Heterogeneous effects of a conditional cash transfer programme on mental health

A study from Malawi

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Overview

Idea
Identify the heterogeneous effects of a conditional cash transfer-mental on mental health, heterogeneity by severity in mental health

Focus
Poor adult population (15 years and older) from rural Malawi

Estimation
Intention to Treat (ITT), Interactions, Quantile Treatment Effects (QTE)

Data
Malawi Incentive Project (MIP), Malawi Longitudinal Study of Family and Health (MLSFH); 2 waves (2006-2008)

Main Findings
The effect of the ITT on mental health is 1.1 (1/4 SD)
QTE are strongest for the lowest quantile with size 4.3 (1 SD)
Outline

1. Background mental health and poverty
2. Data and cash transfer
3. Methods:
   – Heterogeneity by baseline
   – Heterogeneity post-intervention
4. Results and robustness
5. Conclusion
Mental Health matters

• 7.4% of global burden of disease due to mental health problems (Whiteford et al., 2013)
• 80% of world population live in LMICs but >90% mental health resources located in high income countries (WHO, 2005)
• 85% of people suffering from depression live in LMICs (Funk et al., 2012)
• 26.5 million healthy years lost (DALYs) due to unipolar depression in LMICs, 32.8 million Malaria (WHO, 2008)
Background: Poverty and MH

Poverty

Stressors

Lower Productivity

Poor MH

Drift

Social

Causation
Background: Poverty and MH

- Poverty
- Lower Productivity
- Poor MH
- Stressors

- Unconditional Cash Transfers
- Conditional Cash Transfers
- Assets & loans

Drift
Social
Causation
Social
### CCTs and Mental Health

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Participants</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fernald and Gunnar (2009)</td>
<td><em>Prospera</em>, matched control communities, 2-6 year old; stress (salivary cortisol level) is reduced among 2-6 year old with depressed mothers</td>
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<td>Baird et al. (2013)</td>
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</tbody>
</table>
Contribution

1. Identify general population wide effects of a CCT on MH
2. Identify heterogeneous effects by severity
   1. At baseline
   2. Post treatment
3. Identify the usage of the cash transfer and related changes in MH
4. Test the assumptions of our QTE estimator (rank preservation or similarity)
Why Malawi?

High (mental) health risk environment:

- Landlocked country with high rural poverty rate of 85% (Worldbank)
- Exposure to catastrophic shocks: droughts, food shortages (FAO, 2006)
- One of the lowest life expectancy at birth, 59 years (WHO, 2015)
- High HIV prevalence of 10% among adults (UNAIDS, 2014)
- 43% of people with HIV assumed to have mental disorders (Freeman at al. 2007)

Conditional cash transfer programme with RCT design
Conditional Cash transfer programme 2007/2008

- Condition: Keep HIV status for at least one year
  - Joint as a couple or as an individual
  - HIV tests before and after the intervention
- Half of the MLSFH 4 (2006) sample randomized in the CCT (1,403)
  - As individuals (90%) or as couples (10%)
  - HIV positive included to avoid stigmatisation
- 1,308 enrolled and randomized into 3 groups:
  - Untreated
  - Treated with lower transfer (MKW500, MKW1,000)
  - Treated higher transfer (MKW2,000, MKW4,000)
  - Attrition: 142 drop-outs (10%)
Malawi Longitudinal Study of Family and Health (MLSFH)

- Panel survey data with seven waves (1998 - 2012)
- Balaka (South), Rumphi (North), Mchinji (Central)
- Cluster randomized within village level (150 villages)

Sample size:

- Individuals randomized in the MIP
- Total sample size for the ITT and QTE: 790
- 751 for the ATET
Mental Health measure

Outcome variable: Short Form 12-item survey instrument for MH

Baseline: Avg. D=1: 50.227 vs. D=0: 49.614; t: 0.806

• General mental health measure
• 6 PH, 5 PH and 1 question combining MH and PH

<table>
<thead>
<tr>
<th>How much of the time during the past 4 weeks have you felt downhearted and depressed?</th>
</tr>
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<tbody>
<tr>
<td>During the past 4 weeks, how much of the time have you been limited in the kind of work or other regular daily activities, as a result of your physical health?</td>
</tr>
</tbody>
</table>

• PFA to derive mental health weights, 2 vector solution
• Scale: 0-100, with 0 worst and 100 best mental health, mean 50 and SD 10.
Average effect: Intention to Treat (ITT)

\[(1) \Delta y_i = \beta_0 + \beta_1 D_i + \beta_2 y_{i,t=0} + X_{i,t=0} \beta_3 + \epsilon_i\]

- \(\Delta y_i\): Change in SF12 MH (after – before)
- \(D_i\): Treatment dummy variable
- \(y_{i,t=0}\): Baseline SF 12 MH
- \(X_{t=0}\): Baseline covariates
Estimation II

Changes driven by individual conditions at baseline?

\[(2) \Delta y_i = \gamma_0 + Q_i(y_{i,t=0})\gamma_n + Q_i(y_{i,t=0}) * D_i\gamma_m + X_{i,t=0}\gamma_8 + \mu_i\]

- \(\Delta y_i\): Change in SF12 MH (after – before)
- \(Q_i(y_{i,t=0})\): 5 baseline quantiles (0.1, 0.25, 0.5, 0.75, 0.9) of SF12 MH
- \(Q_i(y_{i,t=0}) * D_i\): 5 baseline SF12 MH interacted with treatment
- \(X_{t=0}\): Baseline covariates
Estimation III

Continuous linear effects along baseline mental health?

\[(3) \Delta y_i = \delta_0 + \delta_1 D_i + \delta_2 y_{i,t=0} + \delta_3 (D_i \ast y_{i,t=0}) + X_{i,t=0} \delta_3 + \rho_i\]

- **\( \Delta y_i \)**: Change in SF12 MH (after – before)
- **\( y_{i,t=0} \)**: Baseline SF 12 MH
- **\( (D_i \ast y_{i,t=0}) \)**: Interaction of SF MH baseline with treatment
- **\( X_{t=0} \)**: Baseline covariates
Quantile Treatment Effect: Post-Intervention MH

\[(4) \Delta^\tau (y_{i,t=1}) = Q_{y1}^\tau - Q_{y0}^\tau | X_{i,t=0}, y_{i,t=0}\]

- \(\Delta^\tau (y_{i,t=1})\): Quantile treatment effect at quantile \(\tau \in (0.1, 0.25, 0.5, 0.75, 0.9)\)
- \(y_{i,t=0}\): Baseline SF12 MH
- \(X_{t=0}\): Baseline covariates

We use the sample of treated with QTE to identify cash usage.

Requires:
- Rank invariance or weaker rank similarity assumption
## Estimation 1-3, ITT

<table>
<thead>
<tr>
<th></th>
<th>(1) ΔMH</th>
<th>(2) MH baseline interaction</th>
<th>(3) MH baseline q(.) interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treated</strong></td>
<td>1.124*</td>
<td>-7.955*</td>
<td>-15.886***</td>
</tr>
<tr>
<td>MH baseline quantile q(0.25)</td>
<td>(0.640)</td>
<td>(4.339)</td>
<td>(2.999)</td>
</tr>
<tr>
<td>MH baseline quantile q(0.5)</td>
<td></td>
<td></td>
<td>-21.144***</td>
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<tr>
<td>MH baseline quantile q(0.75)</td>
<td></td>
<td></td>
<td>(2.315)</td>
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<tr>
<td>MH baseline quantile q(0.9)</td>
<td></td>
<td></td>
<td>-23.993***</td>
</tr>
<tr>
<td>Interacted treated with MH baseline q(0.1)</td>
<td></td>
<td></td>
<td>(2.479)</td>
</tr>
<tr>
<td>Interacted treated with MH baseline q(0.25)</td>
<td></td>
<td></td>
<td>-4.821**</td>
</tr>
<tr>
<td>Interacted treated with MH baseline q(0.5)</td>
<td></td>
<td></td>
<td>(2.201)</td>
</tr>
<tr>
<td>Interacted treated with MH baseline q(0.75)</td>
<td></td>
<td></td>
<td>0.470</td>
</tr>
<tr>
<td>Interacted treated with MH baseline q(0.9)</td>
<td></td>
<td></td>
<td>(1.842)</td>
</tr>
<tr>
<td>Interacted treated with MH baseline</td>
<td>0.182**</td>
<td></td>
<td>2.380**</td>
</tr>
<tr>
<td>MH baseline</td>
<td>-0.784***</td>
<td>-0.897***</td>
<td>(1.150)</td>
</tr>
<tr>
<td>Covariates</td>
<td>Yes</td>
<td>Yes</td>
<td>3.347**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.574)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.136</td>
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<td>(1.554)</td>
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</table>
### Estimation IV, QTE

<table>
<thead>
<tr>
<th></th>
<th>(1) Q(0.1) MH</th>
<th>(2) Q(0.25) MH</th>
<th>(3) Q(0.50) MH</th>
<th>(4) Q(0.75) MH</th>
<th>(5) Q(0.9) MH</th>
<th>(6) ITT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated</td>
<td><strong>4.599</strong></td>
<td>1.900</td>
<td>0.458</td>
<td>0.116</td>
<td>0.021</td>
<td><strong>1.124</strong></td>
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<tr>
<td></td>
<td>(1.793)</td>
<td>(1.200)</td>
<td>(0.852)</td>
<td>(0.512)</td>
<td>(0.296)</td>
<td>(0.640)</td>
</tr>
<tr>
<td>MH baseline</td>
<td><strong>0.334</strong>*</td>
<td><strong>0.261</strong>*</td>
<td><strong>0.276</strong>*</td>
<td><strong>0.155</strong>*</td>
<td>0.040</td>
<td><strong>0.216</strong>*</td>
</tr>
<tr>
<td></td>
<td>(0.117)</td>
<td>(0.078)</td>
<td>(0.060)</td>
<td>(0.033)</td>
<td>(0.034)</td>
<td>(0.049)</td>
</tr>
<tr>
<td>Constant</td>
<td>12.347</td>
<td>35.025***</td>
<td>43.526***</td>
<td>53.298***</td>
<td>59.915***</td>
<td>42.259***</td>
</tr>
<tr>
<td></td>
<td>(9.980)</td>
<td>(7.213)</td>
<td>(4.402)</td>
<td>(2.657)</td>
<td>(2.289)</td>
<td>(3.812)</td>
</tr>
<tr>
<td>Covariates</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## Usage of Money, QTE, D=1

<table>
<thead>
<tr>
<th></th>
<th>(1) Q(0.1) MH</th>
<th>(2) Q(0.25) MH</th>
<th>(3) Q(0.5) MH</th>
<th>(4) Q(0.75) MH</th>
<th>(5) Q(0.9) MH</th>
<th>(6) ATET ΔMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash for productivity</td>
<td><strong>8.012</strong>*</td>
<td><strong>6.035</strong>*</td>
<td><strong>3.226</strong>*</td>
<td>1.115</td>
<td>0.876</td>
<td><strong>3.394</strong>*</td>
</tr>
<tr>
<td></td>
<td>(2.808)</td>
<td>(2.446)</td>
<td>(1.643)</td>
<td>(1.068)</td>
<td>(1.141)</td>
<td>(1.318)</td>
</tr>
<tr>
<td>Cash for consumption</td>
<td><strong>7.662</strong>*</td>
<td><strong>6.771</strong>*</td>
<td>2.604</td>
<td>0.614</td>
<td>0.809</td>
<td><strong>3.119</strong>*</td>
</tr>
<tr>
<td></td>
<td>(2.872)</td>
<td>(2.577)</td>
<td>(1.936)</td>
<td>(1.193)</td>
<td>(1.138)</td>
<td>(1.256)</td>
</tr>
<tr>
<td>Cash for education</td>
<td>4.247</td>
<td>-1.735</td>
<td>-1.737</td>
<td>-1.049</td>
<td>0.270</td>
<td>-0.398</td>
</tr>
<tr>
<td></td>
<td>(4.273)</td>
<td>(3.899)</td>
<td>(3.191)</td>
<td>(2.569)</td>
<td>(2.236)</td>
<td>(1.609)</td>
</tr>
<tr>
<td>Cash for transport</td>
<td>5.553</td>
<td>2.180</td>
<td>0.518</td>
<td>-0.171</td>
<td>0.493</td>
<td>0.539</td>
</tr>
<tr>
<td></td>
<td>(3.605)</td>
<td>(3.047)</td>
<td>(2.165)</td>
<td>(1.400)</td>
<td>(1.083)</td>
<td>(1.528)</td>
</tr>
<tr>
<td>Cash for health</td>
<td>1.278</td>
<td>-4.838</td>
<td>-0.884</td>
<td>-2.498</td>
<td>-1.953</td>
<td>-3.359</td>
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<tr>
<td></td>
<td>(5.457)</td>
<td>(4.814)</td>
<td>(5.074)</td>
<td>(2.968)</td>
<td>(1.810)</td>
<td>(2.833)</td>
</tr>
<tr>
<td>Cash for other</td>
<td>-0.527</td>
<td>0.489</td>
<td>0.758</td>
<td>0.523</td>
<td>0.258</td>
<td>-0.075</td>
</tr>
<tr>
<td></td>
<td>(3.280)</td>
<td>(2.196)</td>
<td>(1.433)</td>
<td>(1.028)</td>
<td>(0.739)</td>
<td>(1.260)</td>
</tr>
<tr>
<td>MH baseline</td>
<td><strong>0.492</strong>*</td>
<td><strong>0.292</strong>*</td>
<td><strong>0.340</strong>*</td>
<td><strong>0.136</strong>*</td>
<td><strong>0.076</strong>*</td>
<td><strong>-0.717</strong>*</td>
</tr>
<tr>
<td></td>
<td>(0.113)</td>
<td>(0.091)</td>
<td>(0.078)</td>
<td>(0.052)</td>
<td>(0.046)</td>
<td>(0.056)</td>
</tr>
<tr>
<td>Constant</td>
<td>6.736</td>
<td><strong>27.226</strong>*</td>
<td><strong>37.694</strong>*</td>
<td><strong>50.420</strong>*</td>
<td><strong>55.621</strong>*</td>
<td><strong>34.184</strong>*</td>
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<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Robustness

Controlling for pathways: social interaction, productivity

• Treatment effects are robust and keep strong magnitude, no significant pathway effects on lower quantiles

Rank similarity assumption

• Following Frandsen and Lefgren (2017) we test the rank similarity assumption
• Statistical analysis identifies no rank disadvantage for treated and untreated → H:0 of rank similarity not rejected
• Rank similarity holds
Summary

1. Identify general population wide effects of a CCT on MH
   → We identify an improvement of 1.1 units in SF12 MH

2. Identify heterogeneous effects by severity
   → QTE of the outcome distribution: strongest for lowest quantile 4.3 units in SF12 MH, fades out for >q.25

3. Identify the usage of the cash transfer and related changes in MH
   → Improvements in lowest quantiles of SF12 MH associated with productivity and consumption
Conclusion

• Cash transfers provide *capabilities to invest directly or indirectly* in better mental health

• Individuals with *strongest needs* (worst mental health), *benefit the most* from the transfer for higher marginal returns of health investments
Kiitos!

Thank you!