Remittance Flows under Asymmetric Information: A Contracting Approach

Ganesh Seshan\textsuperscript{1} Robertas Zubrickas\textsuperscript{2}

\textsuperscript{1}Georgetown University
School of Foreign Service in Qatar

\textsuperscript{2}University of Zurich

3 June 2014
Motivation


We explore this observation further, with interest in the magnitude of asymmetry and its effects on remittance behavior. Analysis is empirical and theoretical.
Asymmetry in information about migrant earnings matters for remittances.
Motivation

Asymmetry in information about migrant earnings matters for remittances.

- McKenzie et al. (2013), Ambler (2013), Ashraf et al. (2014)
Asymmetry in information about migrant earnings matters for remittances.

- McKenzie et al. (2013), Ambler (2013), Ashraf et al. (2014)

We explore this observation further, with interest in...
Motivation

Asymmetry in information about migrant earnings matters for remittances.

- McKenzie et al. (2013), Ambler (2013), Ashraf et al. (2014)

We explore this observation further, with interest in

- magnitude of asymmetry
Motivation

Asymmetry in information about migrant earnings matters for remittances.

- McKenzie et al. (2013), Ambler (2013), Ashraf et al. (2014)

We explore this observation further, with interest in

- magnitude of asymmetry
- its effects on remittance behavior.
Motivation

Asymmetry in information about migrant earnings matters for remittances.

- McKenzie et al. (2013), Ambler (2013), Ashraf et al. (2014)

We explore this observation further, with interest in

- magnitude of asymmetry
- its effects on remittance behavior.

Analysis is empirical and theoretical.
Asymmetry in Information

Asymmetry is assessed by contrasting migrants' earning reports with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.

Our findings are:

- Wives report only 79% of their husbands' income.
- Discrepancy increases with migrant earnings.

R. Zubrickas (U of Zurich)
Asymmetry in Information

Asymmetry is assessed by contrasting migrants’ earning reports with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.

Our findings are:
Wives report only 79% of their husbands’ income.
Discrepancy increases with migrant earnings.
Asymmetry in Information

Asymmetry is assessed by contrasting migrants' earning reports

... with reports about their earnings made by their wives.
Asymmetry in Information

Asymmetry is assessed by contrasting migrants’ earning reports

... with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.
Asymmetry in Information

Asymmetry is assessed by contrasting migrants’ earning reports ... with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.

Our findings are
Asymmetry in Information

Asymmetry is assessed by contrasting migrants’ earning reports

... with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.

Our findings are

- Wives report only 79% of their husbands’ income
Asymmetry in Information

Asymmetry is assessed by contrasting migrants’ earning reports

... with reports about their earnings made by their wives.

Sample: 108 households from Kerala, with husbands working in Qatar.

Our findings are

- Wives report only 79% of their husbands’ income
- Discrepancy increases with migrant earnings.
Discrepancy in Reports

The regression line (solid red) is shown with its 95% confidence band (green dashed lines).

Source: Authors' calculations.

R. Zubrickas (U of Zurich)

Asymmetry and Remittance Flows

3 June 2014 4 / 13
Asymmetry and Remittances

The regression line (solid red) is shown with its 95% confidence band (green dashed lines).

Source: Authors' calculations.

R. Zubrickas (U of Zurich)
Asymmetry and Remittances

The regression line (solid red) is shown with its 95% confidence band (green dashed lines).

Source: Authors' calculations.

R. Zubrickas (U of Zurich)
Reported Remittance Shares

Income share of remittances

Migrant's annual earnings report

non-parametric plot of migrant's reported income share of remittance

non-parametric plot of wife's reported income share of remittance

bandwidth=0.99

R. Zubrickas (U of Zurich)
Reported Remittance Shares

Migrant's annual earnings report

Income share of remittances

2000 4000 6000 8000 10000 12000 14000

Non-parametric plot of migrant's reported income share of remittance
Non-parametric plot of wife's reported income share of remittance

Bandwidth = 0.99

R. Zubrickas (U of Zurich)
Theoretical Approach

Our empirical findings demonstrate a significant degree of asymmetry, which call for the Costly State Verification approach (Townsend, 1979).

Justification:
- Verifications are feasible
- Existence of credible punishments
- Implicit remittance contracts

We extend the exchange remittance model with asymmetric information and CSV.
Theoretical Approach

Our empirical findings
Theoretical Approach

Our empirical findings

- demonstrate a significant degree of asymmetry
Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).
Theoretical Approach

Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).

Justification:
Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).

Justification:

- verifications are feasible
Theoretical Approach

Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).

Justification:

- verifications are feasible
- existence of credible punishments
Theoretical Approach

Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).

Justification:

- verifications are feasible
- existence of credible punishments
- implicit remittance contracts
Theoretical Approach

Our empirical findings

- demonstrate a significant degree of asymmetry
- call for the Costly State Verification approach (Townsend, 1979).

Justification:

- verifications are feasible
- existence of credible punishments
- implicit remittance contracts

We extend the exchange remittance model with asymmetric information and CSV.
The recipient offers the migrant a contract \( (r(y), S, s(y), p(y), \hat{y}) \). 

\( y \) is income, \( r \) remittance, \( S \) verification region, \( p \) penalty.

**Theorem**

\[ S = \left[ y, r(y) \right], r(y) = \min(y, r(y)). \]

We also show that the threshold \( r \) is lower when the cost of verification is higher, the recipient holds more optimistic beliefs.
The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)
Optimal Remittance Contract

The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)

- \(y\) is income, \(r\) remittance, \(S\) verification region, \(p\) penalty.

\[\text{Theorem} \quad S = [y, r(y)], \quad r(y) = \min(y, r(y)).\]
Optimal Remittance Contract

The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)

- \(y\) is income, \(r\) remittance, \(S\) verification region, \(p\) penalty.

**Theorem**

\[
S = [y, \bar{r}), \quad r(y) = \min(y, \bar{r}).
\]
Optimal Remittance Contract

The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)

- \(y\) is income, \(r\) remittance, \(S\) verification region, \(p\) penalty.

Theorem

\[ S = [y, \bar{r}], \quad r(y) = \min(y, \bar{r}). \]

We also show that the threshold \(\bar{r}\) is lower when
Optimal Remittance Contract

The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)

- \(y\) is income, \(r\) remittance, \(S\) verification region, \(p\) penalty.

**Theorem**

\[ S = [y, \bar{r}], \quad r(y) = \min(y, \bar{r}). \]

We also show that the threshold \(\bar{r}\) is lower when

- the cost of verification is higher,
Optimal Remittance Contract

The recipient offers the migrant a contract \((r(\hat{y}), S, p(y, \hat{y}))\)

- \(y\) is income, \(r\) remittance, \(S\) verification region, \(p\) penalty.

**Theorem**

\[ S = [y, \bar{r}], \quad r(y) = \min(y, \bar{r}). \]

We also show that the threshold \(\bar{r}\) is lower when

- the cost of verification is higher,
- the recipient holds more optimistic beliefs.
Theoretical Predictions

\[
\omega = \frac{y}{w - y} = \hat{y}/y
\]

The model predicts:
1. \(\omega\) decreases with income.
2. \(\omega\) is lower when (i) there is more asymmetry in information, (ii) the recipient holds more pessimistic beliefs.
3. The lower the value of \(\omega\), the lower the remittances, and vice-versa.
4. The remittance schedule is steeper at lower levels of income.
Theoretical Predictions

We define the reported earnings ratio by

\[ \omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right) \]
We define the reported earnings ratio by

\[ \omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right) \]

The model predicts

1. \( \omega \) decreases with income.
2. \( \omega \) is lower when (i) there is more asymmetry in information, (ii) the recipient holds more pessimistic beliefs.
3. The lower the value of \( \omega \), the lower the remittances, and vice-versa.
4. The remittance schedule is steeper at lower levels of income.
Theoretical Predictions

We define the reported earnings ratio by

\[ \omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right) \]

The model predicts

1. \( \omega \) decreases with income.
Theoretical Predictions

We define the reported earnings ratio by

$$\omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right)$$

The model predicts

1. $\omega$ decreases with income.

2. $\omega$ is lower when (i) there is more asymmetry in information, (ii) the recipient holds more pessimistic beliefs.
Theoretical Predictions

We define the reported earnings ratio by

$$\omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right)$$

The model predicts

1. $\omega$ decreases with income.

2. $\omega$ is lower when (i) there is more asymmetry in information, (ii) the recipient holds more pessimistic beliefs.

3. The lower the value of $\omega$, the lower the remittances, and vice-versa.
We define the reported earnings ratio by

\[ \omega = \frac{y_w}{y_h} \left( = \frac{\hat{y}}{y} \right) \]

The model predicts

1. \( \omega \) decreases with income.

2. \( \omega \) is lower when (i) there is more asymmetry in information, (ii) the recipient holds more pessimistic beliefs.

3. The lower the value of \( \omega \), the lower the remittances, and vice-versa.

4. The remittance schedule is steeper at lower levels of income.
**Determinants of the Reported Earnings Ratio**

*** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(migrant's annual earnings (US$))</td>
<td>770.264***</td>
<td>0.06</td>
<td>**</td>
</tr>
<tr>
<td>Ratio of wife to husband's account</td>
<td>70.007</td>
<td>0.03</td>
<td>*</td>
</tr>
<tr>
<td>Log(median monthly income of Gulf migrants (US$))</td>
<td>70.138*</td>
<td>0.07</td>
<td>**</td>
</tr>
<tr>
<td>Wife is employed (Indicator)</td>
<td>70.0979*</td>
<td>0.05</td>
<td>*</td>
</tr>
<tr>
<td>Only migrant decides on money matters (Indicator)</td>
<td>70.139**</td>
<td>0.05</td>
<td>**</td>
</tr>
<tr>
<td>Wife is unaware of husband's expenses (Indicator)</td>
<td>70.115**</td>
<td>0.05</td>
<td>*</td>
</tr>
<tr>
<td>Disagreement over remittance use (Indicator)</td>
<td>70.112**</td>
<td>0.04</td>
<td>**</td>
</tr>
<tr>
<td>Migrant spends on temptation goods (indicator)</td>
<td>70.184***</td>
<td>0.05</td>
<td>***</td>
</tr>
<tr>
<td>Constant</td>
<td>70.397</td>
<td>0.69</td>
<td></td>
</tr>
</tbody>
</table>

\[ R^2 = 0.242 \quad \text{Adj. } R^2 = 0.345 \]

Observations: 108
### Determinants of the Reported Earnings Ratio

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log migrant's annual earnings (US$)</td>
<td>-</td>
<td>-0.264***</td>
</tr>
<tr>
<td>Ratio of wife to husband's account of annual remittance</td>
<td>-0.007</td>
<td>0.002</td>
</tr>
<tr>
<td>Log median monthly income of Gulf migrants (US$)</td>
<td>0.138*</td>
<td>0.213**</td>
</tr>
<tr>
<td>Wife is employed (Indicator)</td>
<td>0.0979*</td>
<td>0.137**</td>
</tr>
<tr>
<td>Only migrant decides on money matters (Indicator)</td>
<td>0.139**</td>
<td>0.101*</td>
</tr>
<tr>
<td>Wife is unaware of husband's expenses (Indicator)</td>
<td>-0.115**</td>
<td>-0.107*</td>
</tr>
<tr>
<td>Disagreement over remittance use (Indicator)</td>
<td>-0.112**</td>
<td>-0.102**</td>
</tr>
<tr>
<td>Migrant spends on temptation goods (indicator)</td>
<td>-0.184***</td>
<td>-0.160***</td>
</tr>
</tbody>
</table>

*** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level.

Notes: Dependent variable is the ratio of the wife's account of the migrant's monthly earnings to his own report. Robust standard errors are displayed in parenthesis and are clustered at the district level.
**Determinants of Log Annual Remittance**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported, earnings ratio</td>
<td>0.564**</td>
<td>0.21</td>
<td>2.70</td>
</tr>
<tr>
<td>Log, migrant’s annual earnings, (US$)</td>
<td>0.721***</td>
<td>0.21</td>
<td>3.46</td>
</tr>
<tr>
<td>Household has other members, working abroad, (indicator)</td>
<td>0.607***</td>
<td>0.09</td>
<td>6.83</td>
</tr>
<tr>
<td>Household’s annual medical expenditure as a share of migrant’s income</td>
<td>0.642**</td>
<td>0.27</td>
<td>2.37</td>
</tr>
<tr>
<td>Log, household’s monthly income in India, (US$)</td>
<td>0.028</td>
<td>0.03</td>
<td>0.87</td>
</tr>
<tr>
<td>Log, median monthly income of Gulf migrants, (US$)</td>
<td>0.714*</td>
<td>0.33</td>
<td>2.15</td>
</tr>
<tr>
<td>Wife, is employed, (indicator)</td>
<td>0.013</td>
<td>0.10</td>
<td>0.13</td>
</tr>
<tr>
<td>Only migrant decides on money matters, (Indicator)</td>
<td>0.072</td>
<td>0.15</td>
<td>0.48</td>
</tr>
<tr>
<td>Wife, is unaware of husband’s expenses, (Indicator)</td>
<td>0.090</td>
<td>0.09</td>
<td>1.00</td>
</tr>
<tr>
<td>Disagreement over remittance use, (Indicator)</td>
<td>0.055</td>
<td>0.21</td>
<td>0.26</td>
</tr>
<tr>
<td>Migrant spends on temptation goods, (Indicator)</td>
<td>0.047</td>
<td>0.21</td>
<td>0.22</td>
</tr>
</tbody>
</table>

R²: 0.31

Observations: 108
Determinants of Log Annual Remittance

Reported earnings ratio - 0.655***

Log migrant's annual earnings (US$) 0.532** 0.737***

(0.24) (0.23)

Hhold has other members working abroad (indicator) -0.625*** -0.586***

(0.12) (0.10)

Hhold's annual medical expenditure as a share of migrant's income 0.679** 0.664**

(0.26) (0.26)

Log household's monthly income in India (US$) 0.0501** 0.0343*

(0.02) (0.02)

Log median monthly income of Gulf migrants (US$) 0.780** 0.679**

(0.32) (0.28)
Piece-Wise Regression for Annual Remittance

*** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level.

Notes: Controls consist of the number of other household members working abroad, household annual medical expenditure as a share of income and (log) household's annual income in India (USD).

All regression includes a constant term. Robust standard errors are displayed in parenthesis and are clustered at the district level.

The threshold income of USD 6,740 was determined using a non-linear grid search of all variables in column (4) to fit a piece-wise regression.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migrant's annual earnings (US$)</td>
<td>0.255**</td>
<td>0.547***</td>
<td>0.527***</td>
<td>0.533***</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.13)</td>
<td>(0.10)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Migrant's annual earnings beyond income threshold (US$)</td>
<td>C0.455**</td>
<td>C0.438**</td>
<td>C0.426**</td>
<td>C0.426**</td>
</tr>
<tr>
<td></td>
<td>(0.17)</td>
<td>(0.16)</td>
<td>(0.16)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Log median monthly income of Gulf migrants (US$)</td>
<td>1,994**</td>
<td>2,094**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(854.4)</td>
<td>(945.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wife is employed (indicator)</td>
<td>317.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(376.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only migrant decides on money matters (Indicator)</td>
<td>114.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(240.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wife is unaware of husband's expenses (Indicator)</td>
<td>C398.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(271.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagreement over remittance use (Indicator)</td>
<td>C317.8*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(166.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migrant spends on temptation goods (indicator)</td>
<td>C236.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(252.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R²</td>
<td>0.15</td>
<td>0.19</td>
<td>0.41</td>
<td>0.44</td>
</tr>
<tr>
<td>Number of observations</td>
<td>108</td>
<td>108</td>
<td>108</td>
<td>108</td>
</tr>
</tbody>
</table>
### Piece-Wise Regression for Annual Remittance

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migrant's annual earnings (US$)</td>
<td>0.255**</td>
<td>0.547***</td>
<td>0.527***</td>
<td>0.533***</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.13)</td>
<td>(0.10)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Migrant's annual earnings beyond income threshold (US$)</td>
<td></td>
<td>-0.455**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.17)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. Notes: Controls consist of the number of other household members working abroad, household annual medical expenditure as a share of income and (log) household's annual income in India (USD). All regression includes a constant term. Robust standard errors are displayed in parenthesis and are clustered at the district level. The threshold income of USD 6,740 was determined using a non-linear grid search of all variables in column (4) to fit a piece-wise regression.
Conclusions

Asymmetry in information within the transnational household is substantial. Asymmetry is a major determinant of remittance behavior...migrants strategically exploit their private information. The CSV approach is useful in explaining empirical patterns. Future work should revisit remittance models with the symmetry assumption...exploit panel/experimental data to examine how varying information conditions influences remittance flows.
Conclusions

Asymmetry in information within the transnational household is substantial.
Conclusions

Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior.
Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior

... migrants strategically exploit their private information.
Conclusions

Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior

... migrants strategically exploit their private information.

The CSV approach is useful in explaining empirical patterns.
Conclusions

Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior

... migrants strategically exploit their private information.

The CSV approach is useful in explaining empirical patterns.

Future work should
Conclusions

Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior

... migrants strategically exploit their private information.

The CSV approach is useful in explaining empirical patterns.

Future work should

- revisit remittance models with the symmetry assumption
Conclusions

Asymmetry in information within the transnational household is substantial.

Asymmetry is a major determinant of remittance behavior

...migrants strategically exploit their private information.

The CSV approach is useful in explaining empirical patterns.

Future work should

- revisit remittance models with the symmetry assumption
- exploit panel/experimental data to examine how varying information conditions influences remittance flows.