



Financing methods applied to urban infrastructures  
Paolo Beria, Elena Scopel

# Financing methods applied to urban infrastructures.

## An application to Milan metro system

Paolo Beria, Elena Scopel

DiAP – Dipartimento di Architettura e Pianificazione

Politecnico di Milano

LABORATORIO DI POLITICA DEI TRASPORTI  
**TRASPOL**  
RESEARCH CENTER ON TRANSPORT POLICY








# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## CONTENTS

---

-  Scope of the paper
-  Infrastructure financing methods
-  Some case studies
-  An application
-  Concluding remarks



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Scope of the paper

---

There is a great interest on “innovative” financing methods applied to urban transport infrastructures.

- How such methods are actually applied?
- Are they a true solution to financing problems?
- What is the range of applicability of one of the most promising, the **land value capture**?

This paper describes and comments the available financing methods and tries an exercise application to Milan case.



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Infrastructure financing methods

### “Traditional” methods

---

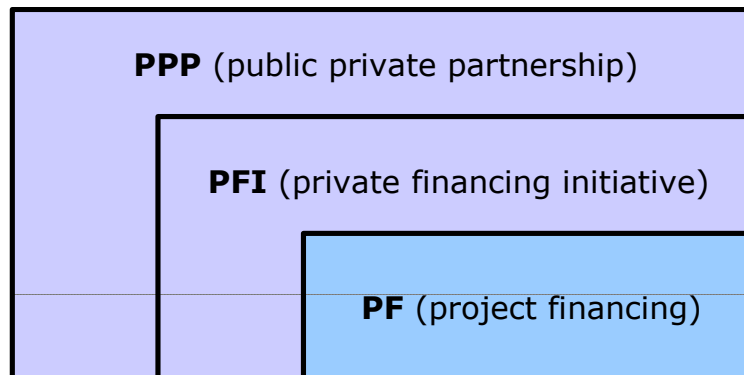
- i. Public funding
- ii. Public-private financing
  - ✓ Extra-costs associated to PF
  - ✓ How is risk shared?
- iii. Fiscal Charges



## Infrastructure financing methods

### “Traditional” methods

- i. Public funding
- ii. Public-private financing
  - ✓ Extra-costs associated to PF
  - ✓ How is risk shared?
- iii. Fiscal Charges





# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Infrastructure financing methods

### “Traditional” methods

- i. Public funding
- ii. Public-private financing
  - ✓ Extra-costs associated to PF
  - ✓ How is risk shared?

### iii. Fiscal Charges

	<b>PROFFERS</b>	<b>IMPACT FEES</b>	<b>BENEFIT ASSESSMENTS</b>
<i>Subject towards the tool is addressed</i>	Property developer	Property developer	Property owner
<i>What</i>	Necessary before construction's permit	Reimbursements to compensate social costs of the project.	Quantification of the benefits of new project
<i>When</i>	Ex-ante	Ex-ante / In itinere	Ex-post
<i>Why</i>	To obtain the construction's permit	To fund actions of public interest linked new project	To capture the benefit of new infrastructure



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Review of the literature

### “Innovative” methods

---

- i. Dedicated taxes
- ii. Land value capture
  - ✓ Skimming part of the rents of owners due to improved accessibility (**lower access time**, plus **monopoly rent**)
- iii. Co-financing through building indexes increase
  - ✓ Developers can build more buildings in change of sharing investment costs
- iv. Valorisation of public estate
  - ✓ Public areas are sold at a higher price thanks to infrastructural betterments



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Review of the literature

### Advantages and disadvantages

	<i>advantages</i>	<i>disadvantages</i>
Public funding	<ul style="list-style-type: none"><li>▪ Less capital costs</li><li>▪ Total <b>public control</b> on public goods</li></ul>	<ul style="list-style-type: none"><li>▪ Existence of a <b>marginal opportunity cost of public funds</b></li><li>▪ Public <b>budget constraints</b></li><li>▪ <b>Scarce efficiency</b> of public sector</li></ul>
Project Financing	<ul style="list-style-type: none"><li>▪ Useful in case of <b>budget constraints</b></li><li>▪ Allows a <b>better project management</b></li><li>▪ If the project is efficiently designed, <b>lower total costs</b></li></ul>	<ul style="list-style-type: none"><li>▪ The wrong <b>allocation of risks</b> generate big problems</li><li>▪ Capture problems of public bodies</li><li>▪ Higher <b>management costs</b> and for risk repayment</li></ul>
Fiscal charges	<ul style="list-style-type: none"><li>▪ <b>Good acceptability</b></li><li>▪ <b>Automatic</b> tool and related to the direct costs</li></ul>	<ul style="list-style-type: none"><li>▪ <b>Automatism is risky</b></li><li>▪ Risk of <b>discretionary decisions</b></li></ul>





# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Review of the literature

### Advantages and disadvantages

	<i>advantages</i>	<i>disadvantages</i>
...		
Dedicated taxes	<ul style="list-style-type: none"><li>▪ <b>Transparency</b></li><li>▪ <b>Responsabilising</b></li><li>▪ <b>constant flow of money</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>Risk to become an ordinary tool</b></li><li>▪ Difficult to adapt</li><li>▪ Cross subsidisation</li></ul>
Land Rent Capture	<ul style="list-style-type: none"><li>▪ Very <b>effective and neutral</b> to collect resources</li><li>▪ <b>Fair</b> (progressive taxation)</li><li>▪ <b>Discourages the speculation</b></li><li>▪ <b>Well related to private benefits</b></li><li>▪ Improves the quality of the <b>debate</b> on infrastructure works</li><li>▪ Applicable also to <b>existing buildings</b></li></ul>	<ul style="list-style-type: none"><li>▪ Scarce <b>political acceptance</b></li><li>▪ Technically <b>complex</b></li><li>▪ High <b>transaction costs</b></li></ul>



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Review of the literature

### Advantages and disadvantages

	<i>advantages</i>	<i>disadvantages</i>
...		
Co-financing trough building indexes increase	<ul style="list-style-type: none"><li>▪ <b>Reduction of private benefits</b></li><li>▪ <b>Effectiveness</b> in raising resources</li><li>▪ <b>Neutral</b></li><li>▪ Good <b>social acceptability</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>Discretionary</b></li><li>▪ Does not cover infrastructure running costs</li><li>▪ Applicable to <b>new developments only</b></li></ul>
Valorisation of public estate	<ul style="list-style-type: none"><li>▪ <b>Optimisation of transport - land use relationship</b></li><li>▪ <b>Valorisation of underdeveloped assets</b></li><li>▪ <b>Public control</b></li><li>▪ <b>Does not increase fiscal pressure</b></li></ul>	<ul style="list-style-type: none"><li>▪ Risk for <b>transparency</b></li><li>▪ Risk of focusing on rising <b>land value only.</b></li></ul>



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Some case studies

### Hong Kong Mass Transit Railway Company

MTR is a public company.

Mission: **develop jointly infrastructures and buildings** (concessions of public land)

Financing trough

- ✓fares
- ✓commercial exploitation of stations
- ✓renting its buildings
- ✓development of properties to be sold.
- ✓borrow loans to the developers.

**79% of the totality of infrastructural expenditure.**

**39% of total land value increase captured.**





# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Some case studies

### Business Improvement Districts

---

Especially in USA, not only for transport issues.

- ✓ “*Special Assessment Districts*” in Los Angeles
- ✓ “ACT Change of Use Charge” in Australia

Particular tax, applied mainly on business property localised in a specific area subject to improvement investments.

The tax is justified by the increase of the value of the land and, finally, of the property.



## Some case studies

### *“Die sozialgerechte bodennutzung”* in Munich

---

Interesting application (1994), used mainly for public housing

- i. **Calculation of land value increment** as the difference between land value before and after the destination or new infrastructure
- ii. each owner has to **pay all the infrastructural costs needed for the area, up to the level of 2/3 of the land value increment** calculated.

Results in ten years (1994-2004):

- 2700 units of new housing (out of 10400 units)
- 100 hectares of private land became public
- 172.9 million euro



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## ■ An application to Milan

### The metro plan 2015-2025

---

Planned lines, scenario after 2015.

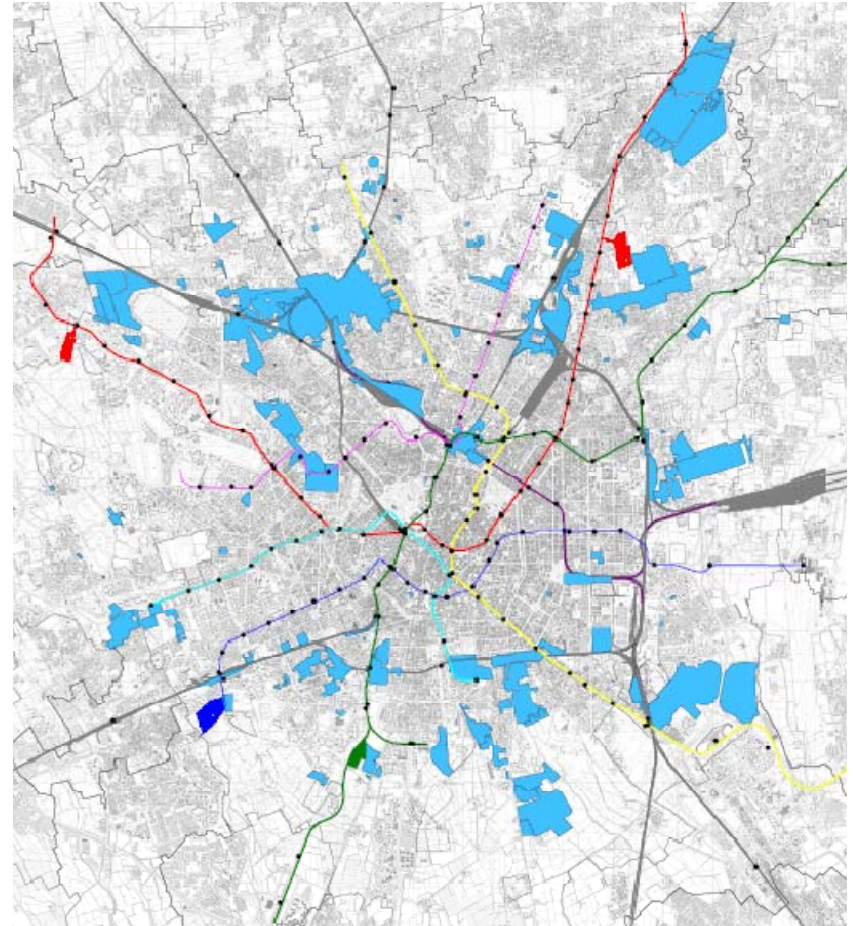
→ new lines: M5, M4, M7, M8

→ Total renovation: M6

→ Urban rail link

→ Extensions

→ Expected **20% more inhabitants** and **500.000 trips/day!**





# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## ■ An application to Milan

### The metro plan 2015-2025

---

M4 is new line, mainly built in the already existing city.

Extensive new developments in brownfields.

Financing methods available:

- ✓ traditional public funding;
- ✓ project financing plus shadow toll;
- ✓ sale or securitisation of public areas;
- ✓ earmarked taxes on new developments;
- ✓ implementation of a **land value capture on existing buildings.**



## ■ An application to Milan

### Metro line 4 case – Land value capture

---

Preliminary estimation of revenues from a tax on land value increment on existing buildings.

Proposal:

- i. **Increase of the *legal value*** of the interested buildings, in the range of distance where significant variation of *market values* occur.
- ii. Imposition of a **tax equal to the 100% of the increased legal value**, but **at the moment of selling**.  
→ more politically acceptable
- iii. The increased legal value determines **more yearly taxes**  
→ cover the operation costs





## ■ An application to Milan

### Metro line 4 case – Land value capture

---

#### Assumptions

- ✓ 15% increase of market price → **15% increase of legal value;**
- ✓ Benefits for **3,4% of all buildings sold** in Milan in one year
- ✓ 30 years, 8% discount rate;



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## An application to Milan

### Metro line 4 case – Land value capture

#### Estimation

	<i>Total transactions Milano 2007</i>	<i>Estimation annual transactions involved with M4 path</i>		
houses	21842			734
offices	1361			46
commercial	2444			82
<hr/>				
	<i>Average legal value (hypothesis)</i>	<i>Value increase due to M4: 15%</i>	<i>Value capture share</i>	<i>Total value captured</i>
houses	60.000	9.000	100%	6.605.021
offices	60.000	9.000	100%	441.566
commercial	10.000	1.500	100%	123.178
<hr/>				
TOTAL				7.139.765

Total resources from the tax in 30 years: **55,3 M€**

→ **3.6% of line cost**



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

## Concluding remarks

---

We commented the financing tools.

We provided some case studies to illustrate the so-called “innovative” ones.

Innovative mechanisms, if correctly applied, can introduce incentives for a better planning and a better risk sharing.

**Land value capture** is among the most interesting ones, capable of rising funds in a **fair** way.

We tried an application to Milan M4, obtaining a very **conservative co-financing share of 4%** (to 10%).

Motivations of success among policy makers.



# Financing methods applied to urban infrastructures

Paolo Beria, Elena Scopel

***Feedbacks are welcome!!!!***

---

paolo.beria@polimi.it

elena.scopel@mail.polimi.it