A THEORETICAL MODEL OF REMITTANCES WITH APPLICATIONS

ABSTRACT

In this paper, we provide a theoretical model of remittances. In doing so, we provide several unique formulas using Taylor’s Theorem to measure the impact of cash remittances on health and education. We then empirically tested the impact of cash remittances on health and education to the Caribbean countries of St. Lucia and Trinidad and Tobago using nonlinear least squares to estimate the parameter coefficients. The results of the model suggest that remittances impact health and education in both countries. While the impact is positive in St. Lucia for both health and education, it is negative in Trinidad and Tobago. The positive impact on health and education in St. Lucia may perhaps be attributed to the lack of revenue allocated to health care and education. On the other hand, the negative impact on education in Trinidad and Tobago may be attributed to the provision of free education for citizens of Trinidad and Tobago.

Keywords: Remittances, Health, Education, Trinidad and Tobago, St. Lucia

JEL Classification: F3, E6

RIASSUNTO

Un modello teorico delle rimesse dall’estero con alcune applicazioni

In questo studio viene proposto un modello teorico delle rimesse dall’estero. A questo fine si forniscono differenti formule che utilizzano il teorema di Taylor per misurare l’impatto delle rimesse sulla sanità e l’istruzione. Successivamente abbiamo testato l’impatto delle rimesse sulla sanità e l’istruzione delle isole di Santa Lucia e Trinidad e Tobago nei Caraibi utilizzando i minimi quadrati non lineari per valutare i coefficienti dei parametri. I risultati evidenziano che le rimesse hanno un impatto su sanità ed istruzione in entrambi i paesi. L’impatto è positivo a Santa Lucia in entrambi i settori, mentre è negativo a Trinidad e Tobago. L’impatto positivo a Santa Lucia può essere attribuito alla mancanza di finanziamenti per le cure sanitarie e
l’istruzione. L’impatto negativo sull’istruzione a Trinidad e Tobago può essere riferito al fatto che i cittadini di queste isole usufruiscono di servizi di istruzione gratuiti.

1. INTRODUCTION

Cash remittances have been recognized as a leading type of capital flow which constitutes an important source of external finance as well as foreign exchange for developing economies (Joseph et al., 2010). Global remittances were estimated at US$551 billion in 2013, US$414 billion of which reached developing economies. Given the increase in remittance inflows, there has been an ongoing debate with respect to the impact of cash remittances on development.

The empirical literature on the impact of remittances on health and education is extensive, but limited to a few countries including Indonesia, Mexico and El Salvador, among others. However, the policy role of foreign capital flows such as remittances has been neglected by the literature, particularly in the English-speaking Caribbean countries. Furthermore, in order to determine the impact of cash remittances on health and education, the existing studies relied exclusively on an empirical approach (see, for example, Kalaj, 2015; Bansak et al., 2015 and Parinduri and Thangavelu, 2010). To our knowledge therefore, the literature lacks theoretical studies and consequently this paper provides a theoretical analysis of remittances. In addition, we implement an empirical model using data for the countries of Trinidad and Tobago and St. Lucia through a comparative analysis.

The rest of this paper is organized as follows: Section 2 introduces the theoretical model. Section 3 details the empirical analysis and Section 4 provides concluding remarks.
2. THE THEORETICAL MODEL

In this section, we present a theoretical model of remittances and its impact on health and education. The government maximizes output (GDP) by choosing the optimal inflation rate

\[ \text{Max } Y(\pi, R(\pi), H, E) \]

Where,

\[ \pi = \text{Inflation} \]
\[ Y = \text{GDP} \]
\[ R = \text{Cash Remittances} \]
\[ H = \text{Health} \]
\[ E = \text{Education} \]

The choice of this objective function is very plausible, since it is well known that the government determines the inflation rate and that \( \pi, E, H, \) and \( R \) impacts GDP. Also important to note is that an increase in inflation has a positive impact on remittance inflows (Haroon, 2012 and Jansen et al., 2012).

The solution yields

\[ Y_\pi + Y_R R_\pi = 0 \]  

(1)

where, the subscripts denote partial derivatives. Consider the following first-order Taylor series expansions:

\[ Y_\pi(\pi, R, H, E) \approx \beta_1 + \beta_2 \pi + \beta_3 R + \beta_5 H + \beta_{10} E \]  

(2)

\[ Y_R(\pi, R, H, E) \approx \beta_4 + \beta_5 \pi + \beta_6 R + \beta_{11} H + \beta_{12} E \]  

(3)

\[ R_\pi(\pi) \approx \beta_7 + \beta_8 \pi \]  

(4)

Substituting (2), (3) and (4) into (1) and suppressing the notations, we obtain
\[(\beta_1 + \beta_2\pi + \beta_3R + \beta_4H + \beta_{10}E) + (\beta_4 + \beta_5\pi + \beta_6R + \beta_{11}H + \beta_{12}E)(\beta_7 + \beta_8\pi) = 0 \quad (5)\]

The above equation can be rewritten as

\[R = -\frac{\beta_1 + \beta_2\pi + \beta_3H + \beta_4\pi^2 + \beta_5H + \beta_7E}{\beta_6\pi} \quad (6)\]

Where \(\beta\) is a parameter to be estimated, while \(\pi, E, \pi^2, H, \pi\) and \(H\) are observed data.

Differentiating (6), we obtain

\[\frac{\partial R}{\partial E} = -\frac{\beta_3 + \beta_7\pi}{\beta_6\pi} \quad (7)\]

\[\frac{\partial R}{\partial H} = -\frac{\beta_5 + \beta_7\pi}{\beta_6\pi} \quad (8)\]

However, given that we are interested in measuring the marginal impact of remittances on health and education, we take the inverse of (7) and (8).

3. Empirical Analysis

We used annual data for the period 1981 to 2010 for both St. Lucia and Trinidad and Tobago. The data was taken from World Bank Developing Indicators. The data series included GDP, inflation rate, life expectancy rate as a proxy for health, secondary school enrolment rate as a proxy for education and remittances for the two countries.

We first estimated (6) using a non-linear least squares. The estimated coefficients appear in Table 1.
We then substituted the estimated parameter into (7) and (8) and calculated the partial derivatives at the average values of the data series. The partial derivatives were then used to calculate the elasticities (that is, the percentage change in health or education in response to a 1% change in remittances). The comparative statics results for St. Lucia and Trinidad and Tobago appear in Table 2.

**TABLE 1 - Estimated Parameters**

<table>
<thead>
<tr>
<th>COEFFICIENTS</th>
<th>Model 1 - St. Lucia</th>
<th>Model 2 – Trinidad and Tobago</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_1 )</td>
<td>-5.286092</td>
<td>2.16814563043e+13</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>-1.829096</td>
<td>-5.7115605162e+12</td>
</tr>
<tr>
<td>( \beta_3 )</td>
<td>0.866444</td>
<td>24266174884.9</td>
</tr>
<tr>
<td>( \beta_4 )</td>
<td>0.067166</td>
<td>-343798960315</td>
</tr>
<tr>
<td>( \beta_5 )</td>
<td>-0.018760</td>
<td>-3167130125.78</td>
</tr>
<tr>
<td>( \beta_6 )</td>
<td>0.027529</td>
<td>91546085568</td>
</tr>
<tr>
<td>( \beta_7 )</td>
<td>-0.130127</td>
<td>-6347156858.13</td>
</tr>
<tr>
<td>( \beta_9 )</td>
<td>-0.150231</td>
<td>1158643037.1</td>
</tr>
</tbody>
</table>

**TABLE 2 - Comparative Results for St. Lucia and Trinidad and Tobago**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Model 1 – St. Lucia</th>
<th>MODEL 2 – T&amp;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{\partial E}{\partial R} )</td>
<td>0.99</td>
<td>-0.19</td>
</tr>
<tr>
<td>( \frac{\partial H}{\partial R} )</td>
<td>2.96</td>
<td>0.014</td>
</tr>
</tbody>
</table>
The results for both countries are indeed plausible and intuitive. They suggest that a one percent increase in cash remittances leads to an increase of 0.99% in enrolment in St. Lucia. These results are similar to that of Yang and Martinez (2006) and Lopez-Cordova (2004) who also found that cash remittances have a positive impact on school enrolment and retention. On the other hand, the results are different for Trinidad and Tobago, such that a 1% increase in remittances results in a 0.19% fall in enrolment. This may be due to the fact that education in Trinidad and Tobago is free and the receipt of remittances may be a reason for children to abstain from school, since their immediate needs are met by the remittances. These results correspond to results found by McKenzie and Rapoport (2011) and Hanson and Woodruff (2003), where remittances negatively impacted the education level.

With respect to health, cash remittances have a positive impact and results in a 2.96% increase for St. Lucia and a 0.014% increase for Trinidad and Tobago. This is consistent with the literature (see, for example, Levitts, 1997 and McKenzie and Hildebrandt, 2005). The impact of cash remittances on both health and education is more significant in St. Lucia than in Trinidad and Tobago, since, unlike St. Lucia, the government of Trinidad and Tobago provides free health care and education.

4. Conclusion

In this study, we developed a theoretical model to determine the impact of non-cash remittances on education and health. We also empirically implemented the model. The results suggest that cash remittances have a significant effect on both health and education. Although, in the case of Trinidad and Tobago remittances negatively impact education, it has a positive and significant impact on health and education in St. Lucia, and a positive and significant effect on health in Trinidad and Tobago. One can therefore suggest that it may perhaps be beneficial for the
relevant stakeholders to incorporate this capital flow in their development plans. It is also important for the government to encourage further research on measuring the real impact of remittances on the economy, so that coherent policies can be formulated for the economy to benefit from these capital flows.

REFERENCES


