Stylised facts about cities
& some policy implications

Regional and Urban Economics
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Frédéric Robert-Nicoud
2006—A major Landmark

• **Over half** of the world population is urbanised
  – World urban population growths by 100 million annually
What is RUE?

- Urban and regional economics adds **geographical space** to economic analysis
  - People live and produce in certain **locations**
  - Moving costs or people is **costly**
- A main focus: **land**
  - **Immobile**, associated with a **unique** location
  - RUE study **land use** and **land price** as a function of this location
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  – Core-Periphery patterns
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  – Cities, Industries and Functions
Core-Periphery patterns
(Core-Periphery patterns)
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(Core-Periphery patterns)

• Cities are the centre of economic activity

• E.g. Japan’s 3 Core Metro Areas
  – 5.2% of area of Japan
  – 33% of its pop.
    • 31% of its manufacturing employment
  – 40% of its GDP
  – 0.18% of area of East Asia but 29% of its GDP!
• Production is spatially concentrated

  – **US**: 100 most active counties
    - 1.5% of US land area
    - 41.2% of US manufacturing employment

  – **France**: Ile-de-France (Paris metro area)
    - 2.2% of area, 18.9% of its population, 30% of its GDP
    - Inside Ile-de-France, only 12% of available land used for housing, plants and roads
    - (88% forests, agriculture, natural activities)
(Core-Periphery patterns)
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Stylised fact 1

• Urbanised areas are growing over time

Source: UN World Urbanisation Prospects, 2005 revision
Répartition de la population dans les régions rurales et urbaines

Les 5 plus grandes agglomérations: Genève, Lausanne, Berne, Bâle, Zurich

Autres régions urbaines

Régions rurales

Source: ESPOP © OFS
Urban growth

- Very similar experiences in most countries
  - But for "physical" growth, there are large differences
- US: ‘sprawl’
- Europe: ‘containment’
- Rest of the world: in-between
Stylised fact 2a

- Cost of living increases with city size
  - E.g. Money expenditure in Lima is 39% higher than in Peru (1971)
  - It is only 14% higher in urban coast (Thomas, 1980)

- Non-market goods and bads
  - Average white urbanite in US: 10-year mortality penalty (early 20th century)
Cost of living & agglomeration size

\[ w(N) \]

\[ H(N) \]

Wage Curve

Cost of Living Curve

Congestion
Stylised fact 2b

• Cities produce more efficiently

→ It must be beneficial for firms and households to cluster

– Holds across a number of efficiency measures: output per worker, TFP, wages, etc (Rosenthal and Strange, 2004)

– Standard elasticities in the 3 – 8 % range
  - Doubling city size increases manufacturing productivity by around 5% in US
  - NYC (10 M) ~ 50% more productive than Lakewood NJ (53,000)

– Distance and industry matter (Rosenthal and Strange 2003)
  - Employment within 1 mile most important. Strong decay.
  - Employment outside own industry less important
Cities produce more efficiently
Cities are centres of innovation

Productivity & agglomeration size

- Matching
- Learning
- Sharing

Wage Curve

Cost of Living Curve

$w(N)$

$w^*$

$w_B$

$H_B$

$H^*$

$H(N)$

$N^*$

(a)

(b)
Second best optimum and Equilibrium

Constrained optimum  Equilibrium city size
City’s stock of roads and buses causes larger population and employment (U.S.)

- Elasticities = 20% (roads) and 8% (buses)
  - Duranton and Turner (2010)
- But increased provision of roads and public transit does not relieve congestion
  - Duranton and Turner (2011)
Second best optimum and Equilibrium

New equilibrium city size

\[ w(N) - H(N) \]

\[ w_B - H_B \]

\[ w^* - H^* \]

\[ N_B \]

\[ N^* \]
(Second best optimum and Equilibrium)

• Migration restrictions (China)
  – Chinese cities are undersized
    ▪ Au and Henderson (2006a,b)
Stylised fact 2c

• Income inequalities are correlated with city size
  – Human capital composition
  – Industrial structure
  – Returns to skills (Behrens and Robert-Nicoud 2008)
Cities are polarized

A tale of two cities – Paraisópolis favela, Morumbi, São Paulo
Cities are polarized
## Returns to skill and city size

<table>
<thead>
<tr>
<th></th>
<th>all</th>
<th>16+</th>
<th>13-15</th>
<th>9-12</th>
<th>0-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>5 %</td>
<td>2.5 %</td>
<td>4 %</td>
<td>7 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Experience</td>
<td>4 %</td>
<td>5 %</td>
<td>4.5 %</td>
<td>4 %</td>
<td>4 %</td>
</tr>
<tr>
<td>Log resident pop.</td>
<td>2.7 %</td>
<td>4 %</td>
<td>3 %</td>
<td>2 %</td>
<td>0</td>
</tr>
</tbody>
</table>

Endogenous variable: Log hourly wages.  
Stylised fact 3

- Population density increases with proximity to the city centre
  - Lausanne, Switzerland
Density gradient

– NY city : Manhattan
• 1980 – 1990: 50 largest US Metro Areas
  – Population increased in all but Pittsburgh (-.4 %)
  – Average: 21.3%; Maximum: Orlando (+70%)

Source: Rossi-Hansberg, Owen and Sarte (2006)
(US Sprawl?)

• Population grew both at centres and edges
  – Las Vegas: +50% in the centre and +80% at edges
  – Employment grew both at centre & in edge counties

Source: Rossi-Hansberg, Owen and Sarte (2006)
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• Cities vary considerably in terms of population size
  – In the US:
    ▪ NY: 18 million
    ▪ Kansas City: 1.8 million
    ▪ Lafayette (IN): 180,000
    ▪ Los Alamos (NM): 18,000
Urban population in Switzerland

- Population in Switzerland in 2009: 7.786 millions
- Population in main metropolitan areas
  - Zürich 1.170 mio 15% (15.0%)
  - Genève 0.521 mio 6.7% (21.7%)
  - Basel 0.488 mio 6.4% (28.1%)
  - Bern 0.351 mio 4.5% (32.6%)
  - Lausanne 0.331 mio 4.3% (36.9%)
  - Luzern 0.208 mio 1.5% (39.5%)
  - ...
  - Stans 0.03 mio 0.4% (69%)
The rank size rule debate

• City size distribution is well approximated by the rank size rule [controversial]
  – Pareto distribution:

\[ \text{Rank}(i) = \left( \frac{\max \text{Size}(i)}{\text{Size}(i)} \right)^a \]

• Zip’s law:

\[ a \approx 1 \]
(The rank size rule debate)
(The rank size rule debate)
(The rank size rule debate)

• Mixed evidence
  – Switzerland: \( a = 0.98 \)
  – France: \( a = 0.97 \) (Duranton) \( a = 1.02 \) (Soo)
  – USA: \( a = 0.85 \)
  – World: \( a = 1.11 \)
  – 73 countries: See Soo (2005)

• Deviations from ‘rule’
  – Urban primacy
  – Thick and thin lower tails
  – Rotations over time
    ▪ Telephone & ICT revolutions
Stylised fact 5

• City rankings and relative city sizes change slowly over time

  Exceptions:
  – Pittsburgh (demise of steel industry), Detroit
    ▪ Lost half of their population over 1950 – 1990
  – San Jose (rise of internet-related industries)
  – Phoenix’s population increased almost by a factor 10

• Changes in US metropolitan areas are mostly caused by local shocks at the industry level
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Stylised fact 7

• Specialised and diversified cities co-exist
### Specialised and diversified cities

Source: Duranton and Puga (2000), using Black and Henderson’s dataset

<table>
<thead>
<tr>
<th>Rank</th>
<th>Specialisation</th>
<th>Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City (sector)</td>
<td>RZI</td>
</tr>
<tr>
<td>1</td>
<td>Richmond, VA (tobacco)</td>
<td>64.4</td>
</tr>
<tr>
<td>2</td>
<td>Macon, GA (tobacco)</td>
<td>55.0</td>
</tr>
<tr>
<td>3</td>
<td>Lewiston, ME (leather)</td>
<td>49.6</td>
</tr>
<tr>
<td>4</td>
<td>Galveston, TX (petroleum)</td>
<td>49.1</td>
</tr>
<tr>
<td>5</td>
<td>Bangor, ME (leather)</td>
<td>45.6</td>
</tr>
<tr>
<td>6</td>
<td>Owensboro, KY (tobacco)</td>
<td>44.4</td>
</tr>
<tr>
<td>7</td>
<td>Corpus Christi, TX (petroleum)</td>
<td>37.6</td>
</tr>
<tr>
<td>8</td>
<td>Cheyenne, WY (petroleum)</td>
<td>33.4</td>
</tr>
<tr>
<td></td>
<td>Buffalo, NY (rubber and plastics)</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Cincinnati, OH (chemicals)</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Chicago, IL (metal products)</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Stylised fact 8

- Industries are mobile

- Evidence of ‘churning’ for France and US (Duranton 2005)
  - Changes in employment at the level of cities and industries are about 10% per year
  - whereas the growth rate of urban population is only about 3% per year
Stylised fact 9

- Larger cities tend to be more diversified
- Cities of similar diversification are of similar size
  - The relationship between size and diversity is not very strong (partly because all cities have a large component of employment in non-tradeable activities)
City size and diversification

Source: Duranton and Puga (2000), using Black and Henderson’s dataset
From sectoral to urban specialisation

– Duranton and Puga (2005)

– Cities have gone from specialising mainly by sector to specialising mainly by function

  ▪ headquarters and business services disproportionately clustered in larger cities
  ▪ production plants clustered in smaller cities
Stylised fact 11

- Most innovations take place in particularly diversified cities and most new plants are created there

- Most relocations are from diversified to specialised cities
Nursery cities

• Jacobs (1969)
• Feldman and Audretsch (1999)
  – data set of 3969 U.S. product innovations in 1982
  – 96% of the innovations in metropolitan areas (30% of population)
  – Regress the number of innovations in sector-cities with diversity within underlying scientific base (++), specialisation (-) and size (+)
• Fujita and Ishii (1998)
  – Japanese electronics MNEs
• Duranton and Puga (2000, 2001)
  – on firm creation in France and firm relocation in France, respectively
• More developed cities are more regulated
  – Hilber and Robert-Nicoud (2010) for the US
    ▪ Cities with nice amenities are more developed and more regulated
    ▪ Looks familiar?
  – Regulation policies seem to be neither efficient nor democratic
Summary

• Cities are growing
• Cities are diverse
• Macro stability
  – E.g. distribution of city sizes is stable
• Micro dynamism
  – Individual cities grow at different rates and may decline
  – Creation and destruction in individual cities
Policy implications

- Localised agglomeration economies
  - Improve urban efficiency
  - Free internal migration
    - Let people and ideas move around

- Dynamic externalities and product cycle
  - Free internal migration
  - Improve market access
  - Allow secondary cities to develop
    - Especially in developing countries
References


Duranton, Gilles. 2007. From cities to growth in developing countries. Mimeo, University of Toronto.


