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International Remittances – A proposal how to test hypotheses about determinants of remittances with macroeconomic time series

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2011

Total number of authors:
2

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*– A proposal how to test hypotheses about determinants of remittances with macroeconomic time series* [♣]

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**Abstract**

We study the determinants of remittances to developing countries at different time horizons. Remittances to developing countries nowadays exceed official development assistance and constitute a significant fraction of the disposable income of many households in developing countries. Different hypotheses suggest that remittances are often sent to compensate for low incomes, which may impose a downward bias when estimating their effects on the economic development (e.g. growth, poverty and consumption) in recipient countries. Two popular hypotheses about the causes of remittances are the altruism and insurance hypothesis. Both hypotheses suggest that remittances are sent to compensate for short-run economic declines, but the altruism hypotheses also predict that remittances should diminish gradually over time as the economic development in the receiving countries proceeds and the need for outside assistance decreases. Hence, the altruism hypothesis predicts a negative correlation between the economic conditions in the receiving countries and remittances in the long-run and the short-run, while the insurance hypothesis only predicts a negative relationship in the short-run. We can thus test which hypothesis that is best supported the data by studying the correlation between remittances and consumption in receiving countries at different time horizons. For this purpose we use a macroeconomic panel with consumption and remittances data from 50 low and middle income economies between 1980 and 2006. We estimate Keynesian consumption functions with GDP and remittances per capita as explanatory variables for the full panel and for different subpanels. The data is decomposed into different time horizons using a maximal overlap discrete wavelet transform. We are not aware of any study which uses similar econometric techniques to test different hypotheses about the underlying causes of remittances. Our evidence predominantly supports a negative long-run relationship, which favours the altruism over the insurance hypothesis.

*Key Words:* Remittances, Altruism, Insurance Hypothesis

## 1. Introduction

Many households in low and middle income economies depend heavily on migrant remittances from abroad. With a total of 251 billion US$ in 2007, remittances to developing countries exceed official development assistance and reach the magnitude of foreign direct investments (World Bank, 2007). Motives to migrate are complex and commonly overlap with motives to remit. The New Economics of Labor Migration (NELM) suggests a set of theories explaining both phenomena. According to neoclassical theory, the migration decision is made by the individual who migrates when the expected income from moving exceeds the

income obtained at home.[i] NELM, in contrast, suggests that migration is the outcome of a collective decision made by all members of the migrant's household (see e.g. Stark and Bloom, 1985). The insurance hypothesis developed by NELM posits that households try to diversify their income sources to insure themselves against unanticipated economic shocks (Lucas and Stark 1985, 1988). In developed countries, financial institutions and government programs typically provide the necessary protection against such short-run economic downfalls. In developing countries these institutions are typically less developed and migration provides an alternative route to acquire insurance against a temporary decline in income.

Another commonly suggested explanation for remittance flows is the altruism hypothesis. People migrate, possibly to increase their personal income, and send money home because they care for the ones left behind. There is one important difference between the implications of the altruism hypothesis and the insurance hypothesis. According to the altruism hypothesis, the amount of remittances is reduced as income and consumption in the receiving country increases and the need for assistance thereby gradually decreases.[ii] The insurance hypothesis has no such implications (see e.g. Rapoport and Docquier, 2005), since, according to this theory, households send migrants to insure themselves against unexpected events, but not to increase their overall income. Both theories, however, suggest that remittances increase when households are exposed to a temporary economic decline.

The empirical literature provides some support for both hypotheses. The first rigorous test of the insurance hypothesis is the work of Lucas and Stark (1985), which found that remittances to households with drought-sensitive assets in Botswana were positively correlated with both the occurrence and the severity of droughts. Remittances were found to increase by a factor of 0.25 for every dollar lost in hurricanes in Jamaica (Clarke and Wallsten

(2004). Gubert (2002) found that declines in crop income significantly raised remittances in Western Mali.

The conjecture that migrants care for the ones left behind (altruism) has also won some empirical support, although there is no strong support for pure altruism[iii]. Altonij *et al.* (1998) study determinants of intragenerational transfers and find that a one-dollar decrease of child income is only coupled with a 13 cent increase of transfer from parent to child. Cox *et al.* (1998), on the other hand, find ambiguous results. Using a household survey from Peru, their results show that sickness and unemployment are factors that significantly increase remittances, but they also find that wealthy households receive more income transfers than poor households.

It is important to understand the aggregated effects of migration on the economy e.g. on capital formation, consumption, poverty and growth can be studied, since it may lead to better policies in developing countries. The World Bank currently recommends that that remittances should be promoted (Ratha, 2008) but researchers have not yet reached full consensus on whether they are beneficial for the economic development in receiving nations (Catrinescu et al., 2009).

Many previous studies on remittances have employed microeconomic level data (household surveys), but attempts with macroeconomic data are quite infrequent. In a frequently cited paper, Chami *et al.* (2003) find a negative relationship between GDP growth and remittances for 113 developing countries. However, the compensatory endogeneity problem of remittances may impose a downward bias on their estimated effects. A negative relationship between remittances and different indicators of economic development (growth, consumption etc.) could be interpreted as either supporting endogeneity or a moral hazard effect. Moral hazard implies that receivers of remittances are less inclined to work and provide for themselves since they can rely on remittances from abroad. Eventually, this may

4

hurt the economic growth in receiving countries. Chami *et al.* (2003) employs two external instrumental variables[iv] to account for the endogeneity problem but it does not critically alter the result. It could be argued that the instruments Chami employ are not sufficiently effective and in a recent paper, Catrinescu *et al.* (2009), estimates the correlation between remittances and growth and account for endogeneity by employing internal instruments[v]. Generally they find a positive correlation between remittances and growth and that the use of instrumental variables leads to higher estimated effects on growth. This supports that remittances are "*compensatory to its nature*" and that the World Bank is right in its current policy recommendations to promote remittances.

Catrinescu *et al.* (2009) further find that remittances have stronger effects on growth in countries with better policies and more developed institutions. Other prior macroeconomic studies include; Adams and Page (2005), Acosta *et al.* (2008) and Glytsos (2005).

In this paper, we contribute to the current debate by proposing a new-fangled way to study the determinants of remittances. Since the insurance hypothesis and altruism hypothesis have different long-run implications, we decompose the data into a trend component and cycles of various lengths. Hence, we can study the relationship between macroeconomic variables over different time horizons such as the short-run, the medium-run and the long-run. This enables us to investigate whether the data supports either of the hypotheses.

We estimate a consumption function using a band spectrum regression (see Engle 1974) in a macroeconomic panel with 50 low and middle income countries covering the period 1980-2006. The data is divided into a trend and four cycles using a maximal overlap discrete wavelet transform (see Percival and Walden, 2006). The lengths of the cycles are 1-2 years, 2-4 years, 4-8 years and 8-16 years, and the trend 16 years and beyond. The trend and the cycles may be interpreted as representing different time horizons, for example, the trend represents the long-run and the cycles the shorter horizons.

The consumption function is estimated for each horizon separately (a band spectrum regression) whereby it is possible to determine whether the altruism or the insurance hypothesis is supported by the data. Following the previous discussion, a negative relationship between remittances and consumption in the short-run and in the long-run may be interpreted as support for the altruism hypothesis. Similarly, we can find support for the insurance hypothesis if the relationship between consumption and remittances is negative in the short-run and zero in the long-run. We are not aware of any study which uses similar econometric techniques to test different hypotheses about the underlying causes of remittances.

The next section presents the data and methodology. The results are in section 3. Section 4 concludes the paper.

## 2. Methodology and Data

Data is collected from the World Bank Development Indicators and the sample contains yearly data from 50 low and middle income countries covering the years between 1980 and 2006. All data is in per capita terms and in PPP-dollars using the price level of 2005. Statistics of average GDP, consumption and remittances for the period are available in Table 4 in the appendix. We model consumption behaviour with a regular (Keynesian) consumption function[vii]. The estimated model is a one way fixed effects panel data model:

$$c_{it}^{h} = \alpha + y_{it}^{h}\beta^{h} + r_{it}^{h}\gamma^{h} + \varepsilon_{it}^{h}, \tag{1}$$

where $i$ denotes the country, $t$ is time, $h$ is the horizon, $c$ is per capita consumption, $y$ per capita GDP and $r$ per capita remittances. The residuals $\varepsilon_{it}$ are assumed to be independent across time and countries and contain a country specific fixed effect.

A similar consumption function with remittances as an explanatory variable has been estimated by Glytsos (2006), who imposes the restriction that GDP and remittances have the

same effect on consumption. However, in order to test for the validity of the altruism and the insurance hypotheses it is necessary to separate remittances from other incomes (GDP).

The data is decomposed into 5 horizons – four cycles of different lengths and a trend. The cycles last 1-2 years, 2-4 years, 4-8 years and 8-16 years and the trend (long-run) represents 16 years and beyond. These cycles may be interpreted in two different ways. First, it is possible to interpret them as shocks (1-2 year horizon), business cycle fluctuations (2-4 and 4-8 years), a growth cycle (8-16 years) and a long-run trend (16 years and beyond) (see e.g. Schumpeter, 1935; Englund *et al.* 1992). A second interpretation, following Friedman and Kuznets (1954), is to view the data as consisting of three components – "temporary" (1-2 years), "quasi-permanent" (2-16 years) and "permanent" (16 years and beyond).[viii] The main difference between these two interpretations is the treatment of the 8-16 year cycle.

The division into these five cycles and the trend is dictated by the length of the data and the chosen method to decompose it. We test whether some or all cycles can be combined into one component. A Chow test supports merging the 2-4, 4-8 and 8-16 year horizons.

Investigating the relationship between remittances and consumption is an alternative to testing the relationship between remittances and recipients' incomes. The altruism hypothesis typically relies on the assumption that migrant utilities depend on their own consumption and the consumption in source communities (see e.g. Rapoport and Docquier, 2005)). Typical measures of national income at the macro level (e.g. GDP, GNI) do not represent disposable income and do not account for e.g. tax payments, possession of financial assets (or wealth in general), or capital gains (e.g. interest rate revenues), all of which affect consumption and therefore remittances as well. Focusing on the relationship between consumption and remittances instead should therefore be a more direct approach.

The insurance hypothesis predicts that a short-run temporary decline of recipients' income is accompanied by rising remittances. The altruism hypothesis, however, also predicts

a negative relationship in the long-run. In equation 1, this implies that negative $\gamma$-parameter estimates over the 1-2 year and >16 year horizon jointly support the altruism hypothesis whereas the insurance hypothesis implies that the $\gamma$-parameter should be negative only over the 1-2 year horizon.

We divide the panel into subpanels to study differences between rapidly growing economies and declining economies as well as between low-income and middle-income economies. In rapidly growing economies, GDP per capita at least doubled between 1980 and 2006. In a declining economy, GDP per capita fell over the same period. Remittances may also have multiplier/growth effects on the economy, which should be captured in the business cycle and growth cycle horizons. It is likely that rapidly growing economies have functioning financial and government institutions and thereby the necessary infrastructure to accept remittances from abroad. It is therefore probable that they experience greater multiplier/growth effects from remittances than declining economies.

Furthermore, the countries are sorted into low income countries (less than 1000 PPP-USD per capita on average over the time period, 2005 price level) and middle income countries (more than 1000 PPP-USD per capita on average). There are in total 8 low income countries and 42 middle income countries. The panel also consists of 8 declining and 8 rapidly growing countries; see Table 4 in the appendix.

We test for non-stationarity and find that the variables are non-stationary in levels, but stationary in first differences. Therefore, to avoid problems with spurious regressions we use first differenced data. Using first differences does not affect the decomposition of the data into different time horizons (see Percival and Walden, 2006).

We correct for heteroskedasticity using a feasible consistent GMM estimator, which weights all variables with the squared residuals in equation 1. This estimator is consistent and asymptotically efficient (Davidsson and McKinnon, 2004).

## 3. Empirical Results

Tables 1-3 show the results of the band spectrum regressions for the short-run (1-2 year horizon), the medium-run (2-16 year horizon) and the long-run (>16 years), respectively. Starting with the short-run (1-2 year horizon), table 1 shows a negative and statistically significant relationship between consumption and remittances (-0.37) for growing economies. In other words, a negative shock leads to increased remittances and vice versa. This result is consistent with both the altruism hypothesis and the insurance hypothesis.

We do not find any significant relationships between consumption and remittances for any of the other subpanels in the short-run. That there is a significant effect for growing economies may be explained by the fact that these economies have developed financial institutions that allow quick transfers of remittances during economic shocks, and better investments opportunities in general. However, one should be aware of potential measurement problems that may exist in data from low and middle income countries (see e.g. Reinke, 2007), so that all the results should be interpreted with caution.

[TABLE 1 ABOUT HERE]

Chow tests suggest that it is not generally possible to separate the business cycle horizons (2-4 years and 4-8 years) from the growth cycle horizon. The 8-16 year cycle shows similar results to the business cycle and could in effect be combined with the 2-8 years business cycles into one long 2-16 year cycle.

Table 2 presents the regression results for a 2-16 year long cycle. There are multiplier/growth effects particularly in growing economies but also in low income economies. The parameter estimate of remittances is 1.4 for growing economies and 1.1 for low income countries. It is slightly less than one (0.9) for middle income countries and the panel of all countries. One implication of the high parameter estimate for remittances is that a quasi-permanent increase in remittances is consumed by the receiving households.

The parameter estimate of GDP is between 0.3 and 0.7 for the different panels, which implies that a general income increase is both saved and consumed in the medium-run. There is no evidence of such consumption smoothing behaviour for remittances. For declining economies, there is almost no relationship at all (-0.003). Declining economies may not have the necessary financial institutions allowing for rapid increases of remittances during economic downfalls. Also, declining and low income economies generally have smaller amounts of remittances (see Table 4). The effect of remittances is positive and generally higher than the effect of a general income increase. For instance, for all countries the effect of remittances is about 0.9 while the effect of other income is approximately 0.60. It is interesting to note that the effect of remittances is higher for low income countries than for middle income countries and that it is particularly high for growing economies (1.4). The latter is in line with the result in Catrinescu *et al.* (2009), who find that remittances are more beneficial for growth in countries with good policies and high quality institutions.

Table 3 shows the estimated regression results for the long-run (>16 year horizon). There is a negative relationship between remittances and consumption for growing economies and middle income countries (-0.35 and -0.51, respectively), supporting altruism. For declining economies, there is no statistically significant relationship and for low income countries there is a positive relationship (0.69) which, however, is only significant at the 10% significance level. It may be that a negative long-run relationship between consumption and remittances, as suggested by the altruism hypothesis, appears only when recipient households are able to consume above a certain level, and that migrants continue to remit until this threshold is reached. The result in the whole panel is negative as well (-0.35).

Overall, the results are more supportive of the altruism than the insurance hypothesis, which predicts a zero relationship between consumption and remittances in the long-run. There is a short-run negative relationship for rapidly growing economies and no statistically significant relationship for the other sub-panels. In the long-run, however, the relationship is significantly negative for three of the five sub-panels (All Countries, Rapidly Growing Economies and Middle Income Economies). The relationship is generally positive for the 2-16 years horizon. For some panels such as rapidly growing countries, the parameter estimates exceed unity, which indicates strong multiplier effects. A one dollar increase in remittances causes consumption to increase by 1.4 dollars. For declining economies a similar increase in remittances has no effect on consumption.

## 4. Conclusions

The aim of this paper is to propose a simple way of testing the relevance of hypotheses about determinants of remittances when using macroeconomic time series. Different hypotheses about remittances may be interpreted as containing various time horizons. More explicitly, it is conceivable that the long-run relationship between remittances and recipients' consumption/incomes is not the same as in the short-run. Using a maximal overlap discrete wavelet transform, the data is decomposed into cycles and a trend. While the altruism hypothesis suggests a negative relationship between recipients' incomes and remittances in the short- as well as the long-run, the insurance hypothesis predicts no long-run dependence (see .e.g. Rapoport and Docquier, 2005). Simple consumption functions are estimated with remittances and GDP as explanatory factors.

Generally, the results provide more support for the altruism than the insurance hypothesis. The long-run relationship (>16 year horizon) is negative and significant for the panel of all countries, growing economies and middle income countries, which is in line with altruism but not consistent with the insurance hypothesis. The parameter estimates are not significantly

different from zero for declining economies and low income countries. This result is not necessarily inconsistent with the altruism hypothesis, since the income of these countries may be so low that migrants keep remitting despite increasing incomes of the recipients. The short-run estimates for rapidly growing economies indicate a negative relationship between remittances and consumption, which suggests some degree of altruism and influence of insurance motives. However the negative relationship in the long-run is only consistent with the altruism hypothesis.[ix]

This paper proposes a new-fangled way of studying the determinants of remittances and in general the results confirm that endogeneity is a major concern when assessing their effects. We find negative correlations between remittances and consumption in the short run and in the long run. Noteworthy is de fact that the medium run horizon generally supports a positive relation between remittances and consumption. It should also be mentioned that the results, in all cases, support a positive relationship between consumption and other incomes (GDP). Higher incomes should indeed raise the ability to consume, and it appears that the positive effects from remittances are best captured in the medium-run horizon. The negative relation between remittances and consumption in the other time horizons is probably due to endogeneity and the compensatory properties of remittances. Hence, to study the relationship between remittances and economic development involves the risk of obtaining severely (downward) biased results unless the endogeneity problem is accounted for.

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Tables

| Table 1 Regression Results Short-Run (Horizon 1-2 years) | | | |
|---|---|---|---|
| Dependent Variable | Consumption | | |
| | Estimate | Std. Dev. | P-value |
| | *All Countries* | | |
| GDP | 0.533*** | 0.123 | 0.000 |
| Remittances | 0.001 | 0.227 | 0.498 |
| $R^2$ | *0.645* | | |
| | *Rapidly Growing Economies* | | |
| GDP | 0.509** | 0.274 | 0.032 |
| Remittances | -0.372*** | 0.101 | 0.000 |
| $R^2$ | *0.598* | | |
| | *Declining Economies* | | |
| GDP | 0.284 | 0.433 | 0.256 |
| Remittances | 1.812 | 1.676 | 0.140 |
| $R^2$ | *0.501* | | |
| | *Low Income Economies* | | |
| GDP | 0.291*** | 0.069 | 0.000 |
| Remittances | 0.108 | 0.179 | 0.273 |
| $R^2$ | *0.607* | | |
| | *Middle Income Economies* | | |
| GDP | 0.536*** | 0.126 | 0.000 |
| Remittances | 0.016 | 0.225 | 0.471 |
| $R^2$ | *0.646* | | |

### Table 2 Regression Results Medium-Run (Horizon 2-16 years)

| Dependent Variable | Consumption | | |
|---|---|---|---|
| | Estimate | Std. Dev. | P-value |
| | *All Countries* | | |
| GDP | 0.600*** | 0.108 | 0.000 |
| Remittances | 0.893*** | 0.291 | 0.001 |
| $R^2$ | *0.785* | | |
| | *Rapidly Growing Economies* | | |
| GDP | 0.692*** | 0.260 | 0.000 |
| Remittances | 1.424*** | 0.204 | 0.000 |
| $R^2$ | *0.908* | | |
| | *Declining Economies* | | |
| GDP | 0.561*** | 0.165 | 0.000 |
| Remittances | 0.003 | 0.316 | 0.462 |
| $R^2$ | *0.704* | | |
| | *Low Income Economies* | | |
| GDP | 0.319*** | 0.061 | 0.000 |
| Remittances | 1.127*** | 0.430 | 0.005 |
| $R^2$ | *0.753* | | |
| | *Middle Income Economies* | | |
| GDP | 0.602*** | 0.109 | 0.000 |
| Remittances | 0.872*** | 0.288 | 0.001 |
| $R^2$ | *0.783* | | |

## Table 3 Regression Results Long-Run  (>16 years)

| Dependent Variable | Consumption | | |
|---|---|---|---|
| | Estimate | Std. Dev. | P-value |
| | *All Countries* | | |
| GDP | 0.445*** | 0.045 | 0.000 |
| Remittances | -0.347*** | 0.133 | 0.005 |
| $R^2$ | *0.801* | | |
| | *Rapidly Growing Economies* | | |
| GDP | 0.330*** | 0.095 | 0.000 |
| Remittances | -0.510*** | 0.174 | 0.002 |
| $R^2$ | *0.655* | | |
| | *Declining Economies* | | |
| GDP | 0.580*** | 0.034 | 0.000 |
| Remittances | -0.085 | 0.316 | 0.394 |
| $R^2$ | *0.983* | | |
| | *Low Income Economies* | | |
| GDP | 0.317*** | 0.118 | 0.004 |
| Remittances | 0.687* | 0.481 | 0.077 |
| $R^2$ | *0.834* | | |
| | *Middle Income Economies* | | |
| GDP | 0.446*** | 0.046 | 0.000 |
| Remittances | -0.349*** | 0.134 | 0.005 |
| $R^2$ | *0.801* | | |

Appendix

| Table 4. Average Country Statistics | | | | | |
|---|---|---|---|---|---|
| Country | GDP | Consumption | Remittances | Income Group | Growth Group |
| Algeria | 5321 | 3436 | 86 | M | |
| Bangladesh | 783 | 680 | 32 | L | |
| Benin | 1124 | 1100 | 47 | M | |
| Bolivia | 3348 | 2930 | 31 | M | |
| Botswana | 7390 | 4138 | 124 | M | R |
| Brazil | 7617 | 6071 | 18 | M | |
| Burkina Faso | 828 | 799 | 35 | L | |
| Cameroon | 2109 | 1666 | 5 | M | D |
| China | 1848 | 1066 | 10 | M | R |
| Colombia | 5090 | 4142 | 73 | M | |
| Comoros | 1170 | 1233 | 47 | M | D |
| Costa Rica | 6767 | 5605 | 54 | M | |
| Corte d'Ivre | 1926 | 1556 | 14 | M | D |
| Dominica | 6022 | 5344 | 262 | M | R |
| Dominican Republic | 3859 | 3251 | 275 | M | |
| Ecuador | 5736 | 4590 | 149 | M | |
| Egypt | 3533 | 3012 | 251 | M | |
| El Salvador | 4619 | 4459 | 453 | M | |
| Gambia | 1057 | 977 | 54 | M | |
| Ghana | 933 | 874 | 3 | L | |
| Haiti | 1615 | 1542 | 137 | M | D |
| Honduras | 2958 | 2458 | 164 | M | |
| India | 1397 | 1066 | 28 | M | R |
| Jamaica | 6257 | 5205 | 576 | M | |
| Jordan | 3832 | 3935 | 759 | M | |
| Kenya | 1363 | 1155 | 30 | M | |
| Lesotho | 1047 | 1457 | 511 | M | |
| Malaysia | 8148 | 5017 | 62 | M | R |
| Mali | 826 | 775 | 31 | L | |
| Mauretania | 1631 | 1606 | 8 | M | |
| Mexico | 9863 | 7653 | 142 | M | |
| Morocco | 2829 | 2282 | 193 | M | |
| Mozambique | 461 | 459 | 8 | L | |
| Niger | 685 | 647 | 5 | L | D |
| Nigeria | 1308 | 974 | 23 | M | D |
| Pakistan | 1730 | 1499 | 77 | M | |
| Panama | 6779 | 4957 | 82 | M | |
| Philippine | 2528 | 2088 | 166 | M | |
| Rwanda | 678 | 670 | 3 | L | D |
| Senegal | 1393 | 1306 | 52 | M | |
| South Africa | 7861 | 6078 | 11 | M | |

### Table 4. Average Country Statistics Continued

| Country | GDP | Consumption | Remittances | Income Group | Growth Group |
|---|---|---|---|---|---|
| Sri Lanka | 2325 | 1968 | 150 | M | R |
| St. Kitts and Nevis | 9645 | 7549 | 251 | M | R |
| Sudan | 1227 | 1119 | 45 | M | |
| Swaziland | 3949 | 3713 | 311 | M | |
| Syria | 3516 | 2926 | 94 | M | |
| Thailand | 4668 | 3178 | 54 | M | R |
| Togo | 820 | 753 | 22 | L | D |
| Tunisia | 4577 | 3552 | 194 | M | |
| Turkey | 5911 | 4809 | 112 | M | |

**Note:** R denotes rapidly growing countries; D declining economies; M middle income countries and L low income countries. All variables are in per capita terms, PPP-dollars using the price level 0f 2005.

[i] The main reference on this is Harris and Todaro (1970).

[ii] The predictions of the altruism hypothesis are also similar to the predictions of the "Strategic Motive hypothesis" and they are therefore hard to separate. There is, however, no study specifically designed to test for the strategic motive and its relevance is difficult to assess (see e.g. Rapoport and Docquier, 2005).

[iii] Pure Altruism implies that a one dollar decrease in income is coupled with an equal increase of remittances.

[iv] The instruments employed by Chami et al. (2003) involve the income gap and the interest rate gap between the United States and the remittances receiving country but these are found to have insignificant explanatory value on remittances.

[v] Catrinescu et al. (2009) use a dynamic panel data estimator suggested by Anderson and Hsiao (1991) and use first and second lagged levels of remittances as instruments for the first difference of remittances.

[vii] A correlation study is performed to determine lag-lengths for the respective horizons. The result shows that it is a coincident relationship between all variables and no lag lengths are thus included in the model.

[viii] An alternative interpretation of the respective horizons is short-run (1-2 years), medium-run (2-16 years) and long-run (16 years and beyond).

[ix] It should also be mentioned that a negative long-run relationship between consumption and remittances may also be supportive of a Moral Hazard effect. This means that remittances receiving households are less motivated to work, which may reduce the national supply of labor and long-run economic growth.