Measuring ethnic stratification and its effect on trust in Africa

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Economic Differences

Noémie Zurlinden (HSG)  Ethnic Stratification  AEL 2019
Between-group inequality
Ethnolinguistic distances
ETHNIC STRATIFICATION

COMBINING ECONOMIC AND ETHNOLINGUISTIC DISTANCES
This paper

**Theoretical part**
- Index of ethnic stratification
- Decomposition into average wealth, Gini coefficient, ethnic fractionalization and co-directionality
- Axiomatic approach

**Empirical part**
- Measure ethnic stratification on town and village level in 26 African countries
- Combine data from Afrobarometer with Ethnologue
- Ethnic stratification is related to lower trust towards individuals (from other ethnic groups) and institutions
THEORETICAL: INEQUALITY AND DIVERSITY MEASUREMENT
- Gini (e.g., Shorrocks 1980), multivariate Gini (e.g., Banerjee 2010)
- Univariate fractionalization (Bossert et al. 2011)
- Polarization (e.g., Esteban and Ray 1994; Reynal-Querol and Motalvo 2005; Permanyer 2012)

EMPIRICAL: BETWEEN-GROUP INEQUALITY AND TRUST
- CONSEQUENCES OF BETWEEN-GROUP INEQUALITY: e.g., low GDP per capita (Alesina et al. 2016), low public good provision (Baldwin and Huber 2010), civil conflict (Gubler and Selway 2012, Cederman et al. 2011, Guariso and Rogall 2016, Huber and Mayoral 2014)
- DETERMINANTS OF TRUST: e.g., between-group inequality (Tesei 2015), historical experiences (Nunn and Wantchekon 2011), conflict (Rohner et al. 2013), protests (Sangnier and Zylberberg 2017), ethnic diversity (Robinson 2017)
THEORETICAL PART: INDEX OF ETHNIC STRATIFICATION
Index of ethnic stratification

- Population $P$ of size $m > 0$
- Distance between wealth levels $w_i$ and $w_j$: $|w_i - w_j|$
- Distance between ethnicities $e_i$ and $e_j$: $\lambda(e_i, e_j)$

Index of ethnic stratification

$$S(f, \lambda) := \frac{1}{m^2} \int_{i \in P} \int_{j \in P} \lambda(e_i, e_j) |w_i - w_j| djdj$$
Decomposition of ethnic stratification

- **Average wealth:**
  \[ \mu(w) := \frac{1}{m} \int_{i \in P} w_i \, di \]

- **Gini coefficient of inequality:**
  \[ G(w) := \frac{1}{2 \mu(w) m^2} \int_{i \in P} \int_{j \in P} |w_i - w_j| \, dj \, di \]

- **Ethnic fractionalization:**
  \[ F(e) := \frac{1}{m^2} \int_{i \in P} \int_{j \in P} \lambda(e_i, e_j) \, dj \, di \]
CO-DIRECTIONALITY

VILLAGE A

VILLAGE B
Empirical part: Local ethnic stratification and trust in Africa
Geocoded data from Afrobarometer survey (BenYishay et al. 2017), rounds 5 (2011-2013) and 3 (2005-2006)

- Assets: Radio, television, mobile phone, motorcycle/car, types of water source, toilet, house and roof
Data

Geocoded data from Afrobarometer survey (BenYishay et al. 2017), rounds 5 (2011-2013) and 3 (2005-2006)

- Assets: Radio, television, mobile phone, motorcycle/car, types of water source, toilet, house and roof ⇒ wealth index (PCA) ⇒ wealth distance

Language, ethnicity: Match to Ethnologue (Gordon Jr., 2005) ⇒ ethnolinguistic distances
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- Language, ethnicity: Match to Ethnologue (Gordon Jr., 2005) ⇒ ethnolinguistic distances
Largest groups in Nigeria

**FIGURE 1: Language trees**
Largest groups in Nigeria

Ethnolinguistic distance: Distance measure by Putterman and Weil (2010)

\[ \lambda_{i,j} = 1 - \sqrt{\frac{2t_{ij}}{T_i + T_j}} \]

**Figure 1:** Language trees
Data

Geocoded data from Afrobarometer survey (AidData), rounds 5 (2011-2013) and 3 (2005-2006)

- Assets: radio, television, mobile phone, motorcycle/car, types of water source, toilet, house and roof ⇒ wealth index (PCA) ⇒ wealth distances
- Language, ethnicity: match to Ethnologue ⇒ ethnolinguistic distances
Data

Geocoded data from Afrobarometer survey (AidData), rounds 5 (2011-2013) and 3 (2005-2006)

- Assets: radio, television, mobile phone, motorcycle/car, types of water source, toilet, house and roof $\Rightarrow$ wealth index (PCA) $\Rightarrow$ wealth distances
- Language, ethnicity: match to Ethnologue $\Rightarrow$ ethnolinguistic distances
- Trust: indicator variables for trust in relatives, neighbors, other people, local assembly (round 5), people from own and other ethnic groups (round 3)
Final sample round 5

Legend

Ethnic stratification

- 0.0000 - 0.0000
- 0.0001 - 0.0197
- 0.0197 - 0.0393
- 0.0393 - 0.0589
- 0.0589 - 0.0785
- 0.0785 - 0.0982
**Specifications**

Linear probability model:

\[ Trust_{ivce} = \beta S_{vc} + \theta X_{ivce} + FE_c + FE_e + \epsilon_{ivce} \]

- **Trust\(_{ivce}\)**: trust indicator for respondent \(i\) living in town / village \(v\) of country \(c\) and belonging to ethnolinguistic group \(e\)
- **\(S_{vc}\)**: ethnic stratification in town / village \(v\)
- **\(X_{ivce}\)**: control variables (wealth, age, age squared, religion, education, urban/rural)
- **\(FE_c\)**: country fixed effects
- **\(FE_e\)**: ethnolinguistic group fixed effects

Also control for:

- **\(F_{vc}\)**: local ethnic fractionalization
- **\(G_{vc}\)**: local wealth inequality (Gini)
- **\(\mu_{vc}\)**: local average wealth

Two-way clustered standard errors at the level of ADM1 regions and ethnolinguistic groups.
## Ethnic Stratification and Trust in Individuals and Institutions (Round 5)

<table>
<thead>
<tr>
<th>Dep. variable:</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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</thead>
<tbody>
<tr>
<td>Trust in relatives</td>
<td>Trust in neighbors</td>
<td>Trust in other acquaintances</td>
<td>Trust in local assembly</td>
<td></td>
</tr>
<tr>
<td>Stratification</td>
<td>-1.30**</td>
<td>-2.19***</td>
<td>-1.73***</td>
<td>-1.31**</td>
</tr>
<tr>
<td></td>
<td>(0.52)</td>
<td>(0.44)</td>
<td>(0.34)</td>
<td>(0.55)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.16</td>
<td>0.18</td>
<td>0.12</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Notes: ***, **, * indicate significance at the 1, 5 and 10%-level, respectively.
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<table>
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<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. variable:</td>
<td>Trust in relatives</td>
<td>Trust in neighbors</td>
<td>Trust in other</td>
<td>Trust in local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>acquaintances</td>
<td>assembly</td>
</tr>
<tr>
<td>Stratification</td>
<td>-1.30**</td>
<td>-2.19***</td>
<td>-1.73***</td>
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<td>0.18</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>Stratification</td>
<td>-1.64*</td>
<td>-2.09***</td>
<td>-2.02***</td>
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<tr>
<td></td>
<td>(0.94)</td>
<td>(0.78)</td>
<td>(0.69)</td>
<td>(0.70)</td>
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<tr>
<td>Fractionalization</td>
<td>0.07</td>
<td>0.03</td>
<td>0.06</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Gini</td>
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<td>-0.09</td>
<td>-0.03</td>
<td>0.01</td>
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<tr>
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<td>(0.09)</td>
<td>(0.11)</td>
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<td>(0.17)</td>
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<tr>
<td>Average wealth</td>
<td>-0.24***</td>
<td>-0.51***</td>
<td>-0.40***</td>
<td>-0.36**</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
<td>(0.14)</td>
<td>(0.14)</td>
<td>(0.15)</td>
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<tr>
<td>$R^2$</td>
<td>0.16</td>
<td>0.19</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>Observations</td>
<td>21,544</td>
<td>21,521</td>
<td>21,475</td>
<td>19,236</td>
</tr>
</tbody>
</table>

Notes: ***, **, * indicate significance at the 1, 5 and 10%-level, respectively.
## Ethnic stratification and trust in own/other ethnic groups (Round 3)

<table>
<thead>
<tr>
<th>Dep. variable:</th>
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<tbody>
<tr>
<td></td>
<td>Trust in own ethnic group</td>
<td>Trust in other ethnic group</td>
<td>Higher trust in own ethnic group</td>
</tr>
<tr>
<td>Stratification</td>
<td>0.23</td>
<td>-0.01</td>
<td>-0.14</td>
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<tr>
<td></td>
<td>(0.43)</td>
<td>(0.43)</td>
<td>(0.28)</td>
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<tr>
<td>$R^2$</td>
<td>0.14</td>
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<td>0.07</td>
</tr>
<tr>
<td>Stratification</td>
<td>0.28</td>
<td>-0.16</td>
<td>0.99*</td>
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<td>(0.57)</td>
<td>(0.72)</td>
<td>(0.51)</td>
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<tr>
<td>Fractionalization</td>
<td>0.00</td>
<td>0.05</td>
<td>-0.18**</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.12)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Gini</td>
<td>0.00</td>
<td>-0.02</td>
<td>-0.07</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Average wealth</td>
<td>-0.15</td>
<td>-0.19</td>
<td>-0.07</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.17)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.14</td>
<td>0.13</td>
<td>0.07</td>
</tr>
<tr>
<td>Observations</td>
<td>11,833</td>
<td>11,710</td>
<td>11,683</td>
</tr>
</tbody>
</table>

Notes: ***, **, * indicate significance at the 1, 5 and 10%-level, respectively.
Conclusion

- New index of ethnic stratification: based on economic and ethnic distances between pairs of individuals
- Calculate ethnic stratification on the town and village level in 26 African countries
- Findings: Higher local ethnic stratification...
  - decreases trust in people an individual knows and in local political institutions
  - makes it more likely that respondents trust people from their own ethnic group more than people from other ethnic groups
THANK YOU!

Comments / questions: noemie.zurlinden@unisg.ch
APPENDIX
Final Sample Round 3

Legend
Ethnic stratification
- 0.0000 - 0.0000
- 0.0005 - 0.0288
- 0.0288 - 0.0571
- 0.0571 - 0.0854
- 0.0854 - 0.1136
- 0.1136 - 0.1419

[Map of Africa with various regions highlighted in different shades to represent ethnic stratification]
<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 5:</td>
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<tr>
<td>Trust in relatives</td>
<td>21,544</td>
<td>0.826</td>
<td>0.379</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Trust in neighbors</td>
<td>21,521</td>
<td>0.607</td>
<td>0.488</td>
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<td>1</td>
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<tr>
<td>Trust in other acquaintances</td>
<td>21,475</td>
<td>0.416</td>
<td>0.493</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Trust in local assembly</td>
<td>19,236</td>
<td>0.493</td>
<td>0.500</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Ethnic stratification (S)</td>
<td>21,579</td>
<td>0.007</td>
<td>0.013</td>
<td>0</td>
<td>0.098</td>
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<tr>
<td>Fractionalization (F)</td>
<td>21,579</td>
<td>0.103</td>
<td>0.147</td>
<td>0</td>
<td>0.696</td>
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<td>Wealth inequality (G)</td>
<td>21,579</td>
<td>0.083</td>
<td>0.047</td>
<td>0</td>
<td>0.390</td>
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<tr>
<td>Average wealth ($\mu$)</td>
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<td>0.341</td>
<td>0.069</td>
<td>0.094</td>
<td>0.738</td>
</tr>
<tr>
<td>Round 3:</td>
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<tr>
<td>Trust in own ethnic group</td>
<td>11,833</td>
<td>0.550</td>
<td>0.498</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Trust in other ethnic group</td>
<td>11,710</td>
<td>0.420</td>
<td>0.494</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Higher trust in own group</td>
<td>11,683</td>
<td>0.263</td>
<td>0.440</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Ethnic stratification (S)</td>
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<td>0.013</td>
<td>0.022</td>
<td>0</td>
<td>0.142</td>
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<tr>
<td>Fractionalization (F)</td>
<td>11,860</td>
<td>0.101</td>
<td>0.149</td>
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<td>0.639</td>
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<tr>
<td>Wealth inequality (G)</td>
<td>11,860</td>
<td>0.252</td>
<td>0.103</td>
<td>0</td>
<td>0.750</td>
</tr>
<tr>
<td>Average wealth ($\mu$)</td>
<td>11,860</td>
<td>0.202</td>
<td>0.058</td>
<td>0</td>
<td>0.551</td>
</tr>
</tbody>
</table>
**Robustness Tests**

- Using index based primarily on ethnicity instead of language.
- Measure economic distances using the perception-based lived poverty index instead of wealth index.
- Controlling for respondent’s generalized trust and for cluster-level average of generalized trust.
- Controlling for trustworthiness of people and local political institutions.
- Use categorical answers to trust questions to build variables that can take values 0 (“not at all”), 1 (“just a little”), 2 (“somewhat”), or 3 (“a lot”).
- Estimate Probit maximum likelihood models instead of linear probability models.
- Round 5: sample restricted to countries from round 3.

Most robustness tests support the general pattern of our results.
We can show that our index of ethnic stratification satisfies the following axioms:

- Co-directionality by wealth creation or transfer
- Bi-polarization by wealth transfer
- Co-directionality by linguistic change
CO-DIRECTIONALITY BY WEALTH CREATION OR TRANSFER
Co-directionality by wealth creation or transfer

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Bi-Polarization by Wealth Transfer
Bi-Polarization by Wealth Transfer

Noémie Zurlinden (HSG)

Ethnic Stratification

AEL 2019 30 / 21
Co-directionality by linguistic change
Co-directionality by linguistic change