

Climate Protection Measures and Smart City Taxation

The Governance of Public Budgets and a Green Local Smart City Tax
in Multilevel Systems from an Interdisciplinary Perspective

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Bangkok, March 30, 2024



Outline

1. Introduction and Motivation
2. Climate Protection Measures and Global Public Goods: A Theoretical Approach
3. Challenges for Cities and the „Smart City Approach“
4. Discussion on a Green Local Smart City Tax
5. Preliminary Conclusions

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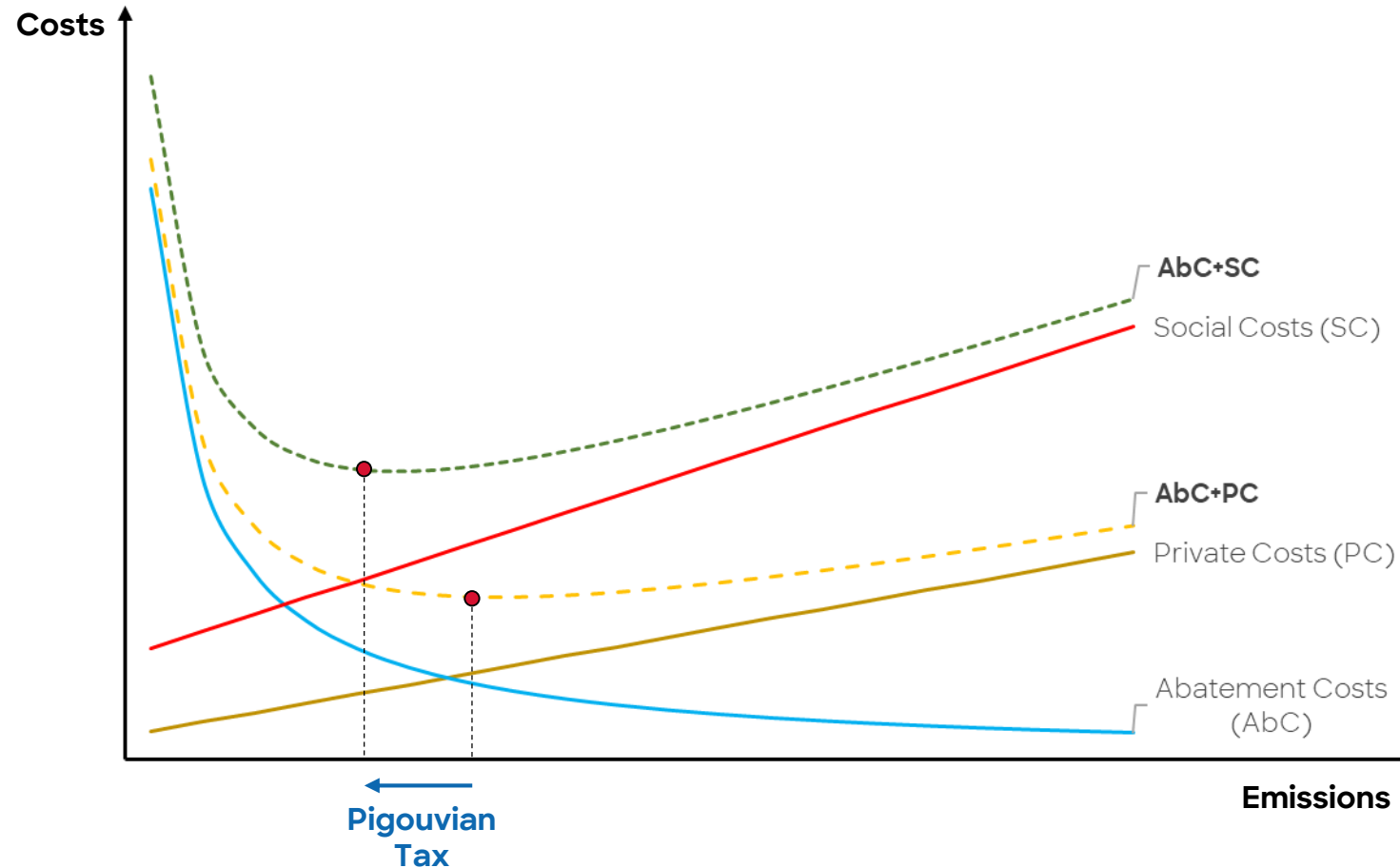
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Background of the Study and Motivation

- Interconnections of today's globalized world reinforce the focus on the so-called **“Global Public Goods”** (GPGs) (Buchholz and Sandler 2021).
- Multi-level interdependence give rise to significant **institutional challenges** regarding coordinating climate policy targets.
- Need to bring together several approaches to solve the problem of providing efficient **multi-level climate protection measures**.
- **„Smart Cities“** offer innovative solutions to mitigate environmental impacts and promote sustainable development.
- **“Green Local Smart City Tax”** represents a fiscal measure to address the financial aspects of local climate initiatives while promoting optimal allocation efficiency and city development in competitive interjurisdictional environments

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Pigouvian Tax on Climate Emissions



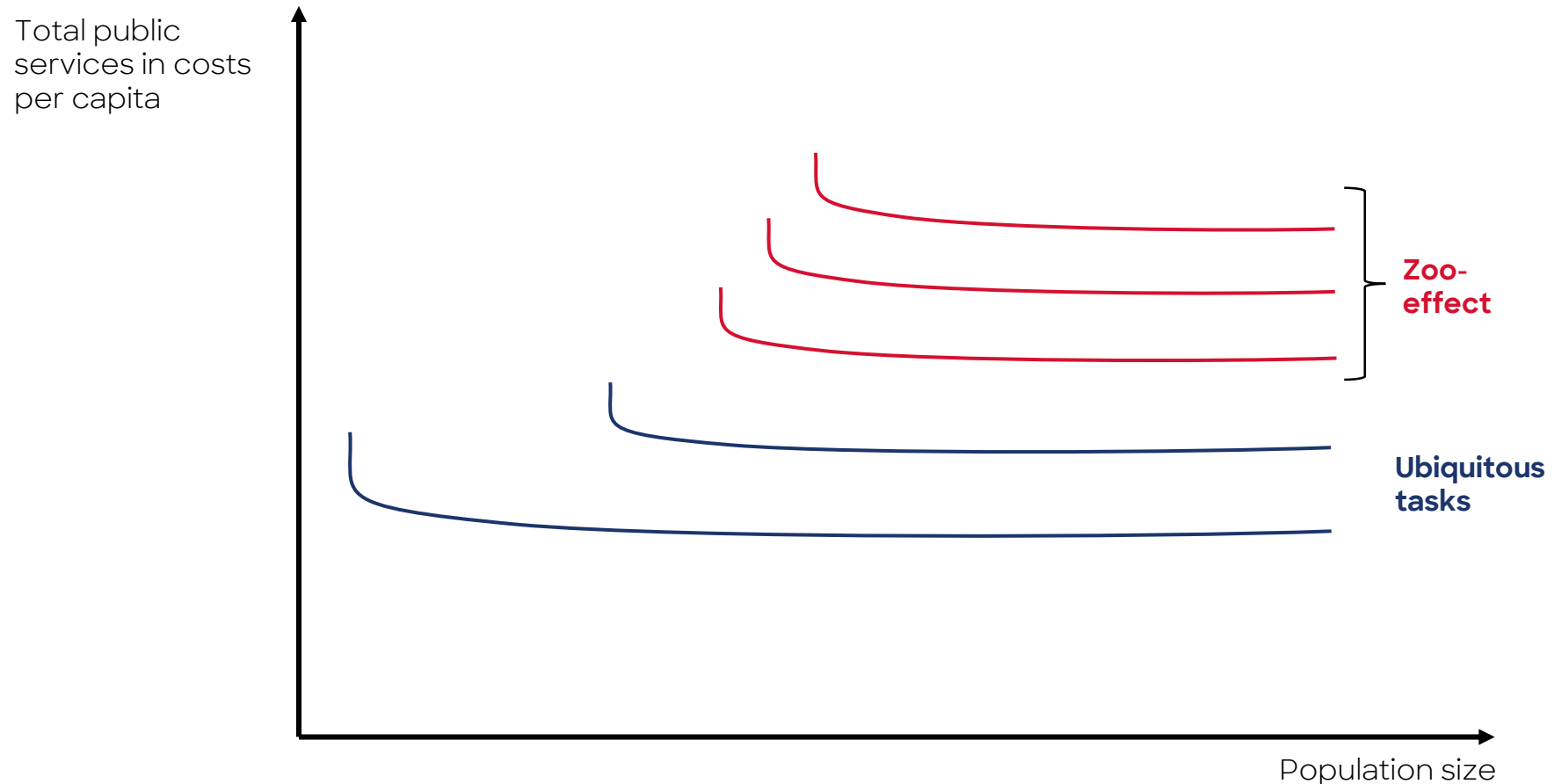
Governing Global Public Goods

- The concept of multi-level governance underscores the need for vertical and horizontal coordination (Benz 2003; Benz and Dose 2010).
- Multi-level governance shapes climate governance by integrating cross-level and cross-sectoral regulatory structures, yet lacks a central coordinating authority, resulting in a fragmented global climate protection system (Ostrom 2010).
- Multi-level governance frameworks must address incentive misalignments driven by external effects, such as the underinvestment in local climate mitigation efforts due to positive externalities.
- What level has to set and collect PIGOUVIAN taxes to internalize external effects?
- What tax instruments and incentives are needed for the provision of multi-level climate protection measures?

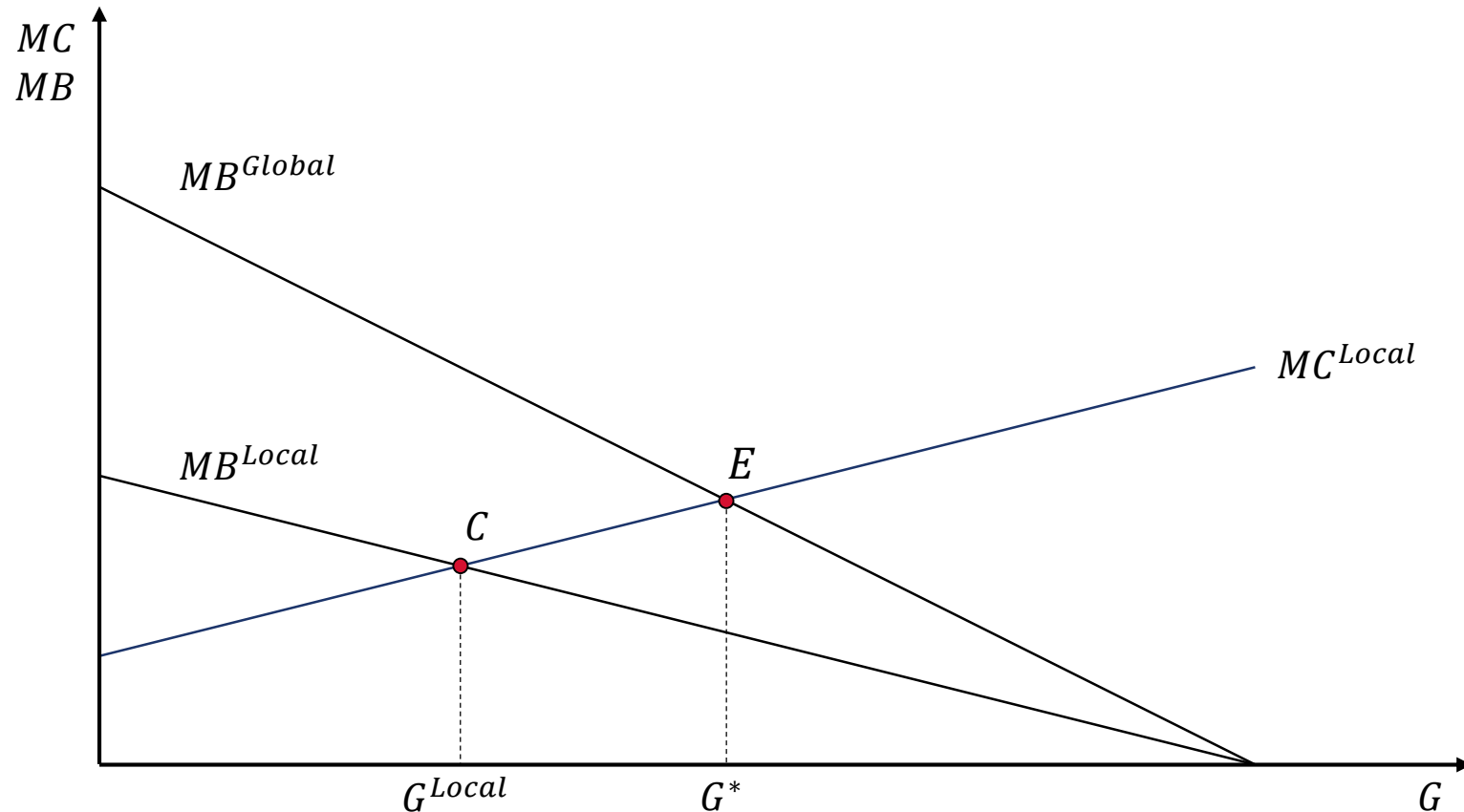
Governing Global Public Goods

- Vertical coordination in climate governance requires an understanding of the diverse scales at which climate actions operate.
- Some climate actions necessitate broader coordination at higher administrative levels.
- The **"Zoo-Effect"** illustrates how larger jurisdictions take on additional tasks due to economies of scale (Oates 1988).
 - Scale effects are crucial in efficiently delivering climate protection measures across different jurisdictions, with larger urban areas potentially benefiting from more effective implementation.
 - **Supporting and financing urban areas** is crucial to promote effective global climate policy and maximize the positive externalities of climate protection measures.

Vertical Coordination in Climate Governance



The Problem of Local and Global Benefits



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Global Urbanization Trends

- The United Nations point out, all regions “are expected to urbanize further over the coming decades.” (UN 2015)
- Hodson et al. (2012) also suggest that a *second wave of urbanization* is under way and acknowledge the need to “reconfigure the world’s urban infrastructures to reshape resource flows through cities in more innovative ways.”
- Explanations:
 - Demographic change
 - Agglomeration effects
 - **Climate change -> Cities are Location of Climate protection measures**
- For example, Geys et al. (2008) have pointed out, municipalities and in particular German municipalities are expected to suffer from demographic changes in the upcoming decades.

Consequences of Global Urbanization Trends

- Henderson (2010) has already pointed out that rapid urbanization is related with enormous population movements and as a consequence of this, enormous local and inter-city infrastructure investments will be required.
- Taking into account that cities and agglomeration cores respectively are centers of economic growth because of related markets (factor markets and goods markets), agglomeration effects, higher incomes, and areas of economic development, “some of the most important urban advantages require urban infrastructure, policies and planning that support the transition to more resilient, healthy and sustainable cities” (McGranahan and Satterthwaite, 2014).
- Henderson (2010) describes the relation between urbanization and economic development as follows: „While urbanization per se does not cause development, sustained economic development does not occur without urbanization.

Relevant Types of Infrastructure

- **Mobility-based infrastructure**

Covers transportation modes where individuals move from point to point within a municipality. This subset of the urban infrastructure sector includes individual transportation modes and mass transportation modes.

- **Supply-based infrastructure**

Covers network structures where goods can be transported to consumers. Examples are waterworks systems, sewerage disposal and solid waste management facilities (cf. Pethe and Ghodke 2002). Further examples are street lightning or power grids.

- **Social infrastructure**

This term describes required infrastructure that is not “technical” as defined above. The term “social infrastructure” is a subset of the infrastructure sector and refers to a class of assets that support social services. For example, publicly funded schools, universities, medical centers, community housing, publicly funded community and sports facilities can be grouped under the heading “social infrastructure”.

About the Term „Smart City“

- One highly discussed issue in the last two decades is the concept of “Smart City”.
- The concept of “Smart City” can be the answer to several local problems in future.
- First contributions in the middle of the 1990 have focused on ICT-infrastructure, but this is no more adequate.
- “Although several different definitions of smart city have been given in the past, most of them focus on the role of communication infrastructure. However, this bias reflects the time period when the smart city label gained interest, viz. the early 1990s, when the ICTs first reached a wide audience in European countries. Hence, in our opinion, the stress on the internet as „the“ smart city identifier no longer suffices.”
(Caragliu et al. 2011: 69 f.)
- The term “Smart City” can not be restricted to one dimension.

Six Dimensions by Giffinger et al. (2007)

Smart economy (Competitiveness)	Smart people (Social and Human Capital)	Smart governance (Participation)
Innovative spirit Entrepreneurship Economic image & trademarks Productivity Flexibility of labour market International embeddedness Ability to transform	Level of qualification Affinity to lifelong learning Social and ethnic plurality Flexibility Creativity Cosmopolitanism, openmindedness Participation in public life	Participation in decision-making Public and social services Transparent governance Political strategies and perspectives
Smart mobility (Transport and ICT)	Smart environment (Natural resources)	Smart living (Quality of life)
Local accessibility (Inter-)National accessibility Availability of ICT-infrastructure Sustainable, innovative and safe transport systems	Attractiveness of natural conditions Pollution Environmental protection Sustainable resource management	Cultural facilities Health conditions Individual safety Housing quality Education facilities Touristic attractiveness Social cohesion

Source: Giffinger et al. 2007: 12.

A „Smart City“ Definition“

“Smart City refers to a city in which ICT and resource-saving technologies systematically are used to move towards a post-fossil society, reduce the consumption of resources, permanently improve the quality of life of citizens and the competitiveness of the local economy - in other words, to improve the future viability of the city. Thereby, the areas of energy, mobility, urban planning and governance are taken into account. An elementary characteristic of a smart city is the **integration** and **cross-linking** of these areas in order to realize the potential for ecological and social improvement that can be achieved in this way. A comprehensive integration of social aspects of urban society and a participative access are essential.”

Rohde and Loew (2011: 6; own translation).

Smart City bezeichnet eine Stadt, in der systematisch Informations- und Kommunikationstechnologien sowie ressourcenschonende Technologien eingesetzt werden, um den Weg hin zu einer postfossilen Gesellschaft zu beschreiten, den Verbrauch von Ressourcen zu verringern, die Lebensqualität der BürgerInnen und die Wettbewerbsfähigkeit der ansässigen Wirtschaft dauerhaft zu erhöhen, – mithin die Zukunftsfähigkeit der Stadt zu verbessern. Dabei werden mindestens die Bereiche Energie, Mobilität, Stadtplanung und Governance berücksichtigt.

Elementares Kennzeichen von Smart City ist die Integration und Vernetzung dieser Bereiche, um die so erzielbaren ökologischen und sozialen Verbesserungspotenziale zu realisieren. Wesentlich sind dabei eine umfassende Integration sozialer Aspekte der Stadtgesellschaft sowie ein partizipativer Zugang.

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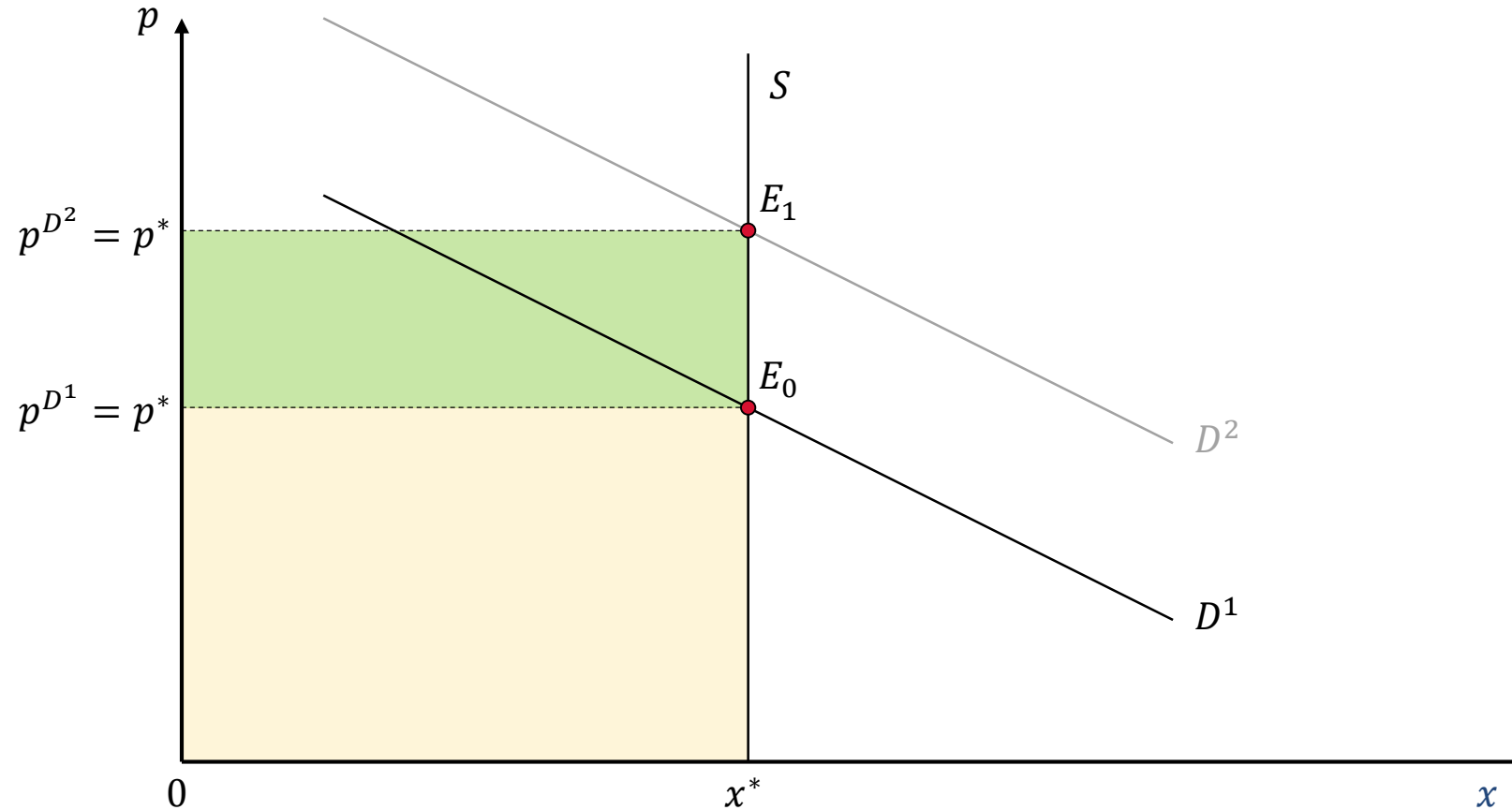
Principles for a Municipal Financing System

- Autonomy
- Less cycling ups and downs in municipal fundings
- Tangibleness of taxation
- High yield
- Strong relation between local taxes and residents

- Local taxation
 - Income taxes
 - Sales taxes
 - Property taxes

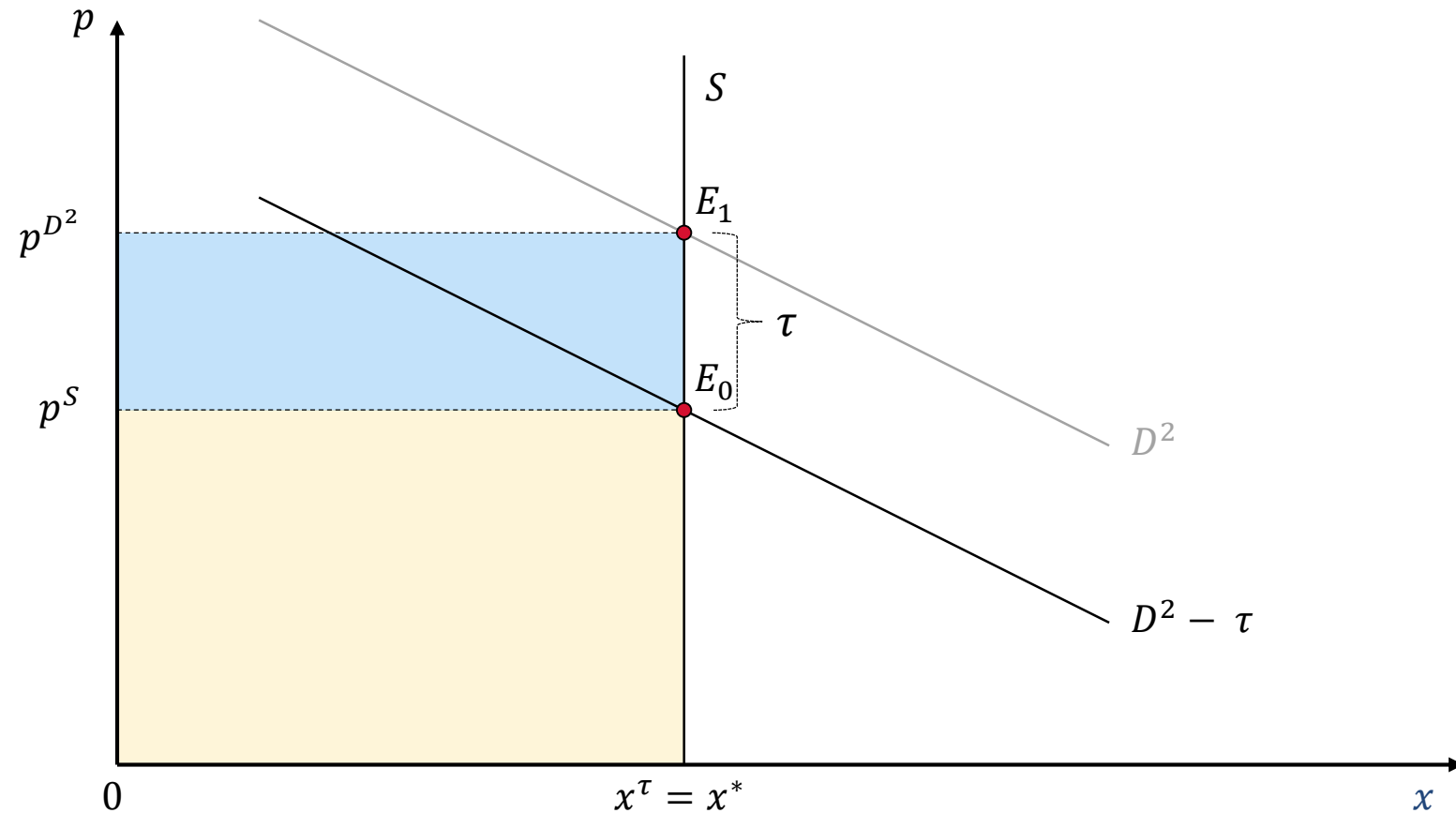
Land supply, Demand, and Land Rent

Smart City Land Rent



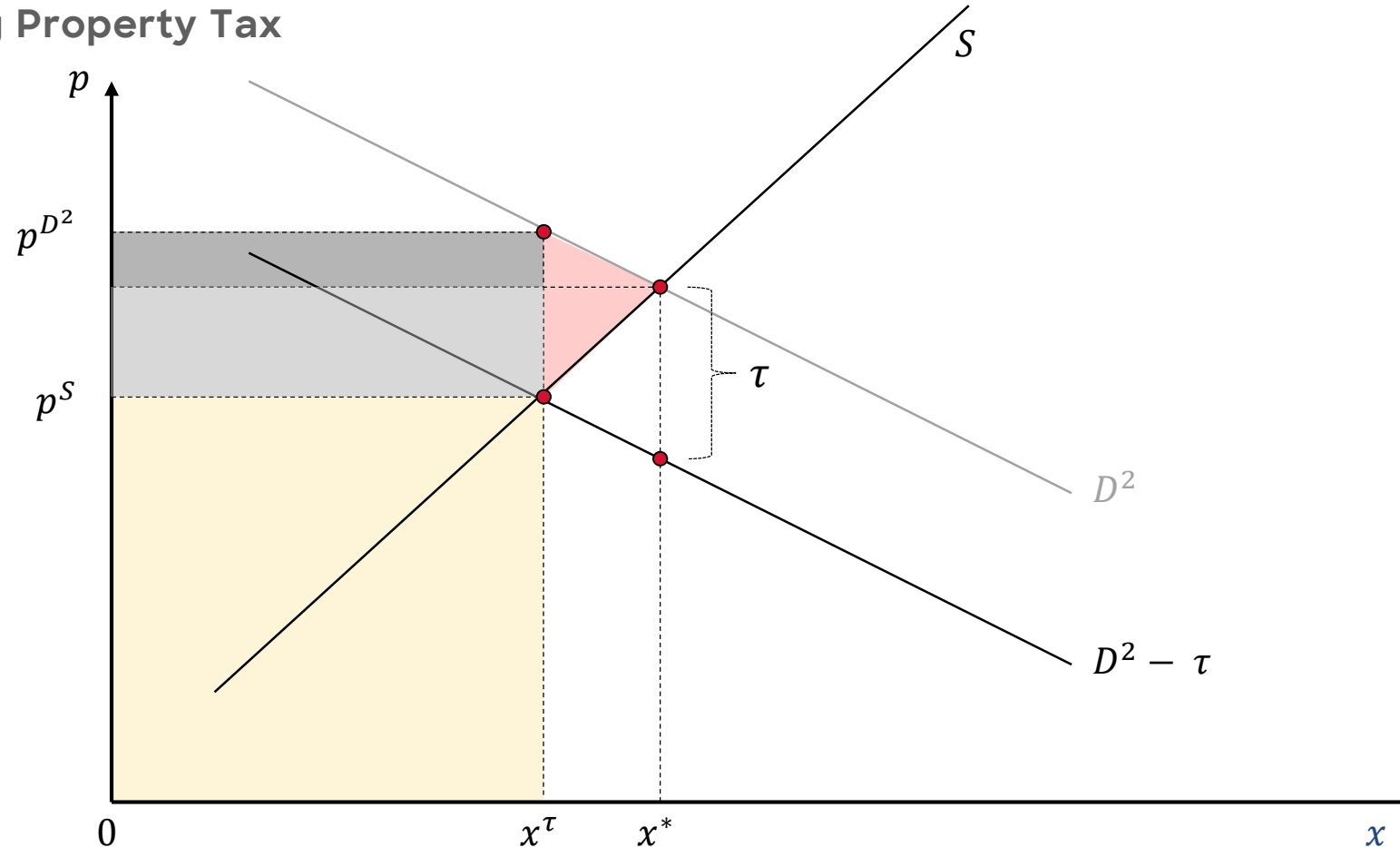
Land supply, Demand, and Land Rent

Green Local Smart City Tax



Land supply, Demand, and Land Rent

Distorting Property Tax



Land Tax – Theoretical Conclusion

- Landowners receive the entire land rent.
- Landowners bear the entire burden of taxation.
- Henry-George-Theorem (1879), *Progress and Poverty*.
- „Golden Rule for Local Public Finance“
 - Under certain conditions, public spending on public goods (e.g. infrastructure) will increase aggregate rent based on land value (land rent).
 - Public sector is a “rent creating institution”
 - Public revenue levied based only on land rents would be sufficient to cover public expenditure.

State Creates Land Rent

“Consider what rent is. It does not arise spontaneously from land; it is due to nothing that the land owner has done. It represents a value created by the whole community. Let the landholders have, if you please, all that the possessions of the land would give them in the absence of the rest of the community. But rent, the creation of the whole community, necessarily belongs to the whole community.”

George, Henry (1886: 328)

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A Green Local Smart City Tax

- Cities are faced with some future challenges.
- To become „smart“ could be a successful strategy for solving future municipal problems and for supporting climate protection measures.
- „Smart Cities“ need „Smart Infrastructure“ to promote climate protection.
- To finance municipal smart infrastructure and locally supported climate protection measures, sufficient financing instruments are needed.
- Land value tax as a „Green Local Smart City Tax“ may be a contribution on the local level
 - to mitigate space consumption in urban areas,
 - to achieve optimal utilization of land and
 - to levy revenue for public spendings on local infrastructure to support climate protection measures.



Thank you very
much for your
attention!