), temporary labor migration varies over the business cycle due to the prevalence of cyclical unemployment brought about by booms and busts in both the labor-sending and labor-receiving economies. Mandelman & Zlate (2009) provided evidence that there are drastic declines in labor immigration flows during recession in most developed countries, which was supported by the findings of Tullao, Conchada & Rivera

(2010) wherein there is evidence of changing demand for nursing graduates and other professional workers in the Philippines due to the global crisis that occurred for the past decade.

With more than 10 percent of the population stationed as either permanent residents, or temporary workers, or illegal migrants in more than 182 countries, the Philippines has emerged as one of the major exporters of labor services in the world (Collymore, 2003). According to Sjaastad (1962), labor migration is a household investment decision that depends on the incentive to migrate which is reliant on the expectations of future earnings at the destination country relative to the country of origin. As such, due to the lack of job opportunities and the unattractive compensation packages in the Philippine labor market, many have opted to seek employment abroad in the hopes of augmenting household domestic income. As the country continues to struggle with political and economic instabilities, the continued exodus of Filipino labor, especially skilled labor, will continue to prevail.

According to the Philippine Overseas Employment Agency (POEA), there have been 1,470,826 deployed Overseas Filipino Workers (OFWs<sup>2</sup>) across the globe in 2010 with a 3.4 percent increase from 2009. It is vital to note that it is difficult to measure with any precision the exact number of Filipinos working abroad. Figures from the POEA only include those people who are working abroad with registered and official contracts, while the number of Filipinos working abroad on an irregular and unofficial basis is unknown but probably quite high. Nonetheless, these figures are likely to persist if there will be no major change within the country's economic policies.

As a consequence of temporary labor migration, the labor-sending country is able to receive remittance income. According to Adam & Page (2005), McKenzie & Sasin (2007), and Acosta, Lartey & Mandelman (2009), the magnitude and the growth rate of remittances received by various developing economies has exceeded the inflow of official aid and foreign direct investments (FDIs). In recent years, that the value of remittances in 2005 was approximately 2.5 percent of gross national income (GNI) in the developing world (Acosta, Lartey & Mandelman, 2009). Subsequently, according to the World Bank (2006) as cited by Acosta, Lartey & Mandelman (2009), the large magnitude of remittance income has contributed to the reduction of absolute poverty, the improvement of human capital indicators, and the reduction of income inequality. However, according to Stark (1988) and Barham & Boucher (1995), migration and remittances has worsened income inequality as compared to a no-migration counterfactual. Moreover, according to Tuaño-Amador, Claveria, Delloro & Co (2008), remittances are counter-cyclical in nature that unlike FDIs and capital inflows, during times of crisis, the amount of remittance still increases. This is because migrant workers must send financial support for the survival of their families. Hence, this protects the economy from further recessions since remittances provide for the consumption expenditure of the recipient country.

Meanwhile, in the Philippines, the OFWs send remittances to their respective households in the country on a regular basis that stimulated the economic performance of the Philippines despite the occurrence of the financial crisis (Tullao & Rivera, 2008). Moreover, according to

Tullao, Cortez & See (2007), the remittances that augments investment in human capital show that migration has both social benefits and social costs. For social benefits, the remittance inflow from OFWs recorded by the Bangko Sentral ng Pilipinas (BSP) in 2010 at USD 18.762 billion contributed on the subsequent improvement in economic and social status of families with members who are working abroad and are often cited as major positive contributions of international labor migration. Likewise, on the average, remittances account for more than 12 percent of the country's Gross Domestic Product (GDP), which signals that economic growth in the Philippines is externally induced (Ang, Sugiyarto & Jha, 2009). Similarly, according to Mandelman & Zlate (2009), the insurance role of remittances in smoothing the consumption path of receiving households is also a contributory factor in their welfare enhancement. Hence, it is evident that remittance has become the principal component of total household financial inflows.

On the other hand, the incidence of labor migration in the Philippines also poses social costs, which on the other hand is mitigated by the way higher education in the Philippines is financed in the more than 1,400 institutions of higher learning. According to Tullao, Cortez & See (2007), almost 80 percent of the students in higher education are attending private educational institutions. Since the cost of higher education is privately financed, demand for higher education can be seen as an investment to enhance their chances of migration. This is the concept of the culture of migration discussed by Tullao & Rivera (2008) wherein because of the success of their family members in global employment, the other members of the family particularly the young ones may also want to seek external employment. Since in the global labor market, the preferred and highly paid workers are the more educated than the less educated ones, there is a tendency for families to invest in education as a means of increasing the chances of their family members to seek overseas employment. In addition, they see future remittances as private returns. Accordingly, one way of compensating the country for the loss of migrants, who attended government funded state universities and colleges (SUCs), is to internalize the cost of their education. Another option is to impose some form of exit tax on migrating workers like nurses whose massive exit have affected nursing education as well as the health sector of the country (Tullao, Cortez & See, 2007).

Then again, it may be argued that aside from the monetary costs, the opportunity costs of overseas employment may also be quite substantial. Massive migration can alter the structure of production in the sending communities and redirect the country's comparative advantage. If the laborers leaving the country are the skilled ones, the training costs of replacements may be quite substantial and may cause the reduction of the productivity of workers left behind. The exodus of highly trained professionals, without replacement, will lead to brain drain in a country with limited access to quality higher education. If the costs of education of these professionals have been shouldered by the state, a substantial loss to society is incurred when these professionals migrate permanently (Tullao & Cortez, 2003).

Indeed, labor migration is such a huge phenomenon that affects the various areas of living. Various studies such as that of Tullao, Cortez & See (2007), Tullao & Cabuay (2011), and

Ducanes (2011) have already established the economic impacts of overseas migration on Philippine households and the aggregate economy. Likewise, Ducanes (2011) also highlighted that overseas labor migration can affect households, macroeconomy, society, human rights, and other political facets of the sending country. The immensity of this phenomenon is forcing the government to implement controlling procedures to impede the exodus of manpower that will arrest the possible hollowing effects on industries and mitigate the loss in international competition as argued by Tullao, Cortez & See (2007). Hence, this study will focus on the labor migration of skilled professionals, which can result to the incidence of brain drain. Specifically, this study is interested in determining the distortions and/or the welfare-enhancing effects of the imposition of a brain drain tax on the emigration of skilled labor as proposed by Bhagwati (1976) and by Tullao, Cortez & See (2007). This study is running on the premise that the possibility of increasing and internalizing the cost of international migration can reduce the economic ills it has generated. In particular, revenues from these initiatives to impose taxes on emigrating skilled workers can be channeled to improve the productivity of workers left behind. As such, this study has the following specific research objectives:

- To develop a theoretical overlapping generations (OLG) model that will incorporate how a hypothetical tax on the income of skilled migrant workers abroad schooled in SUCs affects the paths of capital accumulation and aggregate income of the economy; and
- To assess the theoretical OLG model using calibration in order to determine the implications of the tax reform. This methodology will allow the determination of the effect of taxes on capital accumulation and aggregate income.

In the light of the emerging culture of migration among Filipino households, it becomes an important research inquiry to determine whether the initiatives to control brain drain are plausible and whether it is able to minimize economic costs and harness the benefits of this important contemporary phenomenon on the sending country. Likewise, this study becomes even more significant as the Philippines is one of the labor exporting countries in the world and has relied on substantial remittances from OFWs for sustaining stability and growth of the economy.

### **MANAGING SKILLED LABOR MIGRATION THROUGH TAXATION**

International skilled labor migration is inevitable as evidenced by the alarming figures that ought to trigger authorities to manage and regulate the flow of labor through imposition of rules. This should not be limited to the sending countries only but also to receiving countries as well. According to Lowell, Findley & Stewart (2004), there three alternative areas wherein a governing body can generate policies that will revolve on managing labor migration. These are migration management, the “diaspora option” and democracy and development.

Likewise, the incidence of labor migration through remittances has always been perceived as a primary driver of economic growth and development (Tullao & Rivera, 2008). It does not only enhance consumption in the microeconomic level, but it also serves as a medium to uplift the quality of life of remittance-dependent households. Yet, the distinguishable benefits through the high volume of remittances are tantamount to the accompanying social costs of migration. The government ceases to see the impact of the negative externalities of migration since there is no government policy yet that will manage labor migration specifically the exodus of skilled labor.

As defined by Lowell, Findley & Stewart (2004), migration management focuses on the temporary movement of human capital by establishing regulations in receiving countries through admission policies and sending countries in the form of efficient practices and creating an environment that will attract the return of migrants. It control out-migration from at-risk countries, accountability for recruitment agencies and employers, best practice for employing foreign workers, temporary worker schemes and facilitate and create incentives for return.

Migration management policies are specific policies geared towards mitigating the societal costs of migration such as the incidence of brain drain, the Dutch Disease phenomenon, and the distortions in the labor market. Several known migration management policies proposed include the levying of a brain drain tax, the provision of schooling incentives, and imposition of work bonds to those who benefited from the government's human resource development programs and educational subsidies.

As presented by Mirrlees (1971), taxing migrants is an effective way to distribute income from high skilled workers to low skilled workers. Hence, the study came into the conclusion, that migration of high skilled workers creates "less egalitarian tax system". Increasing tax burden on skilled residents is one of the considerations why they migrate which results to loss of revenues. Egger & Radulescu (2009) modeled how high tax rates should be imposed to highly skilled residents before considering or deciding to migrate. It showed that the most important component is the "progressivity of tax system" in high income brackets. Individuals in this bracket are mostly the highly skilled workers. Then, in the implementation of taxing skilled migrants, it is suggested that to know how elastic migration is with respect to changes in taxes in home countries (Wilson, n.d.). The idea of taxing migrants, aside from the compensation due to loss of revenues, is another factor to be considered by residents whether to leave or not since the presence of tax is another cost for them. Hence, the brain drain tax is not just another redistribution process but a constraint in the flow of migration. According to Scalera (2006, 2009), the Bhagwati Tax, after considering externalities and a functioning government, is a welfare-improving system because the tax may actually boost investment on human capital.

The literature has cited the various social costs when skilled workers migrate from home country. Through taxation the government of the sending country can compensate from the loss of skill. Since instead of benefiting from the possible contributions of the home-trained skilled

worker, other countries are profiting and the home country is left behind. There has been a revolutionary taxation scheme proposed by Bhagwati (1976).

Bhagwati (1976) proposed to impose an exit tax, also known as the Bhagwati tax, upon the departure of skilled labor migrants from their home country. Its basic principle is to tax migrants from the loss of skilled manpower. It is suggested that this type of tax is to be collected “under UN auspices”. Then the United Nations (UN) will be the one responsible in the allocation of tax revenues and will not consider the “corrupt and dictatorial” countries. The revenue allocation will be based on the developmental programs proposed by the sending countries (Bhagwati & Dellafar, 1973).

This type of collection and tax imposition is crucial and difficult to implement. Also, it sparked numerous criticisms because it was deemed unfair and unjust. Bhagwati (1979) then revised his proposition and reported that tax collection should be done by the developing countries or the sending countries through the use of global tax. Furthermore, Bhagwati (1979) emphasized that taxation and its benefits must go to the sending country because migrants are able to retain their nationality and rights. Hence, without appropriate taxation relating to migrant mobility, there is “representation without taxation”.

Most sending countries are developing countries and the implementation of such sophisticated tax system might be another channel of ineffective income redistribution. An ongoing argument is that, non-benevolent government in developing countries might use the brain-drain tax as another collection that will simply end in non-profit earning investments. Furthermore, taxing citizens of the source country while in the receiving countries might end in double taxation cases which will be deemed more harmful to migrants. This procedure might pose a great challenge to governments, especially governments of developing countries, seeing that tax collection in their own home countries is proving to be difficult as well. It is then suggested by Wilson (2003) that a fixed flat rate should be charged to citizens abroad in order to answer the practicality issue of tax collection.

As such, according to Wilson (2003), despite the considerable amount of literature supporting the idea of taxing emigrants, the major roadblock in the implementation of this tax is due to administrative issues specifically for the developing nations. Since problems would exist when taxes are levied on foreign-source income. Bhagwati (1979) urged that developing nations could collect a tax from skilled emigrants as a form of a global tax system, wherein foreign and domestic incomes are both taxed. However, only the United States (US) and a few countries attempted to tax foreign income and they had a hard time given that they have a highly developed tax system. One of the main reasons with the difficulty of taxing foreign income is that there must be information sharing among governments (Wilson, 2003). Wilson (2003) also proposed probable solutions in administering the tax through a voluntary brain drain tax. The tax system was proposed so that returning emigrants face lower tax payments once they return to their home country particularly if they have previously paid the brain drain tax, as compared to those who evaded the brain drain tax. He found out that emigrants would voluntarily pay the

brain drain tax rather than risk the probability of paying taxes once they return home; non-emigrants should also be taxed which in overall represents a residence-based tax on skilled labor. The main idea behind this is that emigrating does not affect a skilled worker's lifetime tax burden. Ideally, everyone should face the same brain drain tax but he realized that income of skilled workers vary abroad, thus creating a role of brain drain tax which varies across emigrants. One probable solution is for the emigrant to supply their income abroad in their tax reforms which can be used by the government to implement varying brain drain tax. Also, if the income abroad is positively correlated with domestic income, the government can implement varying tax penalties as a form of brain drain tax to returning emigrants.

On the other hand, Scalera (2009) reviewed the initial idea of the Bhagwati tax and argued that when taking into account the social externalities of migration, the implementation of Bhagwati tax tends to foster human capital formation and increase resident's income and welfare. Also, if brain drain tax is paid other than the normal income tax, fiscal burden can be outweighed by higher human capital and gross income. Scalera (2009) also discussed the possibility that the tax can easily be avoided because of the initial proposal that the tax collected by the receiving countries shall route revenues towards sending countries. However, taxing poor migrants can be seemingly odious and non-discriminatory which is why receiving countries are less likely willing to levy and transfer a brain drain tax. If brain drain occurs (i.e. more skilled workers migrant than unskilled workers), the mean value of human capital decreases therefore reducing society's overall welfare and income per capita. In such case, a Bhagwati tax can be used to internalize migration benefits and induce the social planner to aim for a higher optimal human capital. Knowing that there are a lot arguments against the Bhagwati tax, Scalera (2009), did not criticize the proposal of Bhagwati but instead argued when taking into account social externalities of human capital and government policies caring for only those residents who are left behind, brain drain tax can be beneficial to all agents; wherein a fiscal burden could be outweighed by higher human capital and income per capita while destination countries can also find it profitable to channel a part of the migrant's income abroad to sending countries in exchange of higher skilled immigration.

Meanwhile, Brauner (2010) examined the levying of a brain drain tax as a development policy regime. It examined the potential of taxation in generating development funds in accordance with international skilled migration from developed to developing countries. Brauner (2010) discussed that the implementation of brain drain is considered to be impossible to administer but with the present international tax regime, brain drain taxation may actually be administered. A study by Kapur & McHale (n.d.) as cited by Brauner (2010) argued that the Bhagwati tax must be re-examined due to changes in circumstance such as the accessibility on the data of the magnitude of brain drain. Likewise, the changes in administrative environment, globalization, trans-nationalism, and international cooperation are sufficient reasons to warrant another attempt in implementing the tax. Moreover, citizenship-based taxation is much more feasible since citizenship is "worth more" and information furnishing from developed countries

are not prohibited. Furthermore, Kapur & McHale (n.d.) as cited by Brauner (2010) provided further support for the brain drain tax by analyzing the whole spectrum of potential policy implementations pertaining to brain drain. Findings included a citizenship-based taxation, which followed the modern version of the Bhagwati tax - a revenue sharing model which requires cooperation among developed countries and an exit tax mechanism.

The most attractive forms of tax is a citizenship-based taxation and a taxation system which involves cooperation amongst receiving and sending countries (Brauner, 2010). It is still apparent for the former that developing countries might not have the ability to administer the tax and the latter cannot be materialized without actual cooperation with the developed nations. Bhagwati (1976) proposed the imposition of surtax, a tax levied on income, implemented by the host country but it was deemed impossible or rather difficult since there is unequal taxation of these immigrants as compared to those residents in the home country. The next alternative is a tax imposed by the host country. However, it was problematic since tax jurisdiction follows residence based on our current international tax regime. Fortunately, a solution for this taxation was found in the form of an alternative personal jurisdiction regime, which is the citizenship based taxation. The main problem for this resolution is the imposition of this citizenship based worldwide income tax is constrained by legal and political complications (Brauner, 2010).

Meanwhile, this does not mean that the tax is infeasible to impose by the sending country. It can still be valid if the sending country currently imposes a tax on a worldwide basis. If the legal system of countries consider immigrants as their residents once they have entered the territory, then the taxation is possible. Moreover, it is also feasible if there are established tax treaties, which are open for minor amendments to incorporate the proposed Bhagwati style brain drain tax. The tax treaties envision cases of dual residence wherein immigrants, by laws, remain to be residents of their home countries and include a provision to “break the tie” such that the immigrant is only considered to be a resident of one of the countries involved (Brauner, 2010). Generally, taxpayers have the capability of altering their dealings in order to produce a positive benefit from taxation and it is likely for skilled migrants to avoid normal residence taxation by their own respective countries. This is due to the fact that income taxation in developing countries that are usually the labor sending countries is progressive (Todaro & Smith, 2006). A probable approach to this is to implement a separate tax outside the scope of the treaty but this approach faces the same problem of citizenship based taxation. Another possible approach is to amend the “tie breaking rules” which in return considers immigrants resident of their own respective host countries to avoid now the incidence of double taxation (Brauner, 2010).

In conclusion, the success of a tax implementation can be measured by its effectiveness in promoting development. Brauner (2010) highlighted that existing literature only focused on the taxing mechanism of brain drain tax and not how the collected revenue can be put into work. Bhagwati (1976) avoided a much more straightforward solution wherein taxes are directly transferred to sending countries or mixing them with host countries’ foreign aid funds. Bhagwati (1976) argued that tax proceeds must be thought about more carefully since blending them with



general funds utilized by the international organizations will be counterproductive, and the “new” tax may be viewed as another excuse to increase aid or yet contribute to the increasingly wasteful list of aid mechanisms. However, Bhagwati (1976) suggested a much more simpler solution through a bilateral agreement, wherein host countries would divert the brain drain tax revenues to sending countries and the former would comply solely because for the purposes of supporting development. The revenue generated must not be combined with the general tax budget since it ceases to see direct effectiveness of the newly generated tax. Conversely, countries may choose to formulate a bilateral vehicle which would review the use of tax proceeds and audit its consistency with the rules and regulations established in the agreement. Lastly, Brauner (2010) suggested other tax mechanisms in the hope of implementing the brain drain tax namely exit taxes and tax sharing. Exit taxes serve as a deterrent for brain drain since it makes labor migration much more costly that spurred objections since it restricts movement of individuals in moral and human rights grounds. Also, this tax mechanism is ineffective since emigrants are yet to benefit from the increase in wages constituting to a positive benefit in the long run. On the other hand, revenue sharing is a tax mechanism that must be explored further because it requires sophisticated cooperation between the host and sending countries regarding their respective tax policies and enforcement levels. The present reality of non-tax cooperation, even among developed countries makes it skeptical if this policy is even viable.

### **THE OVERLAPPING GENERATIONS MODEL**

The OLG model developed by Diamond (1965) will be utilized following the standard assumptions. In this model, one young and one old generation exists at any point in time. Assume that individuals in this two-period economy work full time when young and are retired when old. Moreover, on the first period, an individual must decide whether he or she will work in the domestic labor market or abroad. In period 2, all those who worked abroad referred to as the migrant will return to the home country and retire. Also assume that neither the population nor productivity grows and, for the moment, that there is no government. The young choose their current consumption and anticipated old age consumption on the basis of their preferences and their lifetime resources. Likewise, the young during period 1, by altruism, contributes to the consumption of their relatives. Since parents in this life cycle model are assumed to spend their old age resources, which are comprised of their savings, income earned on their savings, and out of the money given by their offspring who are in their first period working full time, entirely on their old age consumption, there are no bequests, gifts, or other forms of net intergenerational transfers to the young. As a result, the young have no nonhuman wealth, and the lifetime resources of the young correspond to the labor earnings they receive when young.

This study adopts the convention that output is produced, income is received, and consumption occurs at the end of each period, the tangible wealth of the economy at the beginning of any period consists of private assets held by the elderly. Since the elderly consumes

all available resources in their possession at the end of their last period of life, the capital stock available to the economy in the next period consists of savings by the current young that they bring into the next period, which is their old age.

Thus, the supplies of productive factors to the economy consist of the labor supply of the current young plus the capital supplied by the elderly, which is the savings of last period's young generation. These factors are supplied to the production sector of the economy. The output of the production sector in turn is paid out to the productive factors as returns to capital and labor. In the model, equity and debt are perfect substitutes. Hence, the elderly are completely indifferent between exchanging their capital for stocks or bonds at the beginning of their second period and receiving a return of principal plus capital income in the form of dividends and proceeds from the sale of their shares in the case of stocks and in the form of interest plus principal payments in the case of bonds. Furthermore, since the production sector is assumed to be competitive, factors of production specifically labor and capital are hired to the point where marginal revenue products equal factor payments. For the economy to be in equilibrium, the time path of factor demands must equal the time path of factor supplies.

### **The Components of the Model**

Consider a two-period model in which the Philippine economy is represented by a utility function and domestic production function given by Equation 1 and Equation 2.

$$U_t^A = \ln c_t^A c_t^B + \left( \frac{1}{1+\delta} \right) \ln(c_{t+1}^A - \gamma c_t^A) \quad (1)$$

$$Y_{dt} = K_{dt}^\alpha L_{dt}^{1-\alpha} \quad (2)$$

Equation 1 expresses the inter-temporal utility of a member of generation  $t$ ,  $U_t^A$ , as a function of his or her monetary-valued consumption when young,  $c_t^A$ ; monetary-valued consumption of his or her relatives during the first period,  $c_t^B$ , by virtue of altruism;  $1/(1+\delta)$  as the subjective discount factor; and  $\delta$ , which is the pure rate of time preferences. Auerbach & Kotlikoff (1975) defined the pure rate of time preference as the degree to which, other things being equal, the individual would prefer leisure and consumption in an earlier rather than later year. It is also vital to note from Equation 1 that in the presence of habit formation, the utility of a given level of consumption when old must not be independent of consumption when young. According to Wendner (2000), the absolute level of consumption in the second period as well as the increase of second period consumption relative to first period consumption are important. Wendner (2000) furthered that the more that was consumed when young, the more is required to derive the same level of utility in the following period, which is technically referred to as habit

formation or habit persistence. As such, habit formation is represented by  $c_{t+1}^A - \gamma c_t^A$  where  $\gamma$  denotes the strength of habit formation. This formulation of habit formation is quite standard in the literature as exemplified by Wendner (2000).

On the other hand, the Philippine economy's production function, as seen in Equation 2, relates output per young worker,  $Y_{dt}$ , to capital per young worker,  $K_t$ , and labor per young worker,  $L_t$ . It is assumed that  $L_t$  is exogenously supplied by each young worker and is measured in units such that  $L_t = 1$ .

Equation 3 gives the inter-temporal budget constraint of an individual who is young at time  $t$ .

$$(c_t^A + c_t^B) + \frac{c_{t+1}^A - \gamma c_t^A}{1 + r_d} = [m_{dt}^A + (1 - \tau)m_{ft}^A] + \left[ \frac{\rho_1 m_{d(t+1)}^B + \rho_2 (1 - \tau)m_{f(t+1)}^B}{1 + r_d} \right] \quad (3)$$

Since this study is interested in the imposition of a brain drain tax on skilled Filipino migrant workers, specifically to those who graduated from SUCs, as recommended by Bhagwati (1976), the inclusion of this fiscal policy alters the model in two ways. First, it changes lifetime budget constraints, with after-tax lifetime resources substituted for their pre-tax values. Second, the capital stock now corresponds to total national net wealth, that is, the net wealth of the government plus the private sector.

Assuming the role of the social planner, suppose that the brain drain tax system is designed in such a way that the skilled labor migrants will have to pay a constant proportional tax on his or her income earned abroad for all  $t$ . Assume that a specific tax  $\tau$ , where  $1 > \tau > 0$ , is imposed on  $m_{ft}^A$  earned by skilled migrant labor. As long as the skilled Filipino migrant labor is working abroad, the brain drain tax will be applied on his or her wages to be collected by the host foreign economy and shall be remitted to the sending country via an existing facility agreed by both economies. Further assume that a certain proportion of the tax revenue is returned to the people in the form of government transfers, and other welfare-enhancing services.

Note that  $(m_{dt}^A + m_{ft}^A)$  is the income that a young member of generation  $t$  earns at the first time period where  $m_{dt}^A$  is the income earned by working in the domestic market and  $m_{ft}^A$  is the income earned by working abroad, which will be used to finance  $c_t^A$  and  $c_t^B$ . If the individual decides to work in the domestic labor market, then  $m_{dt}^A > 0$  and  $m_{ft}^A = 0$ . On the other hand, if the individual decides to work abroad, then  $m_{dt}^A = 0$  and  $m_{ft}^A > 0$ .

On the second period, the consumption of the individual is now financed by the endowment provided by the younger generation, who are currently on their first period, by altruism. If the younger generation decides to work in the domestic labor market, then  $m_{d(t+1)}^B > 0$

and  $m_{f(t+1)}^B = 0$ . On the other hand, if the younger generation decides to work abroad, then  $m_{d(t+1)}^B = 0$  and  $m_{f(t+1)}^B > 0$ . The parameters  $\rho_1$  and  $\rho_2$  denotes the proportion of income earned by the younger generations in the second period allocated for the consumption of the older generation. All values in the second period are discounted by the domestic interest rate,  $r_d$ . Assuming perfect capital mobility, domestic interest rate must equal foreign interest rate.

Also, it can be deemed that a portion of  $m_{ft}^A$  and  $\rho_2 m_{f(t+1)}^B$  are the remittances sent to the home country in the first period and second period respectively. See Tullao & Cabuay (2011) for the details on the motivations for sending remittances. With the role of remittances, it is now evident that the role of migration is incorporated in the optimization problem. As argued by McKenzie & Sasin (2007), one actually cannot and in most cases separate remittances from migration, because these phenomena are intertwined and endogenous. In fact, it is not immediately clear why one would want to separate them and what the pure impact of remittances would mean or imply. Likewise, the constraint assumes a linear form since working abroad and working in the home country are deemed to be perfect substitutes.

Implementing optimization procedures with the abovementioned equations will yield consumption demands, savings function, and capital accumulation path. Because of the mathematical rigors involved in this study, only the resulting equations are presented. As such, Equation 4 shows the law of motion of capital.

$$K_{d(t+1)} = \frac{(1 + \alpha K_{dt}^{\alpha-1})(1 - \tau)(1 - \beta)K_{ft}^\beta - 2(1 + \delta)[\rho_2(1 - \tau)(1 - \beta)K_{f(t+1)}^\beta]}{(3 + 2\delta)(1 + \alpha K_{dt}^{\alpha-1})} + \Lambda_{dt}^g(1 + \alpha K_{dt}^{\alpha-1}) + \pi(1 - \beta)K_{ft}^\beta - \theta Y_{d(t-1)} \quad (4)$$

It is important to note that the government's choice of the time path of its consumption and tax instruments is constrained by its inter-temporal budget constraint. This constraint requires that the present value of the government's outlay equals the present value of its receipts plus its initial net worth. While restricting the set of feasible policies, the government's long term budget is consistent with a wide range of short- and medium-term policies. In particular, the government can permit debt to grow for a long time at a faster rate than the economy, although indefinite use of this policy is not feasible in this model, since under such a policy debt would eventually exceed national wealth and the capital stock will be negative.

For any particular government policy, the perfect foresight assumption requires that household correctly foresee the time path of government policy variables entering their budget constraints. That is, the generation that is young at time  $t$  must correctly foresee both  $r_d$  and  $\tau$ . Perfect foresight, although not required by the model, is needed by the government if it is to implement effectively its desired fiscal program.

Suppose the economy is initially in a steady state. The equation for the economy's initial steady state capital stock is shown by Equation 5, which can be solved for in an essentially non-algebraic way. Note that under the steady state,  $K_{d(t+1)} = K_{dt} = K$  and the rest are parameter values.

$$K = \frac{(1 + \alpha K^{\alpha-1})(1 - \tau)(1 - \beta)K_{ft}^{\beta} - 2(1 + \delta)[\rho_2(1 - \tau)(1 - \beta)K_{f(t+1)}^{\beta}]}{(3 + 2\delta)(1 + \alpha K^{\alpha-1})} + \Lambda_{dt}^g(1 + \alpha K^{\alpha-1}) + \tau(1 - \beta)K_{ft}^{\beta} - \theta Y \quad (5)$$

Setting  $K_{d(t+1)} = K_{dt} = K$  will yield a non-linear equation in the steady state capital stock; hence, the solution to this equation may not be unique and has no closed form solution.

Assuming that the young migrates on the first period and his or her offspring also migrates on the second period by culture of migration among Filipino households; Equation 5 can be collapsed into Equation 6.

$$K = \frac{(1 + \alpha K^{\alpha-1})(1 - \tau)(1 - \beta)K_{ft}^{\beta} - 2(1 + \delta)[\rho_2(1 - \tau)(1 - \beta)K_{f(t+1)}^{\beta}]}{(3 + 2\delta)(1 + \alpha K^{\alpha-1})} \quad (6)$$

Suppose that in this two-period life cycle model, the Philippine economy is initially in a steady state in which there is no government debt and government consumption is financed by an income tax from the households working in the domestic economy. Moreover, assume that the young migrates on the first period and his or her offspring also migrates on the second period by culture of migration among Filipino households. Thus, the solution for the economy's initial steady state capital stock can be obtained from Equation 6 where  $\tau$  is the steady state income tax rate under the assumption that  $\Lambda_{dc}^g$  equals zero.

Suppose the government in this economy, as per advised by the social planner, announces a ten-period imposition of a brain drain income tax, that is, the government will impose a fixed tax rate for the next 10 periods and that the tax revenues are to be spent on government transfers on welfare-enhancing services. After the 10<sup>th</sup> period, another tax policy regime will be implemented wherein the government will impose a higher fixed tax rate for the subsequent periods.

If the brain drain tax is announced at time  $t = 0$ , the equation for the economy's capital stock at  $t = 1$  is given by Equation 7

$$K_1 = \frac{(1 + \alpha K^{\alpha-1})(1 - \tau)(1 - \beta)K_{ft}^{\beta} - 2(1 + \delta)[\rho_2(1 - \tau)(1 - \beta)K_{f(t+1)}^{\beta}]}{(3 + 2\delta)(1 + \alpha K^{\alpha-1})} + \Lambda_1^g \quad (7)$$

where  $\Lambda_1^g$  is the government's net assets at time  $t=1$ . Meanwhile, the formula for  $\Lambda_1^g$  is given by Equation 8

$$\Lambda_1^g = \tau Y_f - \theta Y_d \quad (8)$$

where  $Y_f$  is the initial steady state level of income in the host economy where the brain drain tax revenues will be sourced,  $Y_d$  is the initial steady state level of income in the domestic economy, and  $\theta$  is the proportion of steady state income that the government spends on welfare-enhancing projects. For  $t \geq 2$ , the economy's capital stock is determined by Equation 5 with  $\Lambda_{dc}^g = \Lambda_1^g$ .

The general equilibrium economic model this study utilizes forms the basis for all the simulation results to be generated. This section examines the choice of parameter values and the method of solving for the quantities and prices that characterize the perfect foresight equilibrium this study is following.

### **The Simulation Method**

The calculation of the equilibrium path of the economy, given a particular parameterization, typically proceeds in three stages as enumerated by Auerbach & Kotlikoff (1987) namely solving for the long run steady state of the economy before the assumed change in fiscal policy begins; solving for the long run steady state to which the economy converges after the policy takes effect; and solving for the transition path that the economy takes between these two steady states.

The perfect foresight assumption is important only in the third stage, since in either of the long run steady states economic variables are constant from one year to the next; any plausible assumption about the formation of expectations would lead individuals to have correct foresight in such situations. The transition begins when information about the policy change becomes available. One should visualize this as an unanticipated change in the fiscal policy regime (Auerbach & Kotlikoff, 1987).

Following the methodology of Auerbach & Kotlikoff (1987), households and firms have perfect foresight in both old and new policy regimes, but do not anticipate the policy change. The policy change may take the form of immediate changes in fiscal variables or of immediate announcements of future changes in fiscal variables. In the case of pre-announced policies, the transition also begins in year 1, which is the year always used to index the beginning of the transition. Although there is no change in fiscal policy until several years later; that is, households and firms has perfect foresight about the future switch in regime, in pre-announced policy changes, the transition begins as soon as the future policy is announced.

Simulation analysis is the only alternative available when it is necessary to analyze large policy changes in models that are too complicated for simple analytical solutions. To solve the OLG model, values for the different parameters identified and used in this study must be chosen. If the model is to be as realistic as possible, the numerical estimates of these parameters must be culled from the empirical literature and some parameters would require an indirect method to obtain their values. What is important is that all assumed parameter values have basis.

According to Auerbach & Kotlikoff (1987), simulating the model for alternative policies replaces the comparative static procedures that are performed with analytical models. Moreover, one can implement sensitivity analysis of the numerical simulation model by examining the impact of conceivable variation in parameter values. Oftentimes, the results of such sensitivity analysis are robust to parameter changes, even though this outcome cannot be foreseen prior to performing the simulation procedure. In other cases, results are quite sensitive to small changes in particular parameters, which is deemed by Auerbach & Kotlikoff (1987) as useful information because it is indicative of which parameters must be precisely estimated empirically.

**Table 1: Parameter Values for Calibration**

Parameters	Description	Value	Source
$A$	domestic capital's share of domestic output	0.1627	Derived using the average share of Gross Domestic Capital Formation to Gross National Income from 2001 to 2010 sourced from the Bangko Sentral ng Pilipinas. World Bank figures revealed an average of 0.1840 from 2006 to 2010.
$\beta$	foreign capital's share of foreign output	0.2033	According to Auerbach & Kotlikoff (1975), it is well known for a Cobb-Douglas production function that factor shares are constant, and the capital share in income equals the capital-intensity. Using the historical share of capital in national income, from 2006 to 2010 sourced from the World Bank, for the countries where skilled Filipino labor are deployed namely Saudi Arabia, United Arab Emirates (UAE), Hong Kong, Italy, United Kingdom (UK), Canada, and the United States of America (USA).
$\rho_2$	proportion foreign income earned by skilled migrant workers to be remitted to the domestic economy	0.7	It is assumed that 70 percent of the incomes of skilled migrant workers are remitted to their households in the Philippines.
$\delta$	pure rate of time preferences	0.7353	There is a limited evidence of the appropriate value of $\delta$ . As such, this study derived its value using the average saving rate of the Philippines from 2001 to 2010 sourced from the BSP. Upon determining the average saving rate, the marginal propensity for current consumption was determined to represent the pure rate of time preferences. This value was selected because it leads to a realistic consumption profile and labor supply decision for reasonable tax parameters and levels of government consumption in the Philippines.
$\gamma$	strength of habit formation	0.4	Otrok (1999)

Table 1: Parameter Values for Calibration

Parameters	Description	Value	Source
$K_{ft}$	foreign capital per young worker at time $t$	1	The steady state foreign capital was normalized to 1 on the assumption that developed countries where OFWs are deployed are more developed than the Philippines; hence, they would have a higher level of steady state capital stock than the Philippines.
$K_{f(t+1)}$	foreign capital per young worker at time $t+1$	1	
$\tau$	brain drain tax as a proportion of income earned abroad by the skilled migrant worker	0.05, 0.10	The proper choice of tax bases is a central question in tax reform. The choice has important implications for the course of savings and economic growth, the distribution of welfare across generations, and the level of economic efficiency in the economy. Hence, a sensitivity analysis on the steady state capital will be implemented under these values of $\tau$ . Likewise, the actual tax system is characterized by a tax base that is much narrower than national income, and hence by much higher marginal tax rates than would be suggested by these revenue percentages. The effect of changing the tax base is one of the issues explored in the simulation procedures to be implemented.
$\theta$	proportion of steady state output that the government spends	0.05, 0.06	A sensitivity analysis on the steady state capital will be implemented under these values of $\theta$ . In the Philippine setting, based on the historical data of the government spending and GDP from the NSO, government spending absorbs a varying 5 to 15 percent over a period of 2 decades. These choices of values represent a compromise made necessary by the simplicity of the model relative to the real economy. Likewise, these values appear quite reasonable in terms of overall revenue.

Table 1 shows the assumed values for the parameters utilized in this study, specifically for calibrating the model with the role of government, together with the basis for choosing the values. Recall that the parameters were declared in the utility function and aggregate production function shown by Equation 1 and Equation 2 respectively.

Given the parameterization of the OLG model designed by this study, an exact numerical solution for the equilibrium of the economy for any given fiscal policy can be obtained, which can be compared with the results for different fiscal policies. By itself, this is the essence of the numerical simulation approach.

To show the movement of the steady state consumption, capital, and income if the government will impose a brain drain tax on skilled migrant workers, calibration procedures will have to be implemented again wherein all parameters in Equation 5, taken as exogenous, will assume the values shown in Table 1.

To analyze the dynamic fiscal policy transition, suppose that in this two-period life cycle model, the Philippine economy is initially in a steady state in which there is no government debt and government consumption is financed by an income tax from the households working in the domestic economy. Note that the economy starts at  $t=0$ . Suppose also that the government is not yet imposing a brain drain tax. Further suppose that at the initial period, the government spends 5 percent of the initial steady state output.

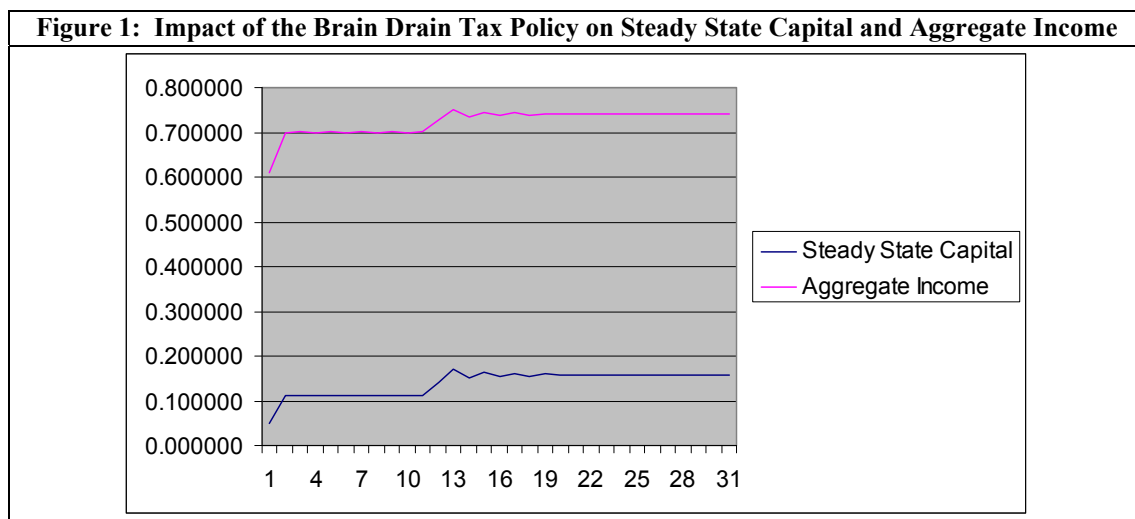


Suppose the Philippine government, as per advised by the social planner, announces a ten-period imposition of a brain drain income tax, that is, the government will impose a fixed tax rate of 10 percent for the next 10 periods, starting at  $t=1$  to  $t=10$ , on the income of skilled migrant workers abroad, specifically to those schooled in SUCs, and that the tax revenues are to be spent on government transfers on welfare-enhancing services, which is assumed to be 5 percent of the initial steady state output.

After the tenth period, which is at  $t=11$ , another fiscal policy regime will be implemented wherein the government will impose a higher fixed tax rate for the subsequent periods. This study will look into a specific state of the world to analyze the consequences of imposing the brain drain tax and further increasing the tax rate on steady state capital and steady state aggregate income; that is, the government increases the brain drain tax rate from 10 percent to 15 percent and it will also increase its proportion of steady state output spending from 5 percent to 6 percent.

### The Resulting Steady State Paths of Capital Accumulation and Aggregate Income

After implementing calibration procedures, Figure 1 graphs the impact of the brain drain tax on the paths of steady state capital stock and steady state output values for the next 30 periods. From the apparent values found in Figure 1, the number may seem strange to those accustomed to thinking of capital-output ratios as being between 3 and 6 as typified by Auerbach & Kotlikoff (1987), wherein the numbers make sense once one realizes that a period in this two-period model corresponds to roughly 30 years in real time. Therefore, output in a two-period model is roughly equivalent to output over a 30-year period, and one must multiply the two-period capital-output ratio by 30 to arrive at a roughly equivalent annual figure.



It can be observed from the results that the imposition of the brain drain tax on a macroeconomic level caused capital stock and aggregate income to increase in order to reach a higher level of steady state value until a new fiscal policy is implemented. Moreover, implementing a new tax policy by  $t=11$  will further allow the economy to reach a much higher steady state capital stock and steady state income with some bumps after the new tax policy is imposed before it reaches the new and higher steady state. This is evidently the transition path that the economy takes between these two steady states. It can be interpreted as the period in which workers adjust consumption due to the tax as well as the period in which the economy adjusts to the policy shock.

## CONCLUSIONS

The Philippines has one of the best practices of temporary labor migration in the globe as evidenced by the volume of OFWs, with varying skills ranging from semi-skilled to highly skilled, being deployed in various destinations and the flow of remittances, which are all considered as the major agents of economic stabilization. Herewith, labor migration undeniably has extensive and significant economic impacts especially to labor-sending economies. In the midst of temporary labor migration, any labor-sending economy can experience brain drain, which is operationally defined as the exodus of skilled labor without them being replaced by the domestic economy. The incidence of brain drain has been found by various literatures to alter the economy's production structure and redirect the country's comparative advantage. Likewise, the migration of highly trained professionals, devoid of replacement, will lead to brain drain in a country with limited access to quality higher education especially if the education costs of these professionals have been subsidized by the government such as those from various SUCs; hence, a substantial loss to society is acquired. Likewise, the training costs of replacements can be reasonably substantial and may cause the reduction of the productivity of workers left behind.

Consequently, this study explored the inter-generational effects of levying a brain drain tax on capital accumulation and aggregate output by developing an OLG model specifically on the Philippine context. The foundation of this study's model is from a simple two-period life cycle model with an inter-temporal utility function of the skilled migrant worker that simultaneously incorporates altruism and habit formation. The production sector, the inclusion of the government, and all other assumptions followed the standard framework of an OLG model.

Simulation results have shown that imposing the brain drain tax, and increasing it after an extended period of time, can enable the economy to achieve a higher steady state capital stock and steady state aggregate income paths on the condition that the government will not spend all the revenues from the brain drain tax on one generation. Hence, the results of calibrating and simulating the OLG model developed engendered the various classic results from an OLG framework such as the convergence to a new steady state path, the divergence from the steady

state path, and the trade-offs in welfare between and across generations. Accordingly, for social planners, the imposition of a brain drain tax and spending a portion of it on the provision of public goods can allow the macroeconomy to reach a higher steady state capital accumulation and steady state aggregate income for an extended period of time.

One may argue that there is no point being belligerent about the issue of brain drain tax especially under the idea that temporary migration brings about temporary brain drain. Conversely, under the OLG framework, it must be noted that regardless of whether the skilled labor returns or not and retires by the second life period, that individual will eventually die, which can be deemed as permanent brain drain, and the economy will not have any use for that individual. Also, the fact that the economy was not able to fully harness the productivity of that skilled labor; it warrants the need for a compensation policy for the loss to society. However, the necessity for the brain drain tax is subject to a lot of considerations that the social planner must deliberate specifically the obvious decline in consumption as a result of an additional taxation. Hence, the predicament of the social planner is between the welfare of the households or macroeconomic growth and the welfare of the current generation or the succeeding generations.

## ENDNOTES

- <sup>1</sup> This study was culled from the author's Doctoral Dissertation, for the degree Doctor of Philosophy in Economics in De La Salle University, entitled *The International Migration of the Highly Skilled Filipino Labor: A Theoretical Consideration of the Welfare and Macroeconomic Impacts of Taxes on Remittances*.
- <sup>2</sup> According to Tullao, Cortez & See (2007), migrant worker refers to a person who is to be engaged, is engaged or has been engaged in a remunerated activity in a state of which he or she is not a legal resident; to be used interchangeably with Overseas Filipino Worker per Republic Act (RA) 8042 also known as the Migrant Workers and Overseas Filipinos Act of 1995.

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