Macroeconomic Transmission Channel of International Remittance Flows
Labour Market Adjustments and Dutch Disease Effect

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Introduction

- A sudden surge in international monetary flows in the developing countries in the form of FDI, private portfolio investments, foreign aid, remittances.

- These flows act as engines of growth and development; at the same time are believed to increase dependency

- Volatility: The recipient economies become vulnerable to external shocks and crisis

- Economic imbalances through real exchange rate problems

- The need is for appropriate policy framework to manage the effects of these flows.

*Appropriate policy designing requires a better understanding of the macroeconomic impact of these flows*
Why Remittances?

(a) Billions of USD in 2006 in Billion USD

(b) Percentage of GDP, 2006

Source: World Bank staff estimates, IMF BOP Yearbook 2006, Author's Calculation

Source: IMF BOP Yearbook 2006, World Bank staff estimates and Author's Calculation
Why Remittances?

- Remittance flows to the developing world has increased from 71 Billion USD in 1997 to 251 Billion USD in 2007, and is the second largest capital flow in the developing countries, following the Official Development Assistance (ODA).

- Current account transfers - received at a household level.

- Remittances are ‘unrequited’ capital flows which are mostly altruistically motivated and hence are countercyclical in nature

- Remittances have strong microeconomic foundations - Affects aggregate demand and aggregate supply through income effects and labour market dynamics.

*Generated at a micro level, has important macroeconomic implications*
Scope and context of the research
Small open developing countries with remittances forming an important component of BOP.

Research Objectives

- Examine the linkages between remittances and the real sector macroeconomic parameters, specifically consumption and employment channels, in the context of small open developing economies.
  - Explain the channel through which the micro-foundations of remittances i.e. household consumption and labour decisions, influence the macro level adjustments in aggregate price level, consumption and labour market.
- Examine the empirical relationship between various macroeconomic factors and remittances, through impulse response functions.
Literature Review
Resource Curse coined by Auty (2003) where he described how countries rich in natural resources were unable to utilize the wealth to promote economic activity.

Sachs & Warner (1995) documented a statistically significant, inverse association between natural resource and growth.

Corden & Neary (1982) were the first to model the Dutch Disease phenomenon.

- A Three-sector economy - the tradable sector segregated as the booming sector and the lagging sector and the non-tradable sector.
- **Resource Movement Effect**: Production shifts towards the booming sector, away from the lagging sector - Direct-deindustrialization.
- **Spending Effect**: The extra revenue increases the demand for the non-tradable output increasing its price, and hence shifting labour to the non-tradable sector from the lagging sector - Indirect-deindustrialization.

Following Corden and Neary many studies have been done to incorporate dynamic adjustment in the model (*Eastwood & Venebles 1982, Neary & Wijnbergen 1984, Buiter & Purvis 1980*)
Remittances and Dutch Disease

- The phenomenon of Dutch Disease applied to resource boom, can also be applied to remittances
- Remittances lead to reduced international competitiveness through real exchange rate appreciation (Amuedo-Dorantes & Pozo 2004, Lopez et al. 2007)
- General equilibrium analysis of macroeconomic effects of remittances (Chami et al. 2006, Acosta et al. 2007, Chami et al. 2008)
- Effects of remittances under different exchange rate regimes (Ball et al. 2008, Acosta et al. 2008)
Empirical Framework
Macroeconomic Performance of Remittances: A Preliminary Look

- Causal relationship between remittances and macroeconomic parameters
- Impulse response of these parameters to a shock in remittance flows.
- 29 countries and 30 time points (1975-2004) from three regions - LAC, South Asia, and Africa

<table>
<thead>
<tr>
<th>Variable</th>
<th>Proxy</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Household Demand</td>
<td>Per Capita Household Consumption Expenditure</td>
<td>WDI</td>
</tr>
<tr>
<td>2. Money Demand</td>
<td>M2 as a % of GDP</td>
<td>WDI</td>
</tr>
<tr>
<td>3. Inflation</td>
<td>% change in CPI</td>
<td>WDI</td>
</tr>
<tr>
<td>4. Labour Participation</td>
<td>Labour Participation Rate</td>
<td>KILM, ILO</td>
</tr>
<tr>
<td>5. Real Exchange Rate</td>
<td>Computed from official exchange rate by deflating it with the ratio of domestic CPI and US CPI</td>
<td>Author’s Calculation</td>
</tr>
<tr>
<td>6. GDP Growth rate</td>
<td>Change in GDP measured in 2000 constant prices USD</td>
<td>WDI, Author’s Calculation</td>
</tr>
</tbody>
</table>
Unit Root Stationarity and Causality

- **Unit Root Test**
  - We have an unbalanced panel of 29 cross section and 30 time points
  - We use the Fisher-type test for testing stationarity for unbalanced panel
    \[(Maddala & Wu 1999, Choi 2001)\]
    \[
P = -2 \sum_{i=1}^{N} \ln p_i
    \]

- **Granger Causality**
  - We represent the causality relation in a VAR form \[(Hurlin & Venet 2001)\]
    \[
y_{i,t} = \sum_{k=1}^{p} \gamma^{(k)} y_{i,t-k} + \sum_{k=1}^{p} \beta^{(k)} x_{i,t-k} + V_{i,t}
    \]
  - We use Arellano-Bond estimator \[(Arellano & Bond 1991)\] for testing the hypothesis:
    \[
    H_0: \beta^{(k)} = 0, \forall \ t \in [1, N], \forall \ k \in [1, p]
    \]
    \[
    H_1: \beta^{(k)} \neq 0
    \]
  - **Test Statistics**
    \[
    F = \frac{(RSS_2 - RSS_1)/Np}{RSS_1/[SN - N(1 + p) - p]}
    \]
## Fisher’s Test for Panel Unit Root

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test Statistics (Level)</th>
<th>Test Statistics (1st Difference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L(Rem/GDP)</td>
<td>102.65**</td>
<td></td>
</tr>
<tr>
<td>L(M2/GDP)</td>
<td>11.34</td>
<td>172.65***</td>
</tr>
<tr>
<td>Inf</td>
<td>280.53***</td>
<td></td>
</tr>
<tr>
<td>L(RER)</td>
<td>68.38</td>
<td>389.89**</td>
</tr>
<tr>
<td>L(HHconspc)</td>
<td>84.59***</td>
<td></td>
</tr>
<tr>
<td>L(labpart)</td>
<td>25.61</td>
<td>274.33***</td>
</tr>
<tr>
<td>GDPgr</td>
<td>551.97***</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Critical Values</td>
<td>85.95</td>
<td>76.78</td>
</tr>
</tbody>
</table>
## Causal Relationship

<table>
<thead>
<tr>
<th>Comparison</th>
<th>F Statistics</th>
<th>Causality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rem $&gt;$ GDPgr</td>
<td>7.86</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Rem $&gt;$ Hhconspc</td>
<td>4.81</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Rem $&gt;$ Labpart</td>
<td>1.92</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Rem $&gt;$ RER</td>
<td>4.82</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>GDPgr $&gt;$ Rem</td>
<td>0.22</td>
<td>No causal relationship</td>
</tr>
<tr>
<td>Hhconspc $&gt;$ Rem</td>
<td>9.25</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Labpart $&gt;$ Rem</td>
<td>19.62</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>RER $&gt;$ Rem</td>
<td>0.75</td>
<td>No causal relationship</td>
</tr>
<tr>
<td>M2 Demand $&gt;$ Rem</td>
<td>7.18</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Rem $&gt;$ M2 Supply</td>
<td>7.76</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Rem $&gt;$ Inf</td>
<td>3.90</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>Inf $&gt;$ Rem</td>
<td>0.64</td>
<td>No causal relationship</td>
</tr>
<tr>
<td>Inf $&gt;$ RER</td>
<td>1.48</td>
<td>There exists causal relationship</td>
</tr>
<tr>
<td>RER $&gt;$ Inf</td>
<td>1.34</td>
<td>No causal relationship</td>
</tr>
</tbody>
</table>

**Null hypothesis: No Causality**

**Critical Value at 10%:** 1.36
Bi-directional causality between remittances and household consumption, labour participation - The demand side of the economy.

One-way causal relationship between remittances and GDP growth - remittances, motivated altruistically - leads to growth in GDP.

One-way causal relationship between remittances and real exchange rate - summary indicator of real exchange rate

Two-way causal relationship between remittances and money

- Supply side effect - Remittances causes money supply
- Demand side effect - Remittances is caused by transaction demand for money

Remittances impact transmission can be broadly defined as:

\[ R \rightarrow HHConsppc \rightarrow M2 \rightarrow L \rightarrow Infl \rightarrow T – Sector \rightarrow RER \]
Vector Autoregressive Model

Impulse Response Graphs

STATA Module for estimating the Panel VAR from Inessa Love, World Bank

1STATA Module for estimating the Panel VAR from Inessa Love, World Bank
Percapita Household Consumption Expenditure: Response is quite erratic in the initial periods, which stabilizes at a later period. Overall an increasing trend.

Labour Participation: Labour supply declines over the period of time, at a decreasing rate.

Inflation: Instantaneous rise in the price level, which then decreases and stabilizes.

Money Demand: Money has a positive response

- Increase in remittances lead to an increase supply of money, through increased international reserves.
- Increase in remittances leads to an increase in the transaction demand for money, through increased prices.

Real Exchange Rate: Appreciation in the real exchange rate.

GDP Growth: Response positively in the initial period. Declines over a period of time.
Analytical Model
Assumptions of the Model

- A small open economy with managed to fixed exchange rate.
- There exists partial to no sterilization of money by the Central bank. Thus we rule out Central Bank’s open market operation to control money supply.
- The economy operates in two sectors of production - the traded and the non-traded.
- Labour is the only factor of production which is fully mobile within two sectors.
The Channel of Transmission Remittances

\( R_t \uparrow \rightarrow C_t^T \uparrow, C_t^N \uparrow, L_t \downarrow \rightarrow \) Labour supply goes down from labour-leisure tradeoff

\[ AD_t^T = C_t^T - Y_t^T > 0 \rightarrow \text{Excess demand in the traded sector} \]

Small open economy, terms of trade unchanged. Therefore, \( P_t^T \) remains unchanged

\[ AD_t^N = C_t^N - Y_t^N > 0 \rightarrow \text{Excess demand in non-traded sector} \rightarrow P_t^N \uparrow \]

\[ \frac{P_t^N}{P_t^T} \uparrow \rightarrow \text{Relative price of non-tadables increase} \]

\[ \text{NT Sector draws labour out of T sector} \rightarrow \frac{L_t^N}{L_t} \uparrow, \frac{L_t^T}{L_t} \downarrow \]

\[ \text{T sector contracts and country loses external competitiveness} \]
Household’s Problem

\[ U = E \sum_{t=0}^{\infty} \rho^t \left[ \gamma \ln C_t + (1 - \gamma) \ln (T - L_t) \right] \]  

(1)

where \( C_t \) is the composite consumption of T and NT goods, defined as:

\[ C_t = C_t^T \eta \cdot C_t^{N(1-\eta)} \]  

(2)

The household maximizes its utility subject to the following constraints:

\[ C_t^T + p_t C_t^N = W_t L_t + R_t \]  

(3)

\[ L_t = L_t^T + L_t^N \]  

(4)
The first order conditions (f.o.c.) from utility maximization with respect to $C_t^T$, $C_t^N$, $L_t$ and Lagrangian multiplier $\lambda$ yields:

$$C_t^T = \frac{\gamma \eta}{\lambda}$$

(5)

$$C_t^N = \frac{\gamma(1 - \eta)}{\lambda p_t}$$

(6)

$$\frac{(1 - \gamma)}{T - L_t} = W_t \lambda$$

(7)

$$W_t L_t + R - C_t^T - p_t C_t^N = 0$$

(8)
Eq. 5 and 6 are typical optimality conditions for consumption. Combining these two equations we can derive the equilibrium condition as:

\[
\frac{C_T}{C_N} = p_t \frac{\eta}{1 - \eta}
\]  

(9)

Eq. 7 gives the optimality condition for labour. It shows that labour is positively related to wage levels but increases with a decreasing rate. We can derive the labour supply function as:

\[
L_t = \bar{T} - \frac{(1 - \gamma)}{W_t \lambda}
\]  

(10)
### Non Traded Sector

NT Production Function:

\[ Y_t^N = A_t^N L_t^{N\alpha} \]  \hspace{1cm} (11)

The profit maximization condition for producers equates the value of the marginal product of labour with the wage rate.

\[ VMPL_t^N = W_t \]

\[ \Rightarrow p_t \frac{dY_t^N}{dL_t^N} = W_t \]

The profit maximizing condition gives the demand for labour in NT sector.

\[ L_t^N = \frac{\alpha p_t Y_t^N}{W_t} \]  \hspace{1cm} (12)
**Traded Sector**

T Production Function:

\[ Y_t^T = A_t^T L_t^{T \beta} \]  \hspace{1cm} (13)

The profit maximization condition for T-sector:

\[ VMPL_t^T = W_t \]

\[ \Rightarrow \frac{dY_t^T}{dL_t^T} = W_t \]

The profit maximizing condition gives the demand for labour in NT sector.

\[ L_t^T = \frac{\beta Y_t^T}{W_t} \]  \hspace{1cm} (14)
Labour market Equilibrium

The labour market equilibrium: Equality of demand and supply of labour.

\[ L_t = L_t^N + L_t^T \]

From equality of demand and supply of labour we get the equilibrium wage rate

\[ \Rightarrow W_t = \frac{(\alpha p_t Y_t^N + \beta Y_t^T) + (1 - \gamma)/\lambda}{\bar{T}} \]  \hspace{1cm} (15)

Substituting this in sectoral labour demand equations,

\[ L_t^N = \frac{\alpha p_t Y_t^N . \bar{T}}{(\alpha p_t Y_t^N + \beta Y_t^T) + (1 - \gamma)/\lambda} \]  \hspace{1cm} (16)

\[ L_t^T = \frac{\beta Y_t^T . \bar{T}}{(\alpha p_t Y_t^N + \beta Y_t^T) + (1 - \gamma)/\lambda} \]  \hspace{1cm} (17)
Model Closure: T Sector
\[ Y_t^T + R_t = C_t^T \] (18)

Model Closure: NT Sector
\[ Y_t^N = C_t^N \] (19)

Equilibrium Sector Labour:
\[ L_t^N = \frac{\alpha p_t C_t^N}{\alpha p_t C_t^N + \beta (C_t^T - R_t) + (1 - \gamma)/\lambda} \cdot \overline{T} \] (20)

\[ L_t^T = \frac{\beta (C_t^T - R_t)}{\alpha p_t C_t^N + \beta (C_t^T - R_t) + (1 - \gamma)/\lambda} \cdot \overline{T} \] (21)

Equilibrium Total Labour:
\[ L_t = \frac{\alpha p_t C_t^N + \beta (C_t^T - R_t)}{\alpha p_t C_t^N + \beta (C_t^T - R_t) + (1 - \gamma)/\lambda} \cdot \overline{T} \] (22)
Comparative Statics
Price Response to Remittance

From the foc of utility maximization

\[ p_t = \frac{C_t^T}{C_t^N} \frac{(1 - \eta)}{\eta} \]

We can say,

\[ \frac{dp_t}{d\Re} > 0 \quad (23) \]

if,

\[ (1 - \eta) > \eta \]

Or,

\[ \eta < 0.5 \]

*Remittances would lead to an increase in the relative price level if the propensity to consume NT good is higher than that of T good.*
Labour Response to Remittances

Total labour supply response:

\[
Or, \quad \frac{dL_t}{d\mathcal{R}_t} = -\frac{\beta(1-\gamma)/\lambda}{D^2} < 0
\]  

Increase in remittances causes households supply less labour

Two effects determine the equilibrium labour supply - the income effect and the substitution effect.

- Income Effect: An increase in income would lead to an increased consumption of leisure (leisure being a normal good)
- Substitution Effect: With an increase in wage rate worker will work more hours to take advantage of the higher wage rate.

Remittances increase the strength of the Income effect


**NT Sector:**

\[
\frac{dL_t^N}{dR_t} = \frac{\alpha \beta p_t C_t^N}{D^2} > 0 \tag{25}
\]

**T Sector:**

\[
\frac{dL_t^T}{dR_t} = -\frac{\alpha \beta p_t C_t^N}{D^2} - \frac{\beta (1 - \gamma)/\lambda}{D^2} < 0 \tag{26}
\]

- The first term on the R.H.S. represent the labour movement from T sector to NT sector.
- The second term on the R.H.S. represents the fall in the total labour supply.
NT Sector:

\[
\frac{d^2 L^N_t}{d^2 R^2_t} = 2 \frac{\alpha^2 p_t C^N_t}{D^3} \frac{T}{\lambda} > 0
\]

T Sector:

\[
\frac{d^2 L^T_t}{d^2 R^2_t} = -2\beta \left( \frac{\alpha \beta^2 p_t C^N_t + \beta(1 - \gamma)/\lambda}{D^3} \right) \frac{T}{\lambda} < 0
\]

An increase in remittances leads to increase in the NT sector labour relative to T sector. This results in a contraction of the T-sector.
Consumption Response to Remittances

NT Sector

\[
\frac{\delta C_t^N}{\delta R_t} = \frac{\beta C_t^N}{\alpha p_t C_t^N + \beta (C_t^T - R_t)(1 - \gamma)/\lambda} > 0
\]

\[
\frac{\delta^2 C_t^N}{\delta R_t^2} > 0
\]

T Sector

\[
\frac{\delta C_t^T}{\delta R_t} = 1 - \frac{\alpha \beta p_t C_t^N + \beta (1 - \gamma)/\lambda}{[\alpha p_t C_t^N + \beta (C_t^T - R_t) + (1 - \gamma)/\lambda]^2} > 0
\]

\[
\frac{\delta^2 C_t^T}{\delta R_t^2} < 0
\]

Consumption of NT good increases with an increasing rate but consumption of T good increases with a decreasing rate, as a response to an increase in remittances
Bayesian Estimation
The Case of Bangladesh

- We simulate the model for the case of Bangladesh
- The assumption of labour as the only factor of production is relaxed and capital is introduced in the model.
- Bayesian method to estimate parameter values is used where a prior distribution is specified for each parameter and the posterior distribution is estimated using the Monte Carlo Markov Chain (MCMC) simulation.
Figure: Model Priors and Posterior Distribution Plots
Figure: Impulse Response to a Unit Shock in Remittances
Discussion

- Increase in remittances causes an increase in the relative prices between NT and T sector - The rate of increase depends on the relative propensity to consume

- Remittances have a negative impact on the total labour supply decisions of the household.

- When examined sectorally, the NT labour increases while the T sector labour falls - Fall in the T sector labour is due to (a) fall in the total labour supply and (b) labour reallocating to NT sector.

- With an increase in remittances consumption of both T and NT good rises - Consumption of NT good rises at an increasing rate, consumption for T good rises with a decreasing rate.

- Increase in the relative prices of the non-traded good and labour moving out of the traded sector result in a decline in the traded sector output, eventually causing a contraction of the sector.
Conclusion

- Many studies on the growth effect of remittances.
- Few studies on the Dutch Disease effect of remittances, mainly with a perspective of real exchange rate appreciation.
- This study explores the channels through which remittances may lead to Dutch Disease type of effects.
- Brings in the sectoral labour reallocation framework.
- Examines Dutch Disease through price responses, consumption responses and sectoral labour reallocation responses.
Remittances and Economic Growth

- Remittances are compensatory rather than opportunistic in nature - increases consumption and alters incentive to work and invest.
- Loosens Governments current account deficit by financing debts.
- Policy incentives have only been targeted towards increasing the level of remittances.

What could be the probable policy measures?

- Policy incentives to reduce the fall in supply of labour - Moving from labour taxes towards consumption-based taxes.
- Policy framework to channelize remittances in public investments - Increasing Government expenditure in public infrastructure.
- Promote investment in business capital formation
Limitations and Extensions

Limitations

- We assume full employment equilibrium at all points in time.
- We have assumed partial to no sterilization in our model, i.e. there is no open market operation by Central Bank to limit the supply of money.

Extensions

- Labour market frictions: Restrictions like specific skill requirement, cost of movement etc. can be introduced.
- Introducing money in the system
- Similar study can be done for other monetary flows like foreign aid, by replacing household optimization with Government optimization.
Thank You