

# The economics of urban growth

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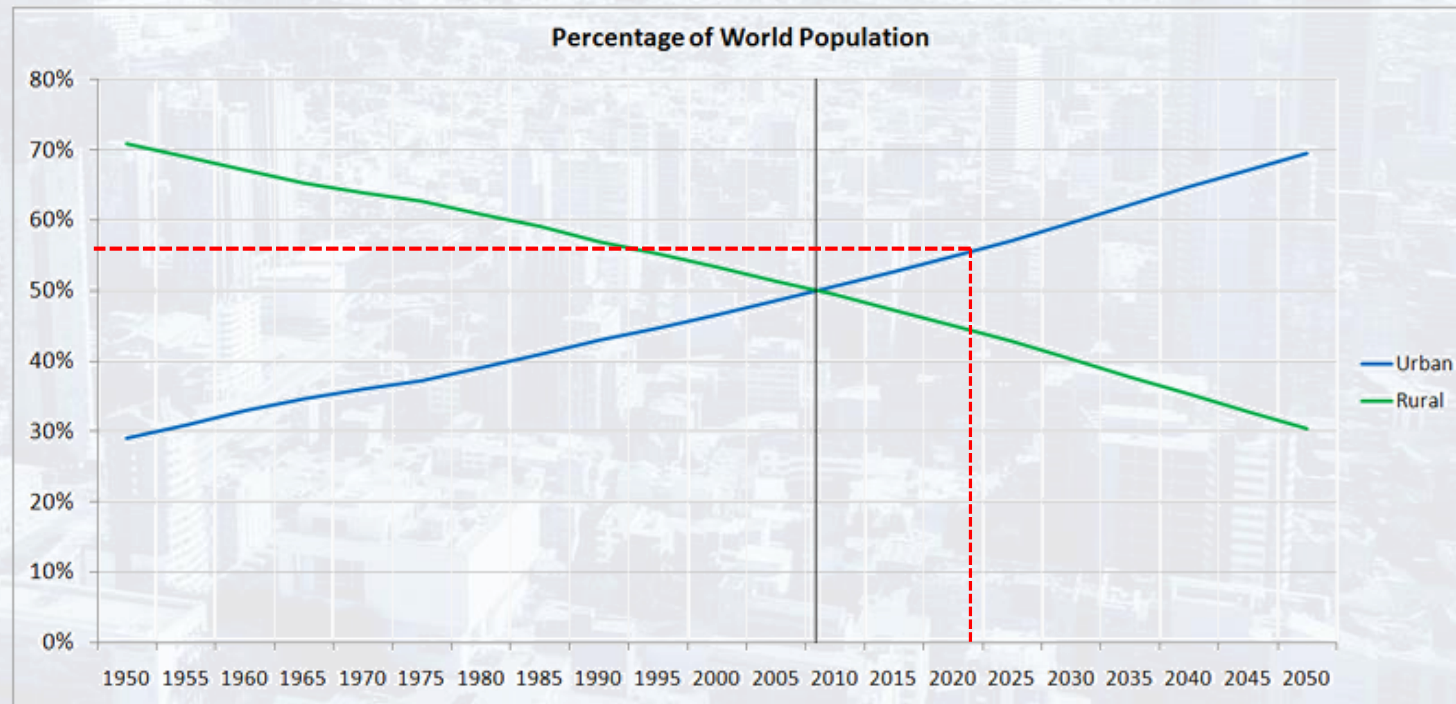
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1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

- 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

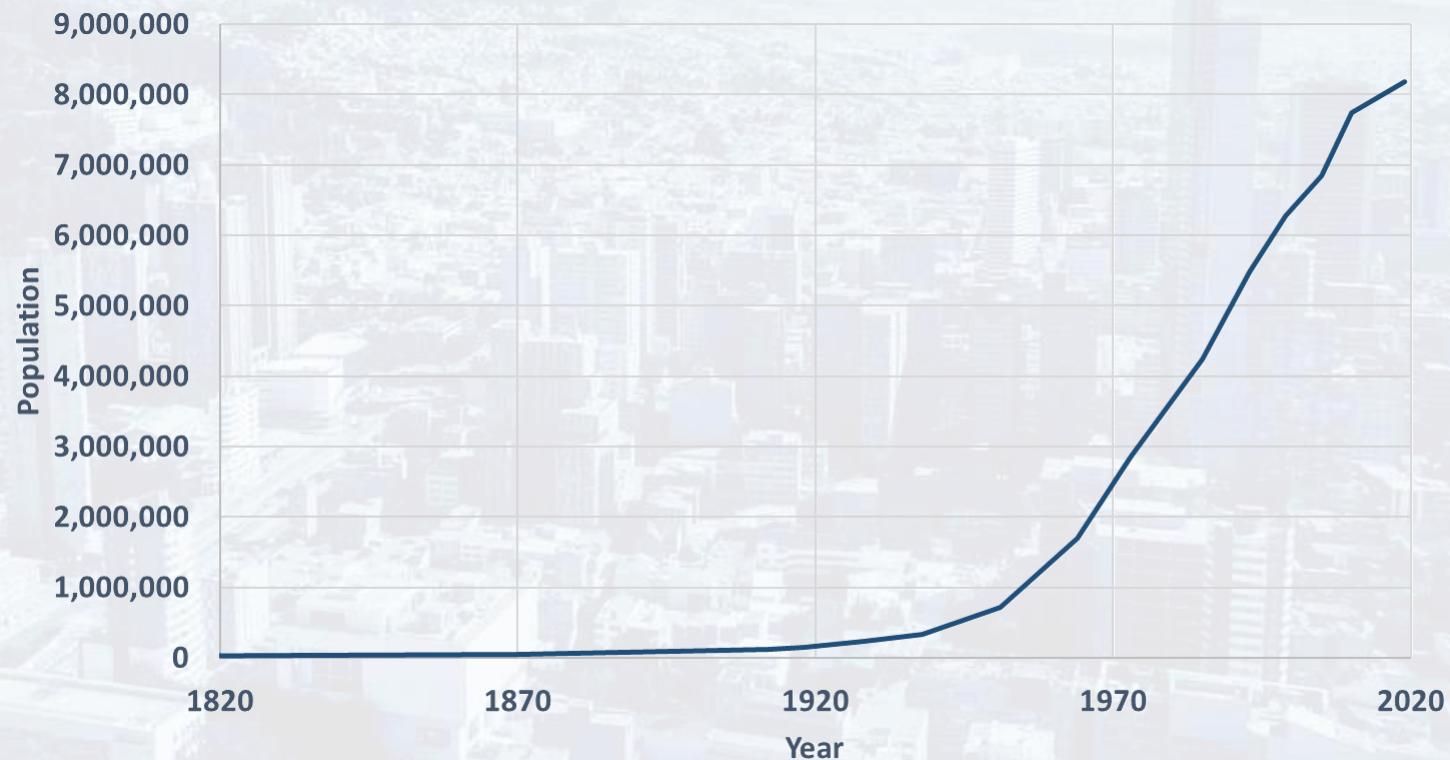
1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

- **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>

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
  - Bogotá is no exception





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

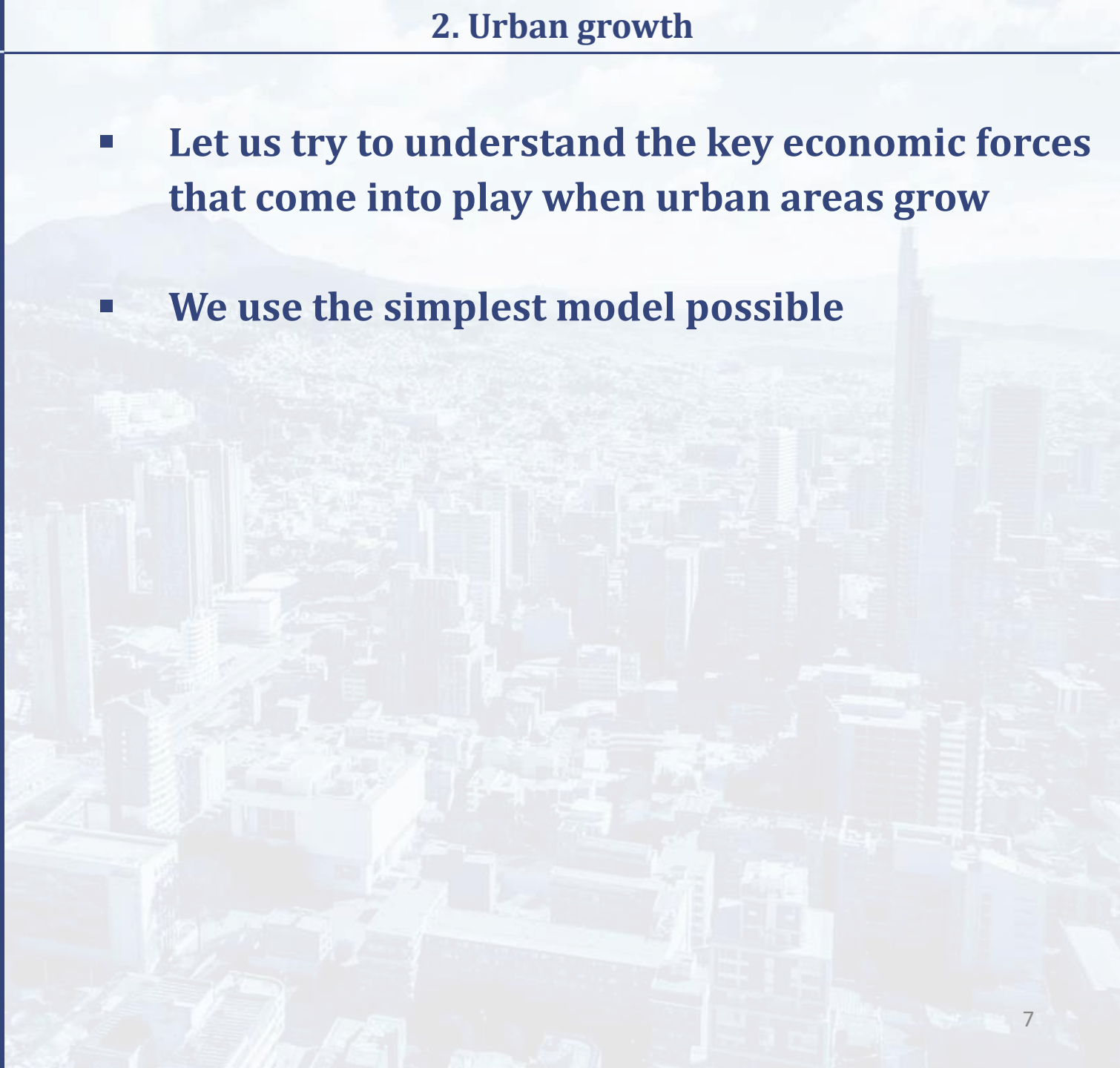
- I will discuss the economic consequences of urban growth for:
  - City size and urban sprawl
  - Densities
  - Land prices
  - Commuting costs
- Market forces are key in understanding and predicting what happens
  - I will outline the most important forces using *a very simple model*

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

- 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...

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

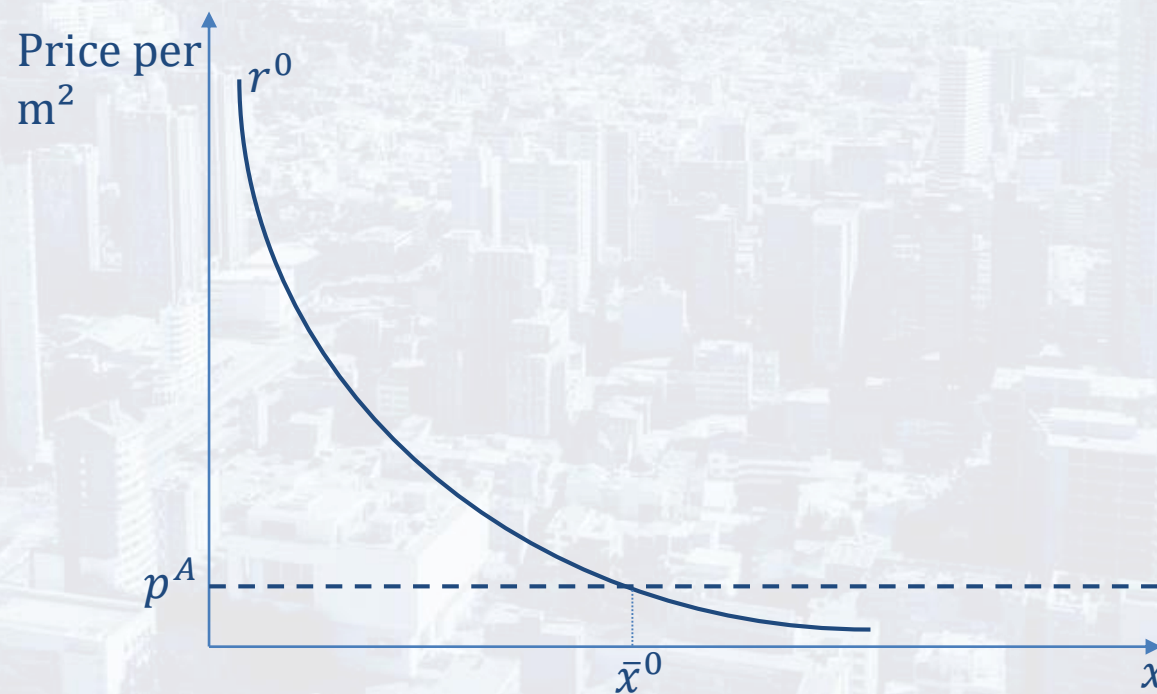
- Let us try to understand the key economic forces that come into play when urban areas grow
- We use the simplest model possible





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

- 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



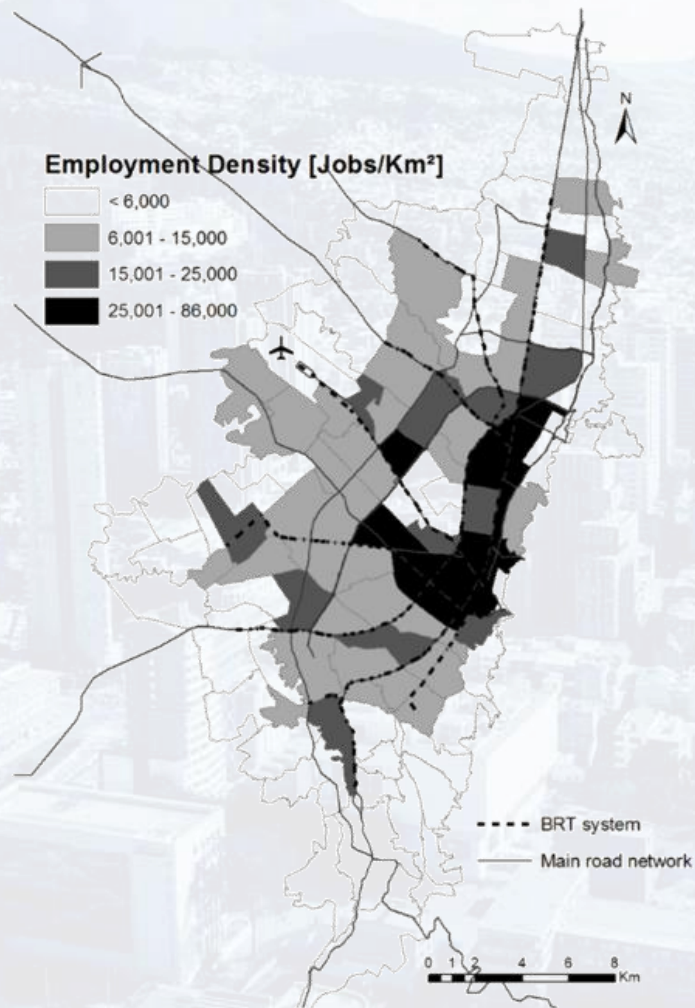
$x$  denotes the distance to the city centre

$p^A$  denotes productivity of agricultural land

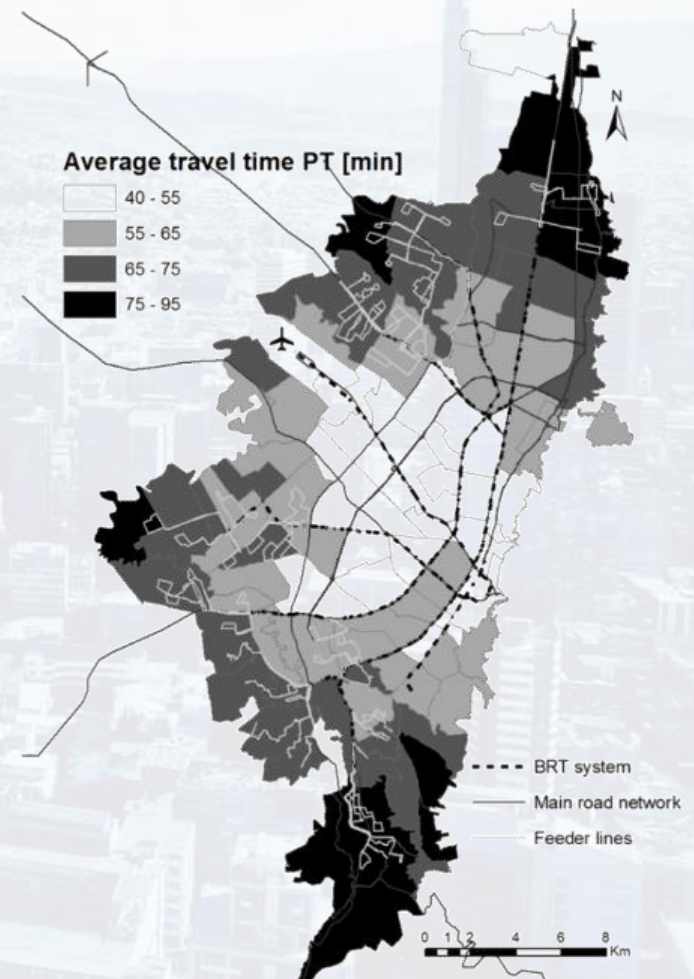


1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

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

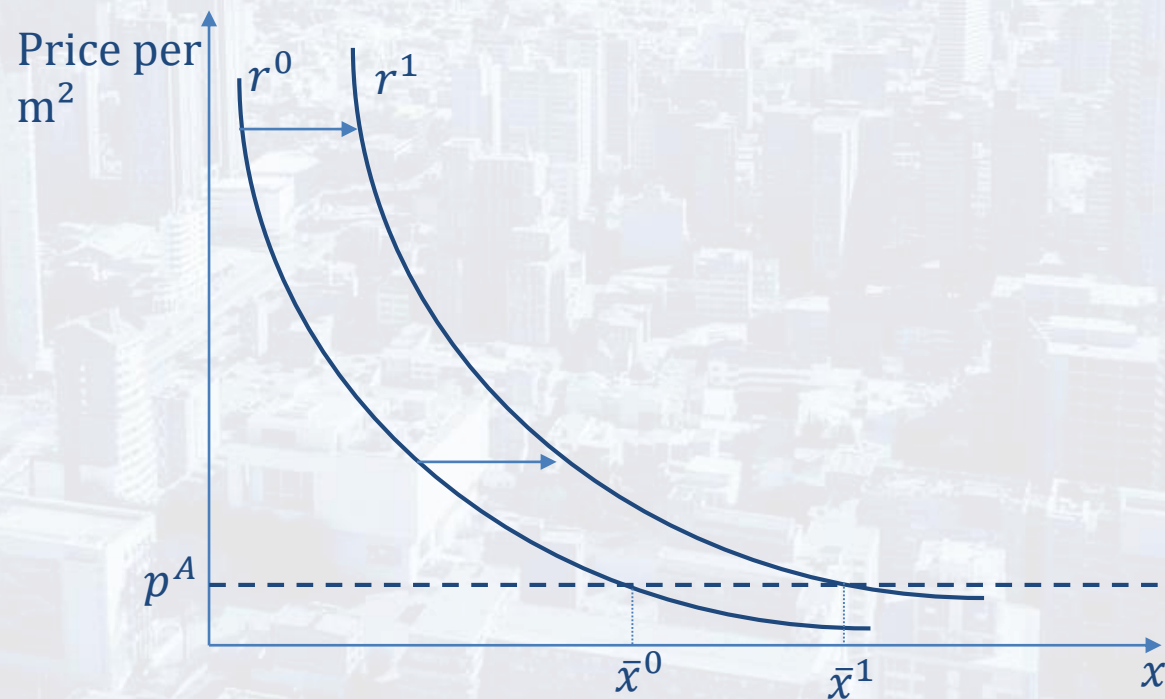


Employment density

Average travel time by public transport  
(work trips)

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

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



$x$  denotes the distance to the city centre

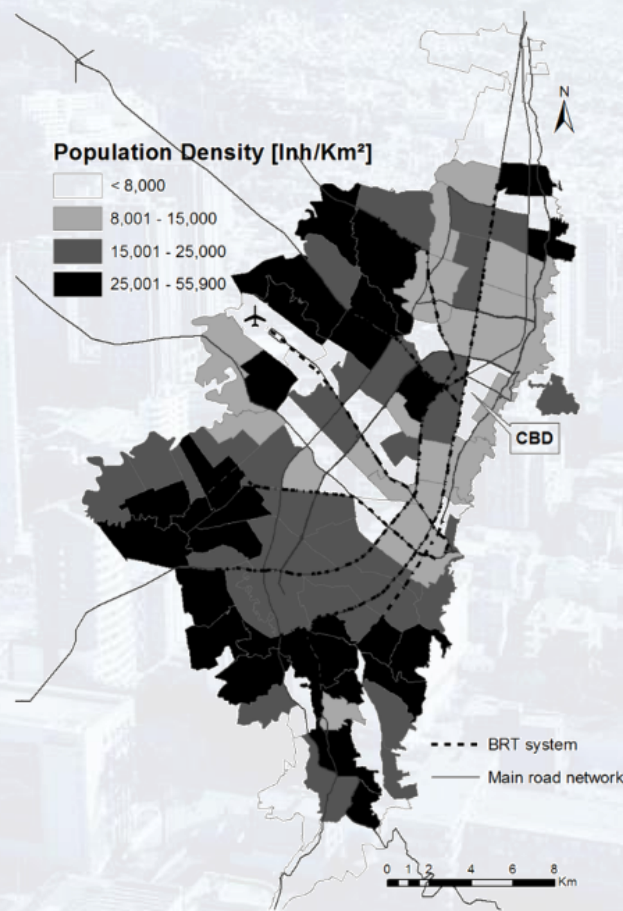
1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

- 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

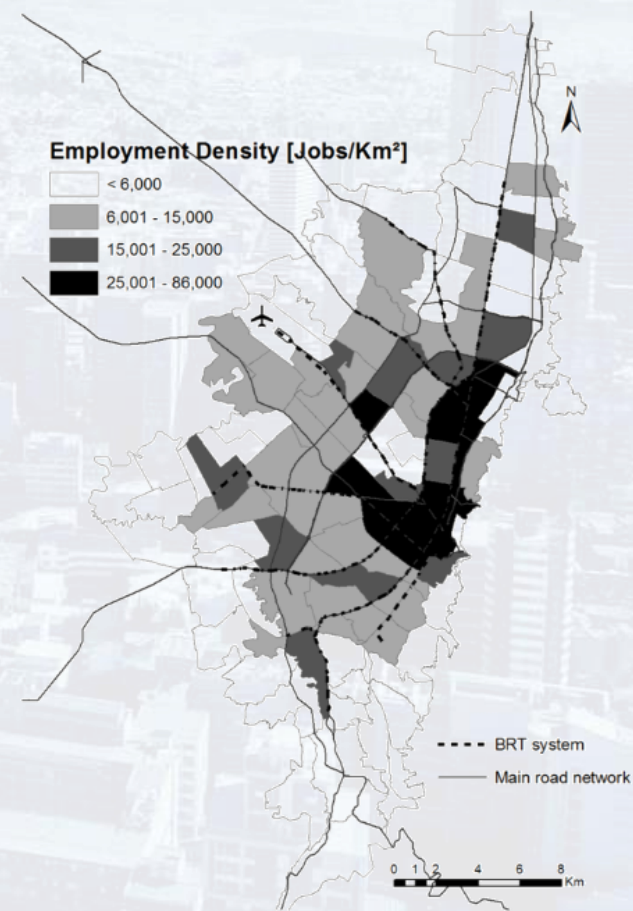


1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

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



Population density



Employment density

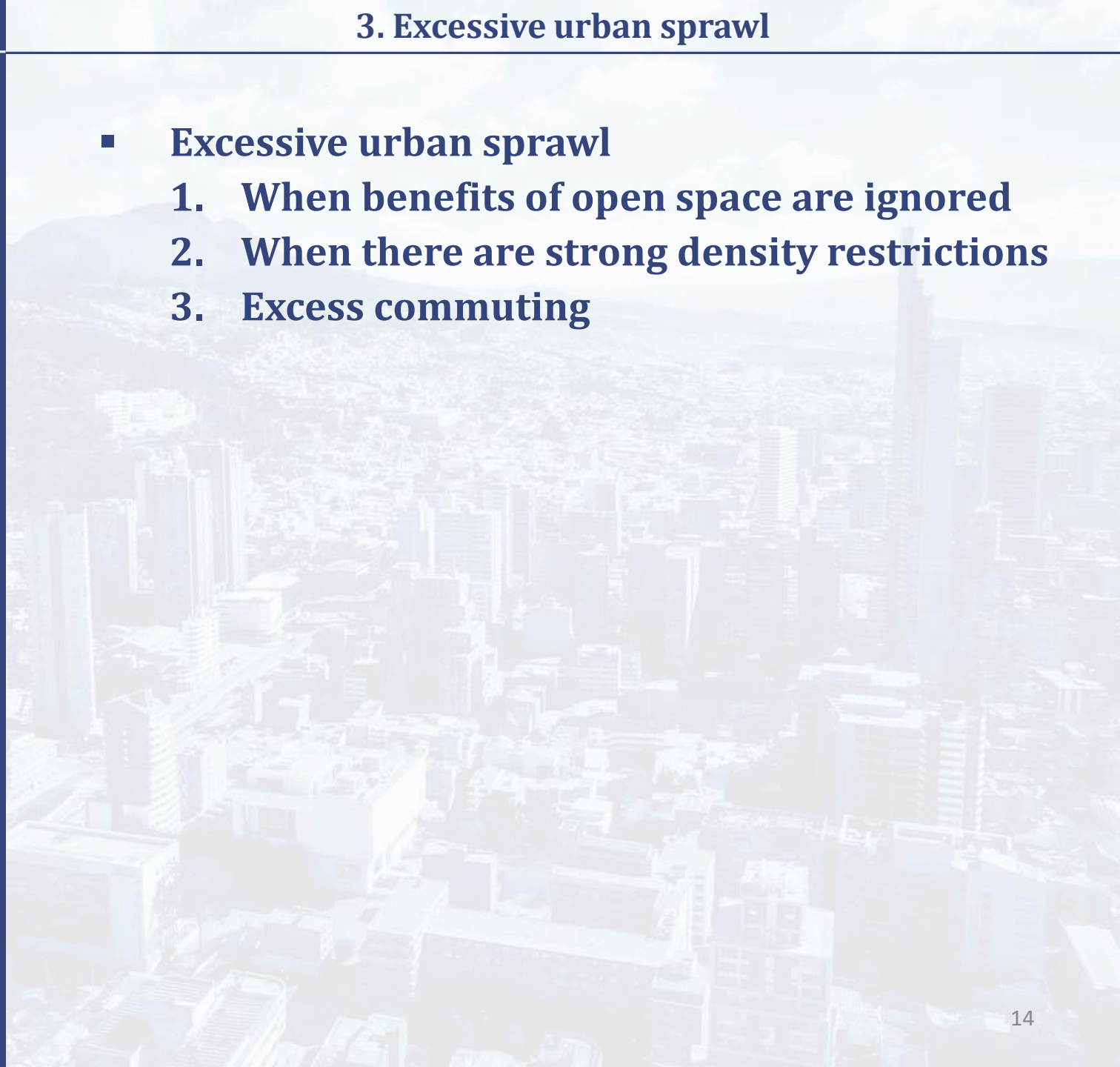


1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

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

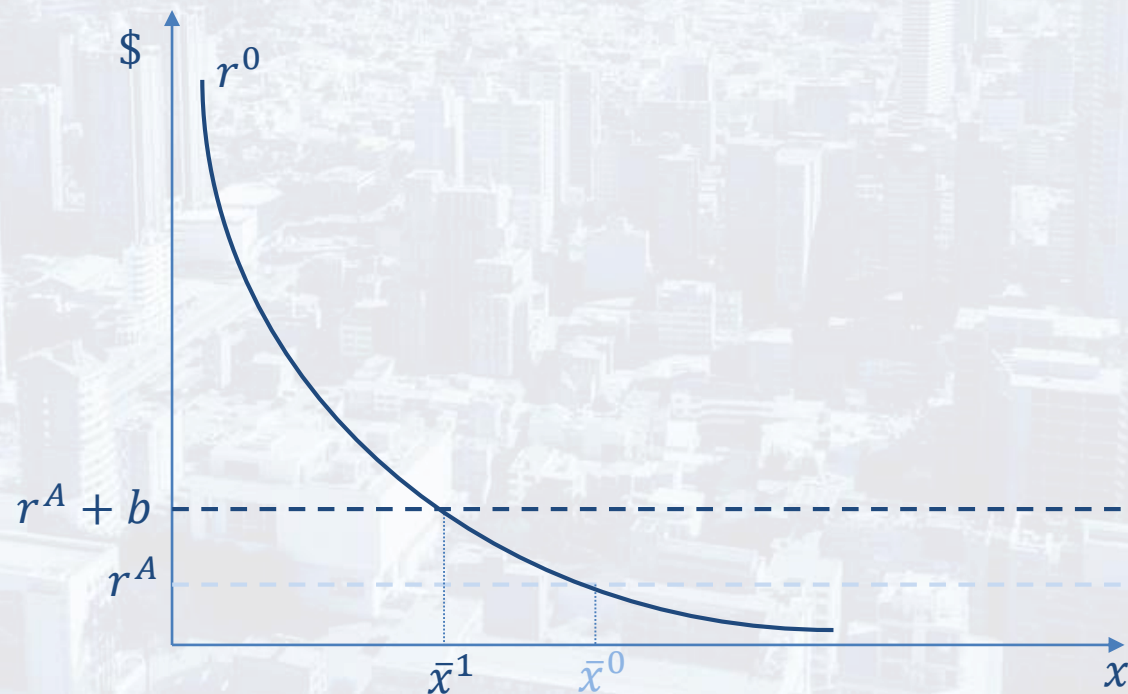
- 1. Introduction
- 2. Urban growth
- 3. Excessive urban sprawl
- 4. Traffic congestion
- 5. Agglomeration economies
- 6. Recommendations
- 7. Summary

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



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

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



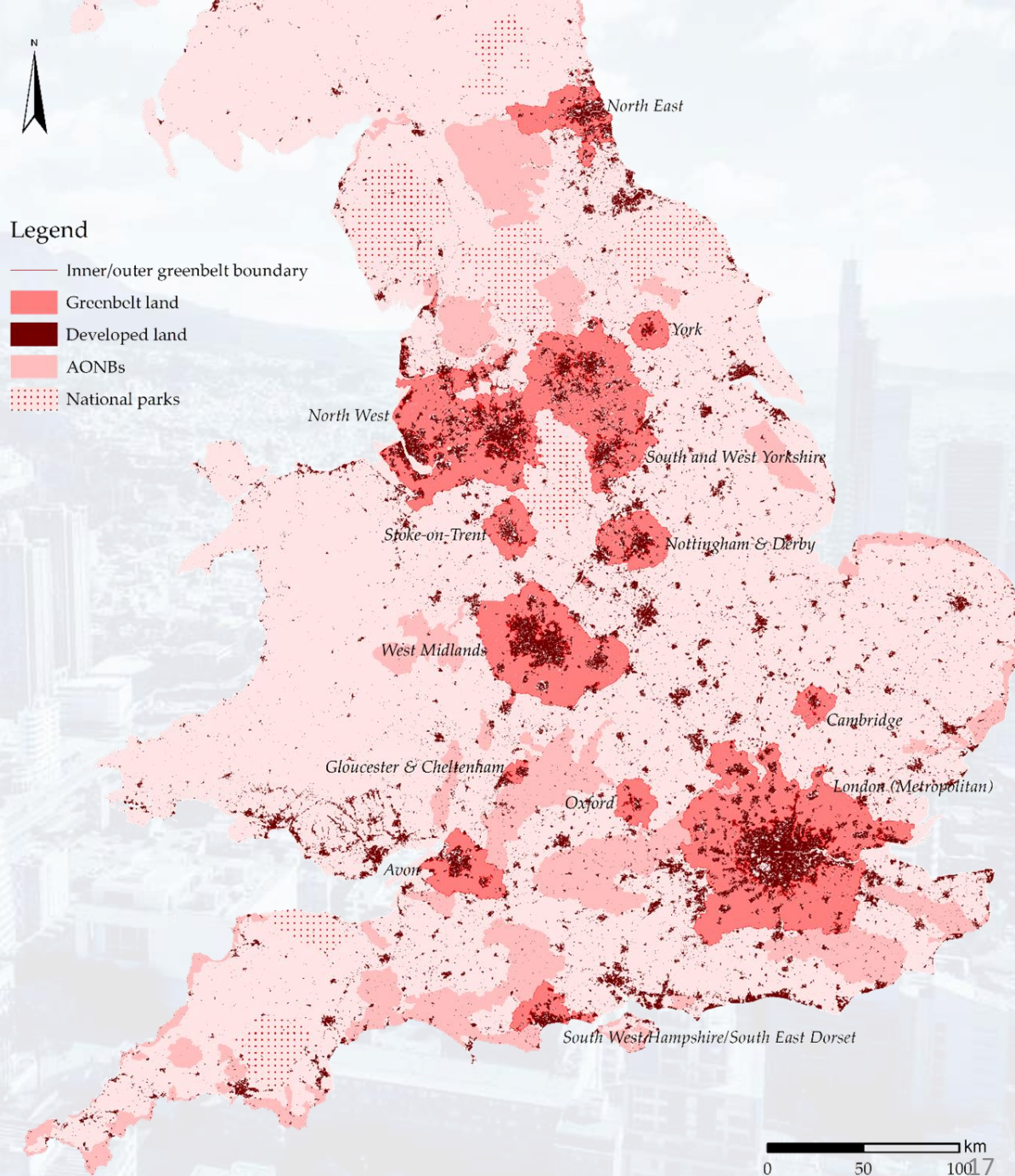
1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

## 1. Benefits of open space are ignored

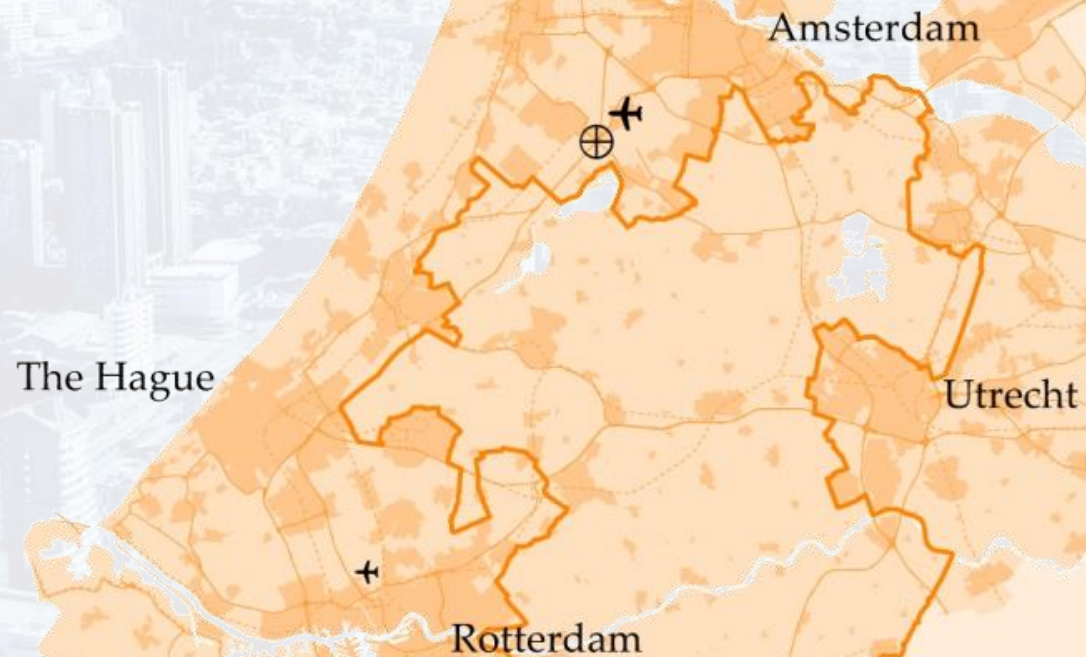
- Many cities around the world therefore protect open spaces around their city
  - England's greenbelts
  - The Dutch Green Heart



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



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



0 10 km



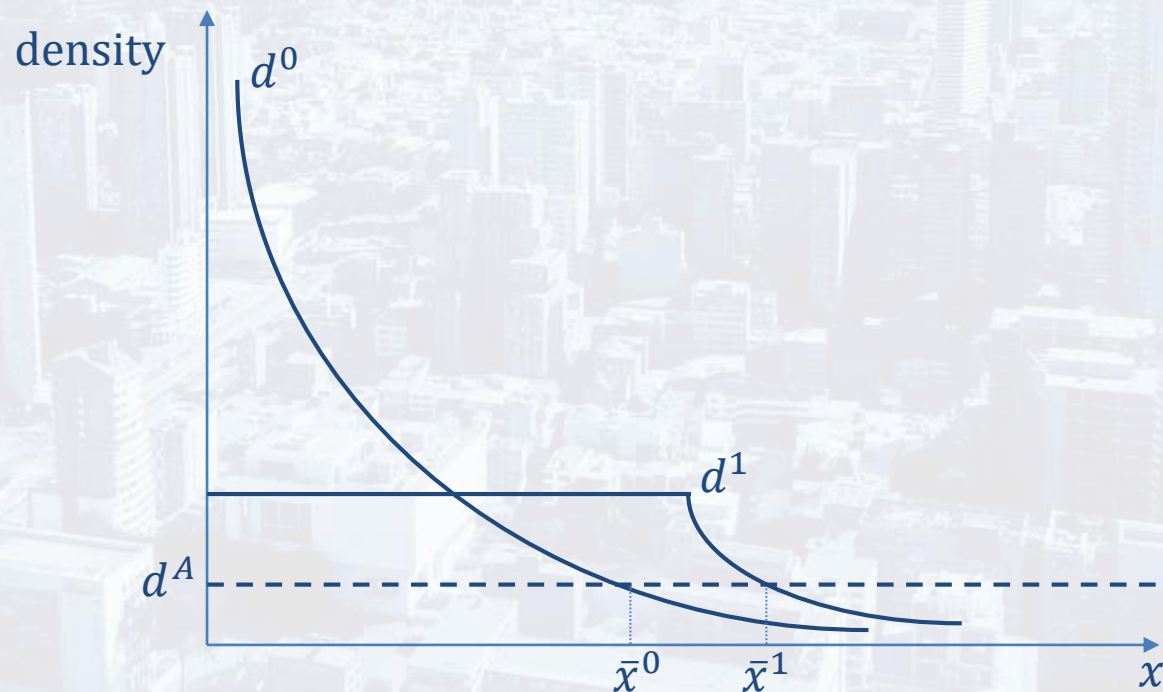
1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

## 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?

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

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





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

## 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]*

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

## 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!

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

## 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



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

### 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



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

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

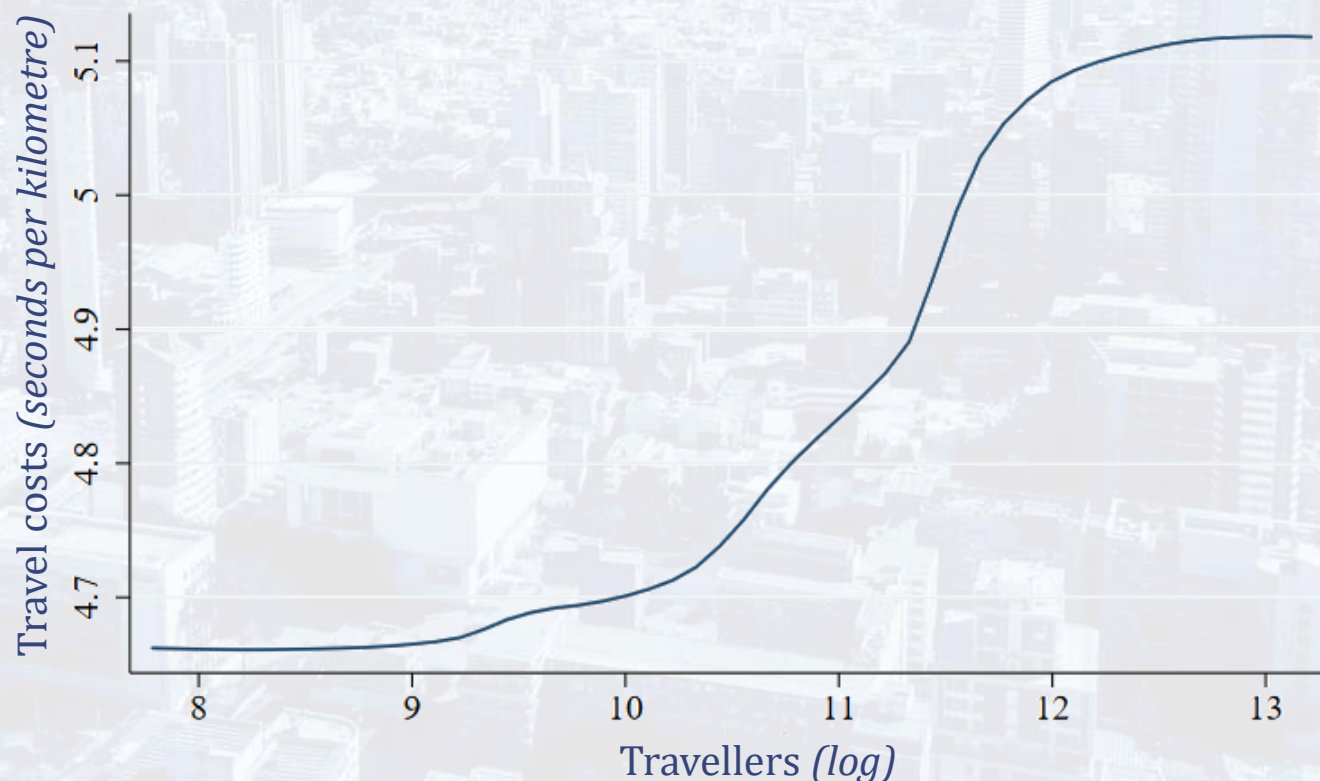
Table Descriptive statistics from the Bogotá Travel Survey

	Mean	Median	Variance	25th pctile	75th pctile
Trips within Bogotá (36,309 well-defined trips)					
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.

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

- **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)



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

- 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



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

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



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

- 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

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

- 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



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

- 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

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

- **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**

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

- **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**



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

- **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**
  - **[...]**

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

- **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**

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

- **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**



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

- **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**

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

- **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!**

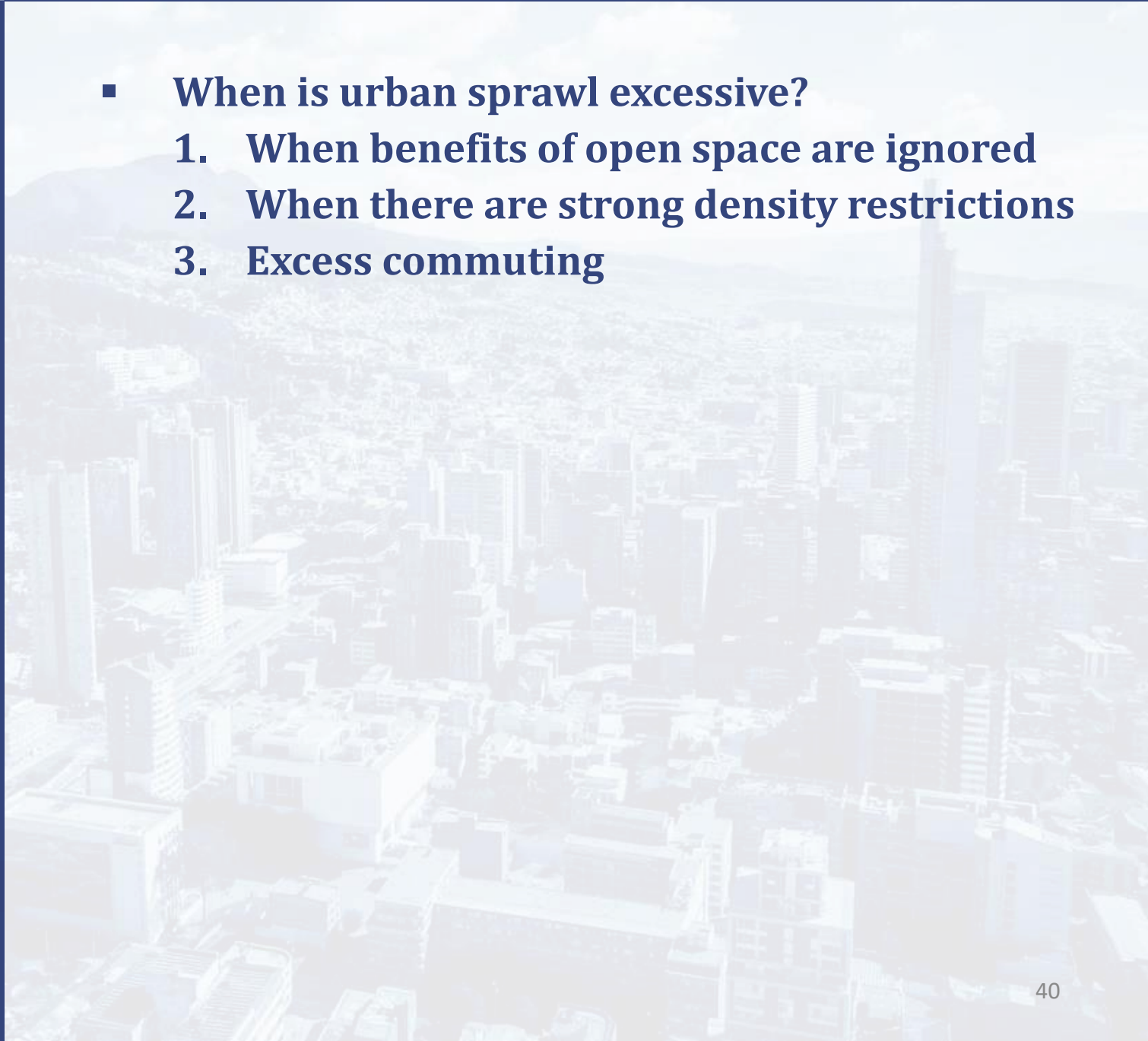
1. Introduction
2. Urban growth
3. Excessive urban sprawl
4. Traffic congestion
5. Agglomeration economies
6. Recommendations
7. Summary

- **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**



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

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



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

- **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

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

- **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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