The Impact of Workers' Remittances on Household Consumption in India: Testing for Consumption Augmentation and Stability

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Abstract

India is the top recipient of workers' remittance flows; recent data indicate that the Remittances/GDP ratio has increased from 2.7% in 2000 to 3.36% in 2015. We apply a consumption behavior model, based on the "permanent income hypothesis", to estimate the consumption augmentation and the stability impact for the period of 1989-2014. The independent variables are: (i) real per capita income (exclusive of remittances) is the measure of "permanent income", (ii) remittances is the measure of "transitory income", and (iii) real interest rate as the indicator of consumers' ability for intertemporal consumption. The economic ramifications are important since current global risk factors could decrease flows in the future. The results indicate the significance of all three variables; there are: (i) evidence of significant consumption augmentation, (ii) consumption responds higher to remittances than to real income, the remittance elasticity is 0.571 and the income elasticity is 0.31, and (iii) evidence of pro-cyclical effect. The VAR model indicates some linkages and causality in the series that result in small response to the shocks. Policies to increase or stabilize remittance flows and to leverage remittances for economic development are important.

Keywords: Remittances, Transitory income, Permanent income, Consumption smoothing, India.

JEL Classification Code: E20, E21, E44.

1. Introduction

The impact of remittance flows on the economy of recipient countries continues to stimulate current research, for example, Barajas et al. (2009), Fajnzylber and Lopez (2008), and Goldberg and Levi (2008).[2] Appendix Table A1 shows that remittances to developing countries are expected to rise by about 4% in 2016-2017 after a fall from 3.2% in 2014 to 0.04% in 2015. Recent studies focus on

several issues: (i) UNCTAD (2011) and Adams and Page (2005) on poverty level (ii) Aggarwal et al. (2006) on financial sector development, (iii) Lueth and Ruiz-Arranz (2006) on the determinants of flows, (iv) Neagu and Schiff (2009) on the stability, cyclicality and stabilizing impact, and (v) Yang (2006) and Yang and Choi (2007) on consumption smoothing. Recent studies, World Bank (2006) and Adams (2006), are supportive of the consumption-increasing and poverty-reduction effects of remittances, these results, however, are based on survey data and the analysis of descriptive statistics. An issue with such important economic ramifications requires a more analytical methodology. The World Bank (2015) examines/discusses ways remittances can help promote consumption stability.

Of the developing countries, the largest recipients in 2014 are India ($71 bil), China ($64 bil), Philippines ($28 bil), and Nigeria ($21 bil). This study, using data from 1989-2014 and an improved methodology based on applied consumer behavior, empirically estimates the impact of remittances on consumption in India. The focus is on consumption augmentation, cyclicality, and smoothing. The model is specified within the framework of the "permanent income

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[2] Migrant remittances are defined as the sum of workers' remittances, compensation of employees, and migrants' transfers. Workers' remittances, as defined by the International Monetary Fund (IMF) in the Balance of Payments Manual, 6th edition (IMF 2010a), are current private transfers from migrant workers who are considered residents of the host country to recipients in the workers' country of origin.

hypothesis" (PIH), articulated by Friedman (1957) and Modigliani (1976); it is justified on the basis of several studies including Willassen (1978), Hall and Mishkin (1982) and Kreuger and Perri (2008). They apply (and test the validity of) the PIH to analyze consumption behavior using different measurements of income (transitory and permanent). Our model includes variables that provide better estimates of the consumption-augmentation and consumption-smoothing effects. The independent variables are: (i) real per capita national income (exclusive of remittances) as the measurement of "permanent income", (ii) remittances as "transitory income" and (iii) real interest rate (the opportunity cost of money). We justify the use of these variables within the framework of the PIH later in the paper. The interpretation of the results is as follows: (i) the coefficient of remittances (transitory income) measures the consumption augmentation effect; (ii) the correlation between remittances (transitory income) and real per capita income (permanent income) indicates the cyclical effect; a low (or negative) correlation is considered counter cyclical and a positive (or high) correlation pro-cyclical; also a negative correlation is indicative of the consumption smoothing effect of remittances, and (iii) the real interest rate indicates the ability of households (recipients) to make intertemporal substitution in consumption through savings, and the accumulation of financial and physical assets. We also estimate the dynamic aspect of the model using VAR and IRF techniques.

The findings/results have important policy ramifications regarding the leveraging of remittance flows for the improvement in economic wellbeing and poverty reduction in India. This is consistent with the achievement of the Sustainable Development Goals (World Bank, 2015) of eradicating poverty and hunger. In recent years India has implemented several policies to leverage remittances for social and economic development, they include: (a) the development of bank deposits for non-resident Indian (NRI) with competitive interest rate, (b) the issuance of diaspora bonds with competitive yield, (c) economic and exchange rate policies to encourage the inflow of remittances, (d) the lowering of transmitting fees, and (e) other avenues for investments including start-up or small business and real estate. The downside risks include: (a) in 2015, remittances decrease by 2.1% to $68.9 billion, the first decrease in several years, (b) slow economic growth in USA and Europe (the main remittance-source regions) could have a negative impact on remittance flows, (c) the decrease in the price of oil has decreased flows from the Gulf country areas, and (d) current immigration policy reform in the United States and Europe could decrease the number of working visas available to skilled foreign workers.

The rest of the paper includes the following: Section 2 reviews the relevant literature, the PIH; Section 3 discusses some empirical studies related to the PIH; Section 4 examines remittance flows and consumption pattern; Section 5 analyzes the pattern of flows to India; Section 6 discusses the impact of remittance in India; Section 7 analyzes the data and statistical properties; Section 8 outlines the specification of the model; Section 9 provides a discussion of the results; Section 10 discusses the results of the dynamic models, VAR and IRF; and Section 11 provides the summary and conclusion.

2. Relevant Literature: Permanent Income Hypothesis and Consumption

This paper encompasses the large literature (originally articulated by Friedman (1957) and Modigliani (1976)) on the determinants of household consumption. The main independent variables of these studies include: (i) current income, (ii) expected future income, (iii) wealth, and (iv) interest rate. The PIH assumes that consumers: (i) prefer a smooth pattern of consumption, (ii) are farsighted and have a clear vision (no uncertainty) about future income, and (iii) are able to borrow. On the basis of this set of assumptions, they are able to maximize "lifetime" or permanent consumption. According to the PIH, the observed value of consumers income (YO) comprises two components, permanent income (YP) and transitory income (YT); YP includes current income plus expected income from various forms of assets, YT is windfall gains measured by (YO - YP). Consumers form an estimate of YP and assign an appropriate fraction for consumption; YT does not affect consumption since its expected value equals zero; also YT and YP are uncorrelated. The life cycle hypothesis (LCH) is partly built on the PIH and focuses on consumption planning over life time, i.e. the choice between current consumption and future consumption. If consumers' current income (YC) is relatively higher (YC > YP), there is saving to be used for future consumption; borrowing occurs if (YC < YP) thus consumption smoothing takes place through borrowing and saving which are determined by the real interest rate.

The role of transitory income on consumption is crucial to the PIH which assumes that it is "windfall gains" (the random variation from average income) and is non-correlated with consumption. [3] Earlier studies, Doenges

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[3] The PIH postulates the following: (i) non-correlation between the transitory and permanent component of income, (ii) non-correlation between transitory consumption and permanent consumption, (iii) non-correlation between transitory consumption and transitory income.

(1966) and Kreinin (1961), examine the marginal propensity to consume (MPC) between transitory income and permanent income, they have arrived at different conclusions. Other studies articulate the rationale for a positive MPC of transitory income; Willassen (1978) argues that if the "windfall gains" (transitory income according to PIH) are anticipated, they should be incorporated in recipients' budget plans and should not be regarded as a random variable. A common problem with these studies is how to estimate or separate the transitory component of income. Hall and Mishkin (1982) examine the sensitivity of food consumption to transitory-income; they report the significance of transitory income measured by a stochastic component of real lifetime income. Their major findings are: (i) consumption responds much more strongly to permanent rather than to transitory movement in income, (ii) the response to transitory income is vigorous if the interest rate is included in the model, and (iii) a rejection of the pure life-cycle/PIH hypothesis. The World Bank (2006, p.125) notes that remittances are viewed by households as transitory income rather than permanent and should be saved rather than currently spent.

3. Empirical Studies of the PIH

Several studies, including Laumas (1969) and Holmes (1974), have documented the measurement of YP and YT as a significant problem in the empirical estimation of the PIH. Hall (1978) notes "the major problem in empirical research based on the hypothesis has arisen in fitting the part of the model that relates current and past observed income to expected future income" (p.971), additionally, "much empirical research is seriously weakened by failing to take proper account of the endogeneity of income when it is the major independent variable in the consumption function." (p.972). Lucas (1976) argues that there is no theoretical reason for expectations formed by reasonably intelligent economic agents about future variables to be adequately explained by past data in a stable manner. Carlin and Soskice (2006) contend that it is necessary to relax some of the assumptions of the PIH in order to account for the empirical behavior of consumers' expenditures because of the uncertainty about future income and the limited access that some households have to financial markets.

The conventional practice in the literature, as noted by Hayashi (1982), has been to proxy permanent income by current or past disposable income. Hall and Mishkin (1982) and Kreuger and Perri (2008) use values for YP and YT that are different from those discussed in the theoretical PIH. The data that we use satisfy the general definition of YP and YT; furthermore, the model is applied to countries with inadequate published data on consumers' ownership of different forms of assets (wealth) and imperfect financial and labor markets.

Our methodology contributes to the current empirical literature by identifying two different sources of income flows that could be clearly classified as YP and YT. It provides results, unlike those of previous studies, that enable us to: (i) analyze consumption smoothing, (ii) determine whether remittances flows have countercyclical or pro-cyclical effects on consumption (and the economy), and (iii) examine the extent to which remittances contribute to savings and investment. The impact of real interest rate which allows for saving and borrowing, a la the Life Cycle Hypothesis (Modigliani, 1976) is also examined since it is an extension of the consumption smoothing effect.

4. Studies of Remittances and Consumption Stability

A recent study in Global Economic Prospects (World Bank, 2015) uses an econometric model to estimate the impact of remittances on the volatility in economy growth and consumption. The dependent variable is country-specific consumption growth and the independent variables are (i) country GDP growth and (ii) remittances/GDP ratio. A negative coefficient for the remittances/GDP ratio indicates the extent to which remittances help lower the volatility in country-specific consumption and output growth. The results show negative coefficients (of different magnitude) for all the regions studied, indicating that remittances have reduced the volatility in consumption and growth. Despite the rigor of this model, there are two possible concerns: (i) whether the definition/measurement of GDP already includes remittances, and (ii) the possible multicollinearity between the two independent variables since both have GDP. The virtue of our methodology is that consumption and remittances are discussed within the framework of established theory of consumer behavior.

5. Flows to India

Remittance flows are the fastest growing category of total private financial flows to developing countries. As a percentage of total flows (FDI, ODA, private debt and equity), it has increased steadily from 24.78% in 1990 to 25.79% in 2014. Several studies, Lueth and Ruiz-Arraz (2006) and Freund and Spatafora (2005), have examined the determinants. Three main drivers of remittance flows to India are: (a) the Indian migrant stock abroad, (b) economic

conditions in remittance sending countries, (c) economic, institutional, and regulatory factors in India, and (d) relative wage rate in India.[4] Flows to India started to increase in the early 1990s, from $2,382 million in 1990 to a high of $70,389 million in 2014 followed by $68,910 million in 2015. The pattern is shown in Figure 1. In terms of remittance dependency, the remittance/GDP ratio has reached a high of 3.4% in 2014.
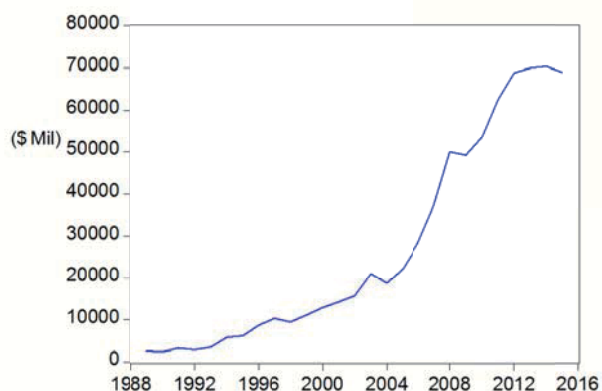

Figure 1: Remittance Flows to India: 1989-2015

Singh and Hari (2011) identify this era as the "globalization phase" of India's emigration pattern which is associated with: (i) the growth of the global information technology industry and the outsourcing of India's information technology companies, (ii) the emigration of skilled professionals (computer engineers, software designers, etc.) from India to the USA, Canada, and Europe. Liberalization policies of the Indian economy in the 1990s also made significant contribution: (i) opening the economy to foreign capital, (ii) government policies to attract remittances through NRI deposits and diaspora bonds, (iii) the introduction of market determined exchange rate and current account convertibility, and (iv) encouraging the shift from "informal" channels (unregulated hawla network) to

"formal" channels (authorized dealers, money transfer companies, and money chargers); this has partially eliminated the problem of understating the value of remittances.

In terms of the geographical sources of remittance flows, the main regions are (a) North America, 44% (b) Gulf countries, 24% (c) Europe, 13% and (d) East Asia, 12%. The main risk factor is associated with the economic and political problems in these regions.[5] It is interesting to note that remittance flows are evenly distributed across the different regions/states of India. Kerala is one of the top remittance receiving states enjoying around 20% of total officially recorded estimates. Many studies have pointed out to the very high remittance dependency of Kerala.

6. Studies of the Impact of Remittances in India

A plethora of studies have focus on the impact of remittances. Chami et al. (2008), Faini (2005), Ekanayake and Mihalis (2008), and Spatafora (2005) focus on the linkages between remittances trade investment and economic growth. Adams (2006) and UNCTAD (2010) examine the consumption/expenditure pattern of remittances. Most Studies of India are descriptive with conventional data analysis. Singh and Hari (2011) analyze the contribution of remittances to the Indian economy by examining the pattern of several ratios derived from macroeconomic time series data. Some of these ratios are (a) remittances/GDP, (b) remittances/FX reserves, (c) remittance/private consumption expenditure, (d) remittances/gross savings, (e) remittances/gross capital formation, and (f) remittances/trade deficit. Most of these ratios indicate an increasing trend which they infer as positive contribution to the economy. They also compare remittance flows with other forms of capital flows (foreign direct investment, official development assistant, etc.) and conclude that remittance flow is the cheapest, largest, and least volatile source of external financing.

UNCTAD (2011) uses an econometric model to examine the impact of remittances on poverty in India. The dependent variable is POV (poverty ratio in India) and the independent variables are PCY (per-capita income), INEQ (income equality as measured by the Lorenz ratio) and REM (remittances to GDP ratio). The results show that

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[4] The World Bank (2016) provides information on India's emigration: (a) Stock of emigrants, 2013: 13,885.1 thousands (b) Stock of emigrants as percentage of population, 2013: 1.1 percent (c) Top destination countries, 2013: the United Arab Emirates, the United States, Saudi Arabia, Pakistan, Nepal, the United Kingdom, Kuwait, Oman, Canada, Qatar (d) Tertiary-educated as a percentage of total emigrants in OECD countries, 2011: 58.7 percent (e) Tertiary-educated women as a percentage of total women emigrants in OECD countries, 2011: 55.9 percent (f) Number of refugees, 2014: 10,393 (g) Second generation diaspora in Australia, Europe, and the United States, 2012: 1,023.6 thousands

[5] Singh & Hari (2011) also note that in the mid-1970s during the oil boom, the Gulf region was a main destination of many Indian emigrants; most of them were semi-skilled workers earning low income.

remittances have a negative impact on the poverty ratio, specifically; a 10% increase in the remittances/GDP ratio will lead to a fall of 1.7% in the poverty ratio.

Our model adds significantly to the literature by using a methodology that is rigorous and has a strong theoretical foundation. The emphasis on consumption-led growth is associated with the economic liberalization reform in India beginning in the early 1990s; the growing middle class is expected to be the engine of growth. Appendix Table A2 shows that India has comparable private consumption expenditure/GDP ratio to that of the advanced countries in Asia.

7. Data Sources and Distributional Properties

The main sources of the data are (i) Migration and Remittances Factbook (World Bank, 2016), and other editions, (ii) International Financial Statistics Yearbook (International Monetary Fund, 2016), and (iii) Migration and Remittances Brief #26 (World Bank, 2016). Real per capita national income (RGDI) is derived from deflating Gross National/Disposable Income (GNI) by population and the GDP deflator (2005=100). GNI is GDP less primary income from abroad, this lends to the accuracy of separating transitory income (remittances) from permanent income (RGDI). COM is per capita household consumption expenditures deflated by the CPI (2005=100). INT is real deposit interest rate. Remittances (REMIT) are denominated in US dollar; we adjust RGDI and COM to US dollar values using the appropriate exchange rate; this minimizes any problem in interpreting the regression coefficients.

7.1. Descriptive Statistics

The descriptive statistics are presented on Table 1; they are measured in terms of logarithmic values. In terms of variability, the standard deviation of LREMIT is 0.9237; this is higher than that of LCOM (0.671). This has important implications in terms of analyzing consumption stability and the volatility of remittances. The distributional properties of the data show non-normality; this is indicated by (i) positive skewness for LRGDI, and negative skewness for LCOM, LREMIT, and LINT, and (ii) platykurtic (coefficient of kurtosis < 3) for LCOM, LREMIT, and LRGDI and lepokurtic (coefficient of kurtosis > 3) for LINT. Based on the values of the Jarque- Bera statistics and the corresponding ρ-values (prob), we do not reject the null hypothesis of normality (skewness = 0, excess kurtosis = 0) for all four variables. Despite non-normality of the data, the other tests (to be

discussed next) reveal their suitability for econometric estimation.

Table 1: Descriptive Statistics (Based on logarithmic values)

	LCOM	LREMIT	LRGDI	LINT
Mean	9.535036	9.497955	2.292767	2.572321
Median	9.553359	9.515166	2.188139	2.547705
Maximum	10.67784	10.91509	2.802089	2.940220
Minimum	8.403487	7.824046	1.908395	2.119864
Std. Dev.	0.670486	0.923709	0.313250	0.193272
Skewness	-0.022677	-0.180779	0.476131	-0.078103
Kurtosis	2.023516	2.185830	1.675804	3.096943
Jarque-Bera	0.796315	0.661331	2.216914	0.028165
Probability	0.671556	0.718445	0.330068	0.986016
Sum	190.7007	189.9591	45.85533	51.44641
Sum Sq. Dev.	8.541488	16.21154	1.864390	0.709730
Observations	25	25	25	25

7.2. Test of Unit Root

To avoid the problems of "spurious regression" in empirical studies using time series data, we test for the stationarity of the data, using the ADF (Augmented Dickey-Fuller) test which corrects for uncorrelated error terms. There are several tests discussed in the literature (Gujarati & Porter, 2009; Enders, 2010), however, the unit root test is very prominent. The results, shown in Table 2, indicate that for all the variables the null hypothesis of the existence of unit root (non-stationarity of the data) is rejected at the first difference level and the second difference level in the three cases that allow for (i) an intercept, (ii) an intercept and deterministic (linear) trend, and (iii) none.

Table 2: ADF Test of Unit Roots

Variable	Test in	Included in Test	Coefficient	t(tau) Value	Prob	Decision*
LREMIT	level	Constant	-0.0451	-1.0933	0.2895	Do not reject Ho
		Constant & Trend	-0.5228	-2.5796	0.0202	Reject Ho
		None	0.0167	4.3077	0.0004	Reject Ho
	1st Difference	Constant	-1.2476	-4.9764	0.0001	Reject Ho
		Constant & Trend	-1.4034	-3.1176	0.0081	Reject Ho
		None	-0.5784	-2.6246	0.0178	Reject Ho
	2nd Difference	Constant	-2.3465	-5.7881	0.0001	Reject Ho
		Constant & Trend	-2.3372	-5.5900	0.0001	Reject Ho
		None	-2.3399	-5.8761	0.0000	Reject Ho

LINT	level	Constant	-0.2076	-0.9331	0.3708	Do not reject Ho
		Constant & Trend	-0.8989	-2.7231	0.0185	Reject Ho
		None	-0.0158	-1.6374	0.1189	Do not reject Ho
	1st Difference	Constant	-1.7530	-2.6403	0.0216	Reject Ho
		Constant & Trend	-4.9265	-3.1657	-0.0158	Reject Ho
		None	-0.5288	-1.4881	0.1550	Do not reject Ho
	2nd Difference	Constant	-0.9778	-3.3922	0.0040	Reject Ho
		Constant & Trend	-1.0700	-2.1248	0.0551	Reject Ho
		None	-0.9658	-3.4501	0.0033	Reject Ho
LRGDI	level	Constant	0.0174	0.2375	0.8151	Do not reject Ho
		Constant & Trend	-0.3007	-2.5735	0.0204	Reject Ho
		None	0.0137	1.4966	0.1518	Do not reject Ho
	1st Difference	Constant	-0.9009	-3.7513	0.0017	Reject Ho
		Constant & Trend	-1.0253	-3.8870	0.0015	Reject Ho
		None	-0.7848	-3.3668	0.0037	Reject Ho
	2nd Difference	Constant	-1.6423	-8.1764	0.0000	Reject Ho
		Constant & Trend	-1.6532	-8.1291	0.0000	Reject Ho
		None	-1.6374	-8.3958	0.0000	Reject Ho
LCOM	level	Constant	0.0006	0.0445	0.9650	Do not reject Ho
		Constant & Trend	-0.6771	-3.7391	0.0039	Reject Ho
		None	0.0126	15.6108	0.0000	Reject Ho
	1st Difference	Constant	-0.6599	-2.6844	0.0163	Reject Ho
		Constant & Trend	-0.3479	-1.1446	0.2730	Do not reject Ho
		None	-0.0043	-0.0658	0.9484	Do not reject Ho
	2nd Difference	Constant	-1.5993	-7.6699	0.0000	Reject Ho
		Constant & Trend	-1.6043	-7.6090	0.0000	Reject Ho
		None	-1.5984	-7.9070	0.0000	Reject Ho

*Ho: unit root exists. Decision based on the Augmented Dicky-Fuller test statistic, MacKinnon (1996)

7.3. Test of Cointegration

The importance of a long run stable relationship among the variables used in time series econometric models is widely documented in the literature (Maddala & Kim, 1998; Enders, 2010, Johansen, 1988). The results of a model

derived from cointegrating variables are stable over the period analyzed and are valid for statistical inferences. Granger (1986) avers that the test of co-integration can be thought of as a pre-test to avoid the problems of 'spurious regression'. We examine two versions of the unrestricted rank test using (a) "trace" statistics test, and (b) Max Eigen statistic each under the assumption of (i) no deterministic trend, and (ii) linear deterministic trend. The results, presented on Table 3, indicate cointegrating relationship among all four variables for both tests in most cases.

Table 3: Results of Johansen Cointegration Test

1. Trend assumption: No deterministic trend				
Unrestricted Cointegration Rank Test (**Trace**)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.883497	68.80698	40.17493	0.0000
At most 1 *	0.649316	30.10986	24.27596	0.0082
At most 2	0.464665	11.24819	12.32090	0.0751
At most 3	3.66E-05	0.000659	4.129906	0.9872
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level,				
* denotes rejection of the hypothesis at the 0.05 level				
Unrestricted Cointegration Rank Test (**Maximum Eigenvalue**)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.883497	38.69712	24.15921	0.0003
At most 1 *	0.649316	18.86166	17.79730	0.0345
At most 2 *	0.464665	11.24753	11.22480	0.0495
At most 3	3.66E-05	0.000659	4.129906	0.9872
Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
2. Trend assumption: Linear deterministic trend				
Unrestricted Cointegration Rank Test (**Trace**)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.886521	75.70981	47.85613	0.0000
At most 1 *	0.687763	36.53928	29.79707	0.0072
At most 2 *	0.451318	15.58742	15.49471	0.0484
At most 3 *	0.233356	4.783185	3.841466	0.0287
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
Unrestricted Cointegration Rank Test (**Maximum Eigenvalue**)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.886521	39.17054	27.58434	0.0011
At most 1	0.687763	20.95185	21.13162	0.0529
At most 2	0.451318	10.80424	14.26460	0.1643
At most 3 *	0.233356	4.783185	3.841466	0.0287
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

The distribution of the data thus indicates the existence of stationarity and cointegration, thus they are appropriate for econometric modeling.

8. Model Specification

The model specified relates real per capita consumption (COM) as a function of three independent variables (i) the real interest rate (INT), (ii) remittances (REMIT), and (iii) real per capita national income (RGDI). A positive relationship is hypothesized between COM and RGDI, and between COM and REMIT, while a negative relationship between COM and INT. A decrease in INT encourages current consumption (by borrowing) while an increase in INT motivates savings (less current consumption). The model is specified in double logarithmic form (ln) as:

$$\ln COM_t = a_1 + a_2 \ln INT_t + a_3 \ln REMIT_t + a_4 \ln RGDI_t + \mu_t$$
(Eq.1)
$t = 1989\text{-}2014, \; a_2 < 0; \; a_3 > 0; \; a_4 > 0$

9. Analysis of Regression Results

Each coefficient estimate is the elasticity of the respective independent variable. The results, presented in Table 4, indicate the significance of all three independent variables (at $p < 0.05$).

Table 4: Regression Results of Equation 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.376651	0.615148	7.114790	0.0000
LREMIT	0.571654	0.040683	14.05143	0.0000
LINT	-0.373820	0.140163	-2.667046	0.0169
LRGDI	0.301130	0.088035	3.420565	0.0035
R-squared	0.891549	Mean dependent var		9.535036
Adjusted R-squared	0.889965	S.D. dependent var		0.670486
Log likelihood	27.86427	F-statistic		625.7788
Durbin-Watson stat	2.150735	Prob(F-statistic)		0.000000

An R^2 of 0.89 and DW = 2.1 (indicating no autocorrelation) attest to the validity of the model and the reliability of the results. Also, with $R^2 <$ DW, there is no evidence of spurious regression (Granger & Newbold, 1974); this also supported by the results of the unit root test and the cointegration test. The results indicate that the response of consumption to remittances is higher than that of income, the remittance elasticity is 0.571 and the income elasticity is 0.31. This is evidence of significant consumption augmentation effect. This finding, like Hall and Mishkin (1982), does not support

the PIH that transitory income (remittances) does not impact consumption. The World Bank (2006, p.125) also notes that remittances are viewed by households as transitory income rather than permanent and should be saved rather than currently spent. There is also the saving effect since only 57% of remittances is used for consumption. This percentage (57%) is lower than that of the 70% for countries in Asia and Africa, reported by UNCTAD (2010).

Another aspect of consumption augmentation is further examined to determine the cyclical effect, i.e. to determine whether there is a smoothing impact. There is (data available upon request) high correlation (0.856) between remittances and national income (LREMIT and LRGDI), suggesting that there is a pro-cyclical impact or no consumption smoothing effect. This conclusion could be further supported by the data on Table 1 indicating that the standard deviation (volatility) of LREMIT is higher than that of LCOM. Neague and Schiff (2009) address the issue of the stability, cyclicality and stabilization impact of remittance flows in comparison with other external flows; they find, inter alia, that remittance flows are pro-cyclical, and have destabilizing effect. Singh and Hari (2011) contend that in recent years, remittances to India have been switched from consumption purposes to investment purposes; this is indicative of the amount of remittances spent for speculative purposes mainly in the stock market and investments in the booming real estate market.

The coefficient of interest rate (-0.373) indicate the ability of households (recipients) to make intertemporal substitution in consumption through savings, the accumulation of real and financial assets (bank deposit), improved access to financial services. Acosta et al. (2008) refers to this behavior as the ex-ante risk coping mechanism, part of remittances must be saved and sources of income must be diversified to enable consumption smoothing. India has implemented several financial and economic reform policies beginning in the early 1990s; interest rate liberalization was a top priority (Mohan, 2005). The results of this paper must be interpreted within the period of our study that is associated with rapid increase in remittance flows.

10. Dynamic Models: VAR and IRF

The dynamic model, focusing on lead-lag relationship between the variables in the series, is estimated using VAR technique; evidence of significant lead-lag relationship indicates causality. The importance of this test is whether the endogenous variables could be treated as exogenous. Finally, we examine the shock effects on the adjustment of the variables using the impact response function, IRF (Carter Hill et al., 2011, Ch. 15).

10.1. VAR Estimates

Table 5 shows the VAR estimates (with two lags) for each variable as the dependent variable. The result shows some significant lead-lag effects in the series for our model the dependent variable LCOM, positive LCOM(-1), positive LREMIT(-2), negative LINT(-1). Based on these results, there is some evidence of causality. Of importance to our study is the lead-lag relation of the dependent variable LCOM which is our model specification.

Brooks (2008) make some interesting comments regarding the concept of causality.[6] Gujarati and Porter (2009, Ch.12, p.789) also note that since the individual coefficients in the estimated VAR models are often difficult to interpret, the practitioners of this technique often estimate the so-called IRF. The IRF traces out the response of the dependent variable in the VAR system to shocks in the error terms.[7]
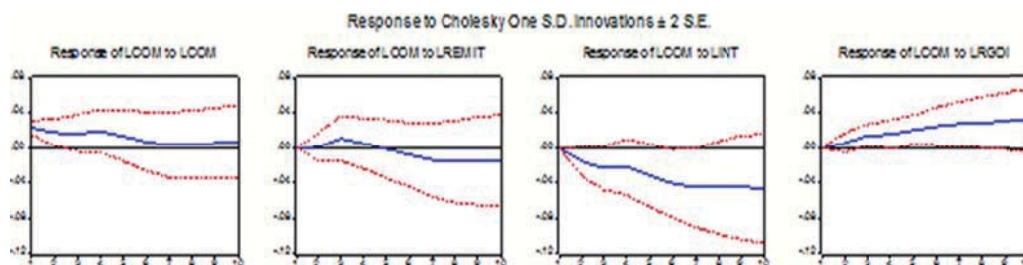
10.2. Impulse Response Function

The IRF shows the effects of the shock on the adjustment path of the variables. Carter Hill et al (2011) note that an advantage of examining IRF (and not just the VAR coefficients) is that it shows the size of the impact plus the rate at which the shock dissipates. Two considerations are important for the IRF analysis; (a) the sign (+ or -) of the responses to individual variables, and (b) whether the response dies down and after how many periods. Given the results of some linkages between the series and the Granger Causality results, the response to shocks are very small as indicated in Figure 2. Also there is no clear indication of the shocks dissipating; see top panel (row), LCOM response to LREMIT; LCOM response to LINT; and LCOM response to LRGDI.

Table 5: Vector Autoregression Estimates; t-statistics in [ ]

	LCOM	LREMIT	LINT	LRGDI
LCOM(-1)	0.904789	1.932815	0.238370	1.420033
	[3.38831]*	[1.16826]	[0.27966]	[2.44185]*
LCOM(-2)	-0.385850	-0.847640	-0.619679	-1.081085
	[-1.71369]	[-0.60763]	[-0.86223]	[-2.20474]*
LREMIT(-1)	0.038532	0.165788	0.271417	-0.345414
	[0.68127]	[0.47311]	[1.50339]	[-2.80427]*
LREMIT(-2)	0.211537	-0.066946	-0.219190	0.084144
	[2.81987]*	[-0.14404]	[-0.91539]	[0.51505]
LINT(-1)	-0.202590	0.255264	0.548906	-0.681047
	[-1.82580]*	[0.37131]	[1.54980]	[-2.81837]*
LINT(-2)	0.104473	-0.444834	-0.806494	-0.231770
	[1.14985]	[-0.79022]	[-2.78087]*	[-1.17133]
LRGDI(-1)	0.135018	-0.045090	-0.296341	0.140562
	[1.10954]	[-0.05981]	[-0.76293]	[0.53040]
LRGDI(-2)	0.129671	0.168040	0.423563	0.676438
	[1.33545]	[0.27933]	[1.36661]	[3.19887]*
C	1.970130	-1.497147	5.970931	1.974910
	[2.68996]	[-0.32993]	[2.55408]	[1.23818]
R-squared	0.899143	0.881315	0.884629	0.886552
Adj. R-squared	0.858382	0.864706	0.782076	0.874597
F-statistic	1312.307	59.08409	8.626113	82.52769

Note: * denotes statistically significant

Figure 2: Impulse Response Function

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[6] Regarding the interpretation of Granger-causality in the VAR model, Brooks (2008, p. 311) make the following observation, "It is worth also noting that the term 'Granger-causality' is something of a misnomer since a finding of 'causality' does not mean that movements in one variable physically cause movements in another…. rather, causality simply implies a chronological ordering of movements in the series." It could validly be stated that movements in one variable appear to lead another.

[7] A shock to the i th variable not only affects the i th variable but it is also transmitted to all other endogenous variables through the dynamic (lag) structure of the VAR. An IRF traces the effect of a one-time shock to one of the impulses/innovations on current and future values of the endogenous variables (Eviews manual #5, page 713).

11. Summary and Conclusion

This paper extends the literature on the impact of remittances on household consumption; it focuses on India which is the largest recipient of remittances and has experienced a spurt in flows beginning in the early 1990s. An empirical model, based on the PIH, is applied. There is evidence of consumption augmentation with remittances responding faster to consumption than real income; however there is little evidence of consumption smoothing. The results indicate a pro-cyclical impact, similar to the results of ECLAC (2014) on Latin America and Caribbean countries.

India has been able to successfully leverage remittances for social and economic development as discussed earlier in the paper (Ratha, 2007). However, potential risk in remittance flow could occur by the slow recovery in the United States and Europe, the drop in oil prices and restrictive immigration policies for skilled workers. How significant is this risk depends on one factor; among the developing countries India is the largest recipient country but it must be noted that its remittance dependence is low, about 4.5% of GDP in 2014.

This study uses aggregate data, the only kind available. With the availability of the published data at the regional/state level, further investigation of the spatial impact of remittances could be done given the economic diversity across India. It must be noted that the results of this study (as well as others) are based on official estimates of remittance flows. Several analysts have noted the existence of an "informal" channel for flows; the use and impact of these flows are not documented.

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