

# The economics of urban growth

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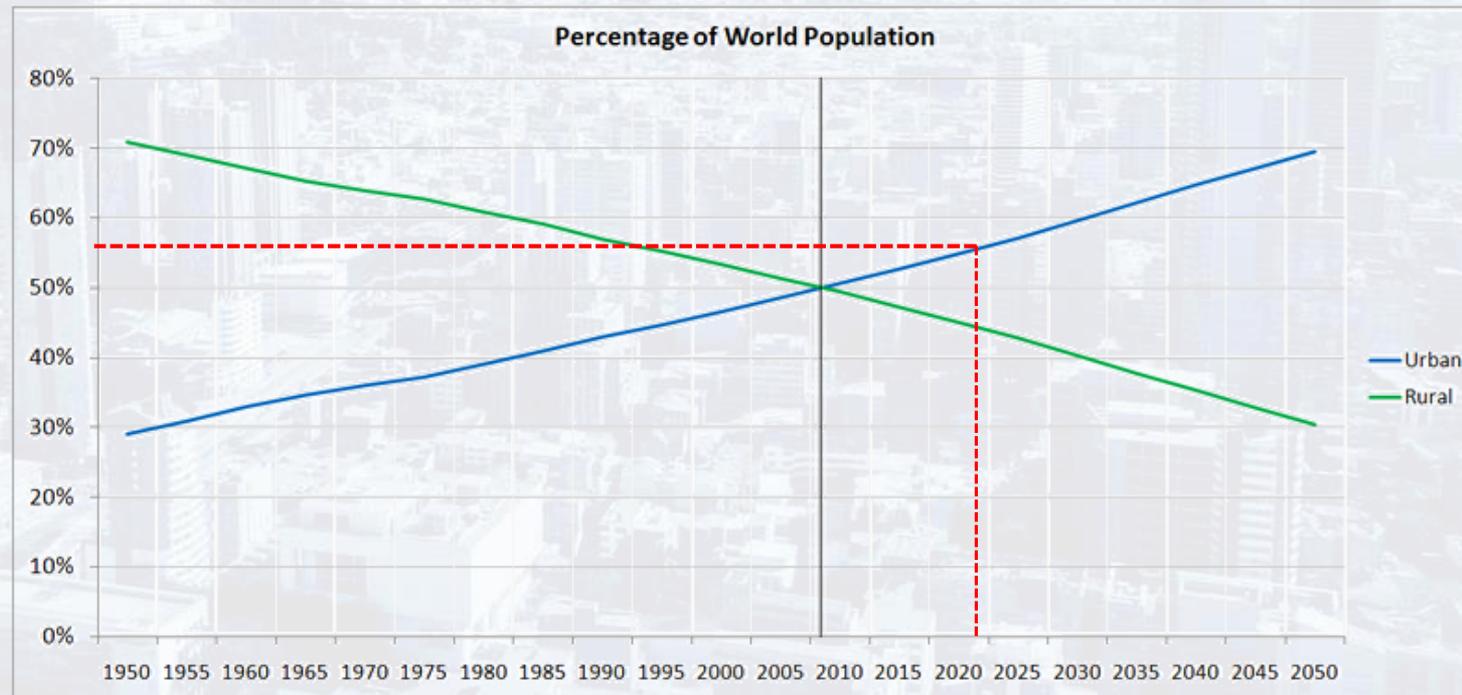
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1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

- Many cities around the world face strong population increase
  - More than 50% of the world's population lives and works in cities



Data Source: United Nations, <http://esa.un.org/unup/p2k0data.asp>

2019

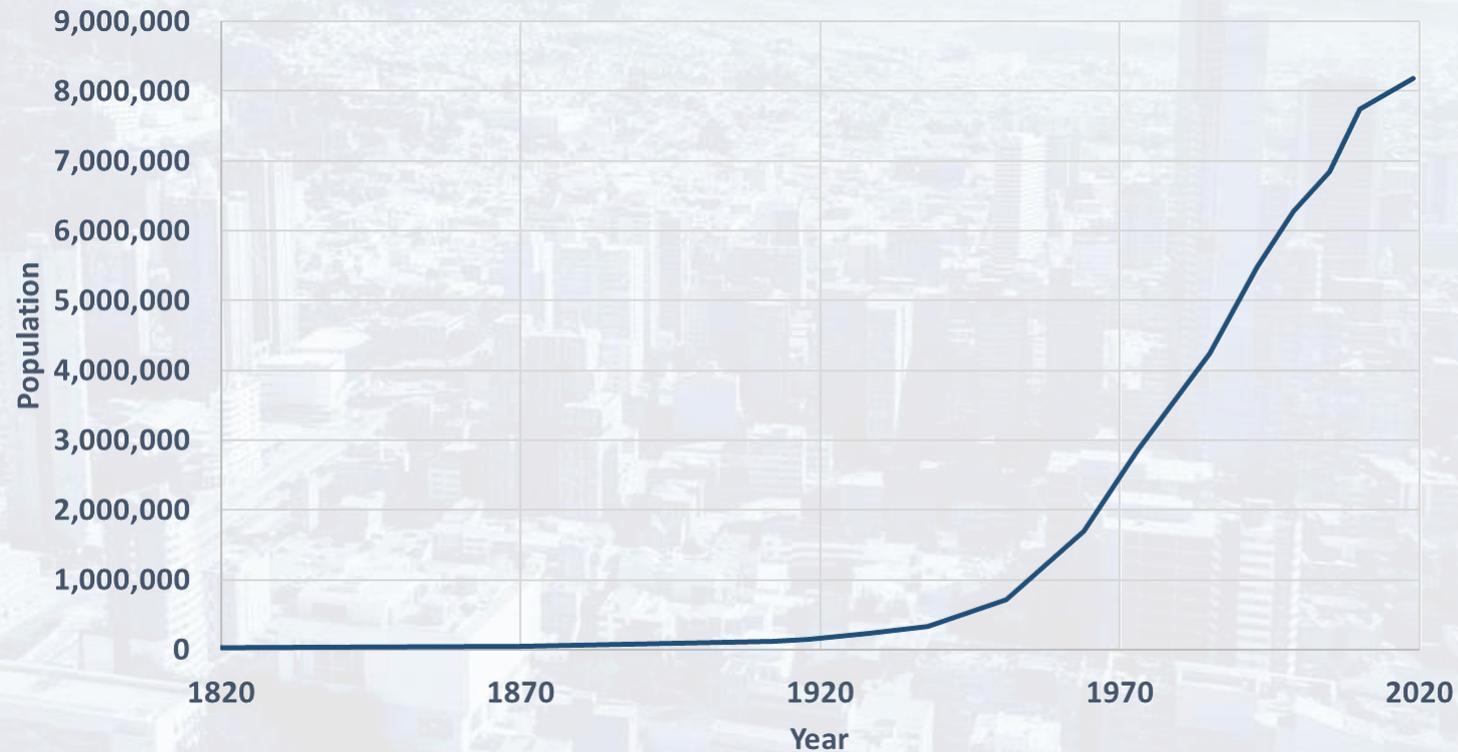
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- **The largest metropolises can now be found in emerging economies and developing countries**

1970		2015	
1. Tokyo, Japan	16.5	1. Tokyo, Japan	37.1
2. New York, United States	16.2	2. <u>Jakarta, Indonesia</u>	<u>26.1</u>
3. Shanghai, China	11.2	3. <u>Seoul, South Korea</u>	<u>22.5</u>
4. Osaka, Japan	9.4	4. <u>Delhi, India</u>	<u>22.2</u>
5. Mexico City, Mexico	9.1	5. <u>Shanghai, China</u>	<u>20.9</u>
6. London, England	8.6	6. Manila, Philippines	20.8
7. Paris, France	8.5	7. <u>Karachi, Pakistan</u>	<u>20.7</u>
8. Buenos Aires, Argentina	8.4	8. New York, United States	20.5
9. Los Angeles, United States	8.4	9. <u>Sao Paulo, Brazil</u>	<u>20.2</u>
10. Beijing, China	8.1	10. <u>Mexico City, Mexico</u>	<u>19.5</u>

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- Many cities around the world face strong population increase
  - Bogotá is no exception



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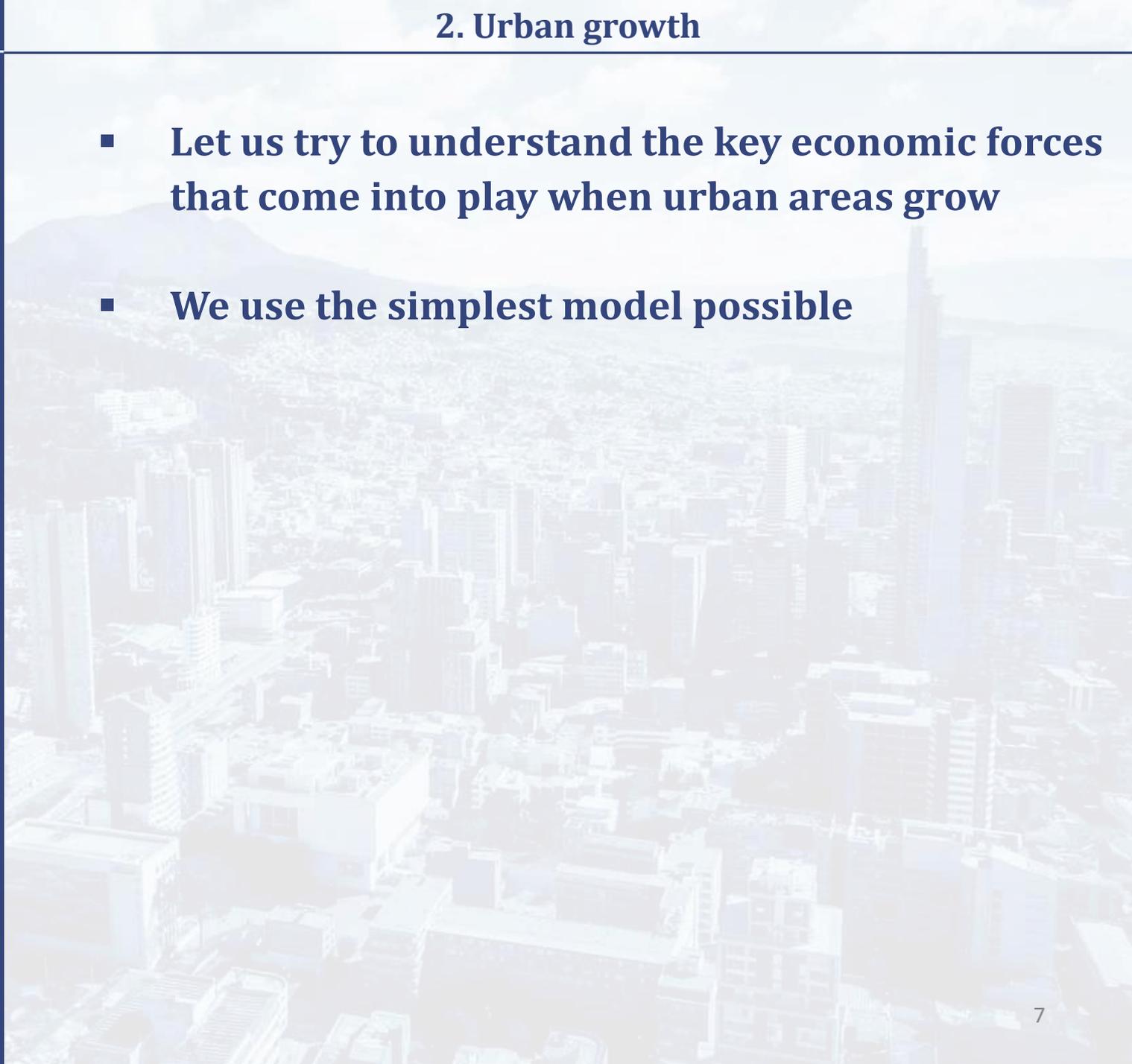
- I will discuss the economic consequences of urban growth for:
  - City size and urban sprawl
  - Densities
  - Land prices
  - Commuting costs
  
- Market forces are key in understanding and predicting what happens
  - I will outline the most important forces using *a very simple model*

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- I then consider arguably the main cost of urban growth
  - Traffic congestion
  - (Pollution is very much related to this)
- I also consider a benefit of urban growth
  - Agglomeration economies
- How to deal with urban challenges?
  - Recommendations
  - A regional perspective...

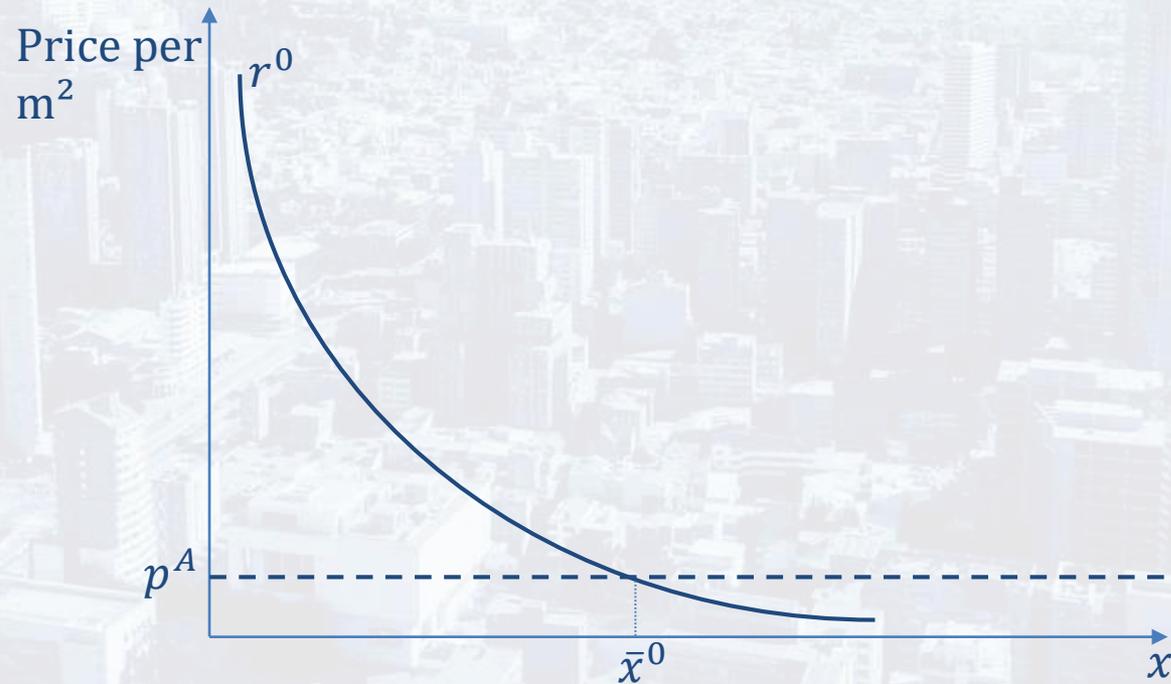
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- **Let us try to understand the key economic forces that come into play when urban areas grow**
- **We use the simplest model possible**



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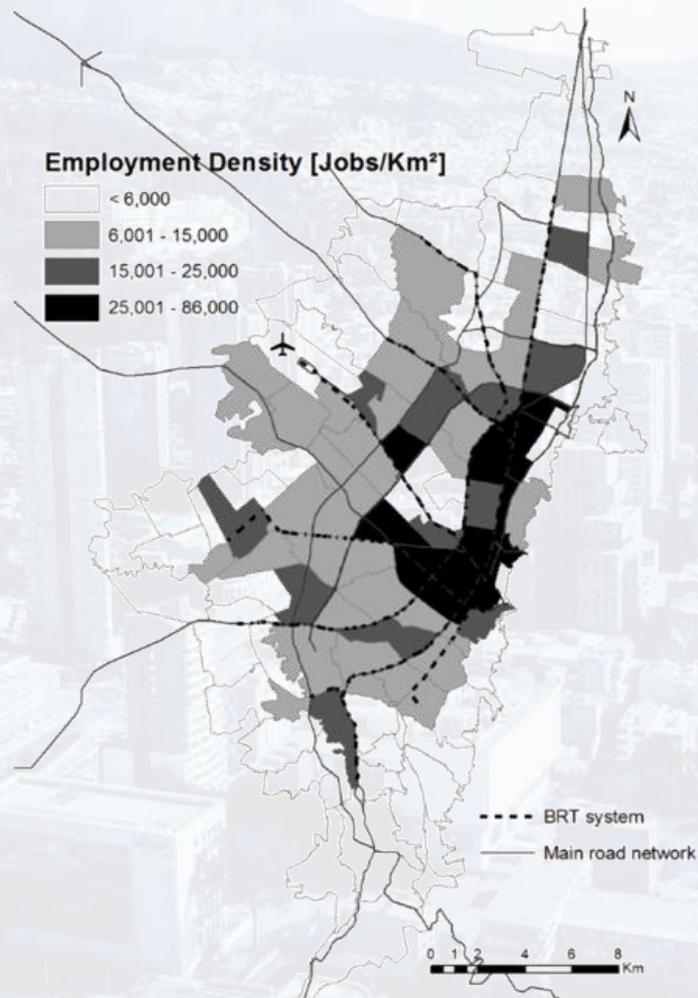
- Let us consider a very simple city with most employment located in the centre
  - People have to commute to the centre
  - Prices are therefore higher in the centre



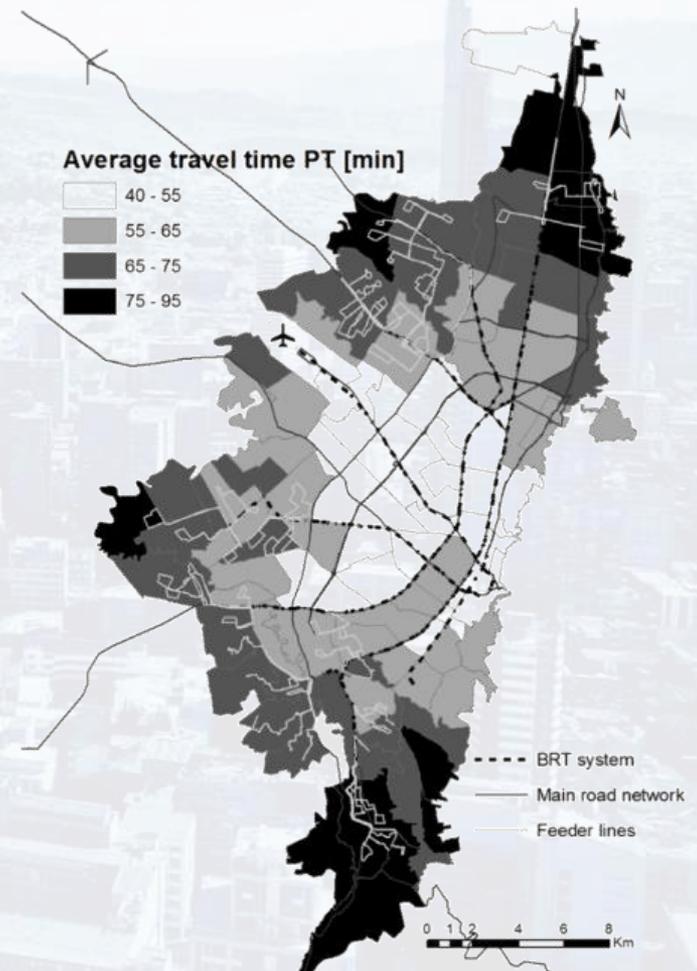
$x$  denotes the distance to the city centre  
 $p^A$  denotes productivity of agricultural land

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- **Bogotá**
  - **Guzman and Bocarejo (2017)**

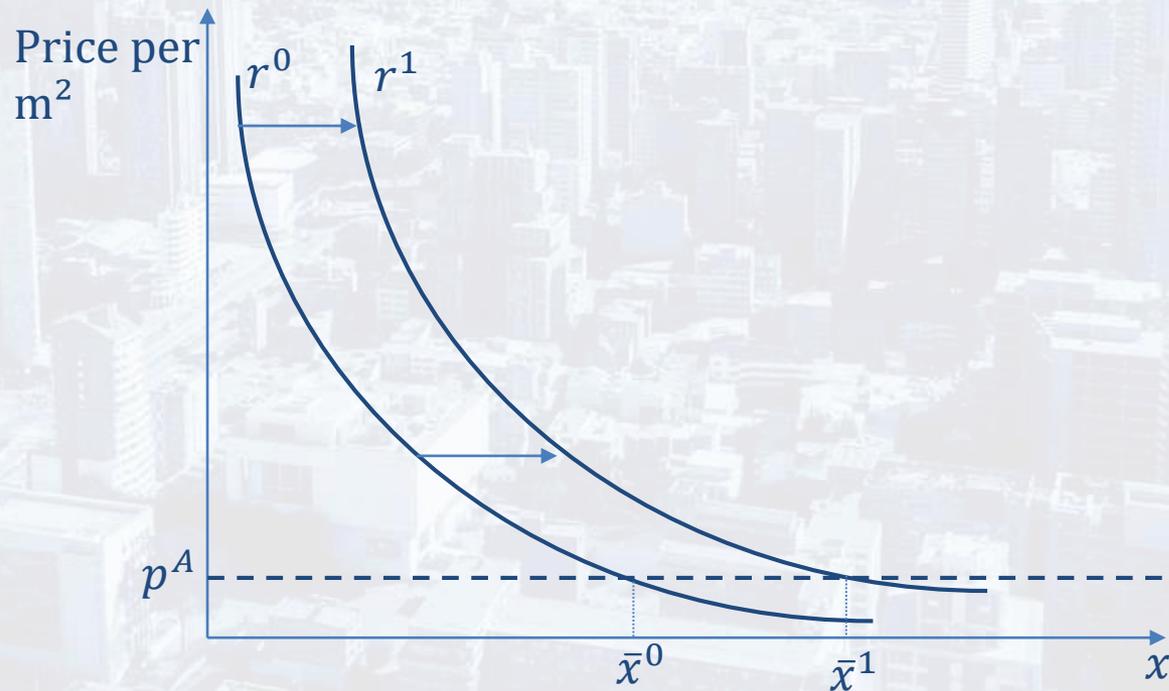


Employment density

Average travel time by public transport  
(work trips)

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- If population grows
  - Land prices will go up
  - The city becomes larger



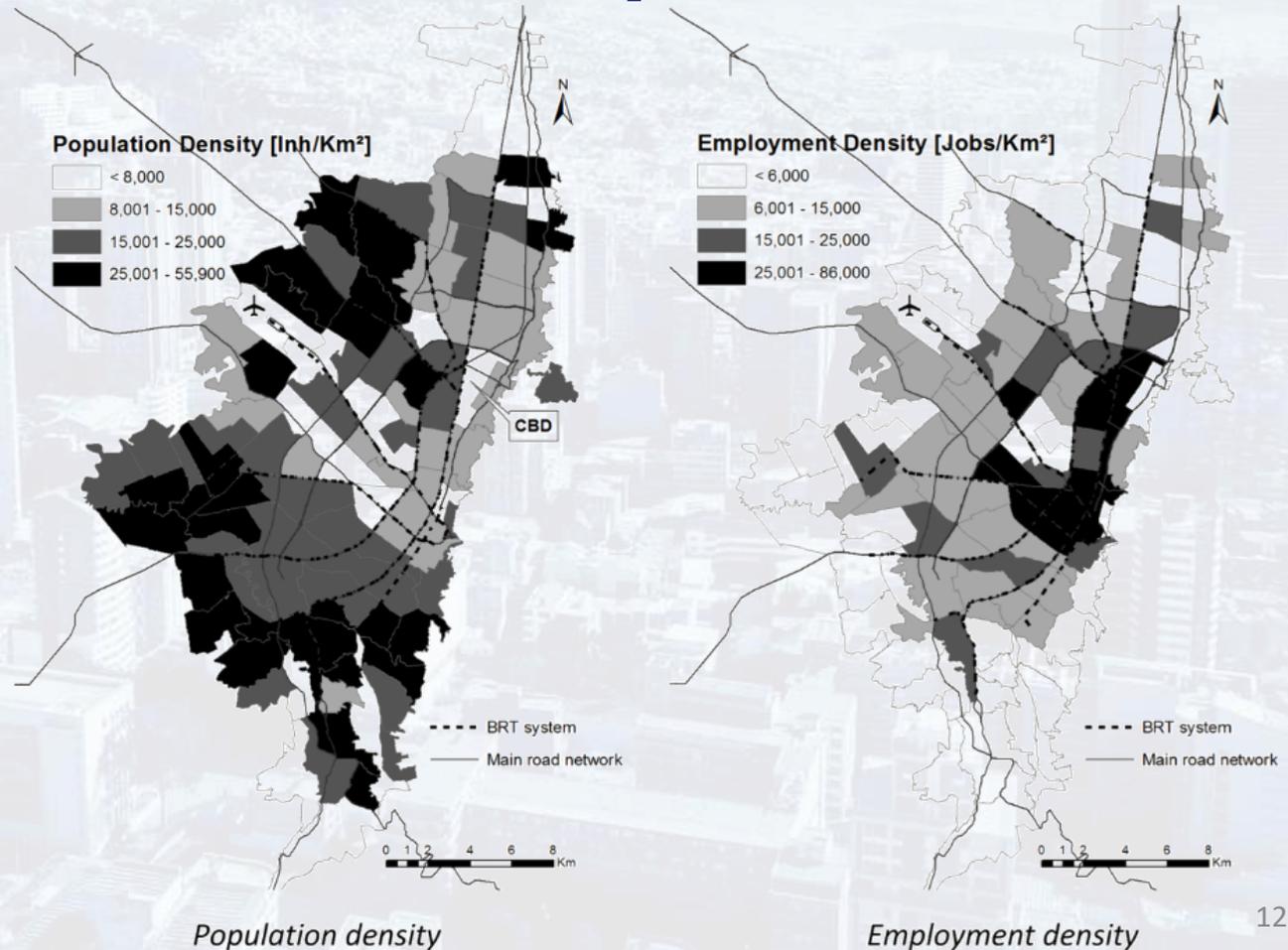
$x$  denotes the distance to the city centre

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- Land prices are higher closer to the centre
  - Buildings are generally taller
  - ... substitution of land for capital
  
- New developments at the city's border are usually of lower density
  - Urban sprawl?
  
- Hence: both urban sprawl and compact development are a result of market forces

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- **New developments at the city's border are usually of lower density?**
  - **Not for Bogotá?...**
  - **Informal developments?**

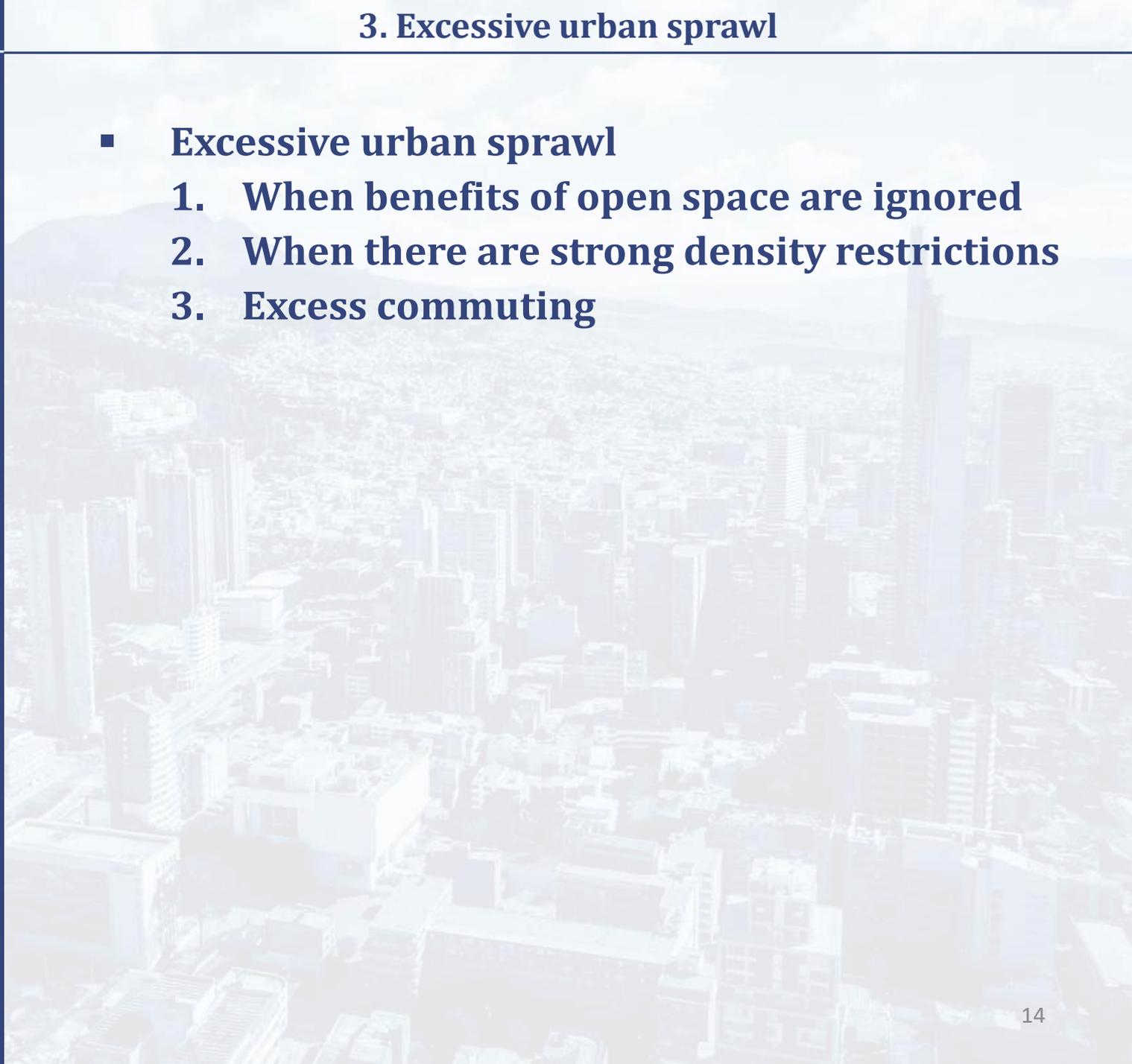


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- Hence, urban sprawl is not necessarily 'bad' and compact development is not necessarily 'good'
  - Brueckner (2000)
  
- In what cases is urban sprawl 'excessive'?

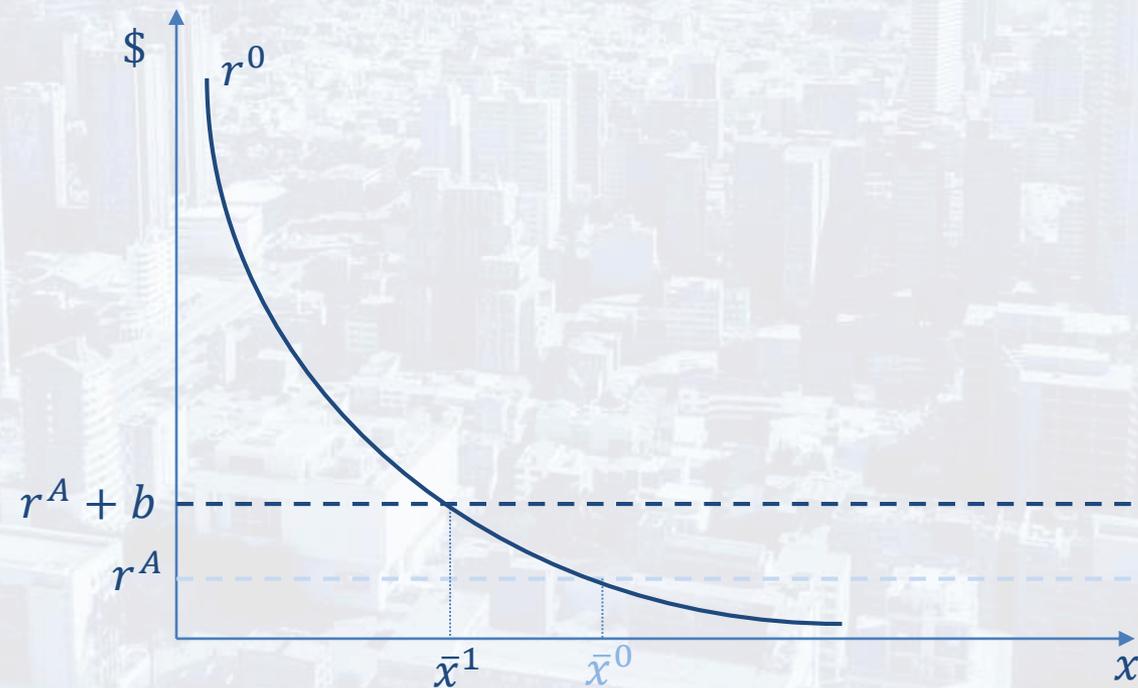
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- **Excessive urban sprawl**
  - 1. **When benefits of open space are ignored**
  - 2. **When there are strong density restrictions**
  - 3. **Excess commuting**



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1. **Benefits of open space are ignored**
  - **The city should be smaller...**



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## 1. Benefits of open space are ignored

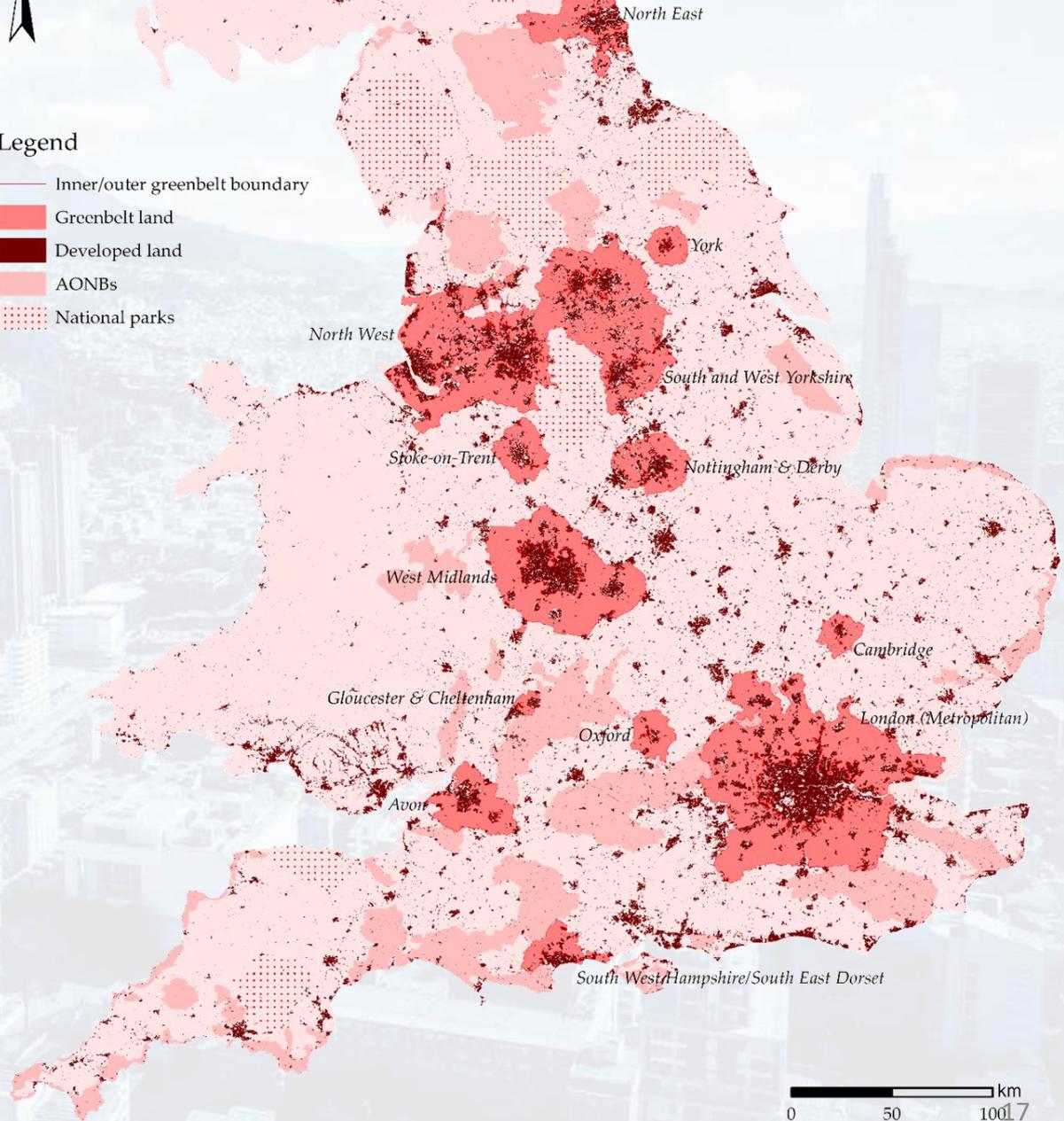
- Many cities around the world therefore protect open spaces around their city
  - England's greenbelts
  - The Dutch Green Heart

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## Legend

- Inner/outer greenbelt boundary
- Greenbelt land
- Developed land
- AONBs
- National parks



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Legend

-  N
-  Built-up areas
-  Major roads
-  Railway line
-  International airport
-  Center
-  Green Heart boundary



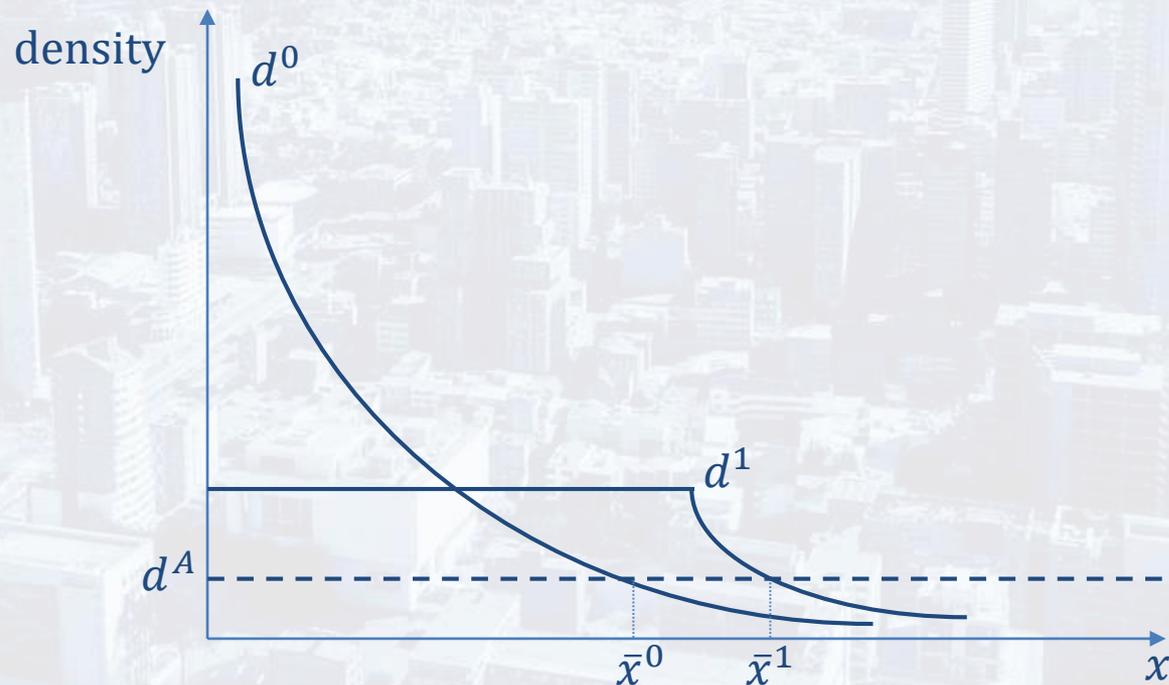
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## 1. Benefits of open space are ignored

- Protection makes sense if open space generates amenities or is necessary for water supply
- I indeed find evidence for substantial, but very local, amenity effects of open space in England
  - However, this amenity effect does not warrant the strong protection of open space
  - ... Reduced supply of housing increases prices for everyone!
- What are benefits of open space in Bogotá?

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2. When there are strong density restrictions
  - Cities are forced to grow bigger if density is restricted



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## 2. When there are strong density restrictions

- **Many examples of Floor-Area Restrictions (FARs)**
  - Many cities around the world (India, China, England) impose density restrictions
- **For India:**

*“In controlling FAR, the goal of the Indian planners has been to [...] limit both job and population densities. It is believed that “excessive” density results in a loss of environmental quality and increased traffic congestion” [Brueckner and Bertaud, 2005]*

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## 2. When there are strong density restrictions

- **The main reason would be to protect cultural heritage**
  - But these areas are often small and FARs should only apply to a few areas
  - *e.g.* in La Candelaria
- **Cultural heritage generates substantial benefits to the society**
  - But again... very local!

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## 2. When there are strong density restrictions

- **However, it is often unclear what the benefits of FARs are**
  - **By contrast, compact development *reduces* commutes and *improves* overall environmental quality**
    - ... but more people may be exposed to higher levels of pollution
  - **Sprawled cities have higher shares of car use**

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### 3. Excess commuting

- **People do not take into account the negative effect on others when using the road**
  - **‘Externality’**
  - **People travel longer than if there would be no traffic**

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- **Costs of urban growth – traffic congestion!**
- **Akbar and Duranton (2017)**
  - **What are the social costs of traffic congestion for Bogotá?**
    - ... **Externality**

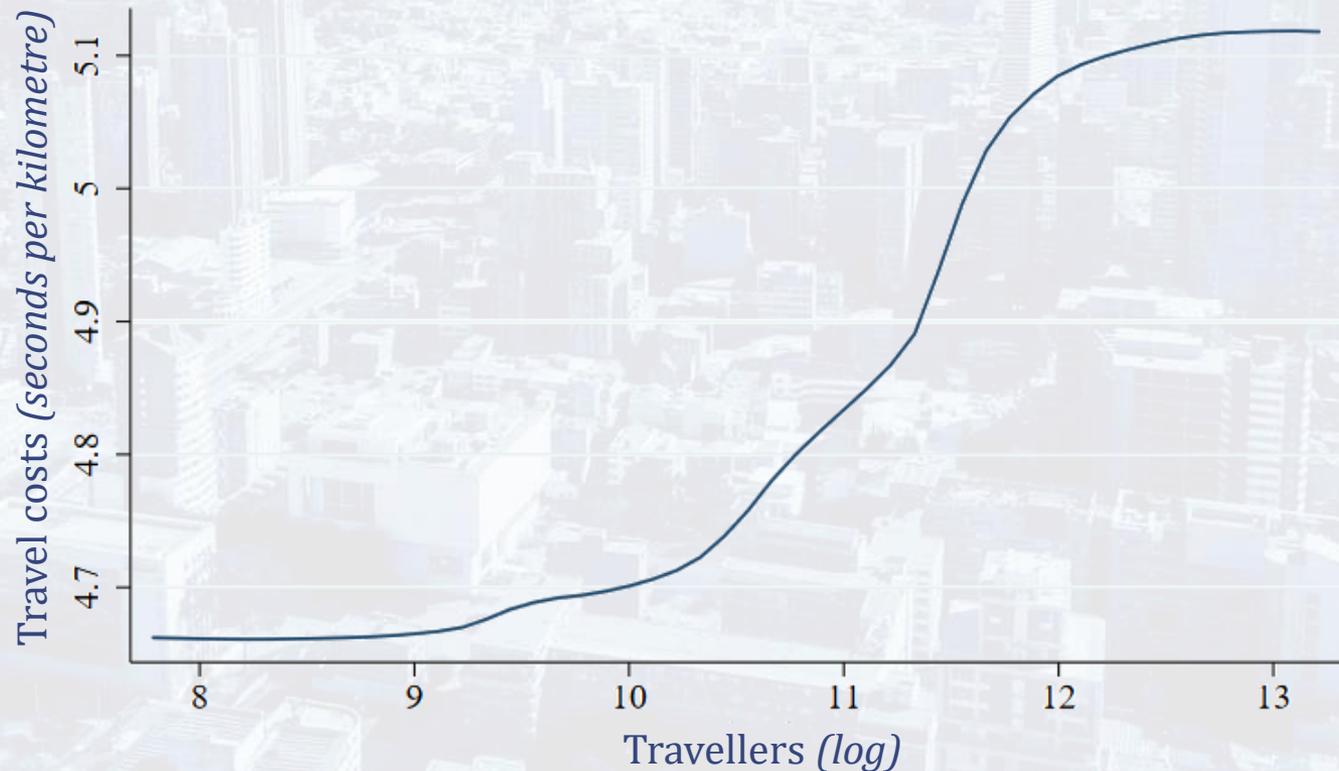
Table Descriptive statistics from the Bogotá Travel Survey

	Mean	Median	Variance	25th pctile	75th pctile
<b>Trips within Bogotá (36,309 well-defined trips)</b>					
Trip duration (all modes)	37.93	30	1,462	10	60
Trip duration (motorised trips)	53.21	45	1,579	30	70
No. of trips per person	2.04	2	2.61	1	2
No. of motorised trips per person	0.91	0	1.67	0	2
Mode	Walk	Private vehicle	Taxi	Transit	Transmilenio
Share of trips	0.448	0.154	0.044	0.245	0.082
Share of trips longer than 15 min	0.286	0.185	0.055	0.334	0.113

*Notes:* Statistics above are computed on all trip instances but are not weighted by sampling expansion factors. Trip durations are in minutes.

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- **Akbar and Duranton (2017)**
  - **What are the social costs of traffic congestion for Bogotá?**
  - **Externality costs appear to be small (less than 1% of the daily wage)**

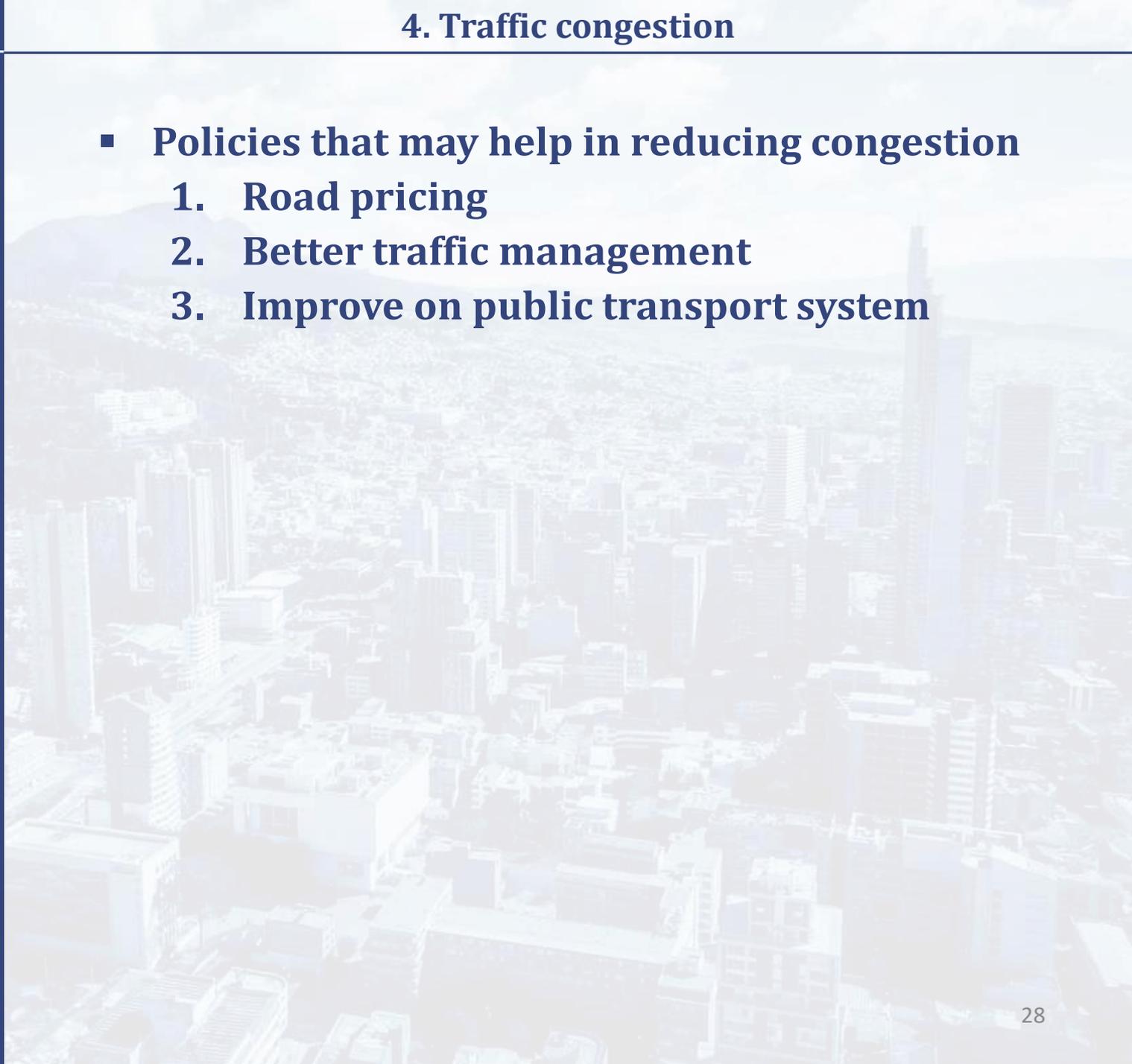


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- **Travel is still very costly in Bogotá due to congestion**
- **Paradoxically: high travel costs lead to a more compact city**
  - **Baum-Snow et al. show that cities grow bigger when new highways are built**
  - **Ostermeijer et al. show that cities become larger when car ownership increases**

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- **Policies that may help in reducing congestion**
  1. **Road pricing**
  2. **Better traffic management**
  3. **Improve on public transport system**



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- **Are driving restrictions based on number plates a solution?**
  1. **Davis (2008)** do not find any evidence for a reduction in congestion in Mexico City
  2. **Viard and Fu (2015)** find some evidence that driving restrictions reduce pollution in Beijing, at the expense of labour supply

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- **Should we build many more roads to combat congestion?**
  - “Fundamental law of road congestion”
  - If travel time of cars reduces, it becomes more efficient to take the car
- **Duranton and Turner (2011)**
  - **Highways: 10% more roads → 10% more traffic**
  - **Urban roads: 10% more roads → 8% more traffic**
- **So adding more roads is unlikely to alleviate congestion**
  - **Still, solving some bottlenecks may be effective**

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- A large literature shows that agglomeration economies are important
  - Combes et al (2010) for France
  - Ahlfeldt et al (2015) for Berlin
  - Dericks and Koster (2019) for London
  - [...]
- Agglomeration economies
  - Firms are more productive in dense areas
  - Hence, firms benefit from other firms in the vicinity
- Particularly holds for business services and shops

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- **However, firms do not take into account the benefits they may have on others**
  - **Think of isolated shops or manufacturing plants**
  
- **Policies that nudge firms to cluster more are likely to be effective**
  - **But only if the benefits of clustering offset the costs (... more congestion)**
  - **Whether this holds for Bogotá remains to be seen**

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- **Urban sprawl is not necessarily ‘bad’ and compact development is not necessarily ‘good’**

1. **Consider what the benefits of open space are when limiting urban sprawl**

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- **Planning restrictions imposing low(er) densities throughout the city may encourage sprawl**

## 2. Be clear on what the benefits of restrictions are

- **Benefits of restrictions**
  - **Cultural heritage protection**
  - **Inner-city open space protection**
  - **[...]**

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- **Congestion usually is not combatted by building new roads or by imposing driving restrictions**

- 3. Consider alternatives: road pricing; better traffic management; investments in public transport**

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- **Agglomeration economies make firms more productive in dense areas**

**4. Cluster employment *if* the benefits of clustering offset the costs of clustering**

- **Research is needed to measure the magnitude of traffic congestion costs and agglomeration benefits in Bogotá**

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- **Urban challenges do not stop at municipal boundaries**
  - **A regional perspective is required!**
- **Benefits:**
  - **Scale economies in provision of infrastructure**
  - **No competition between local governments**
  - **Integrated plans for the region**

**5. Increase collaboration between local authorities**

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- **To test effectiveness, good urban data is required**
  - **Traffic flows**
  - **Firm locations**
  - **Household locations (both formal and informal)**
  - **Land prices (!)**
  - **Wages**
  - **[...]**

**6. Gather data to analyse magnitude of urban problems and test effectiveness of policies**

- **ODUR!**

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- **Market forces shape cities**
  
- **Compact city development and urban sprawl can be both a result**
  - **Compact development in the city centre**
  - **Low-density developments at the urban fringe**
  - **.... as a result of bidding for land**

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- **When is urban sprawl excessive?**
  1. **When benefits of open space are ignored**
  2. **When there are strong density restrictions**
  3. **Excess commuting**

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- **How to combat congestion?**
  - ... not easy!
    1. Road pricing
    2. Better traffic management
    3. Improve on public transport system
  
- **What usually does not work**
  1. Driving restrictions (based on number plates)
  2. Just building more roads

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- **Agglomeration economies**
  - **Firms are more productive in dense urban areas**
  
- **Fostering dense developments could be efficiency improving**
  - **If agglomeration benefits are higher than the additional congestion costs**
  - **... open question for Bogotá**

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