EMTA BAROMETER OF PUBLIC TRANSPORT IN THE EUROPEAN METROPOLITAN AREAS

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Background

The association of European Metropolitan Transport Authorities (EMTA) is an association of public institutions in charge of the public transport systems in the main European metropolitan areas. A total of 26 institutions, from 26 metropolitan areas and 19 countries, are currently members of EMTA.

The EMTA Barometer has been designed as a means to provide information on the public transport systems in those cities, thus permitting comparisons and setting a basis for benchmarking exercises for the EMTA members, and the public at large.

Data included in this first version of the EMTA Barometer refer to year 2000. It is expected that data will be updated and further harmonised in future versions.

The information included in the EMTA Barometer refer to 3 main areas:

- Basic facts of the metropolitan area as population, surface, density, modal split, ...
- Public transport system data in three areas: supply, demand and quality.
- Financial data related to fares, revenues and expenditures, coverage and investments.

This brochure includes data about the following fifteen cities: Athens, Barcelona, Bilbao, Brussels, Helsinki, London, Madrid, Manchester, Paris, Prague, Seville, Stockholm, Vienna, Vilnius and Zurich. Other EMTA cities are expected to be joining this Barometer in the future.

The figures presented in this brochure are only a fraction of those provided by cities. In particular, this information refers to the whole metropolitan area, whereas cities provided information separately for the city centre and the metropolitan ring.

This report was developed under the direction of Mr. Carlos Cristóbal-Pinto, Head of Studies and Planning Department of the Consorcio Regional de Transportes de Madrid (Madrid Public Transport Authority), with the collaboration of BB&J Consult and the Transport Department of Madrid Polytechnic University (UPM). Copies of this brochure or detailed information can be requested to the EMTA Secretariat:

Mr Stéphane Lecler
Secretary General of EMTA
11, avenue de Villars
75007 Paris (FRANCE)
Tel: +33-1 4753 2898
Fax: +33-1 4705 1105
e-mail: emta@emta.com
web: www.emta.com

1. Basic facts about the EMTA metropolitan areas

1.1 Basic data of metropolitan areas

	Population (inhabitants)	Total Surface (km^2)	Built Surface (%)	Motorisation Rate (cars/1000 inh)	GDP per capita (EUR)
Athens	3,700,000	1,450	38	330	10,935
Barcelona	4,339,593	3,236	17	443	17,793
Bilbao	1,140,000	2,117		376	15,142
Brussels	1,850,000	1,362	84	434	24,400
Helsinki	957,000	764	29	360	33,300
London	7,285,000	1,574	68	333	27,200
Madrid	5,022,290	8,028	11	357	17,771
Manchester	2,585,700	1,272		446	
Paris	10,952,000	12,070	20	451	35,946
Prague	1,635,046	3,326		470	5,430
Seville	1,092,542	1,387		366	12,900
Stockholm	1,823,000	6,500		380	
Vienna	2,602,000	8,841	73	430	24,356
Vilnius	534,000	401		292	3,489
Zurich	1,270,000	1,834		483	55,742

The population of the metropolitan areas included in the EMTA Barometer ranges from slightly more than half million (Vilnius) to more than 10 million inhabitants (Paris). Data of population are relative to administrative limits and are not based in functional areas. In some cases, the functional metropolitan area extents over the administrative limits considered in the data reported (Barcelona, Brussels, London) while others are slightly smaller (Madrid, Paris).

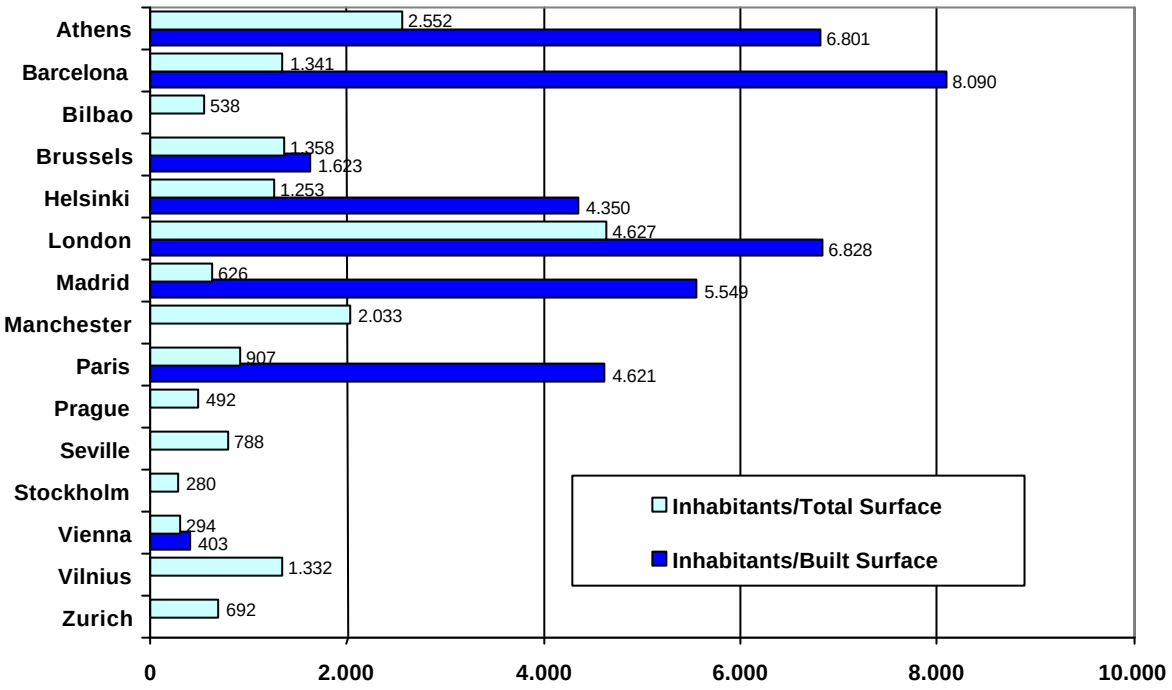
Total surface gives a general idea of the total area that has to be covered by the public transport system. Built surface only includes urbanised areas within the administrative boundaries. Both figures may help to understand other indicators. For some cities, both figures are similar (thus indicating that most of its territory has been urbanised: Brussels, London and/or that not the whole of the functional metropolitan area is included in the figures provided), while for others the built surface is only a small percentage of the total surface, suggesting that the administrative boundaries include large non-urban areas, with only weak functional links with the metropolitan system (Paris, Madrid).

Motorisation rates lack harmonisation among cities, as registration records are not equally updated in the different countries, and there are many other factors to consider: e.g. company cars are usually registered in capital cities, in some countries, even if they finally operate in other cities; the concept of "car" may include or not some categories (family vans, off-road vehicles...). Also the origin of the data gives different motorisation rates, for example Madrid has a motorisation rate of 357 according to household survey and a rate of 536 according to statistical sources. In any case, motorisation rates are well over 300 in all the EMTA cities, with the sole exception of Vilnius.

Interestingly, there seems not to be a clear relationship between GDP per capita and motorization rates. This suggests that, over a certain level of income, the number of cars can not be taken any longer as a symbol of prosperity, but are rather explained by a more complex set of variables.

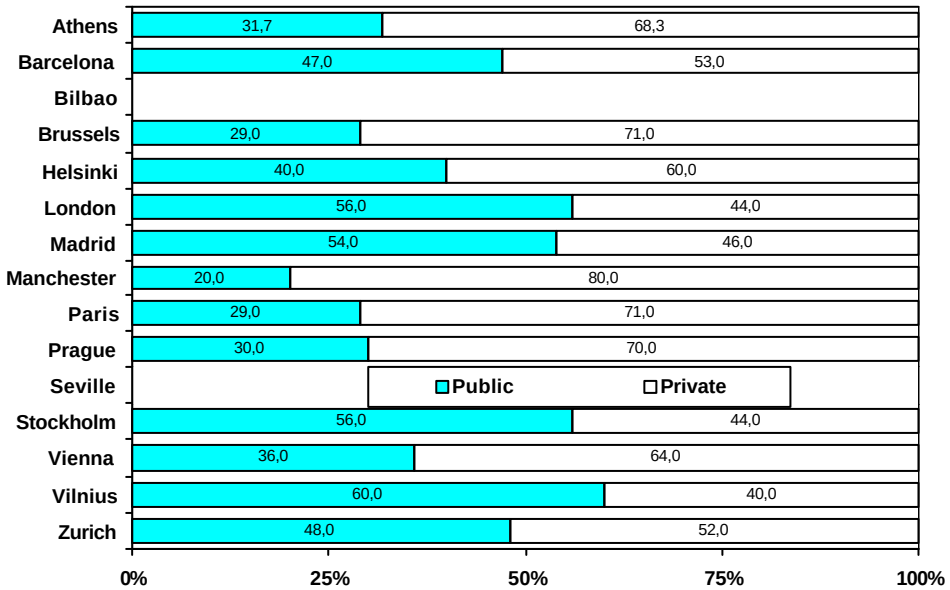
1.2 Population density

Whereas high densities (and particularly high built densities) may be more convenient for providing good public transport services at affordable costs, low densities may impose either, more difficult and costly operations for the public transport system or the development of a dual system, with good public transport systems in the more densely populated areas and poor service in the remaining, sparsely populated zones of the administrative area. The metropolitan areas of Barcelona, Athens and London show particularly high built densities, whereas Madrid and Paris combine high built densities with low total densities.



1.3 Modal split of motorised transport

High public transport shares are the result of many complex and interrelated parameters, including land use patterns, income, etc, besides transport policies. Cities with the highest public transport shares (Vilnius, London, Madrid, Zurich, Helsinki) probably combine well developed public transport systems with rather centralised land use patterns and significant densities. It is worth mentioning that, according to figures from Prague, modal split in Eastern Europe is no longer much different from Western patterns.



2. Description of the public transport system

2.1 Public Transport Supply

2.1.1 Characteristics of public transport supply: bus and taxi (whole metropolitan area)

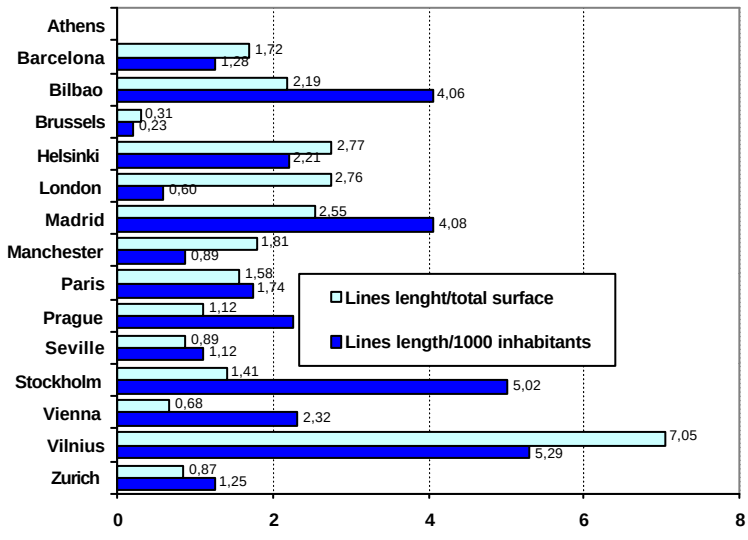
	Urban Bus				Metropolitan Bus				Taxi
	Lines length (km)	Stops network	Avg. Age Vehicles (Years)	Nb. Operators	Lines length (km)	Stops Network	Avg.Age Vehicles (Years)	Nb. Operators	Number/ 1000 inh
Athens			4	2					4.4
Barcelona	1,305	2,799	7	31	4,245	1,082	10	45	2.6
Bilbao	303	400	9	1	4,324	(1)2,209	6	5	1.1
Brussels	(2)421	2,194	6	(4)1	240		15	2	
Helsinki	2,114	4,930	5	10				-	9.9
London	-	4,062		-	(3)4,339	13,718		(3)39	2.6
Madrid	2,995	3,500	6	1	17,483	6,100	5	33	3.2
Manchester	(5)2,300	6,200		50				-	0.6
Paris	(5)581	1,836	7	1	18,524	24,178		97	1.5
Prague	1,894	2,252	6	12	1,818	1,227	7	10	
Seville	1,229			16				-	2.1
Stockholm					(3,5)9,153	(3)5,329		3	
Vienna	623	3,137		-	5,431			(3)13	0.6
Vilnius	(6)2,826		11	-				1	
Zurich	1,591	1,889	9	14				-	

(1) Only Bizkaibus (without ET Bus)
(2) Only local bus
(3) Urban + metropolitan
(4) Same operator as Metro and Streetcar
(5) Network length
(6) With private bus and microbus

Bus services are characterised by lines length (i.e. sum of length of all the lines, considering overlapping of different lines), number of network stops (those used by more than one line are considered once), number of operators, and the average age of vehicles, for the few cities providing this figure. Metropolitan bus networks are well developed in Paris and Madrid. The number of taxis per 1.000 inhabitants is particularly high in Helsinki, and low in Bilbao, Manchester and Vienna.

2.1.2 Bus (urban+metropolitan) lines density

Bus-line densities give an idea of territorial coverage and access of the population to bus services. According to this, buses are a key element of the public transport system, in many cities, offering an extensive coverage of the territory particularly in Helsinki, London, Madrid and Bilbao, with more than 2 km of bus lines per km^2. Compared to their population, Bilbao and Madrid benefit from the highest level of bus services, with more than 4 km of bus lines per 1000 inhabitants, followed by Helsinki, Vienna and Prague (figures in Vilnius include private bus services, and therefore are not comparable to those of other cities).



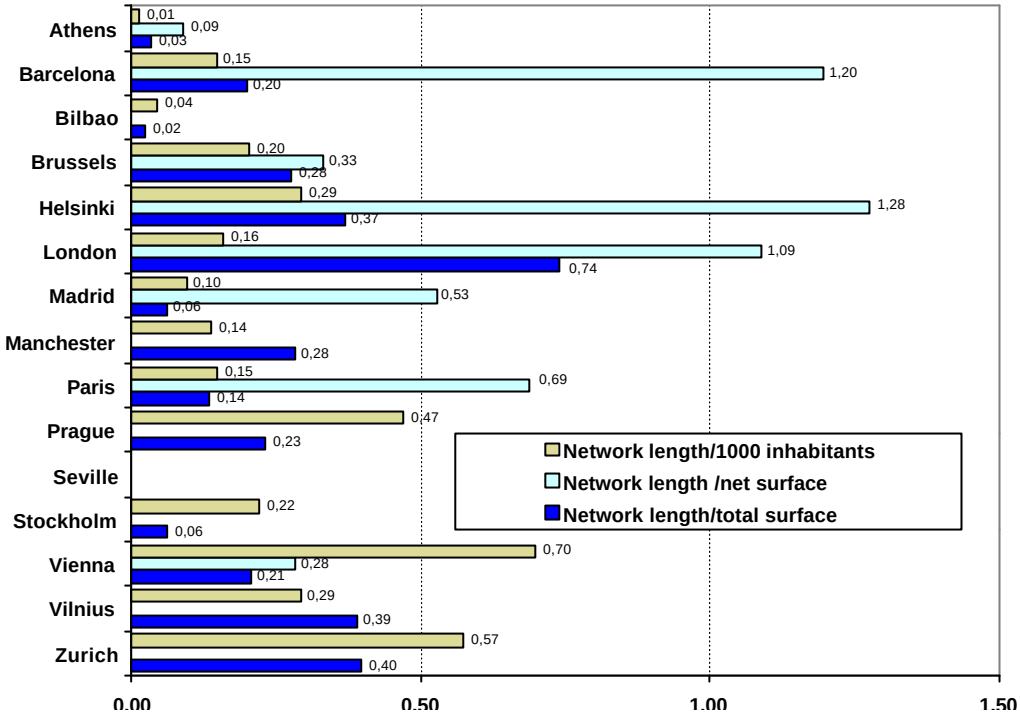
(*) Only local bus (**) Network length (***) Private bus and microbus included

2.1.3 Characteristics of Public Transport Supply: rail modes

Network length, network number of stops and average age of vehicles are used to characterize public transport supply for rail modes. London benefits from the largest metro system, followed at some distance by Paris and Madrid. Commuter rail systems in Paris and Vienna are particularly extensive, being London the third one. Tram systems are well developed in Central and Eastern European cities (Vienna, Vilnius, Prague and Brussels).

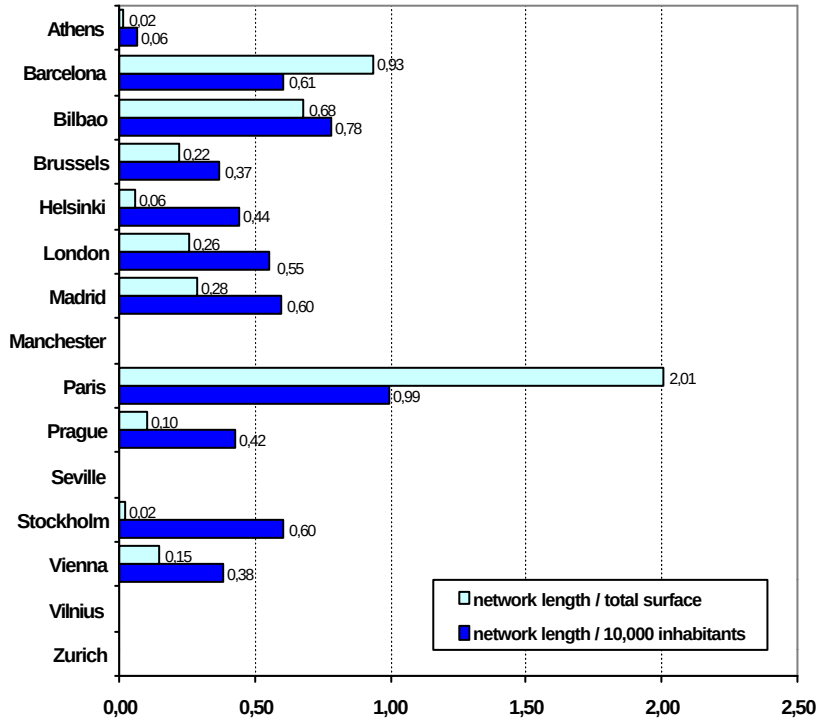
	Metro			Commuter Rail			Tram, Light Rail & Trolleybus		
	Network length	Stops-Network	Avg. Age Veh	Network length	Stops-Network	Avg. Age Veh	Network length	Stops-Network	Avg Age Veh
Athens	23		2				26		12
Barcelona	91	125	17	551	157	8			
Bilbao	28	27	5	23	19	7			
Brussels	35	64	15	210	100	30	131	2,194	28
Helsinki	42	16		163	32		76	240	
London	402	273		707	322		53	72	
Madrid	171	156	13	308	91	7			
Manchester				319	98		39	36	7
Paris	211	297	21	1,401	462	16	20		4
Prague	50	51	16	582	190		136	623	19
Seville									
Stockholm	110	100	17	186	48		107	93	
Vienna	61	86		1,156			183	1,133	
Vilnius							156		12
Zurich				660	176	13	69	164	26

2.1.4 Density of rail lines



Central European cities (Vienna, Zurich and Prague) enjoy particularly large rail networks compared to their respective populations, mainly due to their commuter rail networks. Compared to the total surface served, London is the metropolitan area with the highest rail network density, followed by Vilnius, Zurich and Helsinki. However, compared to built surface, Helsinki, Barcelona and London have the highest densities.

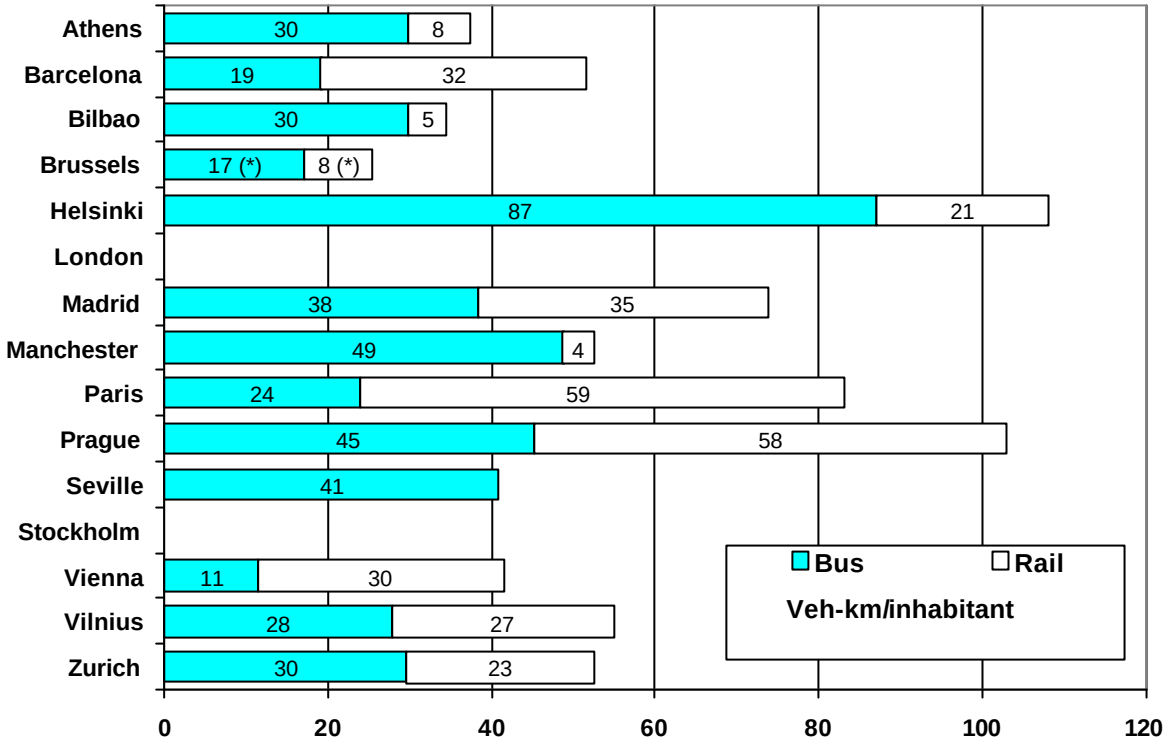
2.1.5 Density of metro networks in city centre



For all cities, except Athens, Helsinki, and Stockholm, the surface and the population of the city centre (without the metropolitan ring) have been considered.

Densities of metro networks in the city centre offer a closer look at the metro system, underlining the importance of this transport mode in the more populated metropolitan areas, particularly in Paris.

2.1.6 Public Transport (bus and rail) supply



(*) Brussels: Suburban bus & suburban rail not included.

Those four metropolitan areas with highest public transport supply per capita respond to very different characteristics: Helsinki offers quite extensive bus services, probably serving a sprawled population; Prague keeps very significant rail (mainly tram) services (probably to a large extent inherited from a past in which private transport was marginal); Paris has extensive rail (commuter rail and metro) supply to serve a large population in a broad region; and public transport services in Madrid have to attend both, high demand in a dense urban core, and radial trips from a large region to the centre, both by rail and bus services. Rail modes are more relevant in cities with extensive metro services (many of which have been operating for many decades, like Paris) or with a dense and important tram network (Prague).

2.2 Public Transport Demand

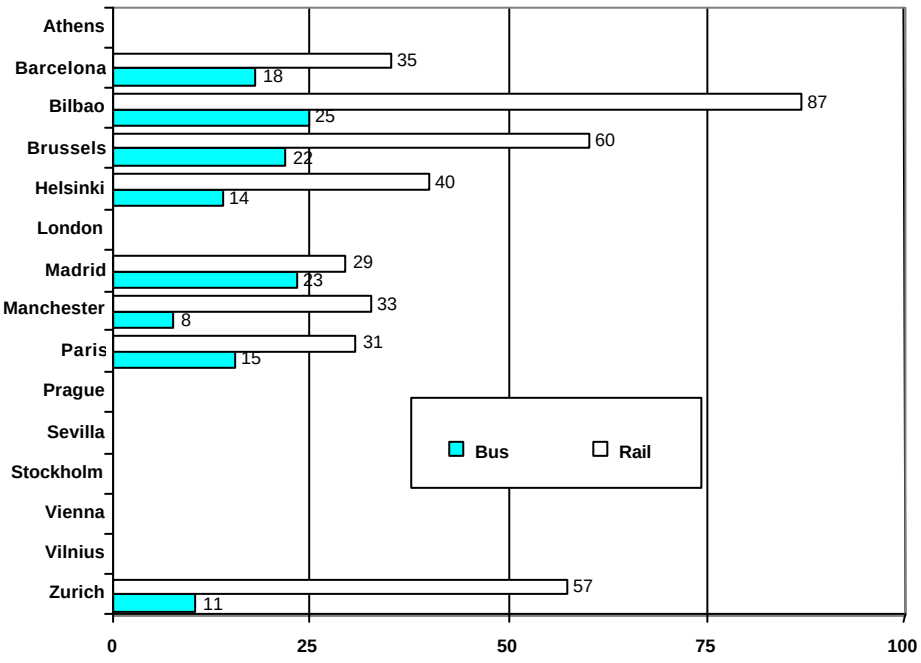
2.2.1 Public Transport demand. Aggregated figures for the whole metropolitan area

	Bus		Rail (metro+train+light)	
	trips/year (millions)	passenger-km (millions)	trips/year (millions)	passenger-km (millions)
Athens				
Barcelona	298	1,494	450	4.928
Bilbao	36	840	56(1)	457(2)
Brussels	58(3)	437(3)	165	930
Helsinki	150	1.165	95	813
London	531	1.896	987	7,636
Madrid	801	4,454	686	5,240
Manchester	200	985	27	310
Paris	1,155	4,203	2,228	19,835
Prague				
Seville	135			
Stockholm		1,499		2,870
Vienna	164		691	
Vilnius			612	
Zurich		400		1,678

(1) Only FFVF (without FT Train, RENFE)(2) Only FT Train + FFVF (without RENFE) (3) Only local bus

The number of public transport trips and passenger-km per year for both, bus and rail modes, is particularly high in Paris, followed at some distance by London, Madrid or Barcelona. Not surprisingly, rail modes are usually showing higher passenger-km figures than bus modes (as they provide for longer trips). Madrid shows a particularly high bus performance, due to its extensive metropolitan bus network.

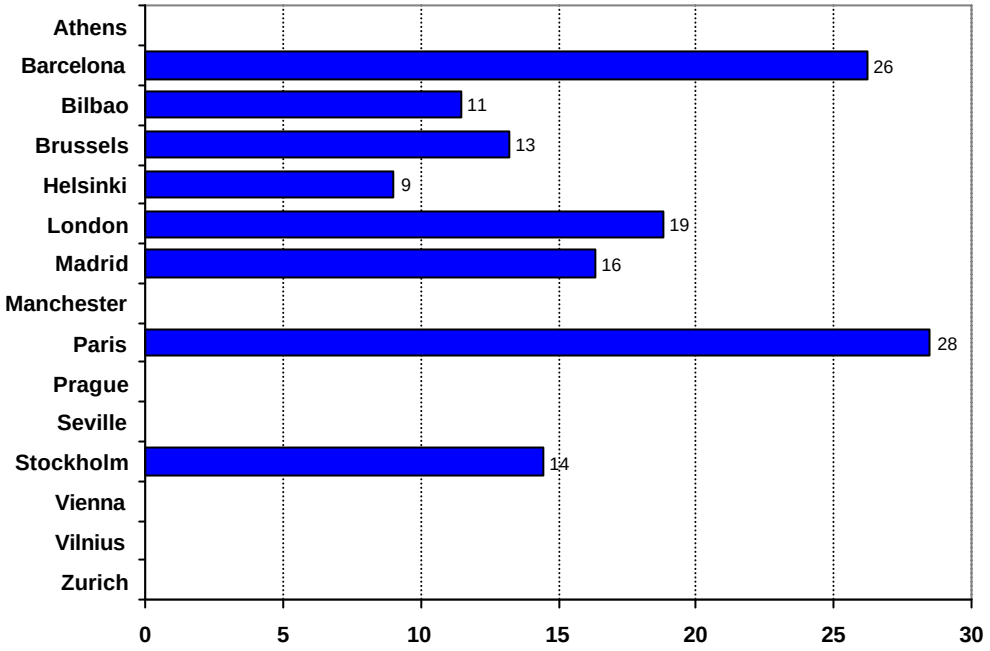
2.2.2 Demand-Supply adjustment



Note: Paris, only urban bus.

This ratio (passenger-km/veh-km) is a proxy of the average occupancy rate by mode. In some cities, a reduced number of metro or commuter rail services become the backbone of the whole public transport system, showing high occupancy figures for those services (Bilbao, Brussels, Zurich). High bus occupancy rates may indicate a certain lack of alternative, quicker and more comfortable modes. For urban buses, occupancy rates are generally low, thus reflecting the traditional context and problems of these services (low commercial speeds, buses giving accessibility to places with low demand...). Differences in rail occupancies are probably due to the fact that some cities are considering trains while reporting their vehicles-km, whereas others provide figures by wagon.

2.2.3 Metro use per kilometer of network

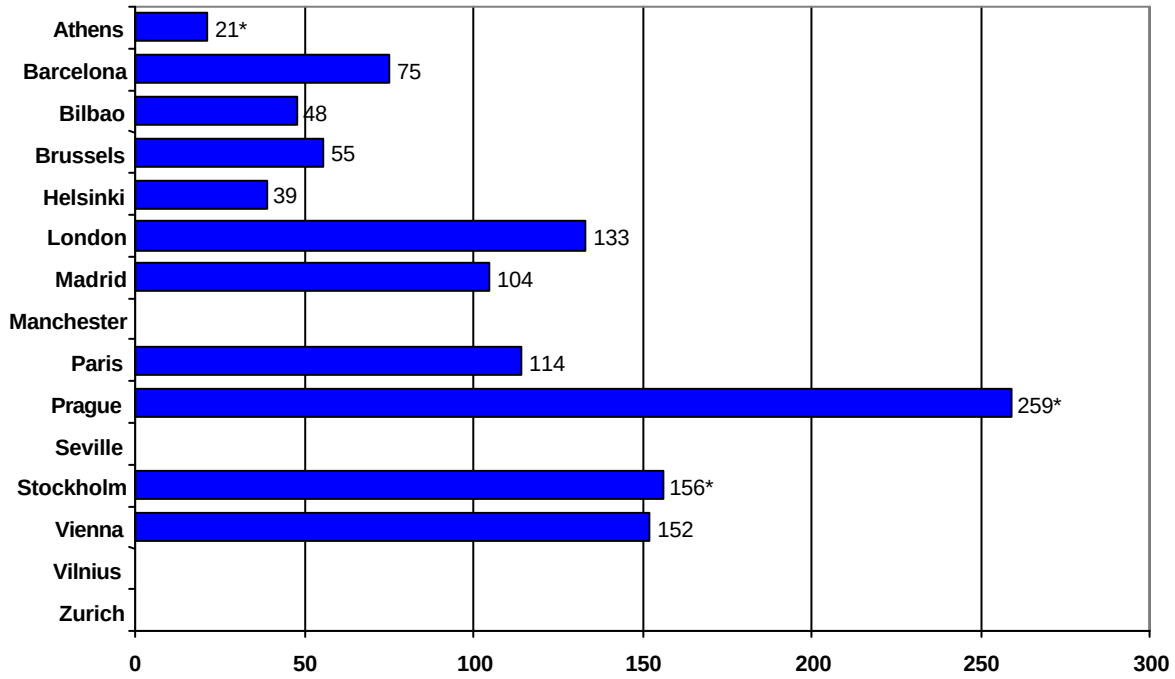


Metro: passenger-km/network length (millions/km)

This indicator (Mio.pass-km/km network) is quite high in Paris and Barcelona, with ratios of more than 25 Mio passenger-km per km of network, followed at some distance by London and the other cities.

2.2.4 Metro use per inhabitant

The citizens of Prague, Vienna and Stockholm are those making a more extensive use of the metro network, more than 150 trips per year per inhabitant, although in some cases the ratio is measured by stages. Other cities as London, Paris and Madrid have more than 100 trips per year per inhabitant.



(*) Number of stages-year instead of trips-year

2.3 Quality of public transport supply

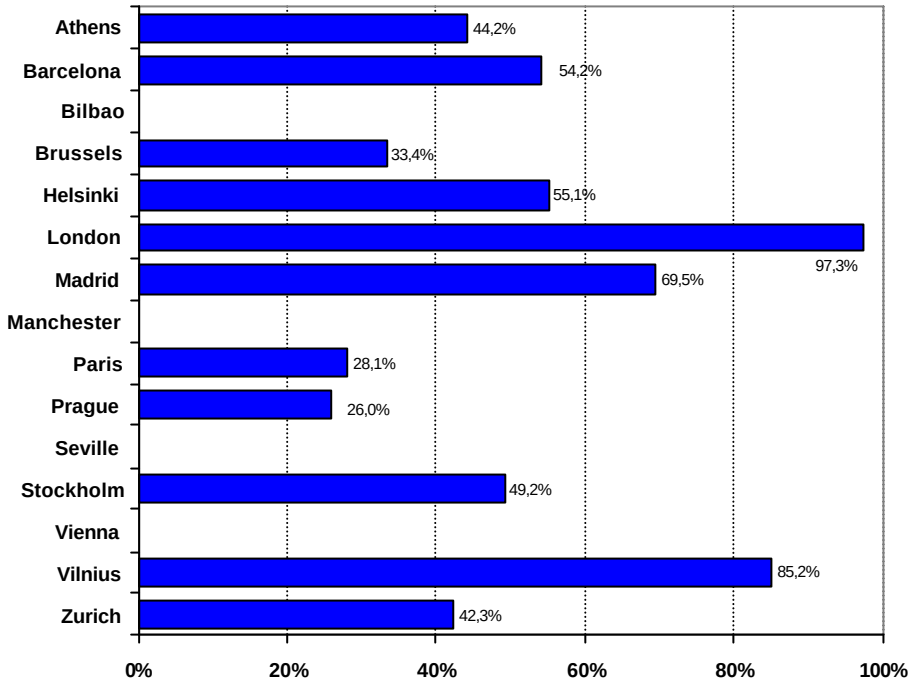
	QUALITY INDICATORS									
	Commercial Speed (km/h)					Bus lane length	Vehicles equipped for PMR	Electric Urban Buses	GNV Urban Buses	Low emission fuel Urban buses
	Urban Bus	Met. Bus	Metro	Commuter rail	Tram& Light rail	(km)	(%)	(%)	(%)	(%)
Athens	14		36		30	16	6.5%	4.4%	13.1%	4.0%
Barcelona	12	30	28	50		(2)76	(1)39.0%		3.3%	
Bilbao	11	28	35	39			(3)43.2%	0.0%	(4)2%	(5)16%
Brussels	18		29		17	67	(6)4.2%	0.0%	(7)3.5%	0
Helsinki						96		0.0%		
London										
Madrid	15	25	25	54		94	(8)45.0%	1.0%	2.8%	3.7%
Manchester	19			40	35					
Paris	13		27	45		366	(9)32.0%	0.2%	2%	4.4%
Prague	17	20	36		19		(10)11.0%			18,1%
Sevilla	13									
Stockholm							(10)46.7%			(2)50.0%
Vienna	18	31			15	(2)620			42.5%	0.1%
Vilnius										
Zurich	21			56	15		(2)9.3%	17.6%		12.7%

(1) Metro, urban bus and metropolitan bus
(2) Urban buses
(3) RENFE not included
(4) Only Bilbobus
(5) Bizkaibus + Bilbobus
(6) Metro+Streetcar+Urban bus
(7) Only urban bus
(8) Metro no considered
(9) Without metropolitan bus
(10) Metro+tram+urban bus

Average commercial speeds may be misleading, as they are not limited to the peak periods, when congestion may affect bus services in those cities with few or poorly enforced reserved bus lanes. Although guided modes are generally the only ones that offer commercial speeds above 25 km/h, metropolitan buses are extremely efficient in many cities, with speeds in the range of 20 km/h (Prague) to 30 km/h (Barcelona). Many cities already offer a percentage of vehicles equipped for PMR (Bilbao, Madrid, Stockholm) close to half of the total. Most of the cities have developed an extensive network of bus lanes. The introduction of environmentally-friendly technologies (electric, GNV, low emission, i.e. at least complying with Euro III standards) appears to be slow in most cities; Vienna is the city with the highest percentage of GNV buses, whereas half of the urban bus fleet in Stockholm complies with low-emission standards.

3. Financial aspects

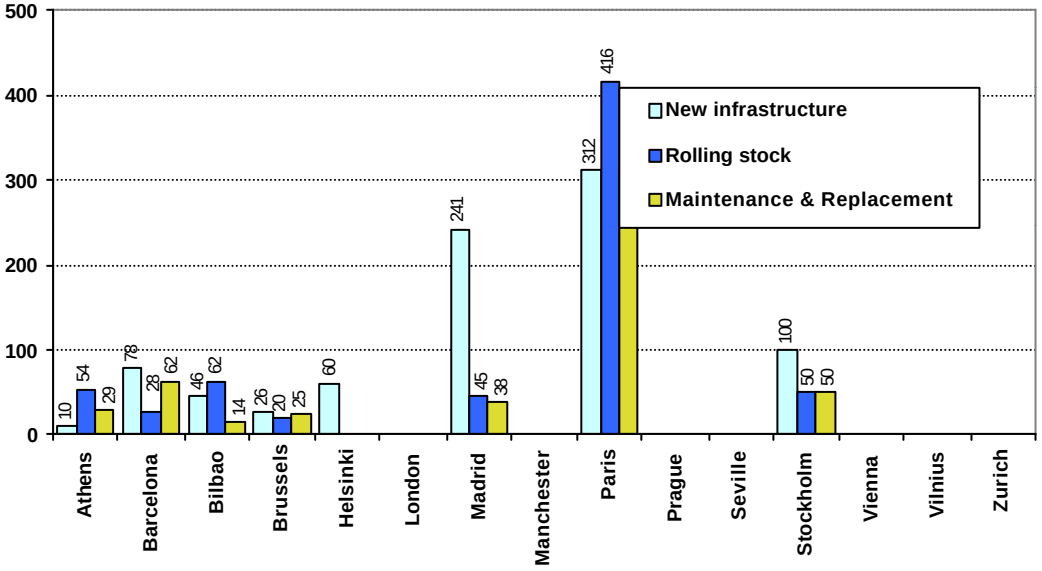
3.1 Coverage of operational costs of public transport system



Operational cost coverage vary widely, although it falls within the 40%-55% range for most cities, with a few exceptions: higher coverage rates are reported by London (showing figures close to full coverage, as subsidies are partially considered as revenues), and Madrid (where commuter trains have not been included, as subsidies to this mode are reported as revenues by the railway company). The lowest rates are reported by Prague, Paris and Brussels, with heavily subsidised systems.

3.2 Investments (in million Euro)

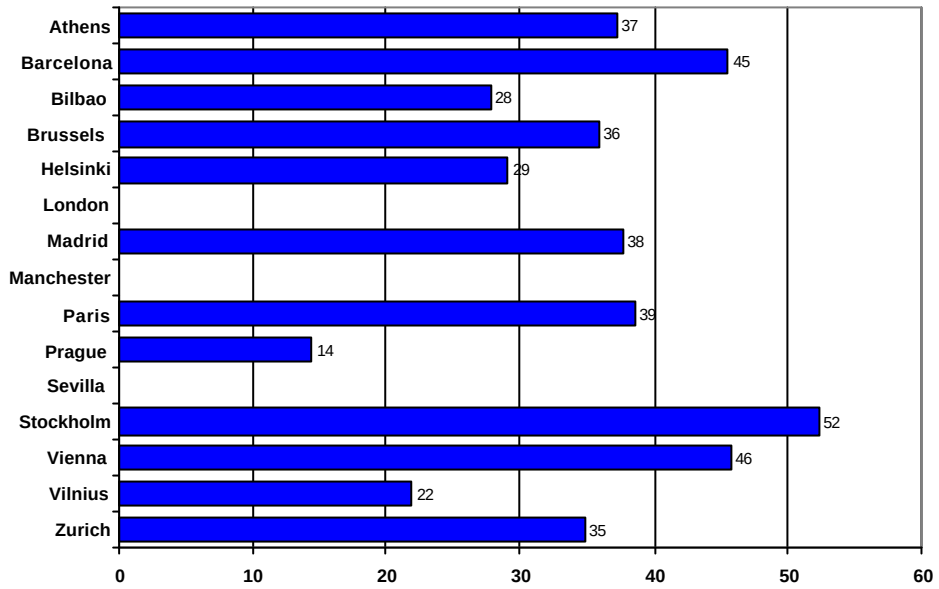
Data suggest that the era of huge infrastructure investments in public transport is over in most European cities, with the remarkable exceptions of Paris and Madrid. Depending on their respective context, cities give priority to new infrastructure, rolling stock or maintenance, but most of them keep a certain balance between these three areas. It is also worth noting that investments in Madrid have been dedicated almost exclusively to metro infrastructure in the 1996-2000 period.



In Madrid, investment in new infrastructure only considers the metro system

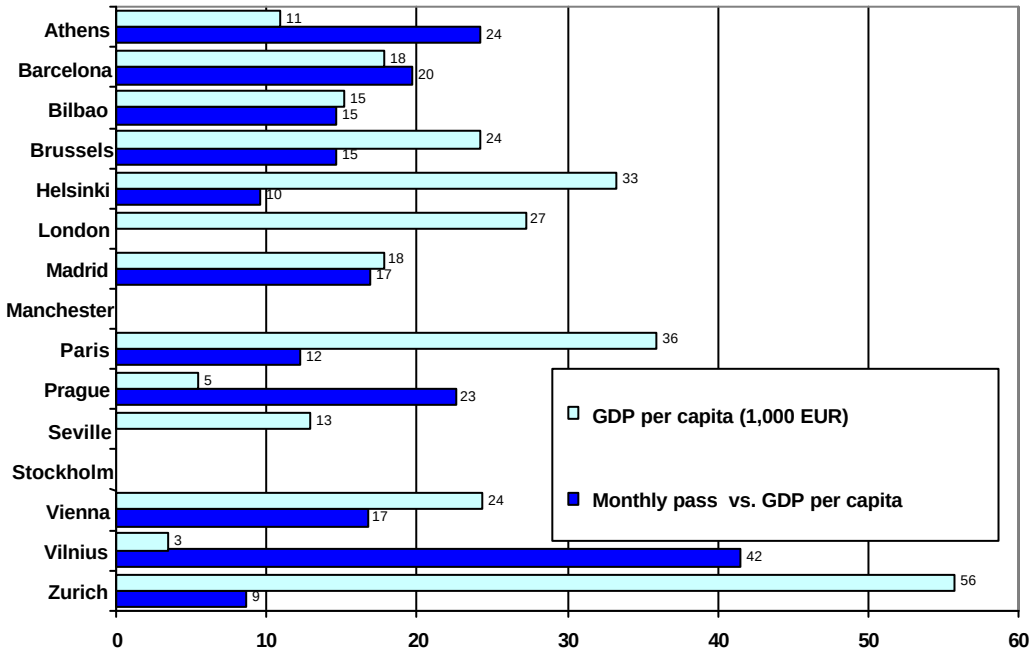
3.3 Fares and financial policy

3.3.1 Public transport price compared to petrol price



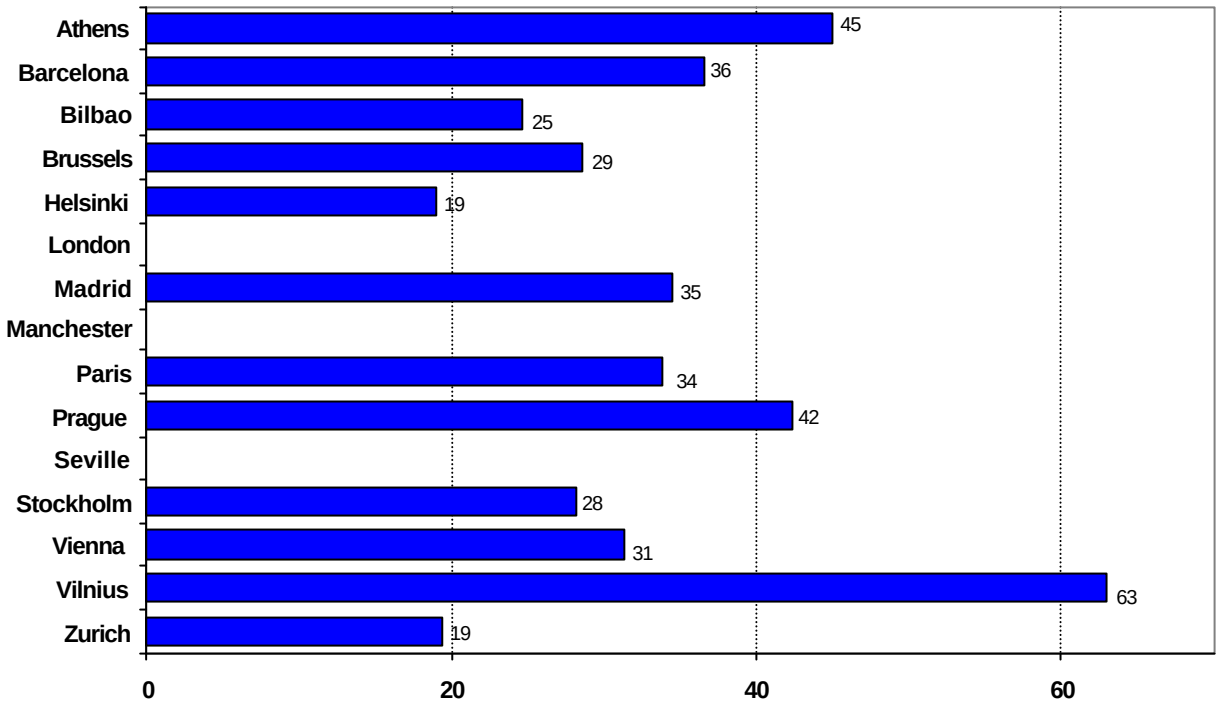
The indicator used is the number of litres of unleaded 95 petrol that can be bought with the price of the monthly pass in the city centre. This allows a reasonable comparison of the appeal of public transport for users, compared to the private car from an economic point of view. A low value means that public transport is relatively cheaper in that city compared to private car use. Prague and Vilnius seem to have very attractive public transport system from this point of view. At the other edge, Stockholm, Vienna and Barcelona have less competitive public transport fares.

3.3.2 GDP per capita (in 1,000 EUR) vs. Monthly pass /GDP (EUR/100 EUR per capita)



The price of public transport is significantly higher in less affluent cities (and particularly in Prague, Vilnius and Athens) compared to GDP per capita. Zurich, Helsinki and Paris are those cities where public transport fares are lower, when compared to GDP.

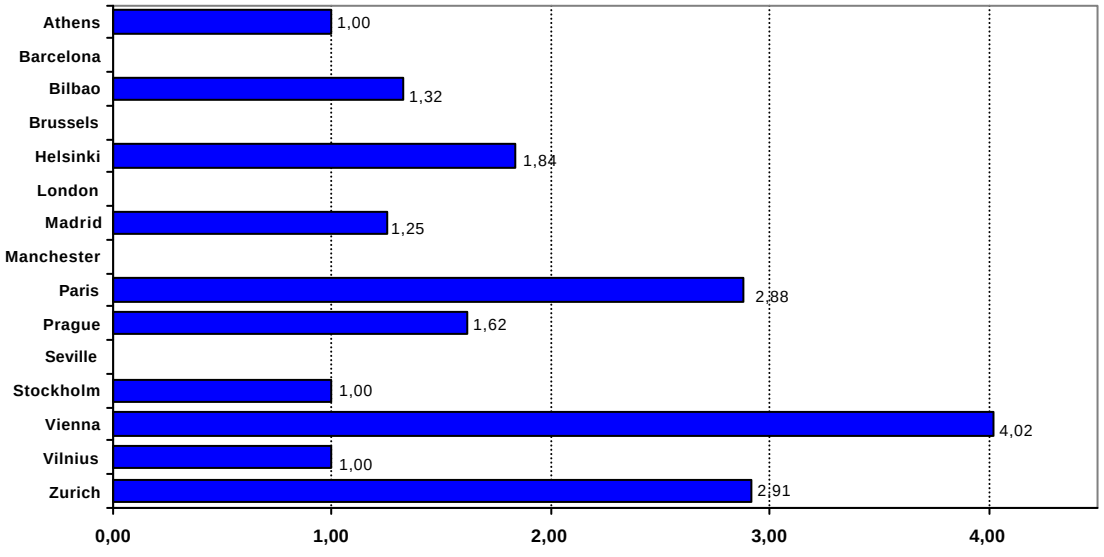
3.3.3 Monthly ticket/single ticket in city centre



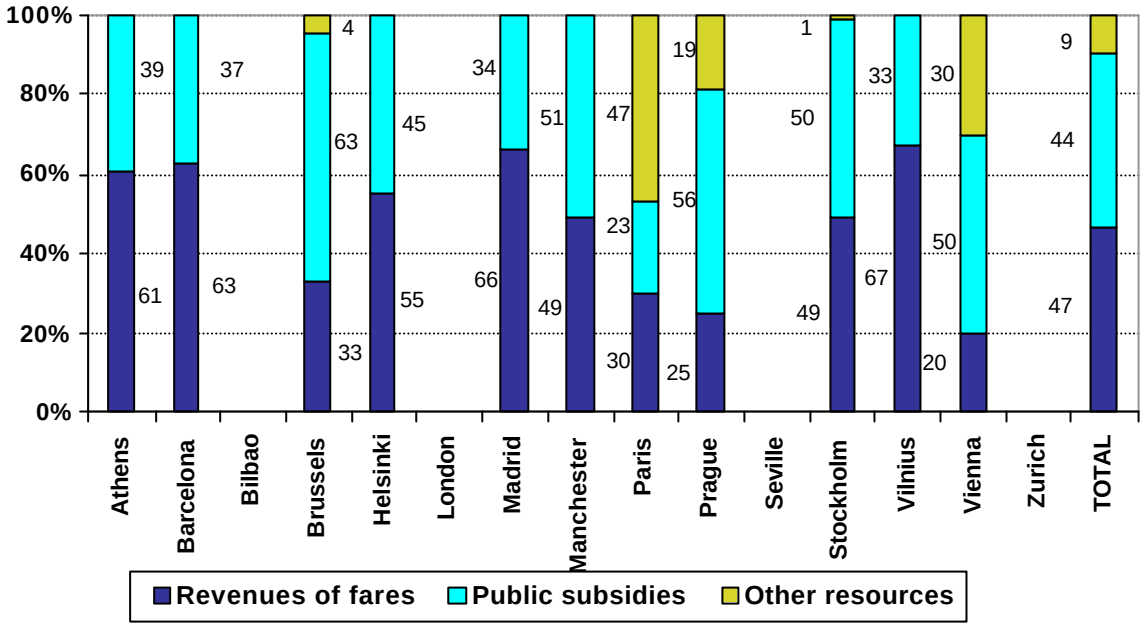
This is an indication of the relative attractiveness of monthly passes compared to single tickets for public transport users. The incentives to purchase monthly passes are lower in cities in Eastern and Southern Europe (as well as in Paris), with ratios over 30.

3.3.4 Monthly pass in metropolitan area / monthly pass in the city centre

A comparison of public transport fares in the metropolitan ring and in the city centre shows that in most cities that ratio is rather low, thus suggesting that there is a trend to minimise the difference. This means that monthly passes are more attractive (compared to single tickets) for commuters than for inner-city inhabitants. It could be concluded that subsidies are focusing more on commuters. This might be justified by the fact that this is a way of making public transport more attractive for those that could be more leaned towards using their private cars. Nevertheless, and for those metropolitan areas with typical income patterns (i.e. medium to high-income families living in the suburbs and low to medium income families living in the inner city), this would mean that subsidies are benefiting relatively better-off families.

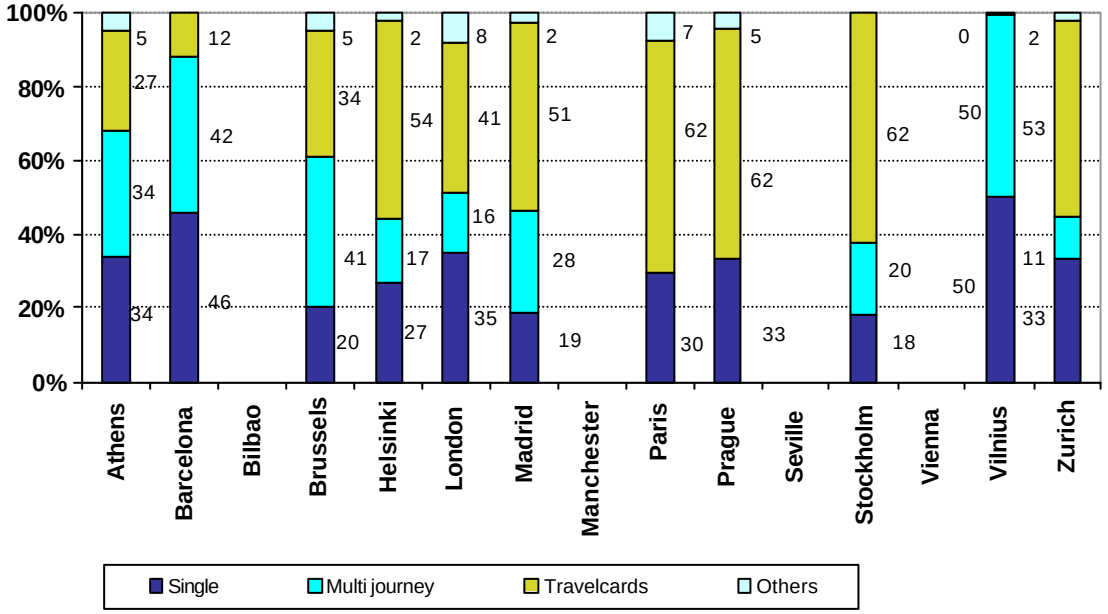


3.3.5 Summary of all resources of operations



The public transport system seems to be highly subsidised in most EMTA cities, covering from more than one third (37% Barcelona, 35% Vilnius, 34% Madrid) to almost two thirds (63% Brussels) of the total costs. Resources outside fares and subsidies have minor importance, except in the case of Paris, where a dedicated tax (*versement transport*) provides almost half of the total revenues, and Vienna.

3.3.6 Share of the different tickets in the exploitation revenues (%)



Fare policy of the different metropolitan areas can be further analysed taking into account the origin of exploitation revenues. Even when monthly travel cards collect varies between 16% (Barcelona) to 62% (Prague and Stockholm), exploitation revenues come in an important percentage from other tickets, less subsidised. Thus, in Madrid, for instance, the travel card has a market penetration of 64.5%, meanwhile it produces 51% of the revenues. On the contrary, the 10 journeys ticket is used in some 25.1% of the trips, being just 10.4 % those travellers using single tickets (representing 28% and 19% of the revenues, respectively).