Internal migration as a risk-coping strategy: evidence from a typhoon.

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Presented at the KNOMAD International Conference on Internal Migration and Urbanization held in Dhaka on April 30-May 1, 2014
To which extent does *internal migration* help alleviate big shocks?

After a shock, 

1. Do households receive remittances?

2. Is it sufficient? How does it compare with other risk-coping mechanisms?

3. Is the migration decision taken *ex-ante* or *ex-post*?
In 2009, typhoon Ondoy struck Vietnam: heavy floodings.

In this paper,

- we reconstruct the flooded areas thanks to satellite images,

- match them with a panel of rural households (2008-2010) in Ha Tinh, Thua Thien Hue, and Dak Lak,

- analyze how internal migration help rural households in the recovery.
Related literature


**Informal transfers**: Townsend (1994), Fafchamps and Lund (2003), Fafchamps and Guber (2007)

**Other risk-coping**: Savings (Paxson 1992), Labor (Kochar 1999)

**Risk management**: Sandmo (1971), Rosenzweig and Binswanger (1993)

Context
Typhoon risk

Source: 1945-2011 Joint Typhoon Warning Center (US Navy)
Ondoy/Ketsana (2009)

- 2.5 Million affected people
- $785 Million in direct damages in Vietnam (EM-DAT), 1% of GDP
- Indirect damages estimated to be 4% of household income

Source: Nasa/TRMM
Risk-coping mechanisms

In rural areas, little diversification:

- mostly rice growers (a bit of coffee): 40-50% crop income.

- some wage employment (800$) and other businesses (900$) versus 2300$ for crops.

Few risk-coping instruments:

- Savings, financial institutions.

- NGOs, insurance, natural disasters funds.

- Informal transfers.
Data
Treatment across regions

Construction: area inundated during different reference periods within different radiiuses around the village (r=1, 2, 5, 10 kms).

Continuous treatment indicator at village-level (positively and significantly correlated with typhoon shock self-reports).
Treatment across time

Share of flooded area over time
(5kms around the village)

Source: Authors’ calculations (MODIS)
Household data

DFG Vulnerability in Southeast Asia:

- 3 provinces: Ha Tinh, Hue, and Dak Lak.
- 220 villages with 10 households each.
### Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Size</td>
<td>2,100</td>
<td>4.39</td>
</tr>
<tr>
<td>No. Men (16-59)</td>
<td>2,100</td>
<td>1.2</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>2,100</td>
<td>.38</td>
</tr>
</tbody>
</table>

**Household Head**

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main occupation: farmer</td>
<td>2,100</td>
<td>.66</td>
</tr>
<tr>
<td>Age</td>
<td>2,100</td>
<td>49.1</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>2,032</td>
<td>6.7</td>
</tr>
<tr>
<td>Female</td>
<td>2,100</td>
<td>.16</td>
</tr>
</tbody>
</table>

**Household Wealth**

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic income (USD)</td>
<td>2,073</td>
<td>5,121</td>
</tr>
</tbody>
</table>

**Migration**

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total remittances (USD)</td>
<td>2,099</td>
<td>526</td>
</tr>
<tr>
<td>from absent hh members (USD)</td>
<td>2,099</td>
<td>344</td>
</tr>
<tr>
<td>from relatives and friends (USD)</td>
<td>2,099</td>
<td>182</td>
</tr>
<tr>
<td>Prob.(Migrant)</td>
<td>2,100</td>
<td>.38</td>
</tr>
<tr>
<td>No. Migrants</td>
<td>2,100</td>
<td>.61</td>
</tr>
</tbody>
</table>

Source: Panel - 2008
Estimation strategy

\[ Y_{h,v,p,t} = \beta_0 + \beta_1 T_{v,t} + \beta_2 P_v + \gamma X_{h,t} + \delta_{p,t} + \alpha_h + \varepsilon_{h,v,p,t} \quad (T) \]

with:

- \( y_{h,t} \): income per capita, remittances...
- \( T_v \) is the treatment: share of area flooded in the aftermath.
- \( P_v \): share of area flooded in normal times.
- \( \mu_{p,t} \): province/wave FE, \( \alpha_h \) household FE
- \( X_{h,t} \): head (age, gender, education), household size, working members.

SE clustered at village level.
Results
Does our treatment affect income?
### Table: Income losses due to the treatment.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>All (2)</td>
</tr>
<tr>
<td>Treatment</td>
<td>-524.75*</td>
<td>-265.60**</td>
</tr>
<tr>
<td>$T_{v,2010}$</td>
<td>(293.60)</td>
<td>(136.45)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summer (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-102.50**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(52.69)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SA paddy (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-71.29**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(31.79)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Winter (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(79.76)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W paddy (6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(58.23)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3,788</td>
<td>3,882</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. All monetary values are expressed in USD (PPP).
I: Do remittances respond to the shock?
**Table:** Transfers from labor migrants in response to the treatment.

<table>
<thead>
<tr>
<th></th>
<th>Labor migrant transfers p.c.</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>local (same dis.)</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Treatment</td>
<td>-42.67**</td>
<td></td>
<td>174.70***</td>
<td>107.09**</td>
</tr>
<tr>
<td>$T_{v,2010}$</td>
<td>(18.36)</td>
<td>(56.80)</td>
<td>(44.69)</td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3,926</td>
<td>3,926</td>
<td>3,926</td>
<td></td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. All monetary values are expressed in USD (PPP).
II: Sufficient? How does it compare with other mechanisms?
**Table:** Consumption and household expenditures in response to the shock.

<table>
<thead>
<tr>
<th></th>
<th>Total (1)</th>
<th>Food (2)</th>
<th>Non-food (3)</th>
<th>Health (4)</th>
<th>Education (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>-204.82</td>
<td>-173.63*</td>
<td>48.85</td>
<td>-27.53</td>
<td>-19.61</td>
</tr>
<tr>
<td>$T_{v,2010}$</td>
<td>(175.52)</td>
<td>(100.06)</td>
<td>(31.97)</td>
<td>(41.81)</td>
<td>(49.36)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3,926</td>
<td>3,926</td>
<td>3,926</td>
<td>3,926</td>
<td>3,926</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. *****: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. All monetary values are expressed in USD (PPP).
Per capita, in the most affected village,

- total income per capita decreases by $400, crop income by $200
- households receive $140 per capita from labor migrants (long distance)
- consumption still decrease: total -$160, mostly driven by food -$130
III: From established migrants?
With established migrants

**Table:** Transfers from labor migrants in response to the treatment – subsamples of established migrants.

<table>
<thead>
<tr>
<th>Labor migrant transfers p.c.</th>
<th>local (same district)</th>
<th>long-distance (dis.)</th>
<th>long-distance (pro.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>-362.52</td>
<td>400.49***</td>
<td>227.38*</td>
</tr>
<tr>
<td>$T_{v, 2010}$</td>
<td>(302.21)</td>
<td>(138.24)</td>
<td>(123.50)</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Fixed effects</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>182</td>
<td>836</td>
<td>731</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. *** p<0.01, ** p<0.05, * p<0.1. All monetary values are expressed in USD (PPP).
Without established migrants

Table: Transfers from labor migrants in response to the treatment – subsamples without established migrants.

<table>
<thead>
<tr>
<th></th>
<th>Labor migrant transfers p.c.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local (same dis.)</td>
<td>Long-distance (diff. dis.)</td>
<td></td>
</tr>
<tr>
<td>Presence (1)</td>
<td>Amount p.c. (2)</td>
<td>Presence (3)</td>
<td>Amount p.c. (4)</td>
</tr>
<tr>
<td>Treatment $T_{v,2010}$</td>
<td>-0.104*</td>
<td>-29.12*</td>
<td>0.167*</td>
</tr>
<tr>
<td>(0.055)</td>
<td>(15.74)</td>
<td>(0.095)</td>
<td>(36.33)</td>
</tr>
</tbody>
</table>

Sample

<table>
<thead>
<tr>
<th></th>
<th>No local migrants</th>
<th>No long-distance migrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3,744</td>
<td>3,099</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. All monetary values are expressed in USD (PPP).
Interpretation and open questions
Interpretation and open questions

Migrants that are send “purposedly” are as “efficient” in terms of transfers as the others.

- are they also efficient in terms of income?
- does it change the long-term migration patterns?
- what can we learn about the migration decision?
Conclusion
Summary

- Ondoy triggered significant negative impacts
  - households are unable to cope with these losses except through transfers from labor migrants
  - while local support networks break down, long-distance networks remain effective
  - affected households without ex-ante labor migrants are more likely to send out new members
  - established and newly-sent labor migrants behave similarly in terms of transfers
  - however, a relatively large part of uninsured risk remains
Policy implications

- strong case for the implementation of functioning public insurance solutions
- further liberalization of internal migration policy in Vietnam
- implications for disaster relief efforts and labor allocation strategies
Thanks

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Appendix
Satellite data

Detecting temporal changes in the extent of annual flooding within the Cambodia and the Vietnamese Mekong Delta from MODIS time-series imagery (Sakamoto et al, 2007)
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Detecting temporal changes in the extent of annual flooding within the Cambodia and the Vietnamese Mekong Delta from MODIS time-series imagery (Sakamoto et al, 2007)
## Mean Comparison

**Table:** Treated versus control districts in 2008.

<table>
<thead>
<tr>
<th></th>
<th>Treated [696]</th>
<th>Control [1,304]</th>
<th>Difference</th>
<th>Value $D$</th>
<th>$P(\mid D \mid &gt; 0)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income per cap.</td>
<td>1403.82</td>
<td>1312.10</td>
<td>91.72</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>Crop</td>
<td>496.05</td>
<td>453.47</td>
<td>42.58</td>
<td>0.260</td>
<td></td>
</tr>
<tr>
<td>Crop (Summer)</td>
<td>101.50</td>
<td>89.23</td>
<td>12.27</td>
<td>0.234</td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>189.51</td>
<td>205.83</td>
<td>-16.32</td>
<td>0.510</td>
<td></td>
</tr>
<tr>
<td>Subsidies</td>
<td>128.86</td>
<td>124.18</td>
<td>4.68</td>
<td>0.785</td>
<td></td>
</tr>
<tr>
<td><strong>Consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption per cap.</td>
<td>1302.7</td>
<td>1223.4</td>
<td>79.32</td>
<td>0.073</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>663.75</td>
<td>610.45</td>
<td>53.29</td>
<td><strong>0.007</strong></td>
<td></td>
</tr>
<tr>
<td>Non-food</td>
<td>244.41</td>
<td>248.52</td>
<td>-4.11</td>
<td>0.797</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>60.71</td>
<td>44.40</td>
<td>16.30</td>
<td><strong>0.017</strong></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>71.51</td>
<td>70.84</td>
<td>0.67</td>
<td>0.930</td>
<td></td>
</tr>
<tr>
<td><strong>Remittances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remittances per cap.</td>
<td>20.71</td>
<td>31.81</td>
<td>-11.10</td>
<td>0.637</td>
<td></td>
</tr>
<tr>
<td>labor migrants (same district)</td>
<td>2.67</td>
<td>1.43</td>
<td>1.24</td>
<td>0.560</td>
<td></td>
</tr>
<tr>
<td>labor migrants (other district)</td>
<td>22.37</td>
<td>15.18</td>
<td>7.18</td>
<td>0.347</td>
<td></td>
</tr>
<tr>
<td>labor migrants (other province)</td>
<td>20.82</td>
<td>13.41</td>
<td>7.40</td>
<td>0.231</td>
<td></td>
</tr>
<tr>
<td><strong>Other smoothing instruments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers from friends per cap.</td>
<td>44.14</td>
<td>33.09</td>
<td>11.04</td>
<td>0.337</td>
<td></td>
</tr>
<tr>
<td>Savings per cap.</td>
<td>65.68</td>
<td>59.29</td>
<td>6.38</td>
<td>0.458</td>
<td></td>
</tr>
<tr>
<td>Borrowing per cap.</td>
<td>558.78</td>
<td>567.42</td>
<td>-8.64</td>
<td>0.489</td>
<td></td>
</tr>
</tbody>
</table>

Source: Panel - 2008. All variables are expressed in USD and per capita, i.e., adjusted by the number of household members.
Table: Transfers from other third parties (non-labor migrants, friends, public redistribution, insurance).

<table>
<thead>
<tr>
<th></th>
<th>Transfers p.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-labor migrants (1)</td>
</tr>
<tr>
<td>Treatment $T_{v,2010}$</td>
<td>-134.69 (92.62)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3,926</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses, clustered at the village level. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. All monetary values are expressed in USD (PPP).
**Table:** Borrowing and dissaving in response to the shock.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Borrowing p.c.</th>
<th>Dissaving p.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formal (1)</td>
<td>Informal (2)</td>
</tr>
<tr>
<td></td>
<td>Liquid assets (3)</td>
<td>Tangible assets (4)</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>-266.35</td>
<td>-38.49</td>
</tr>
<tr>
<td>$T_{v,2010}$</td>
<td>(214.09)</td>
<td>(153.81)</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Fixed effects</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>3,926</td>
<td>3,926</td>
</tr>
</tbody>
</table>

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