Natural Disasters and their Labor Market Consequences: Evidence from the 1998 Flood in Bangladesh

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Background

- Natural disasters have long-term consequences on agricultural growth (Sachs, 2001; Gallup and Sachs, 2000)
- Natural disasters impede accumulation of physical and capital stock (Yamauchi et al., 2008a, 2008b; Skoufias, 2003)
- Climate change increasing droughts, floods, and sea level (IPCC, 2007)
- Large development literature on constraints of households to cope with shocks
Research Objective

- Few studies focus on role of migration and labor markets in coping with natural disasters
- Migration and employment in RNF sector used to cope with shocks
- We evaluate how resilient labor markets in rural Bangladesh were to the 1998 “flood of the century” (short-term vs. long-term)
- We also look at factors that mitigated the damages
- Panel household survey collected for flood impact assessment (del Ninno et al., 2001)
Theoretical Insight on Disasters and Markets

- Consumption smoothing literature shows failure of the PIH model in developing countries
- Literature lacks insight on long-term impacts of widespread shocks
  - Community risk-sharing less likely as informal creditors overburdened (Townsend, 1994)
  - Underinvestment because of risk aversion and asset depletion (Rosenzweig and Binswanger, 1993)
Long-term Disaster Impacts on Labor Markets

- Complementarity of capital and labor crucial
- Decline in agricultural labor demand (most focus on this effect)
- Non-farm labor market also vulnerable if migration is costly or local labor surplus from shock
The 1998 “Flood of the Century”

- Bangladesh use to annual floods
- 1998 flood most severe due to duration and coverage
- Food assistance programs available
- Short-term effects on consumption, nutrition, assets, debt (del Ninno et al., 2001)
- Recent studies focus on long-term impacts on consumption, and physical and human capital accumulation (Yamauchi et al., 2008a, 2008b; Quisumbing, 2005a, 2005b)
Data

- 757 households in 126 villages from November 1998-May 2004 (four rounds)
- Focus on casual labor market module
- Use previous month wage data*
- Plot level information on normal and realized flood depth (feet)
- Village flood measure averages the deviation of the 1998 depth from the normal
- Mitigation: Irrigation, soil type, credit, distance to nearest market
Empirical Strategy

- Daily wage regression
- Covariates
  - Individual labor supply characteristics
  - Flood measure
  - Control for initial labor market conditions in 1997
  - Include thana, month, and year fixed effects
- Pooled OLS and Random effects models*
- Short-term vs. Long-term models
- Thana clustering for arbitrary correlation of flood impacts
## Baseline results

<table>
<thead>
<tr>
<th></th>
<th>Pooled OLS</th>
<th>Pooled GLS</th>
<th>RE OLS</th>
<th>RE GLS</th>
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</thead>
<tbody>
<tr>
<td><strong>1998 Flood shock</strong></td>
<td>-0.019</td>
<td>-0.017</td>
<td>-0.009</td>
<td>-0.007</td>
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<td>(0.009)</td>
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<td>(0.010)</td>
<td>(0.012)</td>
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<tr>
<td><strong>1998 Flood shock*Year 1999 dummy</strong></td>
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<td>-0.020</td>
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<td>(0.018)</td>
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<tr>
<td><strong>1998 Flood shock*Year 2004 dummy</strong></td>
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<td></td>
<td>(0.022)</td>
<td>(0.026)</td>
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<td><strong>Observations</strong></td>
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<tr>
<td><strong>R-squared</strong></td>
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## Agricultural vs. Non-Agricultural Wages

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<td>(0.025)</td>
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<td>1998 Flood shock*Year 2004 dummy</td>
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<td>-0.069**</td>
<td>-0.065***</td>
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<tr>
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<td>-0.038**</td>
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<td>(0.014)</td>
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<tr>
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<td>1998 Flood shock*Year 2004 dummy Agriculture</td>
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<td>R-squared</td>
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<td>0.30</td>
<td>0.31</td>
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Mitigation

- Percent Irrigation: Ability to shift cultivation to the dry season
- Drainage capacity: soil type can reduce the scope of the crop loss
- Presence and scale of informal credit system: Can reduce the distress sale of assets
- Proximity to markets and bazaars: provide workers access to additional outlets for employment
Findings on Mitigation

- Areas with clay soil were most severely affected in the short term.
- Irrigation and credit access might mitigate flood impacts.
  - Irrigation variable didn’t vary over time, so couldn’t identify statistically significant effect.
  - Credit access results weren’t robust.
- Labor markets closer to the weekly market or bazaar were less affected than those further away in the long-term.
Conclusion

- Severe flood caused 4-5% decline in real wages
- Emergency relief programs might have protected individuals in the short-term but not the long-term
- Non-agricultural markets suffered perhaps due to their dependence on the recovery of other markets
- Migration could possibly mitigate these impacts suggesting policies aimed at reducing moving and search costs may be a temporary solution to recover from major flood