Using Data to Make Better Decisions

Prof. Nick Tsivanidis

University of California, Berkeley
International Growth Centre

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Rapid Urbanization: Challenges and Opportunities

- **Amman population today**: 4mn - doubled since 2004
- **Urbanization presents opportunity**: Firms and workers are more productive in cities
- **But also challenges**: Congestion (traffic, housing, public services) & uncoordinated growth (sprawl)
- **Governments can use data** to help minimize the costs & maximize the benefits of urbanization
What Kinds of Data Can Be Collected?

Active/Traditional

- Household/Firm Surveys
- Tax records
- Administrative records (electricity/water/health)

Passive/New

- Satellites
- Bus GPS & Monitoring
- Cellphones
- Sensors & Video Cameras
- Google Maps/Streetview
Using Data to Make Better Decisions

1. **Measuring Gaps** to enhance service delivery

2. **Policy Evaluation**: feedback to understand impacts

3. **Forecasting** the future and predicting the impact of potential policies
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We can measure buildings/slums from satellites

Source: Gechter and Tsivanidis (2018)
...and where cities have grown

- Together, these identify areas to target new service provision

Combining Twitter with Admin Data to Map Floods in Jakarta

- App collects real-time flooding reports

- **Key Feature**: Combines twitter+government data

- Provides key information to identify weaknesses
Using GPS to Improve Public Transport Management

- Intelligent Transport Systems: Bogotá, Santiago, Lagos

- Bus locations tracked via GPS every 5 seconds

- Allows for reoptimization of buses as conditions change

- Data Sharing: Apps can integrate to provide services (e.g. journey planning)
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Data for Policy Impact Evaluation

2 Examples from our team’s research

1. Examining the impact of Bus Rapid Transit in Bogotá
2. Understanding the effect of migrant influx in Amman
TransMilenio: World’s Most Used Bus Rapid Transit System
Overview

1. **Detailed data** across 3000 census tracts available before and after BRT construction
   - Collaborated with *different government departments* (statistics, GIS, cadastral) to collect data for comprehensive analysis
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2. **Measure impact of BRT on**

   - Save Time On Commute
   - Where to live
   - Where to work
   - House Prices, Wages
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3. **Use economic model to measure impact on GDP+welfare** and understand **what would the effect have been of other policies government policies**
Where did the BRT improve workers’ access to jobs?
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Quantifying the Gains from TransMilenio

1. **TransMilenio increased GDP of Bogotá** by at least 2.73% (net of construction+operation costs)

2. About 70% comes from **saved travel time**, 30% from **improved allocation of labor**

3. Low- and high-skill workers **benefit about the same** ⇒ equitable impacts
Understanding the Impact of Rapid Refugee Influx in Amman

Overview:

1. **Document patterns** of migration into and commuting within Amman

2. **Examine impact** of migrant influx on city structure
   - Evaluate the effect on traffic and public service congestion
   - Understand the influx’s impact on housing and labor markets

3. **Quantify effect** on GDP/welfare and **evaluate which policies best solve the challenges** of this rapid urban growth
The Challenges of Rapid Refugee Influx in Amman

Data:

1. **Traditional Sources**
   - Establishment Census (firms), 2006 and 2011
   - Population and Housing Census, 2004 and 2015
   - Business Licenses
   - *In progress*: Cadstral maps of land plots and use, municipal services (water, garbage)

2. **New Sources**
   - Cellphone Metadata: mobile phone calls data and tower locations
   - Satellite Imagery: Identify change in building footprints and urban area
Employment Density 2011

Employment 2011
Post-Secondary Education Share 2015

High Skill Share 2015

[Color legend with intervals from 0.00 to 1.00]
Refugees 2015
Measuring Commuting from Cellphone Data

Each series is an average within a decile of the number of handsets in a neighborhood between 10am and 3pm. Series normalized by mean number of handsets observed per hour overall and daily average within percentile.
Measuring Commuting from Cellphone Data: Handsets 4am
Measuring Commuting from Cellphone Data: Handsets 5am
Measuring Commuting from Cellphone Data: Handsets 6am
Measuring Commuting from Cellphone Data: Handsets 7am
Measuring Commuting from Cellphone Data: Handsets 8am
Measuring Commuting from Cellphone Data: Handsets 9am
Measuring Commuting from Cellphone Data: Handsets 10am
Measuring Commuting from Cellphone Data: Handsets 11am
Measuring Commuting from Cellphone Data: Handsets 12pm
Measuring Commuting from Cellphone Data: Handsets 4pm
Measuring Commuting from Cellphone Data: Handsets 5pm
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Measuring Commuting from Cellphone Data: Handsets 8pm
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Simulating Effects from Hypothetical Policies

Example from Bogotá

- Zoning regulations unchanged before + after BRT ⇒ no change in housing supply

- Simulate the effect of a Land Value Capture scheme:
  - Government ↑ permitted zoning densities by 30% within 500m of stations
  - Sells these permits to developers
Simulating Effects from Hypothetical Policies

1. **Revenues cover between 18-50% of construction costs**

2. **Welfare Gains 23% Higher Under LVC**
   - More people can live where accessibility improves
   - House price appreciation dampened

Results suggest large gains to cities pursuing integrated transit+land use policy
Conclusion

• Cities can leverage increasingly available data to understand...
  • How to best allocate scarce resources
  • Which policies work best to achieve goals

• Collaborating with and making data available to researchers can help with these goals