Motivations I

- Long-time and widely accepted consensus:
  Transport infrastructure has a significant, positive and substantial impact on economic growth and poverty.
Motivations II

- An ineluctable effect? Indeed not:
  - Transport prices in Africa remain the highest in the world.
  - The share of Africa in world’s trade has decreased.
  - Poverty does not decline in most rural areas in Africa

- "Knowledge about [roads’] impacts and the heterogeneity in those impacts continues to be limited" van de Walle (2009)

- Need more robust and reliable evaluations
  Mu et van de Walle, 2007; Khandker et al, 2009

Objectives

=>Relevance of a “one-size-fits-all” approach for roads investments?

- Direct effect apart from
  - Human Capital
  - Market Access
  - Labor Opportunities?

- The Labor Activities Channel
  - What activities to escape from poverty?
  - Heterogeneity of roads 'impact
Outline

- Roads and Poverty in Cameroon
- Literature Review
- Data & Main variables
- Econometric Specification & Empirical issues
- Conclusion & Discussion

Poverty rates evolution

<table>
<thead>
<tr>
<th>Region</th>
<th>1996</th>
<th>2001</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>53.3</td>
<td>49.0</td>
<td>39.9</td>
</tr>
<tr>
<td>Rural</td>
<td>59.6</td>
<td>52.1</td>
<td>55.0</td>
</tr>
<tr>
<td>Urban</td>
<td>11.9</td>
<td>12.2</td>
<td>49.0</td>
</tr>
<tr>
<td>Douala</td>
<td>10.9</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Yaoundé</td>
<td>13.3</td>
<td>5.9</td>
<td>37.3</td>
</tr>
</tbody>
</table>

Source: ECAM I, ECAM II, ECAM III, INS
Literature review I

- **The Human Capital Channel**
  - “[Human capital is] fundamental to the broader notion of expanded human capabilities” Todaro & Smith (2006)
  - Roads as a complementary input for these provisions of human capital formation facilities to be effective Gannon and Liu (1997)
    
    Mu et van de Walle (2007); Khandker et al (2009)

- **The Market Access Channel**
  - Improved road access reduces transport cost Gannon and Liu (1997)
  - Output Market: Rise in income thanks to greater opportunities of sales or higher prices Gibson and Rozelle (2002); Escobal and Ponce (2002); Jacoby and Minten (2008); Khandker et al (2009).

Literature review II

- **The Labor Activities Channel**
  - Creation of employment and new job opportunities
    
    Jacobs and Greaves (2003); Fan (2004); Mu et van de Walle (2007)

  - Diversification of income sources
    - Diversification to meet local demand: Autarky argument.
      Barrett et al (2001)
    - Connectivity entails greater opportunities to diversify.
      Gibson and Rozelle (2002)

  - Diversification outside the farming sector
    Smith et al (2001); Lanjouw et al (2001)
Data

- The 2001 Cameroon National Household Survey (ECAM II)
  - Poverty measurement and analysis
  - Covers all the dimensions of poverty
    - Incomes, human capital, migration...
    - Both objective and subjective
  - Data at the individual and households levels
  - 10992 surveyed households

Main variables

- Poverty: *Welfare Ratio* (Gibson and Rozelle, 2002; 2003)
  - (log of) nominal consumption expenditure per adult equivalent/poverty line

- Access to infrastructures
  - Time (in hours) to the nearest tarred road; primary public school; health center; food market

- Labor Activities

```mermaid
graph TD
    Household[Household Head] --> [Active] --> Agricultural[Active]
    Household --> [Inactive] --> Non-Agriculture[Active]
    Agricultural --> Multi-Activity[Active]
    Agricultural --> Single-Activity[Active]
```
Econometric Specification

Welfare Ratio = α_{w}, z + β_{w}, z_{w} + γ_{w}, Roads + δ_{w} Labor + u_{w}

Labor = α_{l}, z + β_{l}, z_{l} + γ_{l}, Roads + u_{l}

- z: Household’s size and composition; fixed effects
- z_{w}: Human capital (household & cluster level); controls for the access to human capital facilities and markets.
- z_{l}: HH-head’s characteristics
- Labor
  - “Active” HH-head
  - “Agriculture” HH-head
  - “Agriculture Multi-Active” HH-head

Empirical Issues

- Endogeneity of Roads
  - Unobserved heterogeneity => District and rural FE
  - Reverse causality => External IV

- Reverse causality between Labor and Welfare
  - Three-Stage Least Squares

- Selection bias
  - Inverse Mills ratio
### “Active” HH-head

<table>
<thead>
<tr>
<th>Welfare Ratio</th>
<th>&quot;Active&quot; HH-head</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Active&quot; HH-head (D)</td>
<td>2.730 (0.961)**</td>
</tr>
<tr>
<td>Time to the nearest primary school (in hours)</td>
<td>0.389 (0.276)</td>
</tr>
<tr>
<td>Time to the nearest health center (in hours)</td>
<td>0.665 (0.442)</td>
</tr>
<tr>
<td>Time to the nearest food market (in hours)</td>
<td>0.701 (0.467)</td>
</tr>
<tr>
<td>Time to the nearest tarred road (in hours)</td>
<td>-1.860 (1.180)</td>
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<tr>
<td>z</td>
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<tr>
<td>x_{WB}</td>
<td>yes</td>
</tr>
<tr>
<td>x_{i}</td>
<td>yes</td>
</tr>
<tr>
<td>District Fixed Effects</td>
<td>yes</td>
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<tr>
<td>Instrumental Variables</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>5938</td>
</tr>
<tr>
<td>R2</td>
<td>0.3460</td>
</tr>
<tr>
<td>RMSE</td>
<td>0.5550</td>
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</table>

(Rebut 5%); **p< 1%

### “Agriculture” HH-head

<table>
<thead>
<tr>
<th>Welfare Ratio</th>
<th>&quot;Agriculture&quot; HH-head</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Agriculture&quot; HH-head (D)</td>
<td>-0.981 (0.130)**</td>
</tr>
<tr>
<td>&quot;Multi-Active&quot; HH-head (D)</td>
<td>0.021 (0.020)</td>
</tr>
<tr>
<td>Time to the nearest primary school (in hours)</td>
<td>0.060 (0.081)</td>
</tr>
<tr>
<td>Time to the nearest health center (in hours)</td>
<td>0.134 (0.139)</td>
</tr>
<tr>
<td>Time to the nearest food market (in hours)</td>
<td>0.122 (0.144)</td>
</tr>
<tr>
<td>Time to the nearest tarred road (in hours)</td>
<td>-0.208 (0.349)</td>
</tr>
<tr>
<td>Mills</td>
<td>Not sign.</td>
</tr>
<tr>
<td>z</td>
<td>yes</td>
</tr>
<tr>
<td>x_{WB}</td>
<td>yes</td>
</tr>
<tr>
<td>x_{i}</td>
<td>yes</td>
</tr>
<tr>
<td>District Fixed Effects</td>
<td>yes</td>
</tr>
<tr>
<td>Instrumental Variables</td>
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<tr>
<td>Observations</td>
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<td>R2</td>
<td>0.2698</td>
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<td>RMSE</td>
<td>0.5850</td>
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(Rebut 5%); **p< 1%
Main results (I)

- **No significant direct** impact of road access on consumption expenditures
  
  => What matters are the opportunities opened up by roads

- **Significant indirect** through the non-agricultural sector
Main results (II)

- **Agriculture as a poverty trap**
  - Isolation increases the probability to engage in the farming sector (no access to markets and trade opportunities)
  - As long as the household-head is primary involved in the farming sector, his diversification status does not significantly influence the level of consumption expenditures

Policy Implications

- Priority to locations where the development of non-farming activities is possible
  - A large main road may not be required
  - Take more into account economic potential

=> No “one-size-fits-all” approach!!!
Discussion

• To go further...
  ▫ Human capital and markets channels
  ▫ Labor structure in the household determines the choice of the HH-head

• To keep in mind
  ▫ Governance
  ▫ Internal labor mobility

Thanks for your attention

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