RESEARCH ARTICLE

A Theoretical Approach in Explaining the Impact of Remittances on the Macroeconomy: Evidence From an Overlapping Generations Model for the Philippines

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Despite the constraints posed by the coronavirus pandemic on the global movement of migrant workers, cash remittance inflows remained to be a significant component of the Philippine economy. It still comprises a significant proportion of the economy's gross domestic product and exceeds the influx of overseas development assistance and foreign direct investments. On top of the various empirical studies discussing the effects of remittances on the macroeconomy, I took the theoretical approach in explicating its impact on the macroeconomy. Through a micro-founded macro-model overlapping generations model, I trace the effects of remittances on the path of steady-state aggregate income, capital accumulation, and consumption. Calibration results indicated that remittances increase steady-state consumption of remittance-recipient households, stimulate growth in steady-state aggregate income, and drive faster capital accumulation. Such results call for policymakers to revisit policies to manage remittances in light of their economic effects.

Keywords: labor migration, overlapping generations model, remittances

JEL Classifications: E21, E22, F24

Being a global workforce supplier, the Philippines has been experiencing a sustained inflow of remittance from its migrant workers, known as Overseas Filipino Workers (OFW), that has augmented the consumption of remittance-dependent households (Ang et al., 2009) and sustained macroeconomic fundamentals (Bahadir et al., 2018; Bayangos & Jansen, 2009; Borgne, 2009), which influence trajectories of economic growth and development (Meyer & Shera, 2017). Prior to the coronavirus (COVID-19) pandemic, total cash remittances from OFWs in 2019 were recorded at a historically high amount of approximately USD33.47 billion (Lopez, 2020). This declined to USD33.19 billion in 2020 as OFWs were impacted by travel restrictions and border closures to contain the pandemic (Manuel, 2021). Historically, remittances have been comprising approximately 10% of the Philippines' Gross Domestic Product (GDP; Ochave, 2020). Likewise, since 2015, remittances have exceeded overseas development assistance (ODA) and foreign direct investment (FDI) in terms of their contribution to the economy (The Manila Times, 2020; Barne & Pirlea, 2019). Moreover, Adam and Page (2005), McKenzie and Sasin (2007), and Acosta et al. (2009) found similar observations for other developing economies.

These remittances are being used by recipient households as insurance against income shocks (Teele et al., 2009; Yang & Choi, 2007). It also contributes to expenditures on housing, consumer durables, and non-land assets (Quisumbing et al., 2008). That is, remittances act as means of insurance and as means to further current consumption. Likewise, remittances also have implications for savings and capital accumulation (Ait Benhamou & Cassin, 2021; Dash, 2020). That is, remittance may either decrease the need to save due to more wealth; or increase the demand for savings to accumulate future wealth. Although remittances have dynamics with savings and consumption (Ajefu & Ogebe, 2021; Quinn, 2005), reduction in savings is usually accompanied by simultaneous increases in remittances and consumption, suggesting that remittances may also favor current over future consumption. Such a situation tends to create uncertainties and disrupt the basic flow of the interaction between savings and consumption (Delpierre & Verheyden, 2014).

For economics wherein remittances are considered economic pillars, the crucial role of savings and intertemporal consumption in the domestic economy cannot be undermined. According to Rivera (2013), the large volume of remittances received by the Philippines poses certain microeconomic and macroeconomic implications that impact steady-state values of aggregate income, capital accumulation, and consumption. As such, I am motivated to probe the macroeconomic impacts of remittances, particularly on steady-state values.

Given the abovementioned backdrop, I pose the research question: how do remittances affect the Philippines' steady-state aggregate income, capital accumulation, and consumption? In addressing this, I set the following objectives:

1. To develop a theoretical micro-founded macro model, incorporating remittances from OFWs, that solves the utility-maximizing choice of a representative household between current and future consumption;

- 2. To determine the impact of remittances on steady-state aggregate income, capital accumulation, and consumption; and
- 3. To provide frameworks in revisiting policies in managing remittances in the light of their economic effects.

Although other studies focus on the direct and indirect impact of remittances on macroeconomic variables using standard econometric techniques, I will focus on steady-state values of selected macroeconomic variables using a theoretical approach, specifically an overlapping generations (OLG) model. This will allow the validation of empirical results using an alternative approach. In addition, it would contribute theoretical support to the existing discourse on the developmental impacts of remittances. Most importantly, my study can also serve as the lens by which future studies can hinge on their points of inquiry. Consequently, the development of policies in managing remittances would have both theoretical and empirical foundations

The Philippines is a consumption-driven economy (Ferrolino, 2019) stimulated and sustained by remittances (The ASEAN Post, 2018), which are carried on by households from past to present period. It is for this reason that I found the theoretical approach of simulating the behavior of individuals as presentoriented or future-oriented based on their utility relevant. This is because individuals live within a time period that overlaps with another period at one point in time to bring forth endowment and savings towards future consumption.

Literature Review

The Macroeconomic and Developmental Impacts of Remittances

The impact of remittances on the macroeconomy has been widely covered in the literature using conceptual and empirical approaches (Rivera & Tullao, 2020; Atiya & Jawaid, 2017; Khurshid et al., 2016; Oshaibat & Majali, 2016; Roy & Rahman, 2014; Khan & Islam, 2013; Bayangos, 2012; Jansen et al., 2012; Sicat, 2012; Narayan et al., 2011; Borgne, 2009; Cáceres & Saca, 2006; Pernia, 2006; Chami et al., 2003). Likewise, the developmental impacts of remittances on households have also been conceptually and empirically discussed (Tullao & Cabuay, 2016; Tullao & Rivera, 2009; Ang et al., 2009).

The discussions of the macroeconomic and developmental impacts of remittances have yielded mostly corroborating results, highlighting the positive contributions of remittances. However, there are also studies that touched on the ill-effects of remittances, particularly on the incidence of Dutch Disease, brain drain, a culture of dependency, excessive consumption, among others (Ratha & Moghaddam, 2020; Sutradhar, 2020; Bredtmann et al., 2019; Amuedo-Dorantes, 2014; Acosta et al., 2009; Tullao & Rivera, 2009; Tuaño-Amador et al., 2007; Bourdet & Falck, 2006; Loser et al., 2006; Amuedo-Dorantes & Pozo, 2004). Although I cannot exhaustively cite all studies, Orbeta (2008) cited an issue with most empirical studies such as that of Rodriguez and Tiongson (2001); Cabegin (2006), Tullao et al. (2007), and Ducanes and Abella (2008) to control for endogeneity of migration variables that results in inconsistent estimates. Their results angle towards the ill-effects of remittances and migration on labor force participation. Such motivates me to explore a theoretical approach to analyzing migration and remittances.

In line with my research inquiry, I focus on the impact of remittances on my selected macroeconomic variables of interest—aggregate income, capital accumulation, and consumption.

Remittances and Aggregate Income

Given the significant volume of remittances received by the Philippines from its OFWs, it can constitute a huge transitional change in the economy and have the potential to drive economic growth (Amuedo-Dorantes, 2014). For instance, Meyer and Shera (2017), Cañas et al. (2010), and Ang et al. (2009) found a significant positive correlation between remittances and GDP, as remittances positively influence income levels, drive consumption, and eventually alleviate poverty. Because remittances are private flows directly received by recipient households, realizing benefits are dependent on their decision to allocate, spend, and invest it (Baldé (2011).

Likewise, Cañas et al. (2010) analyzed the cost and benefits of out-migration and the remittances they send back. For instance, the exodus of skilled workers in an economy alters the wage structure in the sending economy, impacting those left behind by earning higher wages. Similarly, the migration of those highly skilled translates to further losses in human capital that can reduce potential output and disrupt wage structure in the sending economy. Although remittances increase the income of recipient households, the amount of the benefit weighs upon the migrant's skill level, amount of remittances sent, foreign exchange risks, and price effects-all of which influence the magnitude of remittances' effect on aggregate income (Rapoport & Docquier, 2005). Moreover, Ang (n.d.) discussed that remittances might also drive decreases in agricultural production due to more lucrative opportunities as an overseas worker (i.e., capital-rich, underdevelopment). Consequently, economies deviate from producing goods and services where they have a comparative advantage, resulting in relatively lower GDP. The dynamics of remittances with aggregate income is also dependent on whether remittances are countercyclical (Amuedo-Dorantes, 2014; Yang, 2008; Yang & Choi, 2007; Burgess & Haksar, 2005) or pro-cyclical (Bayangos & Jansen, 2009; Dakila & Claveria, 2007; Tuaño-Amador et al., 2007). Hence, the impact of remittances on aggregate income is also a function of labor mismatches due to migration and the potential contribution of remittances to income inequality.

Burgess and Haksar (2005) saw remittances as the financial component of migration. That is, the benefits arising from remittances may offset the costs associated with brain drain because it supports the economy's macroeconomic fundamentals. Also, there is still inadequate compelling evidence to support a negative influence of remittances on aggregate income. Hence, Ang (n.d.) argued that "while remittance may contribute to economic growth, there is a need for correct policies and nurturing environment for it to be an effective engine of development" (p. 12).

Remittances and Capital Accumulation

Remittances also pose implications on capital accumulation through savings, given an investment motive of remittance-sending (Tullao & Cabuay, 2016). According to Chiodi et al. (2012), remittances drive growth in economies with less developed financial systems because it offers a substitute to the financial services banks offer and relaxes credit constraints. Similarly, Osili (2007) estimated that remittances finance investments of recipient households, which is positively associated with their wealth. That is, migrant workers who earn more will transfer a larger amount of remittance back home, of which a large proportion will be saved towards capital accumulation. However, savings from remittances decrease as the size of the recipient household increases. Likewise, Baldé (2011) empirically determined that a 10% increase in remittances would lead to a 7% increase in savings. In addition to this, it was mentioned that remittances are private flows and are directly received by beneficiary families. However, at the household level, the decision of allocating remittances to current and future consumption, investments, debt repayment, and capital accumulation determines the rate at which the role of remittances in capital accumulation will manifest, which will then impact aggregate income (Rivera, 2013).

Thus, following Osili (2007) and Baldé (2011), remittances have the capacity to improve economic development by alleviating poverty and providing savings for capital accumulation for the migrantsending economy like the Philippines. Although remittances do not have a direct effect on economic growth, their effect is mediated by savings, investment, and capital accumulation. However, this is moderated by the decision of recipient households to either save or spend.

Remittances and Consumption

Because the objective of households is to maximize their welfare through optimal current and future consumption, remittances offer extra funds to spend on the consumption of goods and services; investment in education, healthcare, or housing, among others (Rivera, 2013; Cañas et al., 2010), which becomes a private source of income redistribution (Medina & Cardona, 2010).

Fundamentally, remittances have augmented welfare by significantly expanding consumption through increased allocation towards consumption of food, durables, education, healthcare, and rent, among others (Ahmed & Mughal, 2015). Primarily, remittances have been seen to enhance food consumption of recipient households (Medina & Cardona, 2010; Castaldo & Reilly, 2007). Given an altruistic motive of remittance-sending (Tullao & Cabuay, 2016), remittances are sent to primarily address poverty that leads to larger proportions of income spent on food, education, durables; allocation to savings and investment; accumulation of wealth; and insurance against socio-economic risks.



Figure 1. Literature Map

Given the positive effects of remittances on consumption, studies have also identified potential negative impacts. For Baldé (2010), if migration was funded through debt, enhanced consumption and savings may be delayed until repayment is completed. For Rodríguez and Tiongson (2001), Acosta et al. (2009), and Cañas (2010), remittances tend to increase the leisure time of recipient households, thereby reducing labor supply, which would consequentially dampen the positive effect of remittances on income and consumption. For Tullao and Rivera (2009), remittances create a culture of migration among recipient household members, thereby redirecting decisions towards eventual migration. All of which would have an impact on capital accumulation and aggregate income.

Research Gap

In mapping the literature in Figure 1, there is an abundance of studies discussing the economic impacts of remittances, and most approached it from a conceptual and empirical approach. Although the growing discussion is essential towards continuous validation and updating of recent developments in remittances and migration, I found it imperative to contribute to the growing body of knowledge by offering a different approach (i.e., theoretical approach) in explaining the macroeconomic impacts of remittances. Hence, policy frameworks boosting the positive impacts of remittances and managing their ill effects would have both theoretical and empirical foundations.

Methodology

Overlapping Generations Model

In addressing my first research objective, I follow the track of Rivera (2011, 2013) in utilizing a theoretical OLG model proposed by Diamond (1965) as the baseline model for analysis adhering to its standard assumptions. It is a micro-based macro-model that analyzes the implications of savings and consumption behavior of representative agents, taking into consideration life-cycle periods that overlap with one another. This general equilibrium economic model, characterized by perfect foresight, forms the basis for the simulation. Hence, in recalibrating the standard OLG model by incorporating remittances from OFWs and choosing parameter values to solve

for equilibrium values, I can investigate its effects on Philippines aggregate income, capital accumulation, and consumption.

In solving the OLG model, I follow Auerbach and Kotlikoff (1987) to determine the equilibrium path of the economy given a particular parameterization. This is done through an iterative technique referred to as the Gauss-Seidel method, wherein 10 to 20 iterations are suggested to achieve convergence to an initial steady-state solution. For detailed documentation of this method, refer to Rivera (2011, pp. 69-79).

Baseline Model

I specify in Equation 1 the utility function of a representative household (i.e., Cobb-Douglas) and in Equation 2 the production function of the Philippines (i.e., also Cobb-Douglas) where A = 1 for all time periods. The first time period is when young (y), and the second time period is old (o). Other notations are standard in economic literature.

$$U_t = C_{yt}^{\beta} C_{o(t+1)}^{1-\beta}$$
(1)

$$Y_t = A K_t^{\alpha} L_t^{1-\alpha}$$
(2)

Meanwhile, Equation 3 represents the representative household's budget constraint without remittances.

$$C_{yt} + \frac{C_{o(t+1)}}{1 + r_{t+1}} = w_t \tag{3}$$

Solving the utility maximization problem subject to the inter-temporal budget constraint will yield equilibrium Marshallian consumption functions when young, βw_t and when old, $(1 - \beta)(1 + r_{t+1})w_t$.

Taking the marginal products of labor and capital, Equations 4 and 5 represent wages and interest rates, respectively. I set by assuming that the population is fixed for all time periods.

$$w_t = (1 - \alpha) K_t^{\alpha} \tag{4}$$

$$r_t = \alpha K_t^{\alpha - 1} \tag{5}$$

Equilibrium condition under perfect competition is shown by Equation 6, and the derived law of motion of capital is shown by Equation 7.

$$S_t = w_t - C_{yt} = K_{t+1}$$
(6)

$$K_{t+1} = K_t^{\alpha} (1 - \alpha) (1 - \beta)$$
(7)

Given perfect foresight and rational expectations, at the steady-state, $K_{t+1} = K_t$. Hence, Equations 8 represents the steady-state equation for capital, which is a closed-form solution.

$$\widehat{K} = [(1-\beta)(1-\alpha)]^{\frac{1}{1-\alpha}}$$
(8)

Introducing Fixed Remittances

In addressing the second research objective, I introduce remittances, denoted by R, which is defined to be a fixed and exogenous endowment by virtue of altruism. Equation 9 indicates the intertemporal budget constraint with fixed remittances.

$$C_{yt} + \frac{C_{o(t+1)}}{1 + r_{t+1}} = w_t + R \tag{9}$$

Solving the utility maximization problem with remittances, I derive the following Marshallian consumption functions when young, $\beta(w_t + R)$, and when old $(1 - \beta)(1 + r_{t+1})(w_t + R)$.

Using Equations 4 to 6, I derive the law of motion of capital with fixed remittances as indicated in Equation. When R = 0, Equation 10 can be collapsed into Equation 7.

Parameters	Description	Value	Remarks
β	Elasticity of substitution between consumption when young and old	0.1 to 0.9 in increments of 0.1	For numerical simulation, I eliminate the possibility of 0.0 and 1.0.
$1 - \beta$	Elasticity of substitution between consumption when old and young	0.9 to 0.1 in decrements of 0.1	Computed from the value of β
α	Output elasticity of capital	0.4	Because the Philippines is a labor-
$1 - \alpha$	Output elasticity of labor	0.6	intensive economy, the elasticity of labor should be higher than that of capital (Patalinghug, 2019).
A	Total factor productivity (TFP) or technical change	1.0	Normalized to 1. In fact, the estimated TFP at constant national prices (2017=1) for the Philippines in 2019 is at 1.0076 as per data from the Federal Reserve Bank of St. Louis (https://fred.stlouisfed. org/).
K_{0}	Capital input		Assume that the economy starts at a steady state. If there is no closed-form solution, it is normalized to 1.
L	Labor input	1.0	Normalized to 1
R	Fixed endowment of remittances	0.0 to 5.0 in increments of 1.0.	For numerical simulation

Table 1. Parameter Values

$$K_{t+1} = (1 - \beta)[(1 - \alpha)K_t^{\alpha} + R]$$
(10)

However, in deriving the steady-state equation for capital with fixed remittances, there is no closed-form solution, as seen from Equation 11, warranting the need for calibration to determine if a steady-state value can be determined. Note that when R = 0, Equation 11 can be collapsed into a closed-form steady-state solution as in Equation 8.

$$K = (1 - \beta)(1 - \alpha)K^{\alpha} + (1 - \beta)R$$
(11)

Parameterization

To calibrate (i.e., numerical simulation approach) the model, I assign parameter values to derive exact numerical equilibrium solution for the Philippine economy given the abovementioned formulations. Table 1 summarizes the assumed parameter values.

Results and Discussion

Tables 2 and 3 presents the calibration results for various values of β and *R*. I plot the calibrations in Figures 2 and 3.

Without Remittances

In Tables 2 and 3, I presented steady-state values for capital accumulation, consumption when young (i.e., current), consumption when old (i.e., future), aggregate income, wages, and interest derived by implementing the Gauss-Seidel method iterating for 30 time periods as suggested by Auerbach and Kotlikoff (1987). Other assumed parameter values were held as indicated in Table 1.

In Table 2, I altered the β coefficient, ranging from 0.1 to 0.9 with an interval of 0.1 to simulate the orientation of the representative household to consume more when young. I also altered R from 0.0 to 5.0 with an interval of 1.0 to simulate the increasing remittances households receive. With or without remittances, it can be observed that higher values for β decrease the amount of steady-state capital for the economy. Because this indicates increased preference of households to consume when young, it corresponds to reduced savings when young. Hence, lower savings of the economy translate to lower capital accumulation for the economy. The decline in aggregate income can be traced to lower capital stock, which drives output growth being a productive input. Therefore, it can be generally observed from the calibrated values that as β increases, consumption levels when young increase, consumption when old decrease, and savings when young decrease. Ultimately, driven by the trade-off between consumption when young and consumption when old, capital accumulation declines resulting in decreasing aggregate income.

For factor prices, I observed that β and wages move negatively, whereas β and interest move positively. Given the basic model, in the absence of remittances, wage (i.e., domestically-sourced income) is the household's only source of financing. As such, with declining wages, the household budget becomes more constrained. Alternatively, with a greater preference for consumption when young, it decreases savings today and lowers capital accumulation when old. Consequently, the declining capital accumulation when old makes capital relatively scarce than labor putting pressure on factor prices to move.

With Remittances

In the absence of remittances but with a greater preference for consumption when young, households have lower savings. With remittances, it provides households additional income to improve their consumption, enhance capital accumulation, and stimulate growth (Ang et al., 2009).

From the calibration results in Table 2, I observed that at any value of β , remittances reinforced the magnitude of consumption when young. This is consistent with the findings of Quinn (2005), Delpierre and Verheyden (2014), Dash (2020), Ait Benhamou and Cassin (2021), and Ajefu and Ogebe (2021), wherein remittances do impact savings and consumption wherein it favors consumption when young influencing the dynamics between savings and consumption.

However, when remittances are increased, as seen from Table 3, consumption when young and when old both increase. That is, the effects of remittances are spread towards consumption in both time periods. Because remittances augment household income, they are now in a better position to consume and save more compared to the absence of remittances. This increased level of savings is invested towards capital accumulation. This explains why as fixed remittance level increases, the following increase as well: consumption when young, consumption when old, capital accumulation, and aggregate income. Most importantly, consistent with Ang et al. (2009), Cañas et al. (2010), Amuedo-Dorantes (2014), and Meyer and Shera (2017), calibration results indicated that higher remittance levels facilitate capital stock to accumulate at an increasing rate, thereby increasing aggregate income as well.

On the other hand, the factor prices move differently with respect to fixed remittances. Wages increase and interest decrease as remittances increase. The increase in wages is consistent with the findings of Cañas et al. (2010) that migration alters the wage structure in the sending economy, impacting those left behind through higher wages. Reduction in interest is also aligned with earlier findings that higher remittances result in relatively higher consumption and savings than without remittances. Higher savings results in higher capital accumulation. As the capital accumulates, it becomes more abundant to put downward pressure on its price.

Case A: a	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $R = 0$				
β	K	C _{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t
0.1	0.35809	0.03979	0.62334	0.66313	0.39788	0.74074
0.2	0.29426	0.07357	0.53948	0.61305	0.36783	0.83333
0.3	0.23555	0.10095	0.45988	0.56083	0.33650	0.95238
0.4	0.18218	0.12145	0.38461	0.50606	0.30364	1.11111
0.5	0.13444	0.13444	0.31370	0.44814	0.26888	1.33333
0.6	0.09269	0.13903	0.24717	0.38620	0.23172	1.66667
0.7	0.05738	0.13389	0.1849	0.31880	0.19128	2.22222
0.8	0.02919	0.11678	0.12651	0.24329	0.14597	3.33333
0.9	0.00920	0.08276	0.07050	0.15326	0.09196	6.66667
Case B: α	$= 0.4; K_0 = 1; L =$	1; A = 1; R = 1				
β	K	C _{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t
0.1	1.54216	0.17135	2.01784	1.18919	0.71352	0.30845
0.2	1.33954	0.33488	1.78916	1.12404	0.67442	0.33565
0.3	1.14308	0.48989	1.56506	1.05495	0.63297	0.36916
0.4	0.95316	0.63544	1.34555	0.98099	0.58860	0.41168
0.5	0.77026	0.77026	1.13060	0.90085	0.54051	0.46782
0.6	0.59499	0.89249	0.91998	0.81246	0.48748	0.54620
0.7	0.42821	0.99917	0.71314	0.71230	0.42738	0.66537
0.8	0.27120	1.08481	0.50855	0.59336	0.35602	0.87515
0.9	0.12622	1.13596	0.30100	0.43697	0.26218	1.3848
Case C: α	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $R = 2$				
β	K	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t
0.1	2.59018	0.2878	3.1755	1.46330	0.87798	0.22598
0.2	2.26578	0.56644	2.82059	1.38703	0.83222	0.24487
0.3	1.94843	0.83504	2.47075	1.30579	0.78348	0.26807
0.4	1.63863	1.09242	2.12599	1.21841	0.73104	0.29742
0.5	1.33695	1.33695	1.78622	1.12317	0.67390	0.33604
0.6	1.04419	1.56628	1.45117	1.01745	0.61047	0.38976
0.7	0.76141	1.77661	1.12009	0.89670	0.53802	0.47108
0.8	0.49023	1.96091	0.79099	0.75190	0.45114	0.61351
0.9	0.23353	2.10181	0.45710	0.55891	0.33534	0.95730
Case D: α	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $R = 3$				
β	K	C _{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t
0.1	3.60155	0.40017	4.26936	1.66954	1.00172	0.18542
0.2	3.16059	0.79015	3.79441	1.58455	0.95073	0.20054
0.3	2.72741	1.16889	3.32494	1.49383	0.89630	0.21908
0.4	2.30256	1.53504	2.86096	1.39600	0.83760	0.24251

Table 2. Calibration Results (changing values of β)

0.5	1.88673	1.88673	2.40236	1.28909	0.77345	0.27330
0.6	1.48081	2.22121	1.94882	1.17004	0.70202	0.31605
0.7	1.08604	2.53410	1.49947	1.03357	0.62014	0.38067
0.8	0.70430	2.81720	1.05197	0.86917	0.52150	0.49363
0.9	0.33892	3.05029	0.59840	0.64869	0.38922	0.76560
Case E: a =	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $R = 4$				
β	K	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t
0.1	4.59371	0.51041	5.32979	1.8402	1.10412	0.16024
0.2	4.03898	1.00974	4.73812	1.74787	1.04872	0.1731
0.3	3.49265	1.49685	4.15231	1.64916	0.98949	0.18887
0.4	2.95532	1.97021	3.57235	1.54256	0.92554	0.20878
0.5	2.42776	2.42776	2.99812	1.42588	0.85553	0.23493
0.6	1.91097	2.86645	2.42924	1.29569	0.77741	0.27121
0.7	1.40630	3.28137	1.86475	1.14612	0.68767	0.32600
0.8	0.91585	3.66342	1.30203	0.96545	0.57927	0.42166
0.9	0.44334	3.99002	0.73224	0.72226	0.43336	0.65166
Case F: a =	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $R = 5$				
β	K	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r_t
0.1	5.57361	0.61929	6.36889	1.98818	1.19291	0.14268
0.2	4.90691	1.22673	5.66267	1.88940	1.13364	0.15402
0.3	4.24915	1.82107	4.96263	1.78370	1.07022	0.16791
0.4	3.60100	2.40066	4.26877	1.66943	1.00166	0.18544
0.5	2.96326	2.96326	3.58095	1.54422	0.92653	0.20845
0.6	2.33704	3.50556	2.89877	1.40432	0.84259	0.24036
0.7	1.72380	4.02221	2.22115	1.24335	0.74601	0.28851
0.8	1.12583	4.50330	1.54525	1.04855	0.62913	0.37254
0.9	0.54714	4.92426	0.86141	0.78567	0.47140	0.57438

Table 3. Calibration Results (changing values of R)

Case A: $\alpha = 0.4$; $K_0 = 1$; $L = 1$; $A = 1$; $\beta = 0.1$							
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.35809	0.03979	0.62334	0.66313	0.39788	0.74074	
1	1.54216	0.17135	2.01784	1.18919	0.71352	0.30845	
2	2.59018	0.28780	3.17550	1.46330	0.87798	0.22598	
3	3.60155	0.40017	4.26936	1.66954	1.00172	0.18542	
4	4.59371	0.51041	5.32979	1.84020	1.10412	0.16024	
5	5.57361	0.61929	6.36889	1.98818	1.19291	0.14268	

Case B: $\alpha = 0.4$; $K_0 = 1$; $L = 1$; $A = 1$; $\beta = 0.2$							
R	K	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.29426	0.07357	0.53948	0.61305	0.36783	0.83333	
1	1.33954	0.33488	1.78916	1.12404	0.67442	0.33565	
2	2.26578	0.56644	2.82059	1.38703	0.83222	0.24487	
3	3.16059	0.79015	3.79441	1.58455	0.95073	0.20054	
4	4.03898	1.00974	4.73812	1.74787	1.04872	0.17310	
5	4.90691	1.22673	5.66267	1.88940	1.13364	0.15402	
Case C: a	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $\beta = 0.3$;				
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	Y_t	w _t	r_t	
0	0.23555	0.10095	0.45988	0.56083	0.33650	0.95238	
1	1.14308	0.48989	1.56506	1.05495	0.63297	0.36916	
2	1.94843	0.83504	2.47075	1.30579	0.78348	0.26807	
3	2.72741	1.16889	3.32494	1.49383	0.89630	0.21908	
4	3.49265	1.49685	4.15231	1.64916	0.98949	0.18887	
5	4.24915	1.82107	4.96263	1.78370	1.07022	0.16791	
Case D: $\alpha = \overline{0.4; K_0} = 1; L = 1; A = 1; \beta = 0.4$							
R	K	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.18218	0.12145	0.38461	0.50606	0.30364	1.11111	
1	0.95316	0.63544	1.34555	0.98099	0.58860	0.41168	
2	1.63863	1.09242	2.12599	1.21841	0.73104	0.29742	
3	2.30256	1.53504	2.86096	1.39600	0.83760	0.24251	
4	2.95532	1.97021	3.57235	1.54256	0.92554	0.20878	
5	3.60100	2.40066	4.26877	1.66943	1.00166	0.18544	
Case E: a	$= 0.4; K_0 = 1; L =$	$1; A = 1; \beta = 0.5$					
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	\mathbf{Y}_{t}	w _t	r _t	
0	0.13444	0.13444	0.31370	0.44814	0.26888	1.33333	
1	0.77026	0.77026	1.13060	0.90085	0.54051	0.46782	
2	1.33695	1.33695	1.78622	1.12317	0.67390	0.33604	
3	1.88673	1.88673	2.40236	1.28909	0.77345	0.27330	
4	2.42776	2.42776	2.99812	1.42588	0.85553	0.23493	
5	2.96326	2.96326	3.58095	1.54422	0.92653	0.20845	
Case F: $\alpha = 0.4; K_0 = 1; L = 1; A = 1; \beta = 0.6$							
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	Y _t	w _t	r_t	
0	0.09269	0.13903	0.24717	0.38620	0.23172	1.66667	
1	0.59499	0.89249	0.91998	0.81246	0.48748	0.54620	
2	1.04419	1.56628	1.45117	1.01745	0.61047	0.38976	
3	1.48081	2.22121	1.94882	1.17004	0.70202	0.31605	
4	1.91097	2.86645	2.42924	1.29569	0.77741	0.27121	
5	2.33704	3.50556	2.89877	1.40432	0.84259	0.24036	

Case G: $\alpha = 0.4$; $K_0 = 1$; $L = 1$; $A = 1$; $\beta = 0.7$							
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.05738	0.13389	0.18490	0.31880	0.19128	2.22222	
1	0.42821	0.99917	0.71314	0.71230	0.42738	0.66537	
2	0.76141	1.77661	1.12009	0.89670	0.53802	0.47108	
3	1.08604	2.53410	1.49947	1.03357	0.62014	0.38067	
4	1.40630	3.28137	1.86475	1.14612	0.68767	0.32600	
5	1.72380	4.02221	2.22115	1.24335	0.74601	0.28851	
Case H: α	$= 0.4; K_0 = 1; L =$	1; $A = 1$; $\beta = 0.8$	3				
R	K	$C_{_{yt}}$	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.02919	0.11678	0.12651	0.24329	0.14597	3.33333	
1	0.27120	1.08481	0.50855	0.59336	0.35602	0.87515	
2	0.49023	1.96091	0.79099	0.75190	0.45114	0.61351	
3	0.70430	2.81720	1.05197	0.86917	0.52150	0.49363	
4	0.91585	3.66342	1.30203	0.96545	0.57927	0.42166	
5	1.12583	4.50330	1.54525	1.04855	0.62913	0.37254	
Case I: α =	$= 0.4; K_0 = 1; L = 1$	1; $A = 1$; $β = 0.9$					
R	Κ	C_{yt}	$C_{o(t+1)}$	Y _t	w _t	r _t	
0	0.00920	0.08276	0.07050	0.15326	0.09196	6.66667	
1	0.12622	1.13596	0.30100	0.43697	0.26218	1.38480	
2	0.23353	2.10181	0.45710	0.55891	0.33534	0.95730	
3	0.33892	3.05029	0.59840	0.64869	0.38922	0.76560	
4	0.44334	3.99002	0.73224	0.72226	0.43336	0.65166	
5	0.54714	4.92426	0.86141	0.78567	0.47140	0.57438	

Conclusions and Recommendations

Driving macroeconomic growth can be done through the consumption and savings patterns of the household—both of which are facilitated by the amount of income a household generates. Prior to the boom of temporary labor migration in the Philippines, a typical household generated income domestically through the salaries and wages of its members. However, the lure of better-earning capacities induced the culture of labor migration, allowing Filipino households to have a foreign income source; remittances from family members working abroad augmented their domestically-generated income. These remittances then altered the intertemporal consumption patterns of households that have embedded into the micro-founded macro-model developed in this study.

I have seen from calibrating the OLG model that remittances impact the macroeconomy, consistent with most conceptual and empirical studies. The model captured that as increasing remittances gradually entered the economy, it expanded both consumptions of when young and when old. Households are financially better off with remittances, allowing them to increase both their consumptions across their life period. This is indicative of the welfare-enhancing effects of remittances allowing households to improve their lifestyles (i.e., higher consumption values entering intemporal utility function, higher levels of utility are derived). At the same time, remittances also allow them to have better savings capacity that drives capital accumulation and induces aggregate income expansion. Of course, remittances do affect the behavior of factor prices as consequences of the consumption behavior of households due to remittances. Intuitively, I can construe from my findings that the macroeconomy benefits from the relative improvement of its microeconomic units.



Figure 2. Calibration Results (changing values of β)



Figure 3. Calibration Results (changing values of R)

This also suggests that remittances potentially uplift households away from poverty through improvements in aggregate income, capital stock accumulation, and consumer welfare. These findings pose implications on policy frameworks created to manage remittances in light of their economic effects.

Although remittances are seen to be a contributor to economic growth, policy frameworks are still needed to allow it to be an effective vehicle of growth and development for the Philippines. Hence, in addressing the third research objective, I propose two-pronged recommendations in managing remittances: (a) involve both migrant workers and their dependent families, and (b) understand their realities. I espouse these recommendations because economic approaches have already been established. In contemporary times, it might be effective if policymakers take a step back to see the bigger picture to see where interventions can be made to maximize leverage.

First, the results show the critical role of savings in driving growth through higher capital accumulation, and this mechanism is reinforced by remittances. Hence, the need for OFWs and their dependent households to allocate a portion of their earnings abroad to savings, regardless of amount, must be emphasized. Although it is a fact that OFWs do have savings, there are still many of them who, after setting aside an amount to cover their needs, remit a significant portion to their dependent households for their domestic expenditure. As such, although the Philippine government has been doing everything to support OFWs (see Ofreneo & Samonte, 2005) in their placements, remittance-sending, retirement and reintegration, and other programs to honor their contributions to the economy, these can be improved by involving their respective dependent households as well. I argue that in harnessing the full potentials of remittances in driving greater capital accumulation and economic growth, there is a need to understand an OFW's decision to remit and its dependent household's decision to allocate, spend, and invest.

Therefore, the government—through the Department of Labor and Employment (DOLE), Overseas Workers Welfare Administration (OWWA), and Philippine Overseas Employment Administration (POEA)—can assist on this by formulating several programs to expose and motivate both OFWs and their dependent households to explore productive alternatives such as entry into highly technical jobs, livelihood creation, entrepreneurial development, better wage employment, and other savings-investment schemes.

Second, I also continue to echo a continuous review and strengthening of existing entrepreneurship and investment mobilization programs (e.g., *Unlad Kabayan Migrant Services Foundation, Entrepinoy Program* – see Ofreneo & Samonte, 2005, pp. 25–33), as well as taking advantage of both private and public savings schemes. I put emphasis on entrepreneurship programs as the fundamental approach to economically empower the OFWs and their dependent households. Following Rivera and Reyes (2011), remittances can serve as an avenue to encourage household entrepreneurial activities. In the process of reviewing and strengthening these, there is a need for policymakers to understand the realities among OFWs and their families.

- *Hard and Soft Skills.* Venturing into a business is a function of both technical skills and confidence (Gozun & Rivera, 2016). Hence, aside from entrepreneurial training programs that provide technical skills and knowledge in establishing and running an enterprise, there should also be practical and transformational programs that touch on thoughts, emotions, needs, attitudes, and motivations to boost the confidence of migrant workers and their families in setting up an enterprise.
- **Customizable Programming.** Entrepreneurial programs for OFWs and their dependent families should also incorporate cognizance of their employment stability. That is, those with stable employment are suitable to take the traditional management development programs. Meanwhile, those with less employment stability would benefit more from programs that emphasize business development, marketing, savings-investment mobilization schemes, access to credit and financing assistance, and migrant reintegration programs of the government.
- *Multi-stakeholder Approach*. Making an informed decision to establish an entrepreneurial venture necessitates that both migrant workers and their dependent families are equipped to scan their social and economic position with respect to the communities where they

belong. Thus, entrepreneurial programs should underscore the importance of family assessments and internal-external analysis. This is essential as venturing into a business financed by hard-earned remittances should be powered by a seamless dynamic between migrant workers, their dependent families, and their community—a multi-stakeholder approach in putting remittances to good use other than consumption.

The abovementioned recommendations are what I deem to be critically important. These will pave the way for better management of OFWs' remittances. Considered as modern-day heroes, they and their dependent families deserve a better life fueled by remittances in exchange for the social costs incurred when a family member is away for most of the time. Such sacrifices must not go to waste. Likewise, as has been established, remittances have the power to uplift the economy in the long run when put into good use, not just consumption but also savings and investment. Hence, by successfully encouraging OFWs to save, invest, and engage in business, household development can be ensued, which can diffuse to other households through employment generation. Remittances can stimulate micro-level development that will translate to macro-level development through productive investments.

We recommend that future studies further augment my OLG model by introducing other complexities of realities such as population growth, habit formation, pure rate of time preferences, taxation, among others. Remittances can also be modified from being fixed to proportional remittances. The inclusion of one or more complexities would allow the model to approximate reality better. Such may pose alternative perspectives that can enrich our understanding of the impact of remittances on the macroeconomy.

Declaration of Ownership

I culled this study from my Doctoral Dissertation, for the degree Doctor of Philosophy in Economics in De La Salle University, titled *The international migration* of the highly skilled Filipino labor: A theoretical consideration of the welfare and macroeconomic impacts of taxes on remittances completed in 2011.

Declaration of Interests

I declare that I have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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