

Competition in the Provision of Local Public Goods

STUDIES IN FISCAL FEDERALISM AND STATE-LOCAL FINANCE

Series Editor: Wallace E. Oates, *Professor of Economics, University of Maryland and University Fellow, Resources for the Future, USA*

This important series is designed to make a significant contribution to the development of the principles and practices of state-local finance. It includes both theoretical and empirical work. International in scope, it addresses issues of current and future concern in both East and West and in developed and developing countries.

The main purpose of the series is to create a forum for the publication of high quality work and to show how economic analysis can make a contribution to understanding the role of local finance in fiscal federalism in the twenty-first century.

Titles in the series include:

Political Economy in Federal States
Selected Essays of Stanley L. Winer
Stanley L. Winer

Public Finance in Developing and Transitional Countries
Essays in Honor of Richard Bird
Edited by Jorge Martinez-Vazquez and James Alm

Federal Intergovernmental Grants and the States
Managing Devolution
Shama Gamkhar

State and Local Finances under Pressure
Edited by David L. Sjoquist

The Property Tax, Land Use and Land Use Regulation
Edited by Dick Netzer

Restructuring Local Government Finance in Developing Countries
Lessons from South Africa
Edited by Roy Bahl and Paul Smoke

Reforming Intergovernmental Fiscal Relations and the Rebuilding of Indonesia
The 'Big Bang' Program and its Economic Consequences
Edited by James Alm, Jorge Martinez-Vazquez and Sri Mulyani Indrawati

Competition in the Provision of Local Public Goods
Single Function Jurisdictions and Individual Choice
Alexandra Petermann Reifschneider

Competition in the Provision of Local Public Goods

Single Function Jurisdictions and Individual
Choice

Alexandra Petermann Reifschneider

*Freiburg University, Germany and Chilean Construction
Chamber, Santiago, Chile*

STUDIES IN FISCAL FEDERALISM AND STATE-LOCAL FINANCE

Edward Elgar

Cheltenham, UK • Northampton, MA, USA

© Alexandra Petermann Reifschneider, 2006

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical or photocopying, recording, or otherwise without the prior permission of the publisher.

Published by
Edward Elgar Publishing Limited
Glensanda House
Montpellier Parade
Cheltenham
Glos GL50 1UA
UK

Edward Elgar Publishing, Inc.
136 West Street
Suite 202
Northampton
Massachusetts 01060
USA

A catalogue record for this book
is available from the British Library

Library of Congress Cataloguing in Publication Data

Petermann Reifschneider, Alexandra, 1972–

Competition in the provision of local public goods: single function jurisdictions and individual choice/Alexandra Petermann Reifschneider.

p. cm. — (Studies in fiscal federalism and state–local finance series)

Includes bibliographical references and index.

1. Public goods. 2. Local finance. 3. Intergovernmental fiscal relations.

I. Title. II. Studies in fiscal federalism and state–local finance.

HJ193.R45 2005

363'.09173'2—dc22

2005050624

ISBN-13: 978 1 84542 369 8

ISBN-10: 1 84542 369 0

Printed and bound in Great Britain by MPG Books Ltd, Bodmin, Cornwall

Contents

<i>Acknowledgements</i>	viii
General introduction	1
1 Maximum lot-size regulation	23
1.1 Introduction	23
1.2 The basic model of residential choice	25
1.3 Competitive equilibrium under the maximum lot-size regulation	28
1.4 Optimal maximum lot-size regulation	38
1.5 Concluding remarks	45
Appendices	
1A1 Determination of the competitive equilibrium under the basic model of residential choice	47
1A2 An example of competitive equilibrium without the regulation	52
2 Competing jurisdictions for the provision of local public goods	58
2.1 Introduction	58
2.2 The model	62
2.3 Homogeneous local public goods, $K = 1$	66
2.4 Heterogeneous local public goods, $K \geq 2$	119
2.5 Summary and explanation of the main results	136
Appendices	
2A1 The optimal allocation for homogeneous local public goods	145
2A2 Monopoly price equilibrium for different levels of distant competition	149
2A3 Price equilibrium for two competing local service providers for different levels of distant competition	151
2A4 Price-location equilibrium among competing local service providers under flexible technology	156
2A5 Price-location equilibria among competing local service providers under fixed technology	160
2A6 Influence of distant and local competition on the	

	price-location equilibrium among m competing local service providers under flexible technology	162
2A7	Determination of the equilibrium number of local service providers under the presence of distant competition when technology is flexible	166
2A8	Determination of the minimum equilibrium number of symmetrically located local service providers under the presence of distant competition when technology is fixed	169
2A9	The optimal number of facilities in the case of an elastic demand	172
2A10	Optimal allocation and equilibrium allocation of competing local service providers under the possibility of discriminatory pricing using quadratic transport costs	173
2A11	Price equilibria in a system of one-purpose competing jurisdictions under heterogeneous local public goods for different levels of distant competition	176
3	Cooperation between competing jurisdictions	200
3.1	Introduction	200
3.2	The model	205
3.3	Partial cooperation	206
3.4	Full cooperation	229
3.5	Concluding remarks	238
	Appendices	
3A1	Determination of the total cooperative profits, Π^K , in the Hotelling setting under mill pricing and partial cooperation	242
3A2	Locational duopoly as a repeated game in the Hotelling setting under mill pricing and partial cooperation	244
3A3	Cooperative profits of local service provider 1 for different r_1 and r_2 in the Hotelling setting under discriminatory pricing and partial cooperation	247
3A4	Determination of the cooperative profits, Π_1^K and Π_2^K , in the Salop setting under mill pricing and partial cooperation	249
3A5	Locational duopoly as a repeated game in the Salop setting under mill pricing and partial cooperation	252
3A6	Locational duopoly as a repeated game in the Salop setting under discriminatory pricing and partial cooperation	253
3A7	Locational duopoly as a repeated game in the Hotelling setting under mill pricing and full cooperation	254

Contents

vii

General conclusion

261

Bibliography

268

Index

277

Acknowledgements

This book is based on my doctoral thesis from the University of Freiburg. In connection with this work, I should like to acknowledge the following.

First, I am greatly indebted to Professor Thomas Gehrig, my doctoral thesis adviser, for his continuous encouragement, help and suggestions, which were invaluable in developing the book.

I am also grateful to Professor Günther Schulze, the second adviser for my thesis, who offered valuable suggestions and comments.

I would also like to thank the staff at the University of Freiburg. In particular, I acknowledge the contributions of all the members of the Institute for the Research of Economic Development.

I owe a special debt of gratitude to the DAAD (Deutscher Akademischer Austauschdienst), who financed my doctoral studies.

Finally, I am grateful to my family and friends for their continuous encouragement. In particular, I would like to express my deepest appreciation to my parents, Ivonne and Victor, to my sister Andrea, to Cristina, to my two children, Víctor and Sebastián, and to my husband Andrés, whose unfailing encouragement and patience enabled me to complete this book.

General introduction

NATURE OF THE BOOK

In many modern megacities, especially those located in developing countries, the supply of an adequate urban infrastructure, in the sense of local public goods and services such as refuse collection, police departments, fire brigades, medical support and educational systems, among many others, is a pressing problem. It is precisely in these cities, where the problems emerging from the interactions among people are more acute, and local public goods and services are more urgently required. However, many of these cities suffer from a lack of an adequate urban infrastructure. This problem may result from a lack of competition among jurisdictions for the provision of local public goods in those large urban regions.

Therefore, the central purpose of this book is to analyse the optimal allocation of local public goods or services in large urban agglomerations and the allocation consequences of increasing competition in their provision. We take two innovative aspects of the concept of ‘functional overlapping competing jurisdictions’ (FOCJ)¹ – ‘de-localized membership’ and ‘uni-functionality of jurisdictions’ – which seek to increase competition among jurisdictions for the provision of local public goods.

De-localized membership means that individuals have the opportunity to choose, independent of their place of residence, the local government (or local service provider) they wish to patronize for the provision of local public goods. This should increase competition among jurisdictions, compared to traditional jurisdictions where individuals are obliged to consume the local public goods offered by the jurisdiction where they live. On the other hand, *uni-functionality* means that different local service providers provide each facility with the various types of local public goods. This should also help to increase competition, compared to traditional jurisdictions which offer a bundle of such goods to individuals located in their territory. This book specifically analyses the effect of these two aspects on competition among jurisdictions in large urban agglomerations, and the impact this probable increase in competition may have on the achievement of the optimal allocation of local public goods.

URBAN REVOLUTION, CITY SIZE AND THE IMPORTANCE OF URBAN INFRASTRUCTURE (LOCAL PUBLIC GOODS AND SERVICES)

In the twentieth century, the entire world experienced an urban revolution. From 1300 to 1800, the proportion of the global population living in cities remained relatively stable, at just below 9 per cent (Bairoch, 1985). This figure rose to approximately 16 per cent by 1900, 30 per cent by 1950, and 47 per cent by 2000, and it is projected to reach 60 per cent by 2030 (*ibid.*; United Nations, 2002). Virtually all of the population growth expected at the world level between 2000 and 2030 will be concentrated in urban areas, with most of it (approximately 95 per cent) in urban zones of less-developed regions (*ibid.*).

Furthermore, the size of these urban agglomerations has increased dramatically. During the millennia between the origins of urbanization and the onset of the Industrial Revolution, hardly a city in the world had a population exceeding one million. By 1900, however, the world already had a dozen such cities, and around 1980 there were more than 230, with a collective population close to or slightly higher than that of the entire world population in 1700 (Bairoch, 1985). In 1975, 4.7 per cent of the world's population lived in cities with more than 5 million inhabitants. This figure was 6.5 per cent in 2000, and it is projected to be 8.4 per cent in 2015. Most of these large cities are located in developing countries. In 2001, just nine of the 40 cities with 5 million inhabitants or more were located in developed countries. By 2015, the world is expected to have 58 cities with more than 5 million inhabitants, and only 10 of these will be in the developed world (United Nations, 2002).

There are many reasons for humanity's ongoing shift from an autarkic agricultural form of living to an urban one, and a considerable number of the reasons given in the literature for this concentration of population are economic in nature. According to Alfred Marshall ([1890] 1920), externalities are crucial to the formation of economic agglomerations such as cities. In his well-known *Principles of Economics*, Marshall describes what he considers to be the most relevant externalities: mass production, the formation of a highly specialized labour force, the emergence of new ideas, the availability of specialized input services and the existence of a *modern infrastructure*.²

Throughout history, the availability of urban infrastructure has been one of the most notable characteristics of cities. The congregation of a large number of people facilitates the mutual provision of *collective services* or *local public goods*, which could not have been obtained in isolation (Fujita and Thisse, 2002). Examples include the Roman aqueduct for providing water to the population, the construction of city walls in medieval Europe

to protect urban dwellers, the *agora* in Greek civilization and many of today's local public facilities or city services such as refuse collections and police departments, among others. This is in line with Mills's (1967) view that cities develop in the economy because of *scale economies in production*.

Nevertheless, despite the presence of increasing returns in production (particularly in the production of local public goods), urban areas are bounded. They have a limited size, based on the number of urban dwellers. Therefore, scale economies in production are damped by *scale diseconomies arising in transportation*. As also acknowledged by Mills (*ibid.*), an important factor in determining a city's size is the trade-off between increasing returns and transportation costs. As stated by Fujita and Thisse (2002), in the absence of scale economies in production, there would be no cities (backyard capitalism), whereas with no transportation costs, there would be a single city in the economy (the world megalopolis). In addition to scale diseconomies in transportation, there are many other problems and negative externalities involved in large agglomerations, such as pollution and crime, which discourage a high concentration of population and suggest the possible existence of an optimal city size.³

The criteria for evaluating the optimal size of a city have varied with time and place. The dominant feeling across the various disciplines related to urbanization is that most cities are just too big. Most current urban policies are implicitly based on this assumption. Megacities are viewed as gigantic and dangerous autonomous organisms, whose growth should be curbed. In these huge cities, local governments are unable to solve urban problems, which increase in number and complexity as the population increases. One of the crucial urban problems faced by local governments is how to ensure adequate provision of local public goods or, in Marshall's words, 'infrastructure', such as refuse collection, police departments, fire brigades, medical support, educational systems, transportation services, water and sewer services, and in general collective goods aimed at solving problems linked to the agglomeration of people. This problem is extremely severe in large urban regions, where the provision of local public goods must be continuously and rapidly expanded in order to satisfy the growing demand.

As suggested by Marshall, the existence of modern infrastructure is one of the crucial externalities that explain the formation of economic agglomerations in the first place. Nevertheless, in many modern megacities, especially those located in developing countries,⁴ the supply of adequate infrastructure is currently more of a problem needing to be addressed rather than a motivation for the agglomeration of people. It is possible that when these cities first arose, the level of urban infrastructure served as an incentive for people to concentrate there. But today, although many of the cities suffer from a lack of adequate infrastructure, their populations continue to

increase. For the local governments of these large urban regions, such cities have become excessively big and unmanageable. Why have local governments failed to achieve the adequate provision of local public goods in these large urban regions?

THE PROBLEM OF THE PROVISION OF LOCAL PUBLIC GOODS FROM THE ECONOMIC PERSPECTIVE

Before answering the previous question, let us first discuss some important contributions to the economic literature relating to the problem of the provision of local public goods, which has been viewed as problematic by many authors. Paul Samuelson defined public goods as ‘collective consumption goods . . . which all enjoy in common in the sense that each individual’s consumption of such a good leads to no subtraction from any other individual’s consumption of that good’ (Samuelson, 1954, p. 387). In his well-known paper ‘The pure theory of public expenditures’, he argues that in some sense, no ‘market-type’, solution exists to achieve the optimal provision of public goods.

Charles M. Tiebout was the first to point out that most public goods are locally supplied. In his classic paper, Tiebout (1956) suggests that in an economy of local public goods, the optimal allocation can be decentralized through competition among local governments. Tiebout imagines a system of jurisdictions in which each government offers its own package of public goods/tax structures, and these compete with one another for consumers. By migrating to the jurisdiction that respects their tastes in public goods/tax schemes, consumers reveal their preferences. Competition among jurisdictions and ‘voting with the feet’ may lead to the efficient provision of local public goods. Tiebout did not specify a complete model; it was left to later authors to suggest different models in which his ‘competing jurisdictions’ result in the optimal provision of local public goods.

Following these later studies, we can identify the conditions under which Tiebout’s hypothesis holds. The first crucial condition is the *costless mobility of people among jurisdictions*. Tiebout’s intuition proved correct with respect to the relevance of individuals’ mobility among jurisdictions to the achievement of the optimal provision of local public goods. The opportunity to change one’s place of residence and move to another jurisdiction if a particular local government does not fulfil one’s expectations frees individuals from becoming ‘captured demand’ for their local governments. This may motivate local governments to provide the local public goods preferred by individuals at the lowest possible cost in

order to keep these citizens under their jurisdiction, and thus to provide the public goods efficiently. Nevertheless, costless mobility of individuals guarantees only that the achievable utility for identical individuals is equalized across jurisdictions. It cannot eliminate inefficiencies, which are common to all local governments.⁵

A second crucial assumption required for the Tiebout hypothesis to hold is the *existence of a large number of jurisdictions*. This assumption, explicitly made by Tiebout in his original paper, is crucial in order to ensure competition among jurisdictions and to avoid situations such as the one described in the example in note 5. If there are a large number of local governments (or local service providers), the impact of the actions chosen by any single local government on the common utility level is negligible, and thus local governments can be seen as ‘utility takers’ (this would be equivalent to competitive firms that are price takers). It can be shown that if local governments take the common utility level in the economy as given, the first best optimum can be sustained as a free-entry equilibrium among local governments. In the literature, utility-taking local governments are referred to as ‘perfectly competitive jurisdictions’.

Nevertheless, perfect competition among jurisdictions is extremely unlikely, since perfect competition requires an infinity of jurisdictions, just as perfect competition between firms requires an infinity of firms. In an economy with a finite number of jurisdictions, jurisdictions will not be ‘utility takers’, as noted by Scotchmer (1986). In this case, local governments may seek to manipulate the utility level of individuals. However, despite the existence of a limited number of local governments, the equilibrium allocation will be similar to the optimal one as long as there is *free entry and exit* in jurisdiction formation. In this case, the local monopoly power of the incumbent local governments will be constrained by the threat of an entrant who can steal their customers. The equilibrium allocation converges to the optimal one as the optimal jurisdiction size decreases with respect to the economy.⁶

Another relevant assumption is the *existence of an appropriate number of people in the economy*. In the literature, this assumption is usually referred to as ‘the integer problem’.⁷ This assumption may appear very technical; however, its implications are important for what follows. If N/n^* is not an integer (where N is the total population and n^* the optimal number of individuals in a jurisdiction), this implies that the population cannot be divided into optimal consumption groups. If N/n^* is not an integer and there are a large number of local governments (implying that they are utility takers), the utility-taking equilibrium will not exist.⁸ On the other hand, if the optimal jurisdiction size is large with respect to the population, implying that there are only a few jurisdictions which will behave strategically with

respect to one another, and there is free entry and exit in jurisdiction formation, the fact that N/n^* is not an integer matters because the jurisdiction sizes will be much bigger than the optimal size. However, it will still not pay to form a new jurisdiction, and thus the utility of the individuals will be much lower than at the optimal allocation. The equilibrium allocation converges to the optimal level as the optimal jurisdiction size decreases with respect to the economy.

Up to this point, all of the crucial assumptions that we have analysed in order for the Tiebout hypothesis to hold are similar to those necessary for a market of private goods provided by firms with U-shaped average cost curves which are 'perfectly contestable', in the sense used by Baumol (1982). They are also similar to the necessary conditions for the optimal allocation of club goods within a system of profit-maximizing clubs.⁹

Nevertheless, in pointing out the analogy between private goods and local public goods, Tiebout did not specify the objective function of the jurisdictions. Much of the debate arising from his work has focused on this question. The answer to the question of whether the provision of local public goods by local jurisdictions *à la* Tiebout will be efficient depends on the objective pursued by these local governments. Different authors assume different objectives to be pursued by local governments; for instance, some presume that jurisdictions will coalesce whenever it is in the interest of all members of a coalition to do so, that jurisdictions will seek to maximize the welfare of current residents, or that fiscal policies are decided by vote. Other authors view local governments as less benevolent to residents, and thus seeking, for example, to maximize their budgets subject to zero loss constraint, in a situation where the salaries of the local administrators depend on the level of expenditures.¹⁰

When the provision of local public goods is cast into the framework of club theory without regard to geography, each local public good can be fully financed by the appropriate user charge. The user charges are not only sufficient to cover the costs involved, but they also yield the appropriate incentive for optimal decision making regarding the supply of local public goods, as in the standard private-good case. Hence, in this 'lack of geography' setting, the optimal allocation of local public goods can be decentralized through a Tiebout system of local jurisdictions whose *objective is to maximize profits*. However, local public goods are not supplied by flying clubs to flying individuals. The services are provided at specific locations, and the beneficiaries of the services reside at other specific locations. This follows from the fact that residence requires space, and therefore, individual customers are spread out geographically. Thus, the provision of local public goods is associated with specific costs, such as transportation to the facility supplying the local public good, or a decreasing level of service with

increasing distance between the public facility and the beneficiaries' residential location. When the club theory setting is modified by assigning locations to local public goods and their patrons, the optimal allocation can no longer be sustained through user charges alone. At the optimal allocation, the revenue derived from the user charge falls short of the provision cost, and the deficit is just equal to the aggregate land rent generated by the differences in accessibility to the local public goods experienced by users. In this case, the optimal allocation can be decentralized if local jurisdictions *maximize profits plus land rent* (Hochman et al., 1995).

According to several authors, there is a missing agent in Tiebout's local public-good setting; namely, a land developer who capitalizes the benefits of the public good in the land rent. In such an institutional context, competition among land developers may lead to the efficient provision of local public goods. Indeed, jurisdictions which are identified with land developers can profit by respecting their residents' tastes when the provision of public goods is capitalized into land prices. Thus, if capitalized land values are included in profits, jurisdictions have an incentive to organize their affairs efficiently (Fujita and Thisse, 2002).

In summary, if (i) there is costless mobility of people between jurisdictions, (ii) there are a large number of jurisdictions or free entry and exit in jurisdiction formation, (iii) there are an appropriate number of people in the economy or the optimal jurisdiction size is small with respect to the economy and (iv) local governments maximize profits plus land rent, this decentralized mechanism of competing jurisdictions *à la* Tiebout will result in the optimal provision of local public goods.

However, these crucial assumptions of Tiebout's hypothesis are unlikely to materialize in reality, especially in countries with large metropolitan regions. This makes it problematical to achieve the optimal provision of local public goods by means of Tiebout's competing jurisdictions.

Let us now return to the initial question of why local governments have failed to achieve the adequate provision of local public goods in large urban regions. The reasons for local governments' failure to achieve this goal vary from region to region. To gain an idea of the possible problems involved, let us consider the case of one of these large cities, Santiago de Chile.

SANTIAGO DE CHILE: A CASE OF LACK OF COMPETITION AMONG JURISDICTIONS FOR THE PROVISION OF LOCAL PUBLIC GOODS

According to the last census (2002), the metropolitan region of Santiago had a population of approximately six million, with a growth rate of some

1.5 per cent per year (INE, 2001).¹¹ The units of government responsible for the provision of an important part of the local public goods at the local level are the so-called 'municipalities'. The municipalities provide various types of local public goods¹² (such as refuse collection services, basic health-care centres, security systems, schools and so on) and enjoy a territorial monopoly within their particular area, which means in general terms that all the people living there are obliged to pay taxes to their municipality and to use the services it provides.¹³ These jurisdictions are relatively independent from the central government, despite the fact that there is a body of the central government above them, the Ministry of Housing and Urban Planning (MINVU), which in some sense plays the role of a metropolitan local government in the provision of local public goods or solutions to urban problems involving many municipalities (such as metropolitan parks, link roads and so on).¹⁴ As the population of the city of Santiago has increased, so has that of some municipalities to the point where the central government has decided to form a new municipality. The creation of a new municipality to provide the full range of services for a new population group is a very complex and time-consuming process in contrast to the rapid increase in urban population, and during this process, the existing municipalities are unable to satisfy the increasing demand for local public goods.

In the case of Santiago, this local government structure results in a very low level of competition among local governments for the provision of local public goods. As explained above, there are two levels of local government, the local jurisdictions (municipalities) and the central government body acting as a metropolitan government (MINVU), each of them faced with varying degrees of intensity with regard to competition among governmental units for the provision of local public goods.

In the case of the local jurisdictions, a small and finite number of municipalities comprise the metropolitan region. It is very difficult for new municipalities to emerge. On the one hand, the decision to create a new municipality is made centrally. At the same time, many of the local public goods provided by municipalities involve sunk costs, in the sense that many of them are tied to a location and their use is not easily altered. Furthermore, the fact that a municipality must provide the full range of services to the new population means that a very high investment is involved in the formation of a new municipality, including many types of sunk costs, as previously explained. All these factors suggest that there are high barriers to entry and exit in municipality formation, and thus that the number of jurisdictions is relatively fixed in the metropolitan region of Santiago.

On the other hand, competition among existing municipalities is not very intense, because there is low mobility of individuals among different locations. High costs are incurred in a move from one place of residence to

another, such as those involved in the search for new housing. In addition, individuals incur a variety of sunk costs at their current residences, and there are many other reasons why individuals are relatively fixed to their locations. In the case of the MINVU, there is no competition at all, because it is a central government body.¹⁵

All these factors suggest that there is a lack of competition among local governments in the metropolitan region. On the one hand, competition among municipalities is restricted by individuals' mobility costs, the limited number of jurisdictions and the barriers to entry and exit in municipality formation. On the other, the MINVU is in effect monopolistic with respect to the provision of local public goods or the solution of urban problems involving many municipalities. This lack of competition may serve to impede the adequate provision of local public goods in the case of large urban agglomerations such as Santiago.

Several questions emerge from the previous discussion. How can competition among local governments in large urban agglomerations be increased? And, if it is possible to increase local government competition, would this gain in competition result in the efficient provision of local public goods in such agglomerations, or at least in an improvement over the original situation? At what point will an increase in competition represent an improvement in public welfare? Who will be the winners and/or losers of such an increase in competition?

INCREASING COMPETITION AMONG JURISDICTIONS BY UNI-FUNCTIONALITY AND DE-LOCALIZATION OF MEMBERSHIP

A new approach has emerged in the literature which seeks to increase competition among jurisdictions by *unbundling* the activities of a jurisdiction and opening up each individual activity to competition. In order to generate competition among these new 'uni-functional jurisdictions' effectively, the proponents of this approach argue in favour of *de-localization of membership*. These two factors, the unbundling of activities (uni-functionality) and de-localized membership, seem to be crucial for increasing competition among local jurisdictions in large metropolitan areas.

De-localized membership means that individuals have the opportunity to choose, independent of their place of residence, the local government (or local service provider) they wish to patronize for the provision of local public goods. This would lead to additional local competition among neighbouring jurisdictions, which is absent from Tiebout's classical jurisdiction concept, as well as from Santiago's municipalities.¹⁶ This is because

while people may remain relatively fixed to their locations, and thus moving to another jurisdiction may be very costly, the opportunity to choose the jurisdiction they want to patronize, independently of where they live, reduces the jurisdictions' monopoly power. Nevertheless, because local public goods are provided at specific locations in space, while the users of these services reside at other locations, the use of these local public goods will involve specific costs (such as transportation costs to the facility supplying the local public good, or decreasing levels of service as the distance between the public facility and the users' residence increases), and thus we should expect that jurisdictions will still enjoy some kind of local monopoly power over the people living nearby.

At the same time, the unbundling of activities is also important for increasing competition, because if each facility of the various types of local public goods is provided by different local service providers, free entry and exit in at least some types will be more likely than in the case of a complex multi-purpose jurisdiction supplying many types of local public goods, as seen in Tiebout's classical jurisdiction concept as well as Santiago's municipalities. Furthermore, uni-functionality would also reduce the severity of the integer problem, at least for the provision of some local public goods, namely those whose optimal consumption group is small in comparison with the region's total population.

The idea of introducing these two elements in order to increase competition among local governments and thus achieve the optimal provision of local public goods was first presented by Frey and Eichenberger (1995, 1996a, 1997, 1999), who introduced the FOCJ concept.¹⁷

This concept proposes a new kind of political unit aimed at solving specific local problems, such as the provision of local public goods or services. Briefly, FOCJ are democratic governmental units which provide only one local public good to a group of people (uni-functionality), who freely choose to join this FOCJ, independently of the place of residence (de-localized membership), in order to obtain the benefits of the local public good, and who pay a fee (or tax) directly to the FOCJ for their use of it.

FOCJ are 'functional', because they specialize in one function and their size (in number of users) is determined endogenously, in the sense that the size is not established previously, but has to match its tasks in order to exploit economies of scale, reduce the possible spillovers and adapt the supply to citizen demand. Accordingly, they differ from the traditional jurisdictions, which provide all local public goods in a predefined territory, where the extension of the jurisdiction is a given and people who live at a specific location have to patronize the local public goods provided by the specific jurisdiction responsible for that territory.

Because each FOCJ provides a different kind of local public good, with different cost functions and preference levels, the optimal FOCJ size in terms of members will vary among different local public goods, and thus the FOCJ will *overlap*. Accordingly, FOCJ that perform different tasks overlap and a citizen is, therefore, a member of several jurisdictions.

FOCJ are subject to two competition mechanisms, forcing them to cater for the preferences of their members: the option for citizens to exit FOCJ (without changing their place of residence)¹⁸ establishes competition similar to markets, and in addition their voting rights establish political competition.

FOCJ are formal political units with power to regulate and to tax, and are thus called ‘jurisdictions’. These governmental units are financially independent from the central government. Consequently, the prices they charge to users must at least equal the costs of providing the local public good.

It is argued that the increase in competition for the provision of local public goods implied by the creation of FOCJ, should lead to the optimal provision of these kinds of local public goods, or at least should represent an improvement over the classical concept of jurisdiction¹⁹ in the achievement of this goal.

This concept has been discussed extensively to date, relying on verbal economic reasoning. While it appears to offer several advantages, many open questions remain regarding this new concept of jurisdiction:

- How many different types of FOCJ should exist? What is their optimal size, and what are the determinants of this?
- Does competition between FOCJ lead to an optimum? In particular, will the equilibrium location of their local public goods be efficient? How should exit and entry be regulated? (What about the possibilities of excessive or insufficient entry?) How would price policies be determined? How can they be optimized?
- Do FOCJ really overlap, and is this overlapping efficient? Are there areas of interdependence among different types of FOCJ, such as complementarities? What implications does this have? (Possible monopolization?) Are FOCJ ‘better’ in comparison with the classical all-purpose jurisdictions (Tiebout’s jurisdictions)?²⁰
- Is some degree of coordination between FOCJ necessary? Can cooperation between FOCJ solve the allocation problems that emerge in competition? Under what circumstances? What degree of cooperation between FOCJ is adequate? (Partial or full cooperation?) How should cooperation between FOCJ be regulated? Would cooperation between FOCJ lead to the formation of a cartel of local service providers? (Possible collusion?)

SCOPE AND PLAN OF THE BOOK

This book analyses the optimal allocation of local public goods in a spatial context²¹ and the allocation consequences of increasing competition in a decentralized provision of them. We take two innovative aspects from the FOCJ concept – de-localized membership and uni-functionality of jurisdictions – and examine the effects of these two specific aspects on competition among jurisdictions in large urban agglomerations, and the impact that this probable increase in competition is likely to have on the achievement of the optimal allocation of local public goods.

We concentrate on local public goods with high fixed costs, where it pays for groups to consume collectively (since the average cost decreases with the group size), and it is also possible to exclude others from consumption of the group's own units of the good (for example, refuse collection, medical services, public transport, school systems, water and sewer services and so on).²²

Although the FOCJ concept has many interesting dimensions as explained above, it is not the intention of this book to analyse fully all the aspects involved in it. However, the analysis presented here serves as a benchmark in order to study these two features. Thus we shall address the earlier questions with regard to this new concept of jurisdiction, with the proviso that when we refer to FOCJ we are referring only to our interpretation of the concept relative to the aspects of it that are under consideration.

This work differs from that of Frey and Eichenberger (whose comprehensive treatment can be found in Frey and Eichenberger, 1999) and provides additional insight, in that they analyse the multi-dimensional concept of FOCJ, relying on verbal economic reasoning, while the present book focuses fundamentally on only two aspects, namely de-localized membership and uni-functionality of jurisdictions, and conducts a formal analysis of them. This analysis helps to clarify the forces that are involved and to understand the benefits and problems that the concept may generate regarding the provision of local public goods.

The term 'local service providers' rather than 'local governments' is used in the analysis for the decentralized provision of the local public goods. This is to underline that there is no political process involved in the analysis and that the only objective of the local service providers in this setting is to maximize profits. This is the main difference with the concept of FOCJ, where voting is involved and several objectives may be pursued. However, the analysis in this book is valid even for political competition to the extent that running public services is a source of tax income for any politician.²³

The intention of the analysis is not to discourage or to support such a decentralized provision of local public goods as a FOCJ system, but to discover the advantages and possible problems that such a system may have in order to encourage its positive aspects and to solve any problems that may arise.

The book is structured in three chapters. In what follows, the central point of each chapter will be explained and the developed framework will be used to provide some answers to the open questions posed above regarding this new concept of jurisdiction, namely FOCJ.

CHAPTER 1: MAXIMUM LOT-SIZE REGULATION

In Chapter 1, we discuss the sample case of policies currently being implemented in the metropolitan region of Santiago, which are aimed at solving problems caused by the inefficient provision of local public goods in the region. This example provided the motivation for analysing the problem of the provision of local public goods in large urban agglomerations such as Santiago.

In the case of Santiago, it is argued that the costs for some urban infrastructure (local public goods such as police and fire departments, schools, medical services, transportation systems and so on), which increase with the extension of the city and are borne by the government, are not taken into account by people when they choose their location in the city and the amount of land to occupy, since these individuals assume that a minimum provision of infrastructure already exists at any location. Thus, the outcome is that people use more land, and the city area extends further than would be the case if such costs were taken into account. This situation accordingly results in diminished welfare.

In an effort to correct this inefficiency, a number of policies are currently being implemented in Santiago which aim to reduce the city's expansion by penalizing the use of large amounts of urban land (through, for instance, a tax on vacant land) or by providing incentives for the occupation of less space (as with a reduction of property taxes on smaller houses). In general, these policies seek to restrict the space occupied by individuals in the city in order to limit the city's expansion and therefore the government's infrastructure costs. Nevertheless, the real problem in this case seems to be the lack of adequate incentives for individuals and local governments to achieve the optimal provision of local public goods.

CHAPTER 2: COMPETING JURISDICTIONS FOR THE PROVISION OF LOCAL PUBLIC GOODS

Chapter 2 corresponds to the central part of the book. A framework is developed to analyse the question about the optimal provision of local public goods in large metropolitan regions. We examine the effects of de-localized membership and uni-functionality of jurisdictions on competition among jurisdictions in large urban agglomerations and the impact that this probable increase in competition may have on the achievement of the optimal provision of local public goods.

Using this framework, some answers can be given to the open questions regarding this new concept of jurisdiction, namely FOCJ.²⁴

How many different types of FOCJ should exist? What is their optimal size, and what are the determinants of this?

An important factor in determining the optimal number of FOCJ in a region and their optimal sizes in terms of users is the existing trade-off between fixed and transportation costs, a classical aspect of location models.

For example, taking the case of educational systems within this framework, we should have fewer universities than schools at the optimum allocation in a region, if we assume that the levels of investment for the former are higher than those required for schools. On the other hand, local public goods characterized by high infrastructure costs (such as universities) will have a higher user population at the optimal allocation than local public goods requiring lower infrastructure costs. Furthermore, higher transportation costs mean that at the optimum there will be more facilities providing each local public good, because the price of infrastructure relative to transportation will be lower in this case.

Does competition between FOCJ lead to an optimum? In particular, will the equilibrium location of their local public goods be efficient? How should exit and entry be regulated? (What about the possibilities of excessive or insufficient entry?) How would price policies be determined? How can they be optimized?

With regard to these questions, we find that the effect of competition between FOCJ on efficiency will crucially depend on the technology type of the local public good provided, the price policy implemented and the level of competition among regions.

In the case of local public goods characterized by ‘no location sunk cost technology’,²⁵ their equilibrium locations will be unique and efficient, in the

sense that they minimize total transport costs for individuals, if the FOCJ that provide them can charge discriminatory prices. However, if they had to charge mill prices (that is, at the point where the service is produced, the price is the same for everybody), the equilibrium locations could be inefficient. In the case of 'location sunk cost technology',²⁶ the efficient locations are also an equilibrium when price discrimination is possible, but in addition to this, we have other possible location equilibria. So in this case, we have a multiplicity of equilibria, and we can also have location equilibria that are inefficient.

If there is intense competition from other regions,²⁷ competition between FOCJ inside the region will lead to an optimum in the case of local public goods characterized by no location sunk costs in their provision, in terms of the optimal number and location of local public goods, if price discrimination is possible. Nevertheless, in the case of local public goods that imply location sunk costs in their provision, intense competition from other regions may lead to insufficient entry of FOCJ for the provision of these local public goods, and thus to inefficient allocation of these types of local public goods by FOCJ. This implies that intense competition from other regions will not always bring about efficient allocation under FOCJ. The effect of this competition on efficiency will depend on the type of technology of the local public good provided.

However, if competition from other regions is very weak,²⁸ competition will lead to excessive entry of FOCJ and correspondingly to excess capacity in the region, in the case of local public goods characterized by no location sunk costs in their provision.²⁹ In the case of local public goods with location sunk costs in their provision, very weak competition from other regions may cause either excessive or insufficient entry. The precise nature of the equilibrium pattern of FOCJ in this case, and the possible resulting inefficiency, will depend on the history of the particular region.

We also find that FOCJ offering local public goods will choose, at equilibrium, to charge discriminatory prices based on location, in favour of the more distant locations. As argued above, the achievement of an efficient allocation of local public goods by FOCJ necessarily requires spatial price discrimination.³⁰ Mill pricing will typically increase the inefficiencies identified under discriminatory pricing (at least for the case of no location sunk cost technologies) and in general, the opportunity to charge discriminatory prices with respect to location increases competition and improves welfare in a spatial context.

Do FOCJ really overlap, and is this overlapping efficient? Are there areas of interdependence between different types of FOCJ, such as complementarities? What implications does this have? (Possible monopolization?) Are FOCJ

'better' in comparison with the classical all-purpose jurisdictions (Tiebout's jurisdictions)?

In the case of Tiebout's jurisdictions, which provide all types of local public goods (as with the case of Santiago's municipalities), overlapping of jurisdictions³¹ is not possible, because each one has a territorial monopoly over a particular region, meaning that all the people living there must pay taxes to that jurisdiction and use the services it provides. An important element of the idea of FOCJ is the possibility that these jurisdictions may overlap, in the sense that many different local service providers may extend over the same geographical area, thus potentially increasing competition and utility for the individuals living there. It is reasonable to expect that the incorporation of de-localized membership in addition to uni-functionality of jurisdictions in the case of FOCJ may imply the overlapping of jurisdictions. However, in the case of FOCJ offering homogeneous local public goods,³² optimality requires no overlapping, and at equilibrium they will never overlap.

The possibility of *overlapping* and the idea of *unbundling* the services provided by local service providers is related to the existence of different types of local public goods which are not perfect substitutes for one another. For example, in the case of schools, if these are identical in all aspects, at equilibrium individuals will simply choose the nearest school. This implies that FOCJ providing identical schools will never overlap. This will also represent the optimal distribution of individuals, since if everyone patronizes the nearest school, total transport costs will be minimized. However, if schools can be differentiated, for example in the second language that they teach, with some offering English and others French, they will no longer be perfect substitutes for each other. Some people may prefer English and others French, and in this case, these particular FOCJ may overlap. If local public goods are not substitutes at all, but rather perfect complements – as, for example, schools and universities – their particular FOCJ will always overlap.

Thus, in order to analyse the question of overlapping service areas and the idea of unbundling the services provided by local service providers, we consider a setting containing different types of local public goods. In such a setting, if competition among regions is very weak, the opportunity to unbundle activities may increase competition and the aggregate utility for individuals in a region. Nevertheless, this will only be possible if there is competition for all types of local public goods. If there is a monopoly local government for at least one type, and we assume that local public goods are perfect complements between types, all the gains from increased competition in the other types of local public goods will be redistributed to the monopoly local service provider.

It is important to make clear that this result should not be interpreted as a rejection of the concept of FOCJ in the sense that it can be understood as a statement about FOCJ being never beneficial to the individuals or that the assumptions for them to increase the utility of individuals are too unrealistic or too tough to be satisfied. Actually, we could expect that, within our model, FOCJ increase the utility of the individuals with respect to all-purpose jurisdictions. This is because the assumption of competition in all local public-good types is not necessarily so unrealistic. We could expect to have some degree of competition always, if the market areas are not too big (de-localized membership allows that) and because local public goods are likely to have some degree of substitution between types. In addition, in the case of all-purpose jurisdictions, low mobility among individuals leads to less intense competition among jurisdictions. In such a situation, the addition of de-localized membership under FOCJ introduces a new source of local competition into the system, which is absent in all-purpose jurisdictions, and guarantees a minimum utility level for individuals, which is higher than in all-purpose jurisdictions.

Furthermore, the fact that the competitive pressures may be increased with FOCJ, *could* imply that the utility of the individuals increases. However, this is not always so. Actually and as explained above, in the case of homogeneous local public goods, we could get insufficient entry (by fixed technology) under a decentralized provision like the one under FOCJ, which will imply a lower utility for the individuals than that at the optimal allocation. In this case we should be ready to take measures to increase entry and so enhance the utility of individuals. On the other hand, an increase in the competitive pressures does not necessarily mean that this will increase welfare,³³ and this is an important variable to look at when we evaluate the benefits of alternatives for the provision of local public goods.

The point of the result discussed here, and of the main results of the analysis, is to shed some light on which aspects we should be aware of in order to achieve gains with a decentralized provision of local public goods such as a FOCJ system, in terms of utility for the individuals in this particular case, or more generally in terms of welfare in the case of other important results of the book (such as that of the necessity of price discrimination for efficiency).

CHAPTER 3: COOPERATION BETWEEN COMPETING JURISDICTIONS

In Chapter 3, we address the question about the possible benefits and problems resulting from cooperation between FOCJ. One alleged problem of

this system of uni-functional competing jurisdictions concerns coordination among the large number of FOCJ. Many critics of FOCJ argue that some coordination should exist among them. However, as argued by the proponents of this system, although such coordination often makes sense, and it is possible if required, it is not good in itself, but it can be used to maintain a cartel in which to evade, or even exploit, the desires of the population (Frey and Eichenberger, 1995; Frey, 1997).

Accordingly, we use the framework of Chapter 2 to analyse the equilibrium allocation of a system of FOCJ characterized by cooperation, in order to compare this equilibrium allocation with that achieved through competition and with the optimal allocation. Using this framework, we can provide some answers to the open questions mentioned above regarding the possibility of cooperation with respect to our interpretation of this new concept of jurisdiction.

Is some degree of coordination between FOCJ necessary? Can cooperation between FOCJ solve the allocation problems that emerge in competition? Under what circumstances? What degree of cooperation between FOCJ is adequate? (Partial or full cooperation?) How should cooperation between FOCJ be regulated? Would cooperation between FOCJ lead to the formation of a cartel of local service providers? (Possible collusion?)

As we explain in Chapter 2, the absence of coordination between FOCJ may fail to achieve an optimal allocation of local public goods under some circumstances.³⁴ Accordingly, some level of coordination could be necessary. However, we find that the possibility that cooperation between FOCJ may solve the allocation problems that emerge in competition will crucially depend on the degree of cooperation and the relevant geographical structure for the analysis.³⁵

Under partial cooperation (that is, the non-cooperative choice of locations followed by cooperative pricing), the equilibrium locations of the local public goods provided by two FOCJ would be inefficient if we consider an asymmetrical geographical structure as in the Hotelling (1929) setting.³⁶ This holds for both price regimes: mill and discriminatory prices. Under such a geographical structure, discriminatory prices with respect to locations can help solve this problem and achieve the optimal location choices at equilibrium, but only if competition is guaranteed and partial cooperation is ruled out.³⁷ Accordingly, partial cooperation leads to additional efficiency problems with respect to competition in this context.

However, as Chapter 3 explains, the inefficient location choices crucially depend on the asymmetrical geographical structure of the Hotelling setting. If we consider instead a symmetrical geographical structure, as in

the Salop (1979) setting, we would find that competition and partial cooperation lead to the same location choices at equilibrium under both mill and discriminatory pricing, which are the optimal locations.

In general, under the assumption of a symmetrical geographical structure, efficient equilibrium location choices will always be obtained for local public goods provided by FOCJ. The problem of inefficient equilibrium location choices arises when there is some ‘hinterland’ to be captured and FOCJ have to charge mill prices. In this case, competition and partial cooperation both lead to inefficient location choices, as explained above. Accordingly, we should analyse whether a higher degree of cooperation may lead to the optimal allocation of local public goods in this case. Consequently, in the last part of Chapter 3, we analyse whether *full cooperation* (that is, the cooperative choice of locations and prices) can achieve this goal.

Normally, we would expect that full cooperation would be equivalent to a monopoly situation, and under both symmetrical and asymmetrical geographical structures, and under both price regimes, a monopoly local government would choose the optimal locations for its local public goods in order to maximize its profits, and thus it would be efficient in this sense.³⁸

Accordingly, in our setting, this would imply that full cooperation by FOCJ under an asymmetrical geography and mill pricing should lead to efficient location choices for their local public goods at equilibrium, and in this sense it would imply increased efficiency when compared with competition or with partial cooperation. Nevertheless, and as we show in Chapter 3, full cooperation is not completely equivalent to a monopoly local government, as explained above. Under mill pricing, full cooperation can lead to inefficient location choices in an asymmetrical space, as would competition and partial cooperation under mill pricing in such a setting.

Under full cooperation, local service providers remain independent units, and thus, once the locations of their local public goods are chosen in a cooperative manner (assuming that these are difficult to change once chosen),³⁹ they may still deviate in prices, because these can easily be changed.

If the penalty for deviating from the cooperation price agreement is very low, as reflected in a relatively low value of the discount parameter, full cooperation with optimal pricing will not be sustainable at all locations, and it may not be sustainable at the efficient locations. Thus, in order to choose the location pair that maximizes their cooperative profits, FOCJ will have to look for a location pair that will result in the highest possible *sustainable cooperative profits*, given such a low discount parameter. In the case of relatively low discount parameters, sustainable cooperative profits will be maximized at locations that are farther away than the efficient ones, and for low enough values of the discount parameter, maximum differentiation

from full cooperation will be obtained at equilibrium, as with competition. So, for a low discount parameter, competition, partial cooperation and full cooperation between FOCJ will lead to inefficient location choices for local public goods under mill pricing within an asymmetrical space, which will be equivalent in terms of welfare (total transport costs will be identical in all three cases).

NOTES

1. FOCJ is a concept that proposes a new kind of political unit aimed at solving specific local problems, such as the provision of local public goods or services and was developed by Frey and Eichenberger (1995, 1996a, 1997, 1999).
2. Most of the factors currently used in the field of economics to explain economic agglomerations can be found in the work of von Thünen ([1826] 1966) and Fujita and Thisse (2002). See Fujita (2000) for more details.
3. The problem of city size is not new. In fact, both Plato and Aristotle addressed it with regard to Greek civilization. Aristotle insisted upon the existence of a minimum and particularly a maximum size – a limit that should never be surpassed. Plato was more explicit, stating that the ideal republic would have 5040 citizens. If one interprets ‘citizens’ as being equivalent to heads of household, this implies a population on the order of twenty thousand people. Aristotle stressed the problems of security in overly large cities. But for both, by far the most important criterion for determining the proper size of cities was political in nature, and intimately linked with the problem of communication. The city must remain sufficiently small to permit the holding of public meetings with all citizens present (Bairoch, 1985).
4. As stated above, most of these large cities are located in developing countries.
5. For example, suppose that for some reason there were only two local governments (or local service providers), each providing only one local public good, such as a school, which is limited in capacity. Let us also assume that there is a large population, which would like to attend one of these schools; that is, a population that by far exceeds the capacity of both schools. In this case, despite the mobility of the individuals involved, both local service providers would be able to charge extremely high taxes to the population and provide them with low-quality services, because competition between individuals for the service provided by the local service providers is very high. Thus, the two local service providers would not really compete with each other. In this case, they would act as two monopolists. The fact that people can move freely between schools, or decide not to attend any school, only means that at equilibrium individuals will obtain the same utility. But this utility will be much lower than that which could be achieved at the optimal allocation, if local service providers were providing an appropriate number of schools for the population.
6. See Scotchmer (1985) for a derivation of this result in the case of club goods.
7. See *ibid.* for a discussion about this assumption in the case of club goods.
8. This is shown in *ibid.*
9. See Berglas (1976b) and Scotchmer and Wooders (1987).
10. See Wagner and Weber (1975).
11. INE: Instituto Nacional de Estadísticas (National Statistics Institute), Santiago de Chile.
12. ‘Provide’ does not necessarily mean that the service is directly supplied to the individuals by public enterprises. In many cases, these services are financed by the municipality but supplied to the individuals by private firms.
13. This is a very simplified way of describing how this system works, which we have given in order to concentrate on the aspects of it that are relevant for our study.

14. There are other bodies of the central government that act at a city level, but the MINVU is one the most important ones.
15. Note that the possible creation of a truly metropolitan government, which is being widely discussed in Santiago, does not guarantee that competition at this level will increase. As we shall explain below, a metropolitan government for Santiago would face almost no competition from other metropolitan regions. On the one hand, the country has few if any other large cities, which offer similar living conditions to the population, and thus individuals are relatively 'locked' into their metropolitan region. On the other, individuals' decisions to live in one city or another seem to be determined mainly by the location of their employment. The supply of local public goods is a less important variable in their location choice. This implies that in metropolitan regions, the location of people is not very sensitive to changes in the provision of local public goods, above some minimum level, and thus we can consider people to be relatively fixed to their locations. Furthermore, the barriers to entry and exit in municipality formation, as discussed above, would be substantially increased in the case of metropolitan regions. The complexity involved in the formation of a new metropolitan region is well known, and it is also well known that once such a region is formed, there is a kind of 'snowball effect' in which a growing number of agents seek to congregate in order to benefit from a greater diversity of activities and a higher level of specialization (Fujita and Thisse, 2002). All these arguments suggest that competition among metropolitan regions for the provision of local public goods or solutions to urban problems that involve many municipalities would be virtually non-existent.
16. In Tiebout's local public goods model, individuals are mobile in the sense that they can choose a jurisdiction or location to occupy, but once they have settled there, their level of access to public goods is irrelevant. Individuals cannot use the public goods of a neighbouring locality even if those public goods are physically closer to them. In the case of Santiago, the municipalities exercise a territorial monopoly over their particular areas, meaning that all their inhabitants must pay taxes to them and use the services that they provide. In this sense they are similar to Tiebout's jurisdictions. Providing individuals with the opportunity to choose the local service provider they wish to patronize for the provision of local public goods, independent of the location of their residence, brings a new, competing force into the system.
17. Although the singular of FOCJ is FOCUS, in the text FOCJ will be used for both the singular and plural forms.
18. Note that this source of competition is possible, because of de-localized membership. Furthermore, uni-functionality is also relevant for increasing competition, as explained above.
19. The 'traditional' or 'classical' jurisdictions, comprise the Tiebout concept of jurisdiction, which was explained above. The Santiago municipalities are similar to this concept of jurisdiction, as stated earlier.
20. The Tiebout concept of jurisdiction encompasses 'traditional', 'classical' or 'classical all-purpose' jurisdictions. The Santiago municipalities are similar to this concept, as explained above.
21. By 'spatial context' we mean basically considering transport costs.
22. These are also the types of local public goods on which Frey and Eichenberger (1995, 1996a, 1997, 1999) mainly concentrate in their analysis.
23. It would be interesting to analyse political inefficiencies and self-interested behaviour of politicians and whether the incentives of politicians are different in FOCJ (in the broad sense of the concept) compared with the all-purpose jurisdictions for reasons other than competition. However, this is beyond the remit of the present analysis.
24. Note, 'FOCJ' refers to the interpretation of the concept relative to the aspects considered in this book.
25. 'No location sunk cost technology' refers to the local service provider's ability to reallocate its local public good without incurring any additional costs; that is, there are no sunk costs in its chosen location and corresponding market segment. This is the case, for example, with the technology used in collective transportation services such as buses and

taxis, where there may be high fixed costs represented by the buses and taxis serving a particular area, but these can easily be reallocated to another area if necessary, at almost no cost. Thus, if competition in a region is too intense, the local service provider offering the transportation service can easily (in terms of cost) reallocate its vehicles to another region where it can achieve higher profits. Another example of local public goods with no location sunk cost technology is refuse collection services.

26. 'Location sunk cost technology' refers to the local service provider's inability to change its chosen location and corresponding market segment once it has been selected. Local public goods that are located in space are typical examples of sunk cost technologies, for example, schools and health-care centres. Once they are located at a point in space, it would be very costly to change their location. Their fixed costs are location specific.
27. 'Very intense competition from other regions' means that there is costless mobility of people among regions, and a large number of regions exist, or there is free entry and exit in the formation of regions, and this will be reflected in that the achievable utility in alternative regions will be the highest possible within the economy in question (that is, the utility obtained when the local public goods are provided efficiently, at the optimal allocation).
28. 'Very weak competition from other regions' means that there are high costs involved in changing one's place of residence, or the number of competing regions is low and there are entry and exit barriers to the formation of new jurisdictions, and this will be reflected in a very low utility level achievable in alternative regions.
29. One example of excessive entry when the technology of the local public good is characterized by no location sunk costs is the case of the collective transportation services in the metropolitan region of Santiago, particularly the *micros* (buses). The *micros* are provided by independent small firms (each having a very small number of *micros*, many with only one) which compete with one another for customers. The result of their competition is an excess capacity of *micros* in the region, as evident in the extremely low average passenger rate for each bus.
30. This is also true in Tiebout's setting. Actually, charging taxes (or prices) according to land rent values to achieve optimality in Tiebout's setting is a form of spatial price discrimination.
31. 'Overlapping of jurisdictions' means that more than one is active in the same geographical area.
32. 'Homogeneous local public goods' are local public goods that are identical in all aspects, except for their location in space. In a spaceless framework, these local public goods would be perfect substitutes.
33. The increase in competition may imply excessive entry and be inefficient in this sense, as explained above.
34. Competition among FOCJ may lead to inefficiencies such as inefficient location choices for local public goods when charging mill prices or excessive or insufficient entry of local service providers, with a correspondingly reduced level of welfare.
35. We analysed only the case of cooperation among FOCJ that provide homogeneous local public goods.
36. In this case, minimum differentiation (that is, both facilities located at the centre of the region at $L/2$, where space in the region is described by the interval $X = ([0, L])$) is the only equilibrium. Given that the efficient locations are those that minimize total transport costs (in this case at $L/4$ and $3L/4$), this equilibrium is inefficient.
37. As we explain in Chapter 2, under competition, the use of discriminatory pricing leads to the optimal location choices of two competing local service providers in an asymmetrical geographical structure.
38. Actually, Friedman and Thisse (1993) argue that, in a Hotelling model with quadratic transportation costs, the equilibrium locations under mill pricing and full cooperation with equal profits are the same as the efficient locations.
39. Here we are assuming fixed technology for the local public goods.