Final Draft Report

Capture of Land Value Premiums as a Source of Funding for Public Transport: Evidence and Practice in selected European Metropolitan Areas

A study for the European Metropolitan Transport Authorities (EMTA)

by

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Tables

Figures 4

Key conclusions and Recommendations 5

1 Introduction 10

1.1 Background of the Study 10

1.2 Purpose and Objectives of the Study 12

1.3 Methodology 13

1.4 Structure of this report 13

2 Summary of literature review 14

3 Alternative Funding Options 16

3.1 Versement Transport 17

3.2 Socially justified land use (Die sozialgerechte Bodennutzung): the case of Munich 18

3.3 Tax increment finance (TIF) 21

3.4 Section 106 22

3.5 Congestion charging 22

3.6 Workplace parking levies 23

3.7 BIDs 23

3.8 State petrol tax and sales tax 24

3.9 Conclusion 24

4 Case Study Cities 25

4.1 Helsinki 25

4.2 Copenhagen 28

4.3 Munich 32

4.4 Madrid 36

4.5 Greater London 40

4.6 Ile-de-France, Paris 42

4.7 Conclusion 45

5 General considerations and findings 46

5.1 Conclusions from the case studies. 47

5.2 Empirical Results 49

References 58

Appendix A

Appendix B

Research on Munich underground and suburban railway stations

Figures

Figure 1: Trams in city centre of Helsinki 268
Figure 2: Future public transport system in the Helsinki area 29
Figure 3: Metro in Copenhagen 312
Figure 4: New Metro station at Georg Brauchle Ring 34
Figure 5 New office and housing development near the new Metro station Georg Brauchle Ring 35
Figure 6 Madrid Underground station at Metro Sur 39
Figure 7: Network of the Metro del Sur (MetroSur) 39
:Figure 8: Administrative map of Ile-de-France 424

Tables

Table 1: Annual expense of operating costs and the additional funding in the selected cities 11
Table 2 Number of people employed in the Ile-de-France 43
Table 3 Comparison of basic data in the 6 selected metropolitan areas 46
Table 4 Average premiums in price (per sqm) for building land, housing next to suburban stations in Munich in 2002 50
Table 5 House or apartment premiums next to light rail, metro or suburban stations 51
Table 6 Office premiums next to light rail, metro or suburban stations 51
Table 7 Retailing premiums next to light rail, metro or suburban stations 52
Table 8: Average price increase for building land since 1980 in München 66
Table 9 Price Premiums at Metro Station Mangfallplatz: 1990 and 19981 67
Table 10: Price Premiums at Metro Station Feldmorching: 1990 and 1998 69
Table 11: Price Premiums at Metro Station Hasenberg and Dülferstrasse: 1990 and 1998 69
Table 12 : Average price premium of building land for housing with and without suburban railway stations in 2002 71

Key conclusions and Recommendations

Value capture is the process whereby a funding agency (e.g. the city, the region or the state) attempts to recover a share of the value added to property resulting from any infrastructure development. Value capture is not only discussed in the context of public transport investment, but also for many other investments e.g. housing. This study focuses on urban public transport, especially rail systems, for which many large cities perceive an urgent need for improvement, but have great difficulty in funding.[1]

One of the main objectives of the report was to understand what ideas are being discussed in Europe about land capture mechanisms with reference to public transport. We found that although most experts and local government officers were very interested in this question there was little urgency about it. The representatives of the free market had not been forthcoming because they saw it as a possibility of an extra tax and most local government officers were hanging on to their existing finance mechanisms rather than trying out new ones. Hence we have focussed this research on several questions:

a) when do land value increases occur,
b) under what circumstances
c) how high are these increases
d) what land value capture mechanisms are available
e) how do they compare with other methods of funding and
f) what are the conditions for success.

To avoid misunderstandings, we emphasise that land value capture cannot be unlimited. If too much value is extracted, there is potential for disbenefit, or for actually reducing the incentive for the development to take place. Finding the right balance will depend on the specific local circumstances.

Theory and empirical evidence now establish beyond doubt that land and housing values are increased by proximity to urban rail stations, and also suggest that in some

[1] The study does not cover related policy issues such as the proper prices to be charged for road users, or the impact of road and highway investment on land values (which can sometimes be negative), though recognising that these are also important parts of the overall policy.

circumstances office and retailing values are increased as well. The value difference between land which changes from agricultural use to urban land use was up to 500% in Munich and could be much higher in the capital cities of Europe. More modest increases were achieved for urban land according to its use. The values varied for:

- vacant building land between 10%-65% (Table 4)
- housing between 3-20% (Table 5) and
- offices between 4%–25% (Table 6).

There are the odd examples where there is a negative influence on house and rent prices when a public transport vehicle is too noisy.

Thus the evidence suggests that one necessary condition for capturing some land value for funding public transport improvements is fulfilled: namely, the increased value does actually exist. The legal and political conditions for success vary widely across countries. The best model we found so far in **Europe** where the increase in land value has been used consistently for infrastructure investment (but not for public transport) has been in Munich. (It has also been applied in Hamburg, Nürnberg and Augsburg but we have not researched these cities.) Most of the other cities have used a pragmatic approach to bringing landowners, developers, and authorities together and negotiating some special ad hoc arrangements peculiar to a specific development. The experience is useful to other cities, but not always directly transferable.

Any mechanism on land value capture is likely to work more effectively and swiftly in a period of economic boom or moderately good economic growth. In periods of economic recession, there will be relatively less development (hence little additional value to capture) and in any case downward pressure from the general economic situation is likely to be more marked than upward pressure from development. (It is not usually thought that public transport investment by itself would be powerful enough to halt and reverse a recession). Hence the most effective time to make progress on instruments of land value capture is likely to be during periods of economic growth, starting as early as possible while the momentum is building up.

If such a mechanism is applied, there are advantages if this is done at the level of local authority or region rather than central government, because the local authority

and the region gain most from new public transport infrastructure, and are likely to be closely in touch with its specific routing and operations, and most importantly, are best able to ensure that the captured value stays in the area. Public transport is often controlled at the regional level and the interests of the region and the larger metropolitan areas are reasonably close. In some cases the interest of a small local authority may be different and the reconciliation will depend on the specific government structure in each country.

There is a view especially in the UK that a land capture *tax* system is such a powerful instrument that potentially it could replace some (or indeed most) other taxation, and this can be attractive in cases where the premium in land value exceeds the entire cost of the investment. However, there is not at present widespread agreement that this would be possible or desirable in Europe in every case, and there are also advantages in a variety of other instruments for financing new public transport investments. It is not necessary to abandon existing methods that work, in favour of new methods that are not yet in place. Therefore the conclusion is that such a land value mechanism **alone** is not always a sensible strategy, especially in those European countries where other mechanisms already exist to finance new public transport investments. In these cases, there is a benefit in seeing this as an additional instrument, for which there is a need in all European countries. Hence land value capture will sometimes be sufficient on its own and can always be a useful extra way to reduce the pressure on public budgets. This is especially useful because land value capture is likely to match gains more closely than other taxes, so negative economic impacts are reduced and there may be a more equitable balance of costs and benefits.

Public transport is often a necessary condition for land use development, but not a sufficient condition – other improvements are also required e.g. housing, education. Also an urban area which is enhanced by better public transport accessibility will have additional financial needs, for instance for new or improved streets (e.g. traffic calming), green space, schools, kindergartens etc. In those cases where these extra demands are themselves the **direct** consequence of the developments triggered by the better public transport accessibility, an argument can be made that the value capture mechanism could include such area-wide improvements.

Similarly, the question of affordable housing interacts with the definition of the *correct catchment area* for value capture, which would be different in size according to the transport mode and urban geography. It would be larger in area and population density for suburban train stops than for inner urban tram stops. With a more general value capture mechanism, which would also capture the increase in land value occurring because of other factors, such problems would be more easily solved. It is easiest in areas which are newly developed.

The examples in Helsinki and Munich show convincingly the need for a good data base of land, house and office price and rent evaluations which should be renewed at least every 5 years. This data base should be available to everybody and should not, as is the case in some cities e.g. Paris, be the exclusive good of some organisations which are able to pay the very high costs.

The author recommends that the example of land value capture mechanism in Munich could be used more widely, adopting it to include public transport investment (which is a legal and not a practical issue). Any land that is expected to get planning permission has a value decided by a panel of property market experts. When the land gets planning permission the price of the land normally increases substantially. The difference between the two sets of values forms the basis of the mechanism. The local authority can claim up to 2/3 of the difference (the same as in Finland) as a revenue source to develop the area (schools, roads). The developer keeps the remainder. The panel of experts decides, based on **actual** sales, what the price is for the land with and without planning permission. This mechanism would also be feasible for land which is already developed. A panel of experts would decide the value of land based on actual sales "before" and "after" any public transport investment has taken place. In such cases the issue of catchment area has to be addressed. Any increase in land value would be the basis of the tax, even if not all of the gain can be traced back to public transport investment. This is only possible if land values are established on a regular basis as is the case in Germany and Finland, though the judicial procedures for valuation (for example in the case of compensation for compulsory purchase) as in the UK can also be adapted for this purpose.

A theoretical and practical problem for implementation is whether to apply such valuations *only* to new developments (which is often the pragmatic reality) or whether to apply land valuation consistently for all developed and less developed land (as is sought by those wanting to use this as a rational basis for the entire tax system: they would argue that to apply it only to new developments would act as a disincentive to development). One temporary compromise is made easier by introducing new charges mainly at times of economic growth when there is less concern about any negative effects. The mechanism should apply both for existing and new developments, which receive a new tram or train connections, but one should also not distinguish between urban areas which already have high density public transport services and urban areas with low public transport services. In all cases, the retailing, the housing and office markets will gain in terms of higher rents or higher prices even if we could not prove empirically the increase in values in dense urban areas.

Finally, we note that there are some simple principles which should not be obscured by the complications of particular arrangements. Cities have identified an urgent need for public transport investment. These investments are costly and cannot always be funded from existing budgets. Therefore other sources of finance are necessary. Improved public transport brings financial rewards to land and property owners, as indeed to enterprises, employers and individuals. Therefore it is equitable and efficient that a contribution to the cost should be made by those who benefit.

1 Introduction

1.1 Background of the Study

Twenty eight of the leading cities of Europe have come together as members and associates of EMTA (European Metropolitan Transport Authorities) to develop a new understanding and solution to the common challenge of public transport.

The great cities need public transport now more than ever. There is no way that mobility, economic efficiency and environmental sustainability can be secured unless very large proportions of travel are by train, tram and bus – yet that will only happen if the quality, reliability, comfort and security of public transport can deliver a standard of service at relatively low cost which can compete with the private car.

In some countries there have already been huge investments in public transport but in future these investments have to be further increased because many of our major cities are gaining again in population and employment. That will need big investment.

In a recent review the budgets of European metropolitan transport authorities varied from several million Euros to over €3 billion for the largest PTA (EMTA 2004, p20). Operating cost (without heavy rail) varied from about €100 per inhabitant to nearly €350. On average about half of the total costs needed have to be met by subsidies of some kind. In the 6 selected metropolitan areas (Helsinki, Copenhagen, Munich, Madrid, Greater London, Ile-de-France – Paris) the subsidies of operating cost varied from 28% - 46% (Table 1).

From an economic point of view the benefits of good public transport investment far outweigh their costs – and give much better value for money than urban road building, which damages the environment for only short-lived relief of congestion.

However there is a financial bottleneck: although the value is good the funds needed are still substantial. What options are available to raise more funds? The simple solution to increase fares makes services unattractive and for many too expensive to use. Politicians fear that the limit of tax contribution has been reached. Hence the key

question is: if public transport is good for the economy how can a share of the economic gain be captured for the much needed public transport investment itself?

Thus this report seeks to put together three simple observations:

- Cities need better public transport,
- public transport investment is good for the economy of cities,
- there is a shortage of investment funds from traditional sources.

The question is can value capture from the property market close the triangle? In this report we show that empirically we can prove that land value increases next to rail-based public transport lines occur, but the complicated issue of how to capture that in practice may need more detailed research and policy considerations.

Table 1: Annual expense of operating costs and the additional funding in the selected cities

Metropolitan Transport authority	Annual expenses in €million in 2002 or 03	Additional Funding in €million in 2002 or 03	Additional funding in percent
Copenhagen**	264	102	39
Helsinki	263	92	35
Munich	Data not available		
London	3868	1092	28
Madrid	1090	506	46
Paris *	3388	1119	33

* The Ile-de-France has a Transport Tax of €2,295 million and revenue from traffic fines of €80 million
** only buses and local railways in 2000. The cost of the local railways were only 2 million in 2000.

Until recently the question of land value capture has not been at the forefront of research interest. Studies in this field have tended to concentrate on the whole range of economic impacts that occur when a public transport infrastructure is newly in operation. Although the issues of land prices, rent and sale values of housing, offices and other commercial property are often included in these reports, relatively little specific research is available on this topic, especially with reference to Europe.

There is also very little known on legal options to implement any land capture mechanism.

1.2 Purpose and Objectives of the Study

The objectives of this study were to review theory, evidence and practice of land capture values from:

- examination of available published and unpublished evidence on the effects of transport improvements on property prices;
- interviews with key stakeholders who are or have been involved in major investments and/ or policy decisions;
- discuss recent research and analyse data from 6 selected metropolitan cities.

The purpose of this study was to assist the EMTA Working Group in exploring new land capture funding mechanisms for investment in public transport infrastructure (specifically underground railways) through researching any other practical experience of land value capture in various European metropolitan areas. For this reason 6 different major cities were researched: Helsinki, Copenhagen, Munich, Madrid, London and Paris (Ile-de-France). The case study cities have been selected in discussion with EMTA members to cover a wide range of different situations and different types of major cities in as many European countries as possible. The metropolitan areas chosen had a population of between just under one million (Helsinki) and 11 million. (Ile-de-France). The annual public transport passengers varied from 206 million to 2,670 million. The difference between some of the cities could have not been greater as a result of distinct cultural, historical, geographical and economic conditions and a great variation in political objectives.

As it turned out there has been so far no major European city with any experience in land capture funding mechanisms for investment of public transport infrastructure, but there exist land capture funding mechanisms for other investment. Hence we studied the existing land funding capture mechanism in Munich (and Helsinki) and evaluated the price premiums at rail based infrastructure (Metro, suburban railway and light rail) for housing, office and retailing property in selected metropolitan areas.

1.3 Methodology

Three basic methodologies were applied in this project:

1. The collection, analysis and synthesis of published and unpublished work to provide a generic framework of concepts and relationships.

2. A case study analysis in the form of face to face interviews supported by planning documents for 6 case study cities. Interviews have been carried out with the relevant planning departments of each city, representatives of property agencies, estate agents, Chamber of Commerce, urban agencies in charge of economic development and the public transport operators. Each metropolitan area has a range of various agencies which could provide information but they were specific to each country.

3. The result of the literature review, data and interviews enabled us to develop policy considerations which were reflected with EMTA members to get realistic proposals for the future.

1.4 Structure of this report

After this introductory chapter, Chapter 2 gives a summary of the literature review and the different authors in alphabetical order are in Appendix A. The full version of the literature review can be found in the second volume of this report called *Interviews and Literature Review*.

Chapter 3 gives a short introduction to the different tax options with reference to public transport. Chapter 4 introduced the 6 metropolitan areas according to their city size. It includes basic information about population and employment size, administration and funding of public transport, and their networks and future plans. Chapter 5 is the core of the research, it contains the results of the interviews and research on land prices.

Appendix A contains a list of the most important publications in alphabetical order on the subject of economic impact of public transport investment. There are page numbers given which refer to Volume 2 where more details about the publications are

provided (**Interviews and Literature Review**) of this report. Appendix B provides some statistical calculations of the price premium along underground and suburban railway lines in Munich. There is an additional volume which includes all the interviews carried out and the literature review.

2 Summary of literature review

There is a long tradition of research both in economic history, and urban geography, that relates economic development to transport facilities. The overall conclusion of the literature review is that there has been a variety of methods used to assess economic development effects. These evaluations are seen as urgent by most cities and their transport operators, so many impact studies are done within a few years of the system opening and in many cases this has turned out to be premature. In such cases (e.g. Manchester or Dallas) where the property market has been analysed very soon after opening, the main impacts are in terms of vacancy rates and rent levels rather than new physical development as such.

There are also striking differences in how the residential and commercial property markets are treated. In general, US research gives fuller detail on office property. British studies tend to focus on owner-occupied house prices, given the thinness of the private rental residential market.

There are two fundamental issues underlying all the studies reviewed here: firstly the difficulty of attribution of property market impacts to new urban rail as distinct from the many other influences, and secondly the tricky character of the 'feedback cycle' between transport infrastructure and urban development. In urban contexts that are already 'access-rich', improvements to infrastructure may have very marginal effects. The most detailed and rigorous work on longer term impacts has been done for the San Francisco BART Metro system. The findings, about 20 years after opening, were that the San Francisco city centre had benefited from BART, but elsewhere the impacts were localised and uneven. For the smaller Metro system of Atlanta the findings were more negative, concluding from a sophisticated statistical land use study that the main impact was to make the employment near stations more 'public

sector'. Atlanta was one example of new urban rail that had achieved disappointing ridership levels, and this was seen as contributing to weak development impacts.

The European Commission has also picked up this rising interest in urban rail and its impacts. As always, their funded projects are based on European consortia that cover a wide range of transport forms and urban contexts.

There has been some impressive work analysing the variety of financial devices used in 'joint development projects', the public-private property development projects that are at the basis of many of the large-scale impacts. In recent years, the Royal Institute of Chartered Surveyors has funded a study reviewing 'innovative financial instruments' with special reference to London's transport infrastructure needs. These now include the massive capital requirements not only of the west-east Crossrail project but a range of new London tram proposals. The familiar (in Britain) use of government grant calculated with reference to 'non-user benefits' may be progressively widened out into a more diverse range of financial instruments. Within current British political debate, major issues relating to the pros and cons of the Private Finance Initiative and Public Private Partnerships are constantly under discussion, raising key questions of risk sharing and the cost of capital.

In addition, Washington, DC, and New York City offer useful experience; one of the points often made about bigger development projects is that transit operators do not have the real estate experience to 'strike good deals', indeed they regularly lack the legal power to do so.

However, much of the material on development impact of rail-based public transport systems is anecdotal, i.e. describing quantities of real estate projects that were located adjacent to rail lines, without trying to analyse whether the line brought the development about. This is available for St. Louis, Portland, and San Diego. Critics have also suggested that segregated busways (such as those in Pittsburgh) have brought the same effects. Indeed, there is a strongly sceptical element to the debate over new urban rail in the US; some well-informed commentators maintain that Federal policy is easily biased by over-optimism in favour of rail compared to bus transit.

Specifically on the UK property market, the Tyne and Wear Passenger Transport Authority conducted an impact study only 6 years after opening which found only modest beneficial effects in the Newcastle housing market. Croydon has carried out a *before* and *after* study of the population living in the Tramlink corridor. In view of the buoyant nature of the S. London economy, the main target there is modal change and congestion relief. South Yorkshire has done perhaps the biggest and most detailed impact study, with interviews, telephone surveys, and studies of development and planning applications, but found (5 years after opening) very thin evidence of the Supertram's impact on commercial property.

International studies have also highlighted the success of Vancouver's Sky Train, based on personal research visits, and the UITP found from a survey of all urban light rail systems that about 1 in 5 of the cities were sure of positive development impact, especially in retailing property and housing.

Overall, it was often stressed in a variety of international contexts that improved urban rail access could not '**make things happen**' by itself, but had its strongest effects when reinforced by a strong integrated strategic land use plan and other measures that complemented the access gain. The local economic climate also needed to be strong. Relatively minor access gains could not overcome the adverse effects of dereliction and local economic depression.

In the next Chapter we will explore the different tax options which are most commonly used for financing public transport .

3 Alternative Funding Options

There are a number of alternative options for funding public transport investments. Some are more powerful than others and we have in the following given a short description of the various mechanisms, where they are used and what they can achieve. We have also included the example of the land value capture mechanism in Munich, which is presently not used to support public transport but might be used in

this form. We suggest more research and discussions (also in the other cities (Hamburg, Nürnberg and Augsburg) with the relevant authorities, especially politicians. In Europe the most powerful transport tax is the *Versement Transport* in France.

3.1 Versement Transport

French cities have a great advantage over most other countries in that it can rely on a public transport tax (Versement Transport). This was first introduced in the Ile-de-France in 1971, and in 1973 the Versement Transport was extended to local authorities or larger organisations (transport regions) that provide public transport for more than 300,000 inhabitants; 2 years later a further extension to regions of more than 100,000 inhabitants was possible. Since 1992 all transport regions with more than 20,000 inhabitants have the right to demand this tax which can be used to finance both public transport investment and operating deficits. The Versement Transport is today also applicable to towns as small as 10,000 population (Hass-Klau et al 2004).

Every employer (private and public) with more than 9 employees who is located in a transport authority, may be asked to pay between 0.15% - 1.80% of its total payroll as transport tax to the authority. There is an upper limit to what an employer may be asked to pay.

There are 3 different ceiling rates. An urban transport area between 10-100,000population can request a maximum rate of 0.55%. For urban transport areas with more than 100,000 inhabitants the ceiling rate is 1%, and if they construct an exclusive right of way project e.g. tram, guided bus, then the ceiling rate is 1.75%. This rate can be increased by 0.05% for some urban areas.

Each transport authority can decide, subject to these ceiling rates, whether or not to introduce the transport tax and at what rate. Very few transport areas have the top level.

In the Ile-de-France the Versement Transport has been 2.5% since 1996 (CERTU 2003, p52). There the employers may also pay half the cost of travel cards (which are not compulsory) for their employees. This is in addition to the Versement Transport.

The importance of this form of tax can be seen from the following statistics. In 1991 public transport (operations and investment) in France was financed from the following sources:

- 40 % by Versement Transport
- 32 % by ticket sales
- 23 % by other local tax
- 4% by grant from the Central Government
- 1% private finance (Bührer, Nickel et al 1994).

Data for 2000 showed that the percentage coming from the Versement Transport stayed about the same but there was a significant change between 1991 and 2000 in private financing and ticket sales.

- 39 % by Versement Transport
- 18 % by ticket sales
- 17 % by other local tax
- 7% by grant from the Central Government
- 19% by private finance (Certu 2003,p36)

Yet the percentage of revenue coming from ticket sales varies widely across France. The Versement Transport makes the issue of land value capture mechanism not a very likely option in France.

3.2 Socially justified land use (Die sozialgerechte Bodennutzung): the case of Munich

The most interesting land value capture mechanism in Europe is possibly in Munich, the so called: *socially justified land use.*

The background of this regulation was a severe lack of cheap housing in Munich since the middle of the 1980s. The price for newly rented flats was about 45% higher than in 12 other major West German cities. In a political agreement the Munich parliament decided in 1989 that 40% of newly designated urban land should be used for social housing. Official contracts had to be signed with private owners and the city of Munich. Generally it was usual that if land was designated to urban land use all the

infrastructure costs (roads, water, electricity, schools, green space etc.) were paid by the city of Munich (this is the case in all German cities). At the end of the 1980s, most German cities were suffering from severe lack of funds and it became difficult to pay for these infrastructure costs, hence the designation of urban land use would slow down or not take place at all. A way out of this difficult situation was the 1993 Law of Easing Investments and Housing Construction (Investitionserleichterungs- und Wohnungsbaulandgesetz). With this law it was possible for the first time that the infrastructure costs for designated urban land use could be paid for by investors and developers. The Munich Parliament decided in 1994 to apply the *socially justified land use.* In December 1997 this regulation was included in the Federal Construction Law (para 11 Baugesetzbuch 1998).

The basic consideration of the city was as follows: with a change of land use, e.g. from agricultural to urban land use, the increase in value of this land is considerable. Normally only the investors or the owners are capturing this capital gain. In the framework of social justice the cost for infrastructure should not only be paid by the tax payers (of the city) but by those who gain from the increase in land value. This applies not only for private owners but also for land which belongs to the city, the State and any other public body.

The land value capture is calculated as the difference between the price before the land was designated and the price after. The landowner can keep at least one third of the value he gains with the change of land use. The owner has to pay for the infrastructure costs which are necessary to develop the land, and these costs should not exceed 2/3 of the land value capture. If the necessary infrastructure costs were lower than 2/3 of the captured value, then the developer gains more than one third.

There are several ways of obtaining contributions from the landowner:

- Private land can be given to the city without payment
- money has to be paid to the city for the infrastructure costs
- agreement has to be given to provide social housing or a similar built contribution.

In addition the landowner has to build on the land within a fixed time period. Land can also be used for the promotion of special industries which the city wants to promote.

The land owner could be asked by the city to provide the following:

- free provision of land for roads, kindergartens, schools, green areas etc
- payment of infrastructure costs needed for roads, kindergartens, schools, green areas etc. The owner can pay instead a general sum of 130DM (€67) per sqm of floor space. For instance if the site has an area of 3,000 sqm and the allowed floor space is 6,000 sqm, then the total amount paid would be 780,000 DM about €400, 000.
- 30% of new housing has to be social housing. The city calculates in favour of the land owner for the provided land about 300DM per sqm (€154) and a fixed sum for the infrastructure cost of 150DM per sqm (€77) of floor space built. In fact the owner has to pay in effect the difference between housing at the free market price and the social housing price.
- The city has the right for 25 years to use the flats for social housing. There are a number of even more complicated regulations which I have not included here.

Example:Urban Land Use

Size of (gross) land 20,000 sqm

Size of (net) land 13,500 sqm (6,500sqm is land used for streets, green areas, etc)

Allowed floor space 16,200 sqm (of which 4,860 sqm = 30% is for social housing).

Land value **before** land was designated to urban land = €3 million.

Land value **after** land is designated to urban land = €13.125 million

Value gain to the owner €10.125 million

Sum of cost for social infrastructure assumed €4.3 million (€500,000 for site, cost of infrastructure €0.19 million, cost for school, kindergarden €.1.55 million and the difference between social housing and free market housing €2.06million).

The final land value gain which the owners would retain in this example was €5,825 million (€10,125 minus €4.3 million). The minimum, which could have stayed with

the owner according to the law, would have been €3,375 million thus in the given example he is lucky to gain more.

Interesting is an example in Munich where the central railway land between the main railway station, Laim and Pasing, a 156 ha large area will be changed into housing (7,000 flats for about 15,000 inhabitants) and work places (11,000 employees) during the next 13 years. Unfortunately no figures of values are provided about this deal between the DB-AG and the city of Munich.

Since the introduction of this regulation €172.9 million has been gained in 10 years (1994-2004) plus about 100 hectares had to be given for free to the city of Munich by the land owners.(If one assumes an average sqm price of €200 - €300 that would mean about 200-300 million for 100hectares of land). Fifty-two land use plans in Munich have been used in this way. One has to take into account that it was difficult at the beginning to get this law accepted by land owners and developers.

3.3 Tax increment finance (TIF)

TIF has been used in the US and Canada. It is a form of land value capture tax where public projects are financed by debt borrowed against the future growth of property tax. The assessed value of all the properties around say a light rail station continues to be taxed at a base year. Over the years the property value increases but the tax rate stays the same, and the tax increment is paid into a separate fund from which other public investment can be made and bonds can be raised which do not rely on government guarantees.

Transport for London (2003) mentions that over the past 5 years local authorities have raised more than $10 billion (about €12 billion). However Glaister (2004) mentioned that historically TIF supported projects have been small in financial terms and have focussed on small geographical areas (ibid, pp117-118). In Pittsburgh it was mentioned that TIF is used too much and for too many areas (Interview September 2003).

Even so, according to TfL San Jose has raised €2.1 billion for the redevelopment of its city centre and other business centres. New York is contemplating using TIF to develop the west side of Manhattan at the cost of more than 1.0 billion (ibid, p117).

The city of Toronto has used TIF. They have designated zones around new railway lines, roads and other assets. The value of the property within the zone would be monitored so as to compare the value within and outside the zone. Again we think it would be interesting to follow up the Toronto example and get more information.

The main criticism about TIF is that it is aimed at the non-domestic tax payer. However domestic owners have also increased values and they have to make no payments.

3.4 Section 106

Section 106 of the 1990 Town and Country Planning Act allows planning gains in favour of public transport. However Section 106 can only be operated by the Borough Councils and not by any larger planning body. For instance in Greater London the London Boroughs can use Section 106 but not *Transport for London* or the Mayor's office, which make negotiating and financing of a large-scale public transport project difficult and time consuming. Section 106 is not primarily a tax on transport but on development including housing and offices. As one of the Borough's main tasks is to provide affordable housing and promote office development, they will be more interested in using Section 106 for their concerns. Glaister et al (2004) points out that Section 106 is not likely in its present form to yield anything like the investment needed to underpin the development of any large projects (ibid, p125).
We found in our interviews in Tyne and Wear that Section 106 was not very popular with developers since it was seen as a development tax (Hass-Klau at al 2004)

3.5 Congestion charging

The Greater London Act of 1999 gave powers to introduce congestion charging to the new Mayor of London. Congestion charging started in London in February 2003, and the revenues can be used to improve and fund public transport. The Transport Act of 2000 gave the same powers to other local authorities. According to Glaister et al

(2004) congestion charging in Central London will produce a net yield of £65 million per year (ibid, p126) about €100 million, which will be enough to build about 10-12 km of light rail track annually. It is planned to extend the central charging area of London, and that would increase the amount of tax provided for public transport funding considerably. Generally speaking road charging is not a very popular policy and it may well be that apart from one or 2 more cities in the UK and the three cities in Norway (Oslo, Trondheim and Bergen) we will see very little use of it unless the political climate towards car use changes substantially.

There are discussions about national road user charges in the UK and there exists a charging feasibility Steering Group. This could yield revenue of up to about €7.5 billion but it is unlikely that this will all be used for public transport improvements; most of it may go directly to the Treasury.

3.6 Workplace parking levies

Workplace parking levies were also made legal under the Transport Act 2000 and are already in place in Nottingham and Milton Keynes. These levies can also be used for public transport investment and improvements. Workplace parking levies have been successfully implemented in Sydney and Perth. A study by the Central Government in the UK found that £3,000 per workplace could bring annually £100 million (about €150 million) in an extended central area of London (Glaister et al 2004, p126). However it is unlikely that in a place like London both congestion charging and charges for workplace parking levies will be introduced. It is more likely that one or the other will be chosen.

3.7 BIDs

BIDS (Business Improvement Districts) were originally created in the United States and Canada. They consist of a property tax paid by business located within a specific improvement district. The money is used to improve the local environment and is not normally used to support public transport investments.

3.8 State petrol tax and sales tax

In some States of the US and in some provinces in Canada funding of public transport is done by means of a small percentage of petrol tax. In Alberta for instance, 5% of the provincial fuel tax is paid for urban transport infrastructure, including public transport. That is also the case in Germany. About 3% of the tax revenue from each litre petrol sold is invested in local infrastructure (regional railways, public transport or local roads (Hass-Klau et al 2004).

3.9 Conclusion

In this chapter we discussed a number of interesting ways of financing public transport. The French transport tax (*the Versemont Transport*) is the most successful tax in Europe in funding large parts of the investment **and** operating costs of public transport. It has been copied only in Portland (US).The amount of funds achieved is high; in the Ile-de-France it contributes over 40% of the public transport costs.

Substantial funding could be achieved with congestion charging and workplace parking levies. So far very few cities have adopted this policy, London is the most well-known example and an extension of the central area is planned which would give even more funding to public transport.

Some of the other tax options are only indirectly used for public transport funding, they are more development or property mechanisms, such as TIF, BIDs and Section 106. From the sources available it is difficult to evaluate the real financial potential of TIF. According to Transport for London the values appear to be very high but the evidence what is included and what not is not clear.

With *socially justified land use* as practised in Munich; the city has gained about 42 million annually on average over the last 10 years. Clearly the value would be higher if more land were developed. However it should not be forgotten that presently it is not used for public transport funding.

4 Case Study Cities

4.1 Helsinki

- location, area size and administration

The city of Helsinki is located in the very south of Finland. Its size is 686sqkm (of which 185 sqkm is land) and the Helsinki metropolitan area has a size of 4,693 sqkm (of which 3,091 sqkm is land). Helsinki is part of a conurbation that includes 3 additional smaller cities (Espoo, Vantaa, Kauniainen) of which Kauniainen is by far the smallest.

The Helsinki Metropolitan Area Council (YTV) was created in 1970 and is responsible for transport, waste management, environment, development and planning. Its legal base is a regional assembly comprising 22 members from the 4 local authorities (Helsinki, Espoo, Vantaa and Kauniainen).

- population

The conurbation of Helsinki had a total population of just under 1 million. This is also the unified transport area. The city of Helsinki itself had a population of about 560,000 in 2002 (www.tilastokeskus.fi/tk/tp/tasku/taskug_vaesto.html, accessed 16.2.04). The metropolitan area is larger with 1.3 million people, about one quarter of the total population of Finland (5.2 million). In terms of our case study cities, Helsinki is by far the smallest urban agglomeration. It seems to be also the *leafiest* city with an average population density of 3,027 inhabitants per sqkm.

- employment

In 2000, 380,000 people were employed in Helsinki and 575,000 in the conurbation (YTV 2001, p2). Fifty five percent of the total workforce is employed in the service sector (Catella 2003, p6).

- economic situation

At present the Finish economic situation is very good. The real GDP growth for 2004 is expected to be 2.7%, it was the second highest after the UK of our case study areas.

- transport

There were 360 cars per 1000 population in 2002, which is low in comparison to the UK, Spain, Germany or France. Finland as a whole had 422 cars per 1000 inhabitants in the same year (www.tilastokeskus.fi/tk/tp/tasku/taskue_liikenne.html, accessed 16.2.04).

A new port is planned to the east of the city, in Vuosaari. This will be completed in 2008 (Catella 2003, p6). Vuosaari has a very recently-built Metro station and there is a significant amount of new housing adjacent to the station. The areas around the 2 old existing ports will be converted into new housing and offices (interview with public transport operator 13.2.04).

- public transport

Helsinki City Transport is operating the underground railways (Metro), the trams and urban buses in the City of Helsinki, Espoo and Vantaa. The suburban railways are operated by the State Railways. The YTV coordinates public transport, regulates prices and timetables in the conurbation and is also responsible for suburban bus routes.

- about the network

The suburban rail network is 56km in the metropolitan area (e-mail Teerioja, 18.6.04). The city of Helsinki still has an extensive tram network of 42km (track length) consisting of 10 lines and 109 trams and 242 tram stops. In addition there are 2 Metro lines of 21km length with 16 stations. The city has a very extensive and highly praised bus system with 1,500 buses running on 260 routes with about 5,000 stops (EMTA 2004, p58). Since 1998, some bus routes have been privatised and private companies are serving mostly the suburban routes.

A total of 206 million passengers used public transport in the conurbation of Helsinki in 2003. The breakdown using different public transport modes was:
56.8 million tram
55.4 million Metro
93.4 million bus
1.3 million ferry (Helsinki City Transport 2003).

Not included in his total are the 37 million railway passengers and about 78 million suburban bus passengers (EMTA 2004, p58).

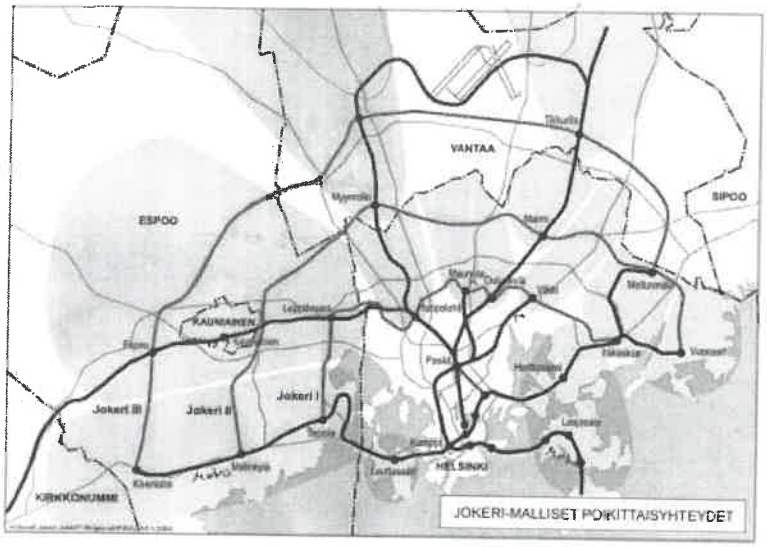
Figure 1: Trams in city centre of Helsinki

- funding of public transport

The 4 local authorities of the conurbation pay the operating costs for the public transport systems. Most of the investment costs for the Metro were paid by the City of Helsinki. Only for the most recent section did the State contribute 25%.

Investment costs for trains are paid for by the State but the stations have to be built by the municipalities; annually about €50 million are available for rail investments. The subsidy level on operating costs in the City of Helsinki was about 50%, which is paid for by the city. Across the conurbation as a whole the subsidy level was lower at 34% in 2003, which is shared by all 4 cities (Interview with Mr. Teerioja 11 2.04).

Figure 2: Future public transport network in the Helsinki Region



- future public transport and rail transport projects

A new Metro line to the west is planned (Figure 5). The total length is to be about 16km. Most of the line will be located in the town of Espoo. This town will have to pay 50%, Helsinki 20% and the State the remaining 30% of the investment cost.

There are a number of new rail projects:
The northern city rail link (12km) from Tikkurila to Kerava, opening 2004,
the Marja railway line (17km and 8 stations) opening around 2008 and
the western city rail link extension (9km) from Leppavaara to Espoo, 2010 (EMTA 2004, p59).

There will be a new high-speed train line connecting Helsinki and St. Petersburg (Russia) running via Lahti, a town of about 100,000 inhabitants to the north-east of Helsinki (Catella 2003, p6). The high-speed train will reduce travel time to Helsinki by 20 min (interview with Huoneistokeskus February 2004 – see Second Volume).

4.2 Copenhagen

- location, area size and administration

The urban area of Copenhagen is located on the eastern part of the island Zealand. The region covers 2,870sqkm, which is about 7% of Denmark and the city of

Copenhagen has 90sqkm. The Copenhagen region is divided intro three counties: Copenhagen, Frederiksborg and Roskilde and there are 2 urban areas Copenhagen and Frederiksberg. Within the 3 counties there are 48 districts (HUR 2002a, p11). The Greater Copenhagen Council was dissolved in 1990 and the central part of Copenhagen took over responsibility for central regional tasks. In 2000 the Greater Copenhagen Authority (HUR) was formed consisting of a governing council made up of the 11 politicians from the 5 different local authorities. Their responsibilities cover among other tasks, public transport and regional planning (HUR 2002b, p3 and www.hur.dk, accessed 26.5.04).

- population

The region had 1.8 million inhabitants in 2002, which is about a third of the total Danish population. The population in the city of Copenhagen had declined from 700,465 in 1940 to 495,699 in 2000. Since then there has been a slight increase in the population to 500,531 inhabitants in 2002. The region however increased in population from 1.2 million in 1940 to 1.8 million in 2002 (HUR 2000a, p21). The average population density is 7,783 inhabitants per sqkm.

- employment

There were 963,000 people employed in the region of which 265,000 were employed in Copenhagen in 2001 (ibid, p99).

- the economic situation

Denmark had a GDP growth of 1.6% in 2002 and a GDP per capita (using purchasing power parity) of $28,900 in the same year (www.cia.gov/cis/publications/factbook/geos/gm.html, accessed 16.6.04).

- transport

Car ownership in Denmark is very low because of high taxes on cars. There were only 229 cars per 1000 inhabitants in Copenhagen in 2000 and it is forecast that there will be an increase to 268 by 2013 (Trafik- og Miljøplan 2003, p5).

Trams disappeared in 1972 in Copenhagen (interview Rørbech, 3.10.03), and were replaced by buses and extensive suburban rail lines.

There is a very high level of cycling, which is reflected in very wide cycle lanes along the major roads in the city. The city provides at many locations bicycles, which can be hired without cost. 14% of all trips to the city centre are made by bike and 30% use public transport (Cane.de/winnwd/135.htm, accessed 26.5.04).

Most important for the economic development of the Copenhagen region and south Sweden was the Øresund bridge, a fixed rail and car link between the two countries which opened in 2000. The rail-car link consists of a bridge and a tunnel and is 16km long.

- public transport

The public transport organisation is called HT (hovedstadsomradets trafikselskab) and was formed in 1974. The owners were the 5 local authorities of the Copenhagen region. HT was responsible for operating, planning, pricing and co-ordination of public transport in the conurbation of Copenhagen. This role has now been taken over by HUR.

HUR co-ordinates daily 1,100 buses on 270 routes and there are about 10,000 bus stops. There were 258 million public transport passengers in 2002 (www.hur.dk/traffic/plan, accessed 14.6.04). The breakdown of trips was:

Suburban train: 114.9 million

Metro: 3.2 million

Urban buses: 167.9 million

Other buses including regional buses: 60.7 million.

All operating services including some private railway companies (except the suburban and national railways) have been privatised since 2001, a process which started in 1990 (Haubitz 2003, p35).

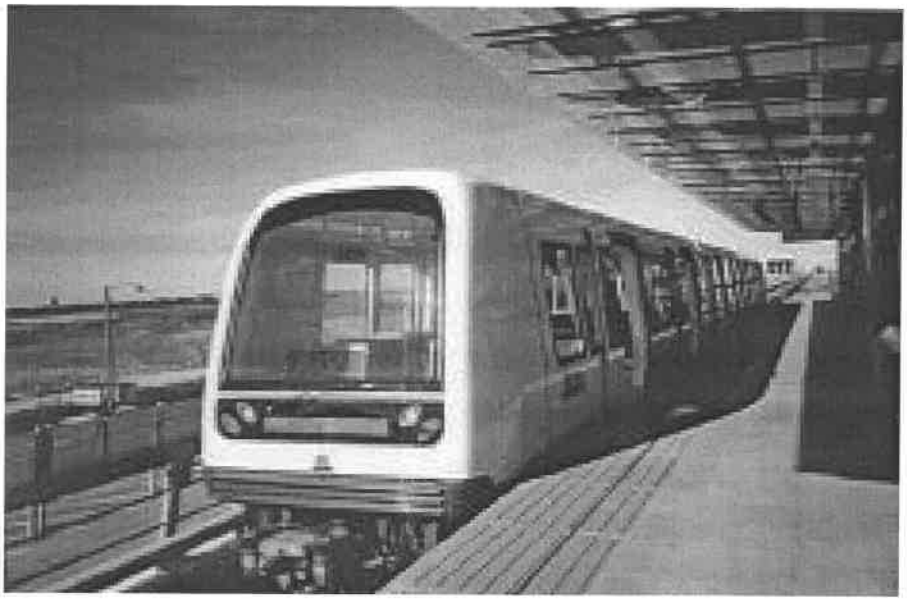
- about the network

Copenhagen has an extensive suburban network of 430km (track length) and 7 major suburban railway lines and 80 stations. Nearly all the lines provide a 10 minute

service most of the day. The trains are operated by the DSB (the Danish national railways).

The fully automatic Metro has two lines, 14 stops and is operated along 17km of track with 19 vehicles running at 90 second intervals. The cost was so far €1.5 billion (www.copcap.com/composite.1670.htm/update, accessed 31.10.02) (Figure 3).

Figure 3: Metro in Copenhagen



The Metro opened in 3 stages:
Stage I : Nørreport-Lergravsparken/Vestamager, October 2002
Stage II : Frederiksberg to Nørreport, May 2003
Stage III: Frederiksberg to Vanløse, October 2003.

In December 2002 there were 50,000 passengers per day (the forecast was 61,000) and one year later in December 2003 they were about 98,000 daily passengers (the forecast had been 198,000 passengers per day). (passagertal_mdr_dec2003.gif, accessed 2.3.04).

- Ørestad Development Corporation

The organisation responsible for the planning and building of the Metro is the Ørestad Development Corporation (ODC), based in Copenhagen, a consortium of the city of

Copenhagen (55%) and the State (45%) which was established in 1993. The other task is to manage the construction and development of Ørestad.

- funding of public transport

Private companies run all buses and investments in new buses are made by them. HUR is responsible for investment in information technology, marketing, bus stops and terminals. Some investment is carried out together with the Danish Railways; others are made with various local authorities and regions (HUR 2002b, p11).

The total operating cost for HUR was €264 million and total revenue was €162 million in 2000 (ibid, p11). About 39% of the funding has to come from the local authorities of the Copenhagen region (Table 1 above).

- future of public transport

Stage IV of the Metro development will be the Østermagen line, it will run from Lergravsparken to the airport and will open in 2007. The interchange with the S-Bahn system is at Nørreport, at the northern end of the city centre. By then the Metro will be 21km long with 22 stops. In addition there is a Metro ring line planned which could open at the earliest in 2010 (Interview with Mrs. Kampmann, 2.10.03 see Volume 2).

4.3 Munich

- location, area size and administration

The city of Munich is located in the south of Germany. Its size is 310.5 sqkm. It is the capital of the State of Bavaria (70.6 million skm). It has a directly elected mayor and a city parliament. Munich contains 41 districts. The transport area of Munich covers 5,533 sqkm and has 175 independent local authorities including Munich.

- population

Munich had a population of about 1.2 million in 2003 (www.net-lexikon.de/muenchen.html, accessed 17.5.04), in comparison to the Munich region,

which has 2.5 million inhabitants and the State of Bavaria with 12 million people. The average population density of Munich is 3,865 inhabitants per sqkm.

- employment

In 2001, about 696,000 people were employed in the city of Munich and 1,106,000 in the region. This figure does not include the civil servants and the self-employed because of lack of Census data. (www.suedbayern-online.de/Deutsch /Fakten/arbeitsmark.html, accessed 24.5.04).

Figure 4: New Metro station at Georg Brauchle Ring

- economic situation

At present the economic situation in Munich and in Bavaria is slightly better than in the rest of Germany. The unemployment rate was 6% in the region of Munich compared to about 11.6% in Germany as a whole in 2003 (Bayerisches Statsministerium für Wirtschaft, Infrastruktur, Verkehr und Technologie 2004. p21). The real GDP growth in Germany was 0.2% in 2003 but negative in 2003 (with -0.1%), the first decline since 1994 (www.destatis.de/basis/d/vgr/vgrgrafl.htm, accessed 24.5.04).

- transport

There were 560 cars per 1000 population in Munich in 2003, which is high in comparison to the capital cities of the Denmark, Finland and the UK.

- public transport

The transport area of Munich called MVV (Münchner Verkehrsverbund) was formed in 1971. It created a unified ticket for all transport modes in the city and the region in 1972 and co-ordinated the 13 suburban train lines, 13.5km of underground railways, 111.5km of tram lines and 304km bus routes in the city and an extensive network of bus routes in the region.

However the Münchner Verkehrsgesellschaft (MVG), which belongs to the City of Munich, operates the public transport services in Munich, and bus services in the region are mostly operated by private companies. The suburban trains are run by the German railways (DB-AG Regio).

- about the network

The construction of the subway started in 1965 and the first part of the Metro opened in 1971 (12km). Since then the underground system has been continuously extended and the last opening of a station was in October 2003, the extension of the U1.

In 2004, Munich has an underground system of 8 lines and covering 85km (track length). The system has 90 stations, which are served daily by 556 trains. The remaining tram network still has 10 lines, 99 trams and 71km of tracks and 147 tram stops. There are 72 bus lines and 434 buses. The total bus network is 416km and contains 818 bus stops. In addition there are 24km of bus lanes (www.net-lexikon.de/MVV---Muenchner –Verkehrsverbund.htm, accessed 17.5.04). The region is served by a suburban network of 420km.

Figure 5: New office and housing development at the new underground station Georg Brauchle Ring

A total of 555 million passengers used public transport in the transport region of Munich in 2002. The breakdown using different public transport modes was (includes changes of modes):

242.2 million suburban train
306.6 million underground
82.7 million tram
161.4 million bus

(information from MVV by email 18.5.05).

- funding of public transport

Although transport investment is the responsibility of the Länder (States), Central Government can substantially help in the financing of public transport. In 1992, the Federal Government increased the maximum percentage for new tram, light rail and underground investments to 75% in West Germany and up to 90% in East Germany. Any city and operator that wants funds for new investment has to prepare a cost benefit analysis, which is competitive with those of other operators.

Länder and the Federal Government can finance public transport investments, together or separately. If the standardised cost-benefit analysis does not have the appropriate benefit/cost ratio, and therefore federal funding is rejected, the Land can still decide to fund the project fully if it thinks it politically expedient to do so.

Operating costs have to be funded by the local authorities. West German cities can also fund operating costs as cross-subsidy from other services they own and may make profits, e.g. gas, water and electricity.

- future public transport projects

A second city centre suburban railway tunnel will be built in Munich as the present tunnel is running at capacity and this affects especially the suburban rail services at the outer limits of the region. The new tunnel, which will be finished in 2010, will provide shorter headways for suburban rail services. This project is financed by the DB-AG (German Railways) and the State of Bavaria. In addition a 180km *tram-train* railway ring is planned and will be finished in 2020 (a *tram-train* is a vehicle which can run on railway tracks and also on street e.g. the Karlsruhe model) (www.mvv-muenchen.de/de/dermvv/konzeptionelleplanung/st... ,accessed 7.6.04).

4.4 Madrid

- location, area size and administration

Madrid is the Spanish capital and is located in the centre of Spain. The agglomeration of Madrid, which contains 179 municipalities including Madrid, is one of 17 Spanish autonomous regions, which were formed in 1985. The city has a size of 606 sqkm and the region 8,028 sqkm (EMTA 2004, p65).

-population

The region of Madrid had 5.6 million inhabitants in 2002. The city of Madrid is by far the largest local authority in the region with a population of 3,060,000 million in 2002 (Concorcio de Transporte Madrid 2002, p28). The city of Madrid has hardly lost population when comparing 2002 with 1975, when the number of people living in

Madrid was at its highest level.
(www.munimadrid.es/estadistica/poblacion/cuardro11.html, accessed 26.02.04). The population density of the city is high with an average of 5,050 people per sqkm.

- **employment**

There were 1.8 (EMTA says 2.25) million people employed in the agglomeration of which about 66% were employed in the city of Madrid itself in 2001 (ibid., p3). About 80% of Madrid's employees worked in the service sector in 2003, which shows Madrid's overwhelming function as one of the major centres of administration in Spain. Its industrial role is now rather narrow with only 12% of the total workforce (numbers are from 4. Trimestre of 2003, www.munimadrid.es/estadistica/economia/EPA/EPA.html, accessed 26.02.04).

- **economic situation**

The annual GDP per inhabitant was €22,818 (EMTA 2004, p65) and the GDP growth was 2% in 2002 (www.cia.gov/cia/publications/factbook/geos/gm.html, accessed 16.6.04).

- **transport**

There is a very low level of cycling but a high level of walking and public transport use. According to a survey in 1996, over a third of all trips were made on foot (37.2%) another third used public transport (33.3%) and about 30% were travelling by private vehicle (29.5%) in the region of Madrid (Consorcio Regional de Transportes de Madrid 2003, p3). As everywhere in the urban areas of Spain, the percentage of walking is still very high compared to Germany, the UK and Ireland.

- **public transport**

The public transport of the region is organised by the Consorcio Regional de Transportes (the public transport organisation of the agglomeration of Madrid), which was formed in 1985 (Consorcio Transportes Madrid 2002, p16). The organisation is responsible for the running of all public transport modes (excluding the suburban trains) and the Consorcio carries out the present and future planning of public transport. Since the formation of the Concorcio, the number of public transport passengers has increased significantly with 1.5 billion passengers in 2002. However

this is also the result of a growth in the number of communities, which was particularly strong up to 1992 and the higher growth rate of the population of the Madrid region.

- about the network

Trams disappeared in 1972, the same year as in Copenhagen. Buses and a significant expansion of the Metro network replaced them. The first Metro line opened in 1919 in a north-south direction and was 4 km long with 8 stations (from Glorieta de Cuatro Caminos to Puerta del Sol) (www.ucm.es/info/hcontemp/, accessed.26.2.04). Between 1970-1983 the network exceeding 100km for the first time (www. Metromadrid.es/default.asp/id=164, accessed 28.2.04).

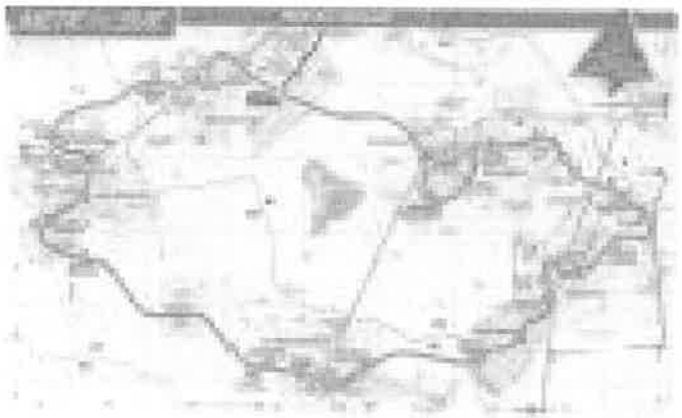
In 2003, the Metro had 173km of track length with 205 stations and 12 lines (Concorcio Transportes Madrid 202, p29). The Metro Line 10 reached 5 local authorities in the southern region of Madrid (Alcorcón, Móstoles, Fuenlabrada, Getafe and Leganés) in 2000. These 5 local authorities are connected by a metro ring line. The suburban train network is 318.5km long operating on 12 lines and 92 stations (Consorcio Transportes Madrid 2002, p36).

The buses in the City of Madrid are publicly owned and the regional buses are privately operated but still controlled by the Concorcio. There are 33 private companies. The Metro is owned to 75% by the city of Madrid and 25% by the region. The suburban trains are owned by Renfe, the national railway company of Spain.

Figure 6: Madrid – Underground Station at MetroSur

There were 1.433 billion public transport passengers (1.5 billion tickets) in the transport region of Madrid in 2002 of which 563.9 million travelled on the Metro and 675.5 million were bus passengers and 193.7 million suburban train passengers (Consorcio de Transportes Madrid 2002, p39).

Figure 7: Network of the MetroSur



- **funding of public transport**

Total funding operating costs was €1.09 billion in 2002, of which .53.3% were fares, 21.4% came from regional government, 13.3% was provided by the National Government, the Madrid Municipality contributed 9.6% and other funding was 2.1% in 2002 (EMTA 2004, pp65, 67).

- **future public transport projects**

New metro extensions of about 36km will be constructed between 2003 and 2006, and a new tunnel for suburban trains from Atocha to Charmartin is already under construction. Its total length will be 8.4km and the investment amounts to about €169.19 million (EMTA 2004, p67).

4.5 Greater London

- location, area size and administration

Greater London is located in the south of England; the area covers 1,580km.
Since 2000, London has had an elected Mayor and an Assembly (who together form the Greater London Authority). London contains 32 Boroughs and the Corporation of London.

- population

Greater London has 7.2 million inhabitants in 2001 and 3 years later the population had grown already to 7.4 million. The population of London contains about 13% of the total population in the UK (58,8 million) (www. statistics.gov.uk/census2001/ pyramids/pages/uk/asp, accessed 21.5.04). The average population density is 4,684 inhabitants per sqkm.

- employment

Greater London had 4,570,000 jobs in 2004, an increase of 1.6% on the previous year. The number of jobs is the highest since the data series of the GLA (Greater London Authority) began in 1971 (Greater London Authority 2004, pp7, 13).

- economic situation

The UK economic growth will be between 3.0-3.5% in 2004, the highest of all our case study countries. It was estimated as 1.8 % in 2002 but it was in fact much higher. www.cia.gov/cia/publications/factbook/geos/gm.html, accessed 16.6.04).

-transport

According to the National Travel Survey 1999-2001, 37% of all London households had no car compared to 27% in the rest of Great Britain. When studying the modal split figures, the dominance of the car is still high even in a city of the size of London. Sixty four of all residents use the car, 17% the bus, 10% the tube, 7% railways and 2% the taxi for their daily trips (excluding walking)(www.transport for london.gov.uk/ltr2003/road-related-trends-3.shtml, accessed 21.5.04). However 80% of all public transport trips are made to the centre (21% of all trips are to the Central London area) (EMTA 2004, p63).

- public transport

Transport for London (TfL) is responsible for the management and planning of the majority of London's public transport systems (except railways). In addition TfL is responsible for 580 km of main roads, all the traffic lights, and also regulates private taxis and the private hire trade. TfL is in charge of the central London congestion charging scheme, in place since February 2003. The suburban train services, which are run by 12 different private operators, have a length of 788km, 40 lines and about 500 stops.

- about the network

The underground rail network is 408km long has 12 lines, 275 stops and 598 vehicles. There are 28km of tram length in Croydon in the South of London, consisting of 3 lines, 38 stops and 24 vehicles. The Docklands Light Railway, which is technically more an underground rail than a light rail line is 27km long, has 4 lines, 34 stops and 35 vehicles. In addition London has an extensive bus network of 3,730km of length, 700 routes and about 17,000 bus stops and 6,500 vehicles. 30 private operators which run the bus network are under contract from TfL (EMTA 2004, pp62-63).

A total of 3,189.3 million public transport trips were made in Greater London in 2001 (?). The breakdown using different public transport modes was :

655 million suburban train
953 million underground
41.3 million light rail
1540 million bus

(EMTA 2003, p63 – it is not clear from which year the trips are from)

- funding (investment and operation?) of public transport

New public transport infrastructure in London is mainly funded by the Central Government via government grants. 58% of its total requirement was provided in 2002/3. The London Underground, which became part of TfL in July 2003, receives another 45% of its total cost from Central Government (EMTA 2004, p64).

- future public transport projects

There are many new projects planned. The Thames river crossings including:

- an extension of Docklands Light Railway from London City Airport to Woolwich,
- a road bridge between Gallions Reach and Thamesmead (Thames Gateway bridge) and
- a road tunnel between North Greenwich and Silvertown.

There are three major tram projects: an extension of Croydon Tramlink, the new tram lines in West London called West London Transit, and another major new tram line, the Cross River Transit. There is also a Greenwich Waterfront Transit planned which will be bus-based.

In the very long run there are plans for a major west-east rail connection (Crossrail), which will give access between the financial districts and Heathrow.

4.6 Ile-de-France, Paris

- location, area size and administration

The city of Paris is located in the centre of the capital region Ile-de-France which is made up of 8 Departments with Paris being by far the smallest land area. The surface of the Ile-de-France is about 12,000 sqkm and Paris has only 105 sqkm (EMTA 2004, p75).

Figure 8: Ile-de-France: administrative division

- population

The Ile-de-France had about 11 million inhabitants in 2002 and it had increased to just under one million compared to 1982. It is by far the largest urban region we studied. The city of Paris had 2.1 million inhabitants in the same year whereas twenty years ago 2.2 million people lived there. Similar to Madrid, the size of the population has not changed significantly during the last 20 years (Evenson 1984, p267). The average population density is astonishingly high with 20,000 inhabitants per sqkm.

- employment

Table 2 shows the dominance of Paris as an employment centre but also its stronger decline in the number of people employed in 1999 in comparison to the Ile-de-France. Fifty six percent of all employees worked in the Ile-de-France in the service sector, 25% in manufacturing industries and 18% in commerce in 1999. As expected the service sector is slightly higher (52%), and the industrial sector lower (32%) in the Ile-de-France than in France as a whole (Insee Ile-de-France, IAURIF 2003, p28).

Table 2: Number of people employed in the Ile-de-France and Paris

Year	Ile-de-France	Paris
1982	4,704,744	1,807,952
1990	5,075,974	1,815,345
1999	5,041,995	1,600,815

Source: Insee Ile-de-France, IAURIF 2003, p28.

- economic situation

The Ile-de-France region produces 28% of the French GDP. The GDP growth rate was 1.2% in 2002 and even less in 2003 (reference see above).

- **public transport**

The Syndicat des Transports d'Ile-de-France (STIF) was formed in 1959 to co-ordinate public transport services, to determine the fare policies and set fare levels. STIF organises all public transport services in the Ile-de-France, including heavy rail and suburban rail (RER), metro, tramways and buses. It co-ordinates the activities of

80 different transport companies. STIF is also in charge of funding, planning and improving public transport in the Ile-de-France region (EMTA 2004, p75).

The board of directors includes 34 members of which 17 represent the French State and 17 the local authorities of the Ile-de-France. Ile-de-France is the only region in France where the Central Government is directly involved in funding.
About 29% of all motorised trips in the Ile-de France are made by public transport but in Paris ths increases to 62% (ibid., p.76).

- about the network

The first line of the metropolitan railway opened in Paris in 1900. Some extensions to the suburbs occurred in 1930s (Evenson 1984, p269). Suburban rail commuting expanded rapidly during the 1920s and by 1931 there were already 363 million travellers (Everson 1984, p269).

In 2002, the Metro network in the Ile-de-France (which runs mainly in Paris) was 211km long (14 lines), plus 580km of five RER lines and 1,286km of additional suburban railway lines (STIF 2003, p17). There are also 2 tram lines of about 20km of length.

In total there were 3,502 million passengers of which 1,283 million travelled by Metro, 984 million by RER and SNCF (Ile-de-France) and 1,139 million by bus and 91 million tram and tram-bus, TVM, PC (bus) in 2002. Studying the passenger figures over time one can see a constant growth since 1995 (ibid, p19).

- funding (operation and investment) of public transport

The total financing of investments and operating costs was €6.73 billion. The majority of funding (42.3%) is achieved with the transport tax. About one quarter (25.7%) were fares, 9.9% was paid by the State, 8.3% by the region, 7.8% by the 8 Departments and 6.% by others (including STIF and local communities) in 2002 (ibid, p15). The funding of operating costs (€6.2 billion) was different for the same year. It was: 46% *versemont transport,*

10.6% from the State,

3.8% from the region,

7.5% from the Departments and

4.2% others (Stif 2003, p15).

- future public transport projects

Between 2000 and 2006 the State and the region will spend about €3.6 billion. Here are the most important projects:

- the construction of a ring of tramways in the inner suburbs (€400 million for 20km of new lines),
- the construction of an orbital network of heavy rail lines (€880 million for 120km) and the extension of 5 metro lines (€630million),
- the building of new tram lines and other dedicated lines (€1,130 million).

Finally the very ambitious target is to reduce car traffic by 3% between 2000 and 2005, in Paris by 5% and in the region by 2% (EMTA 2004, p77).

4.7 Conclusion

When studying Table 3 the highest ratio of rail km per population is found in Copenhagen followed by Munich. The Copenhagen figure needs interpretation; considering the low relationship between public transport trips and population the length of the rail network is quite astonishing. The lowest relationship between rail km per population is found in Madrid. Hence the urgent need for more rail-based public transport investment. The suburban rail network in the Madrid region is relatively small with only 13% of the total public transport trips .

The highest level of public transport trips per population is found in London which can be partly explained by being a tighter bound transport region compared to the Ile-de- France or Munich.

Table 3: Comparison of basic data of the 6 selected metropolitan areas

Metrop. Areas	Pop of metr. Area in million	Pop in capital city in 1000	Employ metr.area in million	Rail km per pop. of metr area	Rail based infrastructure in km	public.t. trips per pop in 1,000	Car ownership/ 1000 pop.

Helsinki	0.9	560	0.6	132	119	353	360
Copenhagen	1.8	501	1.0	248	447	192	299
Munich	2.5	1,200	1.1	230	576	317	560
Madrid	5.6	3,100	1.8	88	492	268	
Greater London	7.4	7,400	4.6	169	1,251	431	350
Paris Ile-de-France	11	2,200	5.0	191	2,097	243*	

- Passengers
-

5 General considerations and findings

Although the main focus of this study was on land value impacts with reference to rail-based public transport infrastructure, it is clear that this is only one of several different economic effects. Especially in dense urban areas there are a number of factors affecting not only the price of land but also the prices of houses, offices and retailing, other than public transport accessibility. These can include principally:

- the image of the area
- the location
- schools, parks, shops and other public facilities
- the economic situation in general and in the specific region
- factors affecting the distribution of incomes (including social, economic and taxation policy)
- the nature of the hinterland (free standing city or a city, which is part of a large conurbation and is competing with other cities directly)
- the structure of local industry and employment
- special events e.g. Olympic Games.

These aspects form a general background in all cases. It was not feasible to try to collect and analyse data sufficient to separate these out and to give a value to each, but relevant aspects are noted in relation to each case.

5.1 Conclusions from the case studies.

In all European countries we studied there is no explicit legal provision to fund public transport investment directly through a levy on capital gains resulting from urban development. However special negotiated deals between local authorities and owners or developers are possible. In practice by far the majority of public transport investment has been funded by the various regional and federal governments.

- Rail versus bus

In all the interviews carried out with representatives of estate agents and developers it was uniformly agreed that bus stops or bus corridors are not as important for land and property prices as rail-based modes. This can be used as a powerful argument in favour of light rail and underground railways.

- Centre versus non-centre

There were indications that rail investments in non-central areas had a greater effect than in central areas. This needs some explanation and care in interpretation. The point is that public transport service densities in the centre of European capitals are often very good, and this is likely to be one of the many contributory factors for the already higher *general* land values in city centres. With these high city centre values, the location of a rail-based public transport stop is normally **not** an indicator of an even greater increase in land value since housing and offices can be reached on foot equally well from any station. But there is much more scope for a noticeable effect when the public transport network density is lower, or when rail-based public transport is missing altogether. Therefore we see especially in suburban locations marked differences in the land prices between properties which have a close proximity to rail-based stops and those without, e.g. Munich and Helsinki.

- The state of the economy

Overall, the most powerful factor is the state of the economy in the city in question. When the economy is booming, accessibility to public transport becomes more important than when the economy is declining and unemployment is high.

For the unemployed the price of their accommodation is more important than public transport access (even if they would gain from public transport access). For the unemployed seeking a job, any work at any location will be preferred - with or without good public transport access – or even with the expense of buying an old car which he/she can hardly afford.

During periods of property price depression the only positive effect may be that quicker sales of houses/flats and offices around stations are achieved than somewhere else, as will also be the case in an booming economy.

In a period of economic buoyancy public transport accessibility is more important as an **additional positive** feature than in a declining economy but even in such a situation the price of housing is decisive ahead of easy access to public transport. Overall urban public transport accessibility is more important for the housing market in periods of economic growth because in periods of decline people buy less and move less.

In a depressed economic climate new **office development** will still occur at public transport stops, but possibly not if the land price premium for this location is much higher than elsewhere. One has to be aware that office developments work with a time lag; that is to say offices are still being built even when there is weaker demand for office space, because of the lengthy construction period required.

- Retailing

Many businesses in the retailing sector rely on car accessibility apart from the city centre locations which have good public transport access, and small local shops where local walking is more important than public transport or car access. In an economic downswing when customers watch their outgoings, car-based shoppers may switch to local retailing centres which are mostly dependent on people living in close proximity and not only on good public transport access.

5.2 Empirical Results

The literature review and the interviews carried out in the 6 metropolitan areas allowed us to present three different though sometimes overlapping forms of evidence which are cited, as follows:

A – formal statistical modelling using multivariate techniques, published as a research report or journal article;
B - direct observation of market property prices in the neighbourhood of a rail line or station, using 'before-and-after' or 'with-and-without' comparisons;
C – professional judgement of local estate agents, property valuers or developers, based on general market experience.

Tables 4-7 summarise the main findings from various cities.

Table 4: Average Premiums (per sqm) for Building Land of Housing next to Suburban Train Stations in Munich in 2002

City	Average % premium in land price	Mode	Nature of source	Form of evidence
Munich *	-8.5	Suburban trains	Own calculation	B
Munich *	52	Suburban trains	Own calculation	B
Munich *	38.7	Suburban trains	Own calculation	B
Munich *	64.7	Suburban trains	Own calculation	B
Munich *	33.8 and 40.1	Suburban trains	Own calculation	B
Munich *	16.7	Suburban trains	Own calculation	B

Munich *	50	Suburban trains	Own calculation	B
Munich *	10	Metro	Own calculation	B
Munich *	10.5	Metro	Own calculation	B
Munich *	-10.8	Metro	Own calculation	B
Munich *	21.3	Metro	Own calculation	B
Unweighted average (mean)	28.9			

*see Table 9 and 12 in Appendix B: These values do also include other factors which could not be separated.

One example of the price for building land for warehousing was found in the surroundings of Munich. There was a price difference of 46% in the same local authority between land located close to the suburban train station and land located next to a road.

Table 5: House or Apartment Premiums next to Light Rail, Metro or Suburban Railway Stations

City	Average % premium in property value	Mode	Nature of source	Form of evidence
Dallas	8	light rail	Weinstein/ Clover	A
Freiburg	3	light rail	Estate Agent	B
Greater Manchester	10	light rail		B
Hannover	5	light rail	Estate Agent	C
Helsinki	6 – 18 (12)	Metro	9 Estate Agents	C
Helsinki	10	Metro + suburban rail	Construction firm	C
Helsinki	10	Metro	Estate Agent	C
Helsinki	7.5 – 11 (9.25)	Metro	Research Institute	A
Helsinki	4	Metro	Research Institute	A
Newcastle	20	light rail	2 Estate Agents	C

Paris	3.3	T2, light rail	Research Institute	A
Paris	5.2	T2, light rail	Research Institute	A
Portland	10	light rail	Statistical Report	A
Portland Gresham	5	light rail	Town Planning Department	C
Rouen	10	light rail	Estate Agent	C
Strasbourg	7	light rail	Estate Agent	C
Unweighted Average	8.2			

Source: Hass-Klau et al 2004, Literature Review and Interviews

Table 6: Office Premiums next to Light Rail, Metro or Suburban Railway Stations

City	Average % premium in property value	Mode	Nature of source	Form of evidence
Bremen	25	Light rail	Investment company	B
Freiburg	15 – 30 (22.5)	Light rail	Trade promotion	B
Helsinki	10 – 15 (12.5)	Metro + suburban rail	Construction firm	C
Helsinki	6-18 (12)	Metro	9 Estate Agents	C
Helsinki	4	Metro	Researcher	A
Helsinki	10-15 (12.5)	Metro	Construction firm	C
Paris (Marne-la Vallée)	57	RER	EPA	B
Paris	52	Metro	APUR	B
Strasbourg	10 – 15 (12.5)	Light rail	Chamber of Commerce	B
Unweighted average	23.3			

Source as in Table 5

Table 7: Retailing Premiums next to Light Rail, Metro or suburban Railway Stations

City	Average % increase in property value	Mode	Nature of source	Form of evidence
Copenhagen	10 – 15	Metro	Property Adviser	C

Helsinki	6-18	Metro	9 Estate Agents	C

Source Interviews in Copenhagen and Helsinki

5.3 Interpretation of Results

Our assessment of the quality of the evidence, and further information about the nature of the relationships, is as follows:

- **proximity to public transport stations**

According to the evidence so far there is no doubt that the value of building land and residential property in the proximity of a station (Metro, light rail or suburban rail) increases. This seems to apply both to selling prices and rental values, for family houses, rented accommodation and owner occupation. The effect is dependent on the distance from the station. There may be a negative effect if the property is very close to the station (up to 100m depending on the mode). Our previous research (Hass-Klau et al 2004) suggests that occasionally a decline of property values can be experienced along a new tram line if the vehicles are too noisy. One example in Munich shows that other effects could be stronger than the closeness to a suburban train stations.

The highest values are achieved between 200-500metres from a station. Overall the values we found in this study varied between 3-50%, and our average value of 11 observations for building land in Munich (more research could be done on building land in the surroundings of Munich) was on average about €142 per sqm or 36%. (some value should be subtracted because of other factors) For housing and flats (16 observations) was about 8%. Similar results, 7-8% were found for Boston (Armstrong 1994) and Philadelphia (Voith 1993) for single family homes.

Although logically a similar effect should apply to bus services, this does not seem to be the case. Suggestions to explain this have included the higher visibility of the track, and the greater confidence that a track-based mode will remain in place for a long time. In many cities, there is a strong view that rail has a better image than bus, and is better able to attract richer people (who, of course, have a proportionally greater effect on property prices), though there is some evidence, for example in London, that this negative image of buses can be counteracted by suitable policies.

- higher densities

There is some evidence that the effect on property values interacts with residential density, in two ways. First, the price premium for flats with good rail access was higher than for flats with no public transport accessibility, and the permitted densities of land is higher around public transport stops. There is also a tendency that more flats than single-family houses are built next to rail-based stations because single families living in houses normally rely more on private cars than families in flats, for reasons of income and family structure.

Secondly, when a new housing development is planned in an integrated way with a new rail line, it is often the case that the rail provision is linked to a higher planning density than would be possible if high levels of car use are expected. Therefore the rail provision allows higher densities, and the higher density produces a greater land value. Therefore one model of value capture, appropriate in some cases, is that the higher development densities is the incentive offered by the local authority to persuade developers to contribute, directly or indirectly, to the transport facility.

- increase of the value of offices

There is widespread (but not unanimous) agreement between experts that the level of office rent is dependent on good public transport but in many cities, including our case study cities, this effect was so strong that it had resulted in nearly all offices being located in positions where they had good or very good rail-based public transport accessibility: hence an empirical comparison with offices without good public transport was nearly impossible. Thus the result is a paradoxical one – the effect of public transport access on office property values seems very much bigger than for housing, but the research evidence is weaker.

- **increase of the value of retailing**

Even more difficult to prove is a price premium for retailing although nearly everybody we interviewed agreed that such a premium exists. It is important to distinguish between retailing located in places where public transport is essential, like the city centre as against the mall-type developments, following the American model of urban development, where the car is by far the dominant mode. In the past it has

been assumed that public transport is almost irrelevant to the latter, though this assumption could be challenged.

- **time savings**

Social cost benefit analyses of the value of transport investments are often dominated by the estimated value of the time savings made by travelling faster. It is this that has been used to justify public expenditure on transport infrastructure. However, extending the impacts to property values is not entirely straightforward. The economic theory of location suggests that property values will be influenced by time taken to travel, in general and specifically to dominant destinations e.g. to the centre of the city. (Hence there is expected to be a 'rent gradient', with lower property values further from the centre, and residents trade-off between accessibility and space). If a new transport facility saves time, there will be a higher price premium of housing. By a similar argument, offices or shops which are provided with better public transport facilities will have access to a larger pool of employees or consumers, with resulting lower costs or higher revenues which again will feed through into their property prices.

The problem then is that, over time, the operation of the property market captures the value of the time saving or accessibility from the commuters or companies who initially benefit from it, and transfers it to the landowners in the form of higher prices. The next generation of commuters still travels faster, but has to pay for this in the form of higher rents or house prices, eroding much or all of the benefit to them. There is then *less* possibility of capturing the value of the time savings from the travellers, by higher fares, and land value becomes more important as a source of funding. This is a powerful argument against the possibility of raising all the necessary funds through increases in fares, since the benefits that would have made this possible (time savings, proximity to stations etc) have already been partly transferred to the landowner through the property market.

One research study, on Helsinki's Metro, shows this effect very clearly. It also revealed that there was a reduction in house prices on feeder bus routes (because here travel time increased). Hence the gain for the people living close to a station has to be reduced by the loss of the people living on feeder bus routes.

This raises wider questions of benefit. The time saving factor may only occur at specific locations, and in any case a 'small' average time saving may be less important than a frequent and reliable service.

- **specific lessons from each of the case study cities**

Every city is subject to its own and its country's legal framework, property rights, planning controls, and the political strengths and influence of different groups and individuals. Since these are different in every place, different methods have been used to try to capture some of the potential funding available in property prices, and these rarely, perhaps never, exactly fit into a pure economic model. They usually involve the sale of some land to developers, trading off permits to develop, taxes on sites or land values or profit on the development, or setting up new multi-interest agencies in which each party contributes some negotiated proportion of the total cost.

Some general problems appear, including

- different time perspectives and uncertainty about future market conditions
- influences of fashion or illusion, for example in the relative importance of housing and office development
- conflicts between one-off deals (typical of initial land sales) versus continual revenue flows (typical of tax systems)
- imbalance of power or expertise between public and private agencies.

How these have appeared and been handled in each of the case study areas is summarised as follows.

Land sale was part of the financing deal for the new automatic Metro in **Copenhagen,** and is thought to show potential long run success, but in the short run over-optimistic assumptions were made (probably due to ignoring the importance of other more favourable locations for offices), with expectations that with the opening of the Metro, land prices would double: in reality only a small increase occurred. This illustrates a difficulty that developers often require a commercial payback within a much shorter period, say five years or so, than the 30 years or more which transport planning normally considers suitable.

Helsinki has a well-established case of land value increase. Nearly all stations showed a significant increase in new housing at high density or new highly concentrated retailing and office developments. Even so there has so far been no attempt to capture the land value for the planned western extension.

Munich has practised land value taxation for new housing developments during the last 10 years. The surplus value gain for the city can however not be used for public transport investment and the gain declines in period of economic weakness. Building land located at suburban railway stations show a distinct difference in price levels compared to building land without public transport access. The main reasons for not using this tax is that most of the public transport funding is provided by federal and especially regional government. One should bear in mind that Bavaria is one of the richest regions in Germany and Munich, as the capital, will always get preferential funding. There has been so far not shortage of funding.

Greater London has no financial mechanism to be able to invest as a city even in a medium scale project. Only the Central Government has the financial and legal powers to promote public transport investment. Development gains by way of Section 106 do normally not generate large amounts of funds for public transport. The yield produced from congestion charging is about €100million annually. This is not high considering the infrastructure needs in London.

In **Madrid**, it was emphasised by some developers that there is a legal barrier to raising funds for public transport, since this is a government responsibility. However in reality this assertion is not completely correct; and for the extension of the Metro Line 1 to *Vallecas,* 37% (€24 million) of the infrastructure cost will be paid for by private developers.

When a large office, residential and/or commercial development is planned in the **Ile-de-France (Paris)**, land sales and development is organised by a State Agency, which is specifically formed for this purpose. However such policy is rather exceptional both in geographical and political terms. Most of areas are located in the Ile-de-France and they were part of the new town development programme of the 1960s.

Overall the State is the great beneficiary and other agencies (region, local authorities) benefit to a lesser extent.

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Appendix A:

Literature Review according to authors in alphabetical order

Author	Title	Year	Comments
Anas, A.	Capitalization of Urban Travel Improvements into Residential and Commercial Real Estate: Simulations with a Unified Model of Housing, Travel Mode and Shopping Choices	1995	
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North Central Texas Council of Governments	*Before and After Assessment of the DART Light Rail Starter System*	2001	
Parsons and Brinckerhoff	*The effect of rail transit on property values: a summary of studies*	2001	
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Richmond, J.	Simplicity and complexity in design for transportation systems and urban forms	1998a	
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Appendix B

Analysis of land valuation with references to the opening of new Metro stations in Munich[2]

- Methodology

The city of Munich produces a report on the real property market every 2 years. These reports are of special interest for the construction economy, banks, insurance companies, the public sector and estate agents. The reports are legally required and have had to be produced in all German cities since 1960. The authors of the reports are experts in the field of estate agency, construction industry and banking. Attached to the reports are detailed maps of the city including land price information, irrespective of whether it is built on or not, and the permitted size of floorspace.[3] The basis of a report are all the actual transactions of construction land (not housing or offices) during the last 2 years. For instance in 1998 and 1999 there were about 27,513 transactions.

For this research we have used the data on the opening of the various Metro lines or line extensions. This way one could create a 'before' and 'after' situation. For instance the opening of the Metro line was in 1996; for the 'before' study the land valuation transaction for 1990 were used, and for the 'after' study the data were for 1998. One has to be aware that Munich started to build Metro lines back in the 1965 and the first sections which opened were in the city centre or close to it where land values were already exceptionally high. At some stations we could not find comparable data

We studied the land valuation maps in Munich between 1980 and 1990 but did not find any significant land prices differences. The average land price difference during

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[2] Bodenrichtwert = land valuation with reference to its location

[3] The GFZ = Die Geschossflächenzahl gibt an, wieviele Quadratmeter Geschossfläche je Quadratmeter Grundstücksfläche zulässig sind (z. B.: Grundstück: 1000qm → GFZ 2 = 2000qm bebaute Fläche zulässig. GFZ 0.6 = 600qm bebaute Fläche zulässig.) = is the size of the building one can build on the land; for instance if the size of the land is 1000sqm and the GFZ is 2 that means the total floorspace one is allowed to is 2000sqm.

the period 1980-90 was high with 107% over the 10 year period. It increased strongest between 1985 – 1990 as can be seen from Table 6. This compared to the land prices between 1990 and 1998 where the average land price difference was only +3.7%. We have subtracted the average percentage rise from the local land price increase to obtain an increase relative to the market as a whole.

Table 8: Average price increase for building land since 1980 in München:

Year	Index
1980	100
1985	130.2
1990	206.6
1998	214.2
2000	220.6
2001	237.2
2003	225.3

Source: Gutachterausschuss (1999) Der Immobilienmarkt in München, Jahresbericht 1999, München, p14.

Official calculation when site for housing is comparable but has a different density:

GFZ	Umrechnungsfaktor (factor to use for the same price)
0.30	0.500
0.40	0.535
0.50	0.587
0.60	0.654
0.70	0.730
0.80	0.814

Example: the price is €600/ sqm official allowed density is 0.5
Comparable site has a density is higher 0.7. What would be the cost ? Answer €746/sqm.
(€600 x 0.730 divided 0.587 = about €746).

Source : Bodenrichtwerte für den Landkreis München zum 31.12.2002/01.01.2003 Gutachterausschuß für die Ermittlung von Grundstückswerten im LandkreisMünchen.

- Findings – have to be studied with caution

Line U1 – South: from Kolumbusplatz – Mangfallplatz: We studied the area around the U-station in a radius between 200 – 500 m. This line opened in 1997.

Table 9: Price Premiums at Metro Station Mangfallplatz: 1990 and 1998

Year	Metro station: Mangfallplatz	Price	Max Floorspace Density*
1990	Mangfallplatz, around the end stop	DM 1500	1
1990	Housing area	DM 1520	0.6
1990	Along the Metro line direction north-east (still unbuilt)	DM 1500	1
Year	Metro station: Mangfallplatz	Price	Max Floorspace Density*
1998	Mangfallplatz, around the end stop	DM 1700	1
1998	Housing area	DM 1500	0.6
1998	Along the Metro line direction north-east	DM 1500	1

* GFZ: Maximum permitted sqm of floorspace per sqm of land area

Premium land next to the underground station increased between 1990-98 by about 10% relative to the market average (13.3% minus 3.7%); the prices for the other land in this area stayed more or less the same.

Next station : Wettersteinplatz:

We find here that the maximum floorspace density increases from 0.35 - 0.5 and from 1.3 - 1.5. The price increases ranged between 13.3 – 14.3% (17-18% minus 3.7%), but the density was changed and we can not compare the prices. However in one housing block the density stayed the same and there was a price increase of about 18%. (22% -3.7%) .

Next station : Candidplatz:

In 1990 there were no prices given for Candidplatz, it was marked as an area for industry and trade. In 1998, prices directly around the underground station were DM 2,200 and a density of 1.7. The area directly around the underground station had become a high quality property market with offices and retailing. Hence the new underground station has increased the status of the land.

Two other housing areas around the underground station increased from:

1990	DM 2800 / 2 DM 1550 / 0.8
1998	DM 3200 / 2 DM 2300 / 1.5

The increase of same plot of land and same level of construction was 10.5% relative to the average rise of 14.2% (-3.7%). The same increase can be seen on the opposite blocks of land.

Next station : Kolumbusplatz:

In the housing area next to underground station, land prices declined between 1990 and 1998 by 10.8% (-7.1% -3.2%), the other areas showed no price change. South of the underground station there was a slight increase of about 0-2.1% .

1990	DM 4200 / 2.5
1998	DM 3900/ 2.5

B) Line U2 North: from Dülferstraße – Feldmoching opened in October 1996

Station Feldmoching – end stop

Table 10: Price Premiums at Metro Station Feldmorching: 1990 and 1998

Feldmorching	**1990**	**1998**
Mixed use – direct next to station	No price	DM 1800 / 1.2
Housing direct next to station	No price	DM 1500 / 1.0
300-500m distance		
Housing	850/0.35 and 970/05	DM 1050 / 0.5
Housing	800/0.35 and 910/0.35	DM 1050 / 0.5

In 1990 the area was different, there was already a suburban railway station close by, and nearly all of it was housing. The densities around the underground station and in the housing areas have been increased in 1998 compared to 1990.
Price increase: 11.7 % (15.4% - 3.7%)

Next stations: Hasenberg and **Dülferstraße** which are 2 underground stations located in the same housing area:
Table 11: Price Premiums at Metro Station Hasenberg and Dülferstrasse: 1990 and 1998

1990	
Wohngebiet	DM 1200 / 1.0
Wohngebiet	DM 870 / 0.35
1998	
Distance 200-500m	
Wohngebiet	DM 1500 / 1.0
Wohngebiet	DM 1150 / 0.6

Price Increase: 21.3% relative to average(25% - 3.7%)

We see that, apart from the Kolumbusplatz area (where some negative property market development must have deflated the prices), all the areas adjacent to U-Bahn

stations had significant price increases. There were 5 sub-areas examined, with land price rises ranging from 10-21% above the 3.7% average for land prices as a whole. In most cases the maximum permitted development density remained stable over the 1990-98 period for which we examined the land price maps. Where there was a permitted development density change (in sqm floorspace / sqm land), it took the form of an increase. Although this is a small sample, it provides further evidence of land price rises above the average, associated with Metro access.

However we checked our findings with some of the staff of the Gutacherausschuß and they were of the opinion that in the city of Munich differences in the price level of land may occasionally be the result of the underground opening but could as well be the result of other factors.