State vs Consumer Regulation
The case of Road Safety in Kenya

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Traffic fatalities and injuries

• Global figures
  – Annual road fatalities: 1.3 million
  – Annual road injuries: 20 – 50 million

• By level of development

<table>
<thead>
<tr>
<th></th>
<th>Low income</th>
<th>Middle income</th>
<th>High income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths per 100,000 population</td>
<td>21.5</td>
<td>19.5</td>
<td>10.3</td>
</tr>
<tr>
<td>Deaths per vehicle (relative rates)</td>
<td>9</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
# Leading causes of death

<table>
<thead>
<tr>
<th>2004</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>%</td>
</tr>
<tr>
<td>Ischaemic hearth disease</td>
<td>12.2</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>9.7</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>7.0</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>5.1</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>3.6</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>3.5</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>2.5</td>
</tr>
<tr>
<td>Trachea, bronchus, lung cancers</td>
<td>2.3</td>
</tr>
<tr>
<td>Road traffic injuries</td>
<td>2.2</td>
</tr>
<tr>
<td>Prematurity and low birth weight</td>
<td>2.0</td>
</tr>
<tr>
<td>Neonatal infections and other</td>
<td>1.9</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.9</td>
</tr>
<tr>
<td>Malaria</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Source: WHO Global Status Report on Road Safety, 2009
Leading causes of death, by age

<table>
<thead>
<tr>
<th>Rank</th>
<th>0-4 years</th>
<th>5-14 years</th>
<th>15-29 years</th>
<th>30-44 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perinatal causes</td>
<td>Lower respiratory infections</td>
<td>Road traffic injuries</td>
<td>HIV/AIDS</td>
</tr>
<tr>
<td>2</td>
<td>Lower respiratory infections</td>
<td>Road traffic injuries</td>
<td>HIV/AIDS</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>3</td>
<td>Diarrhoeal diseases</td>
<td>Malaria</td>
<td>Tuberculosis</td>
<td>Road traffic injuries</td>
</tr>
</tbody>
</table>

Source: WHO Global Status Report on Road Safety, 2009
## Causes and Responses

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather conditions</td>
<td>Hope?</td>
</tr>
<tr>
<td>Road conditions</td>
<td>Road construction and maintenance</td>
</tr>
<tr>
<td>Vehicle conditions</td>
<td>Vehicle Inspection laws</td>
</tr>
<tr>
<td>Driver quality</td>
<td>Driver training and licensing laws</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver risk taking behavior</td>
<td></td>
</tr>
<tr>
<td>• Speed</td>
<td>Speed limits</td>
</tr>
<tr>
<td>• DUI</td>
<td>Blood alcohol limits (other drugs?)</td>
</tr>
<tr>
<td>Driver/passenger precautions</td>
<td></td>
</tr>
<tr>
<td>• Seat belt use</td>
<td>Mandatory use laws</td>
</tr>
<tr>
<td>• Child restraint use</td>
<td>Mandatory use laws</td>
</tr>
<tr>
<td>• Helmet use</td>
<td>Mandatory use laws</td>
</tr>
</tbody>
</table>
Economic motivation

Inter-vehicle externality

Intra-vehicle externality
This project

• We focus on one type of vehicle
  – 14 seater minibuses, or *matatus*, in Kenya

• Assess the impacts of two interventions
  – The Michuki Rules
    • a tightening of regulations governing *matatus*, and a strengthening of enforcement
  – Consumer empowerment
    • a simple message campaign aimed at passengers

• Caveat: this is not a full RCT
Outline

I. The Michuki Rules: State Regulation
   – Description of the reform
   – Data
   – Empirical Strategy
   – Results

II. RCT of an intervention to Motivate Consumer Regulation
    – Results of Phase I
    – Proposed Phase II: scale-up plus modifications
I. Michuki Rules

• Initiated by the Minister of Transport, John Njoroge Michuki, in February 2004

• Wide-ranging reforms
  – Mandatory speed governors
  – Driver certification
  – Seat belts, to enforce limits on occupancy
  – Vehicle and driver/tout appearance
Before

After

I’m serious!
Outcome

- Widespread shortages of public transport immediately after the reform

- Anecdotal evidence of large positive effects on *matatu* safety, followed by a perceived deterioration of safety conditions

- Michuki became Minister for Internal Security in December 2006
Data

• Claims data from four insurance companies
  – In 2008, these covered 90-95% of *matatus*
## Insurance data

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Blue Shield</th>
<th>Amaco</th>
<th>Direct Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy data</strong></td>
<td>✓</td>
<td>x</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Claims data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vehicle Class*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Deaths</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Injuries</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Claim amount</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Private vehicles, commercial vehicles (trucks, etc.), buses, *matatus*, motorcycles.

- **Standard data is most suitable for studying Michuki rules**
Empirical Strategy

• We examine changes in claims rates of *matatus* before and after the reforms

• .......and compare these with claims rates for other private vehicles not directly affected by the reforms

• Specifically:

\[
prob(y_{ijt} = 1) = \theta_0 + \omega_i + \sum_\tau \delta_\tau I_{t=\tau} + \sum_\tau \beta_\tau C_j I_{t=\tau} + \varepsilon_{ijt}
\]

where \( y_{ijt} = 1 \) if vehicle \( i \) of class \( j \) filed a claim in period \( t \); \( t = 0 \) is date of reform; \( C_j = 1 \) if class is *matatu*.

• \( \beta_\tau \) captures the deviations from trend compared with private vehicles.
Time Profile for Policies/Accidents for Private Vehicles

- Number of policies
- Claims

- Months after reform

○ Policies
△ Claims
Time Profile for Policies/Accidents for Matatus

- Number of policies
- Claims

Months after reform

○ Policies
▲ Claims
Differential Likelihood of Matatu Claim

Months after reform
Time Profile for Policies/Accidents for Buses

- o Policies
- ▲ Claims
II. Consumer regulation

• We empower/encourage passengers to demand better driving behavior, to:

Heckle and Chide!

• Phase I, we inserted motivational stickers in the passenger cabins of randomly selected *matatus*

• Drivers enrolled in a lottery to encourage retention of stickers (cost about $5 per vehicle per year)
Don’t just sit there as he drives dangerously! STAND UP SPEAK UP NOW!

Je, utaweza kuongea akizusha ajali? KAA MACHO. KAA CHONJO. TETA!

Hey, if he’s driving recklessly, will you arrive? BE AWAKE. BE STEADY. SPEAK UP!

Je, ukiendeshwa vibaya, utafika? KAA MACHO. KAA CHONJO. TETA!

Hey, will you complain after he causes an accident? BE AWAKE. BE STEADY. SPEAK UP!
The REST *survived* the matatu accident

A **careless** MATATU driver is your wake up call!
STAND UP. SPEAK UP.
OR WILL THE REST OF YOU SURVIVE TODAY?

This message has been given in the interest of passenger safety with support from:
Matatu routes
Design

• Sample size: 2,300

• Assigned to treatment/control based on last digit of license plate

• All treated *matatus* offered same five stickers

• Control *matatus* got nothing, ineligible for lottery
Recruitment site, Nairobi
Sticker insertion
Results

\[ y_{ijt} = \alpha_o + \beta_1 Post_{it} + \beta_2 T_{it} + \beta_3 (Post \times T)_{it} + \mu_j + \epsilon_{ijt} \]

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post I</td>
<td>0.024</td>
<td>0.025</td>
<td>0.029</td>
<td>0.030</td>
<td></td>
</tr>
<tr>
<td>(0.012)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post II</td>
<td>0.007</td>
<td>0.009</td>
<td>0.010</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>(0.010)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post x T I</td>
<td>-0.042</td>
<td>-0.043</td>
<td>-0.050</td>
<td>-0.051</td>
<td></td>
</tr>
<tr>
<td>(0.016)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post x T II</td>
<td>0.062</td>
<td>0.042</td>
<td>0.061</td>
<td>0.042</td>
<td></td>
</tr>
<tr>
<td>(0.008)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SACCO controls</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>4322</td>
<td>4318</td>
<td>4322</td>
<td>4318</td>
<td></td>
</tr>
<tr>
<td>Rate reduction</td>
<td>-45%</td>
<td>-57%</td>
<td>-50%</td>
<td>-63%</td>
<td></td>
</tr>
</tbody>
</table>

*p-values in parentheses.
Sustainability?

Differential likelihood of claim (matatus vs private) by quarter

![Graph showing differential likelihood of claim by quarter.](image-url)
Phase II: Stickers

• Collaborating with Direct Line Assurance to implement a second phase
  – Sample size: up to 10,000

• We examine additional issues of:
  – Mechanisms (direct observations)
  – Fear vs Reason (different stickers)
  – Group vs individual action (different stickers)
  – Lottery vs stickers (use pure control + placebo)
  – Sustainability (local ownership, etc.)
Phase II: Media campaign

• We are also partnering with Royal Media Services
  – Operates 12 radio stations across the country
  – Some in local tribal languages
  – Willing to geographically roll out campaign/randomize

• So we hope to examine relative effects of
  – real-time motivation (stickers) vs
  – general awareness campaigns (radio)
Conclusions

• There is limited evidence that explicit regulation had, if anything, only a short term impact on road accidents

• There appears to have been no long term effect

• Encouraging evidence from information campaign
Time Profile for Policies/Accidents for Private Vehicles

- Number of policies vs. Months after reform
- Injury/Death Claims vs. Months after reform

○ Policies
▲ Claims
Injury/Death Claims

Time Profile for Policies/Accidents for Matatus

- Number of policies
- Injury/Death Claims

Months after reform

○ Policies
▲ Claims

34
Differential Likelihood of Matatu Claim: Injury or Death

Relative Likelihood

Months after reform

-20 -16 -12 -8 -4 0 4 8 12 16 20 24