CHAPTER 8

THE ECONOMICS AND FINANCING OF URBAN MOBILITY

This chapter seeks to provide an understanding of the economics and financial options that determine the success or failure of urban mobility systems. Each such system includes a range of mobility options, from walking to rail-based metro systems. In economic terms, the various modes of urban mobility are both complementary and competitive. They are complementary because residents typically avail themselves of more than one travel mode as they go about the daily activities of urban life. At the same time these modal alternatives often compete for passengers. If better-coordinated and sustainable transport systems are to evolve out of such complex systems, it is going to require an understanding of the incentives and disincentives faced by buyers and sellers of transport services.

The ways that urban transport options emerge and evolve depend heavily upon the costs of these options and the ways in which these costs are financed: either directly in fares, indirectly in taxes and fees or absorbed as pollution, climate change, congestion, road traffic deaths and injuries, or other social costs. Thus, this chapter reviews the economics and financing of urban mobility in light of its impacts on the ways the choices are made to explicitly pay for or implicitly absorb the costs.

In matters of urban transport economics, financial arrangements are always paramount. Finance systems can encourage (or discourage) the alignment of economic, environmental and social goals. Differentials in investments and operating funds among modal alternatives have social, spatial, environmental and equity impacts. These may be good or bad, as the various modes compete for scarce urban space and market shares. Whether by indecision or decision, such choices are made continually, and thus outcomes in this regard are results of – and impact upon – public policy.

To understand the financial dynamics, it is necessary to understand the economic relationships among and within urban travel modes. With the exception of rail-based modes (which travel on segregated rights of way) all other forms of urban movement – from walking to motorized travel – rely on access to a shared system of sidewalks, streets, roads and highways. Thus, while different modes of urban movement appear to be physically and financially ***independent*** of one another, they are nonetheless physically and financially ***interdependent*** because of their shared (and usually competitive) use of public infrastructure.

In economic terms, the various modes of urban mobility are both complementary and competitive

The improvement of urban mobility systems requires strategic choices regarding the structures through which the infrastructure and equipment that service urban ***public*** transport are financed. Public transport must be bolstered as both a viable alternative to private cars (and motorcycles) and a strong supportive and complementary supplement to non-motorized mobility. As a result, there is a need to address the incentives and disincentives built into current financial configurations.

In order to address the issues outlined above, the first section below presents a brief overview of the conditions and trends that determine the economics of urban mobility. This is followed by discussions on the economic role of transport in the functioning of an urban economy, and the need to move away from economics of mobility towards economics of access. The fourth section develops an understanding of the systems of incentives and disincentives built into the current methods used to finance urban transport systems. Based on this discussion, the fifth section proposes policies and plans that permit urban transport to make a major contribution to the realization of socially and environmentally sustainable cities, while the final section contains some concluding remarks and lessons for policy.

Differentials in investments and operating funds among modal alternatives have social, spatial, environmental and equity impacts

THE ECONOMIC AND FINANCIAL CHALLENGES OF URBAN MOBILITY

This section discusses the key economic characteristics of urban transport. It begins by examining trends in private car ownership and use, since private motorized transport is the least environmentally sustainable, most land-intensive modal option. It then compares user costs and the cost to build and operate various urban transport modes.

Data on the relationship between rising income levels and rising rates of car ownership are strongly positive; as income rises, car ownership increases.

The central challenge is to ensure that financing for public transport and non-motorized transport infrastructure and service delivery is at least comparable to efforts for accommodating the car

The global dominance of private motorized transport

The global dominance of the private car as the preferred means of urban transport is setting global urbanization on a collision course with the world's pressing equity and environmental concerns.[1] As indicated in Chapter 2, the forecasts for the future in terms of non-motorized and public transport are not promising, if current car-ownership trends continue.[2]

Data on the relationship between rising income levels and rising rates of car ownership are strongly positive; as income rises, car ownership increases. Within countries, wealthier residents are much more likely to own motor vehicles. For example, modal split is closely correlated with socioeconomic groups in Bogotá (Colombia) and Santiago (Chile). Seventy per cent of the high-income group in Bogotá and 80 per cent in Santiago use private cars compared with 70 and 60 per cent of low-income groups using public transportation, respectively.[3]

In China, with only 44 passenger cars per 1000 people in 2010,[4] estimates indicate that for every 1 per cent increase in average disposable income, car ownership in Chinese cities is expected to increase by 1.8 per cent.[5] São Paulo is another example of the trend; bus ridership declined by nearly half (from 6.7 million to 3.8 million passengers per day) during the 1990s. At the same time, car use and road congestion increased, and bus speeds slowed from 19 to 12 kilometres per hour.[6]

Figure 8.1 illustrates the same relationship globally by comparing per capita income and the number of cars. Although the relationship between income levels and car ownership is relatively weak in countries with high incomes, it is strong among low-income countries. As the majority of the world's population live in low-income countries, an overall increase in income in these countries could have a significant impact on car ownership.[7]

These data convey an ironic message: as living standards in developing countries rise, their cities will find themselves under ever-greater pressure to accommodate private motorized transport, with all its other negative side effects. Where economic development policies are successful[8] economic growth will stimulate demands to acquire valuable land for use as roads and parking spaces. The simple reason for this is that given the contemporary state of urban public transport, private motorized transport is almost universally considered to be the superior alternative whenever people can afford the choice.[9] One result of this perception is the support for transport finance policies that privilege expanded street and road networks to accommodate expanded reliance on car-based travel, while other options languish.

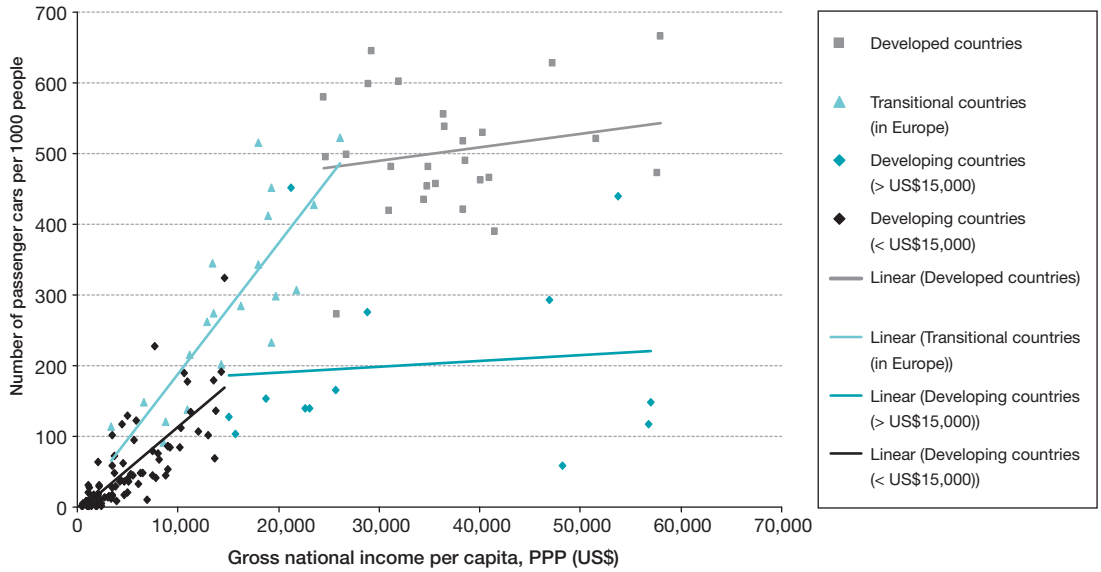
Thus, from an economic point of view, the central challenge is to ensure that financing for public transport and non-motorized transport infrastructure and service delivery is ***at least*** comparable to efforts for accommodating the car. To do less is

Figure 8.1

Car ownership as a function of gross national income (2010)

Note: The figure includes data for 150 countries. Data are from the latest year available during the period 2005–2010, and refer to road motor vehicles, other than two-wheelers, intended for the carriage of passengers and designed to seat no more than nine people (including the driver). The gross national income per capita is based on PPP in 2010.

Source: Based on data from http://data.worldbank.org/indicator, last accessed 23 January 2013.



to virtually ensure that public transport remains an inferior choice.

Economic characteristics by mode and context

As noted in Chapter 2, non-freight transportation can be divided into non-motorized transport (walking and bicycling), public transport, informal motorized transport and private motorized transport. Each of these modes has different economic characteristics, which largely depend on contextual features, such as city size and density, geography, demographics, institutional framework and history.

In many cities, there is a wide gap between modal use, infrastructure allocation and modal funding. That is, a large share of the population uses non-motorized or public transport, while a disproportionate amount of infrastructure and funding supports private motorized transport. For example, in Dhaka, Bangladesh, almost 80 per cent of trips are by walking, bus or informal motorized transport, yet 70 per cent of the road space is dedicated primarily to private vehicles.[10] In some Eastern African cities, walking accounts for more than half of all trips but less than 1 per cent of total costs, while accommodating private vehicles incurs 50 per cent of total system costs.[11] This section presents an overview comparing the economics of the various modes in a variety of contexts.

■ *Non-motorized transport*

Non-motorized modes are highly cost effective as they entail the lowest capital and operating costs, because they require only sidewalks and dedicated street lanes. They also cost the least for users who expend only calories and can use relatively inexpensive bicycles. In many developing country cities, non-motorized transport is thus the predominant modal choice.[12]

Despite its relatively low cost, infrastructure for non-motorized transport (pedestrian bridges, paths, sidewalks and crossings) is sorely lacking in many urban areas, making it a relatively unsafe and often inconvenient mode of travel.[13] Financing for such infrastructure is usually limited to central government funds, yet the historic nature of urban transportation policy has a distinct bias towards motor vehicles. This has resulted in non-motorized transport being completely ignored or allocated an insufficient budget. This is a paradox, as most trips contain at least one segment of walking.[14] The main factor related to the lack of financing of non-motorized transport facilities in cities of developing countries is that they are not 'revenue generating' and, hence, private investors and international lending agencies are not keen to provide finance, while the cost is, in many cases, beyond city capabilities.[15]

In many cities . . . a large share of the population uses non-motorized or public transport, while a disproportionate amount of infrastructure and funding supports private motorized transport

■ *Public transport*

In general, public transport can provide excellent access within urban areas when it is affordable to the user, frequent, predictable, safe and integrated within a comprehensive network.[16] However, public transport often entails high capital and operating costs compared with private cars, although it is considerably more environmentally sustainable.[17] To make a comparison between the real cost of public versus private motorized transport, it is essential that the full cost include social costs, local pollution and

Public transport can provide excellent access within urban areas when it is affordable to the user, frequent, predictable, safe and integrated within a comprehensive network

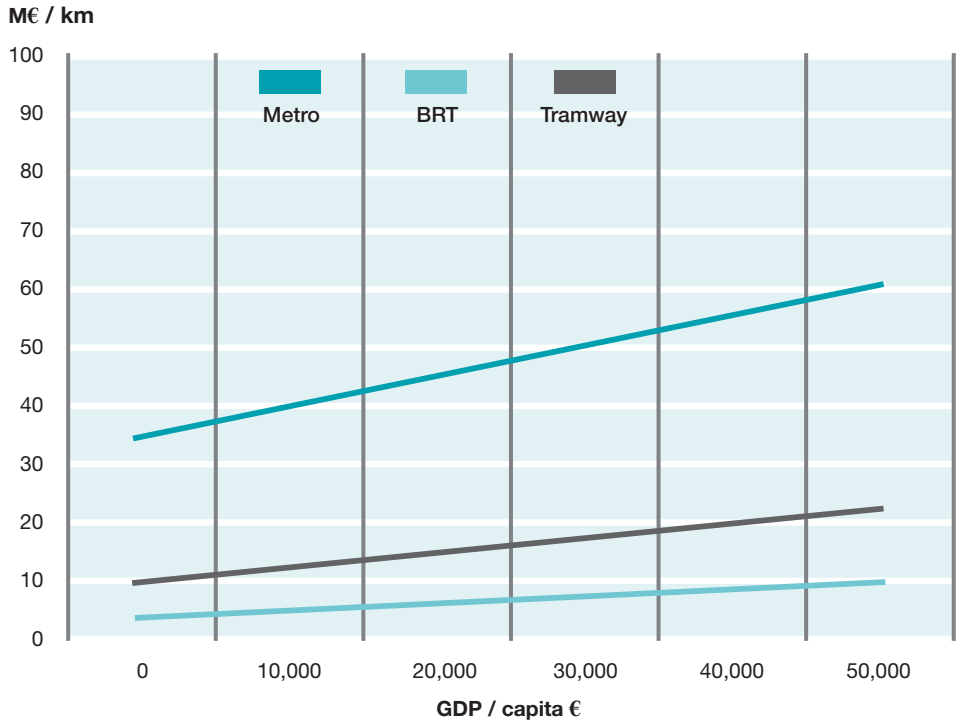


Figure 8.2

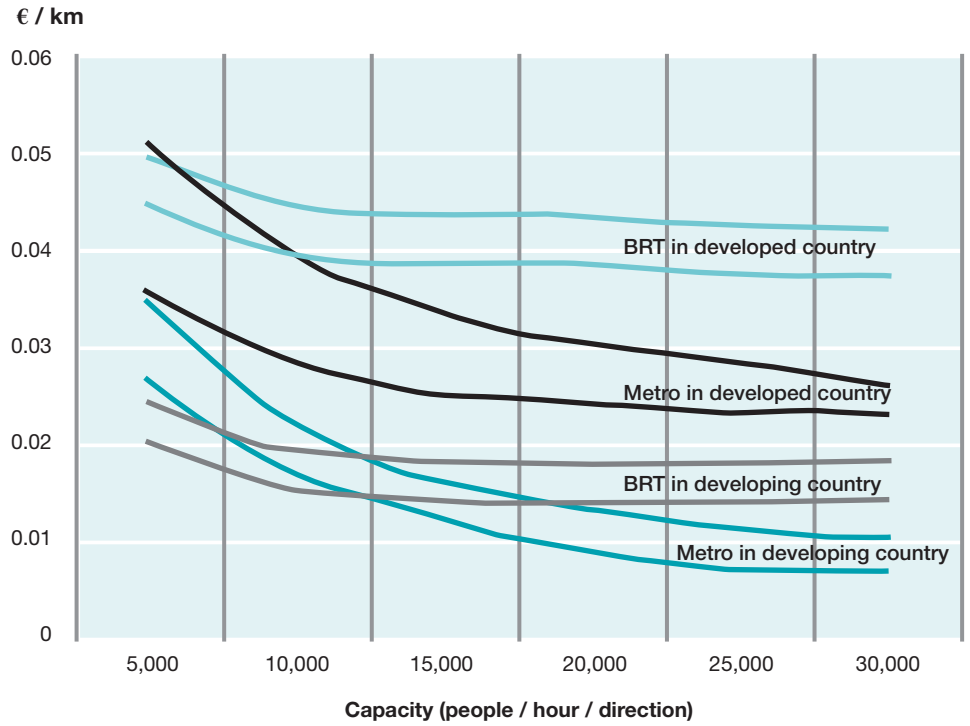
Average capital costs (infrastructure and rolling stock) of major public transport modes, as a function of GDP per capita

Source: CODATU, 2009, citing Lasserre, 2008.

Figure 8.3

Average operating costs (operation, maintenance and replacement) of major public transport modes, as a function of GDP per capita

Source: CODATU, 2009, citing Lasserre, 2008.



Public transport is primarily financed through fares, subsidies and value-capture arrangements

In recent years, 'value capture' . . . has emerged as an attractive political approach to the challenge of creating sustainable revenue sources for public transport

global greenhouse gas emissions as well as the economic cost of congestion.

Rail has the highest capital costs of all public transport modes, irrespective of per capita national incomes (Figure 8.2). While the capital costs range widely, they are consistently higher than for other modes. It has been estimated that the total per kilometre capital cost for metros generally ranges between US$50 million and US$150 million (2002 US$ values).[18] BRT capital costs (i.e. stations and dedicated lanes) are considerably lower and the systems are built faster than rail. A US study (from 2001) found the average capital cost per kilometre of BRT lines to be about US$8.4 million, compared to US$21.6 million for light rail.[19] Similarly, in India, the first phase of the BRT system in Ahmedabad cost only 5 per cent of the capital cost of the Delhi Metro (US$1.4 million and US$30 million per kilometre, respectively).[20] A major reason for the high cost of metro construction is related to tunnel excavation. Construction of each kilometre of metro underground lines has been estimated to be between four and six times more costly than for lines above the ground.[21] However, BRT does generally entail higher maintenance and operation costs than rail (Figure 8.3).

Public transport is primarily financed through fares, subsidies and value-capture arrangements. ***Fares*** are perhaps the most contested component of public transport financing. Cost recovery from fares ranges widely (Box 8.1). In many cases, fares are not affordable to large segments of the population. Box 8.3 shows that fares and other transport costs can comprise a sizable share of income for low-income and poor populations.[22] When fares increase, riders may protest, and ridership may decline to the effect of precluding any revenue increases – as in Ouagadougou (Burkina Faso) in 2004 and Lomé (Togo) in 2009.[23]

Thus, international aid and/or broader-based ***subsidies*** must be sought to support public transport systems.[24] These range from taxes on individuals and employers, to industry and sales. Public transport can also be supported by tolls collected on bridges and tunnels in the adjoining metropolitan region.[25] In London (UK), public transport is supported in part by congestion charges paid by drivers of private cars entering into the central business district. Subsidies may also be tied to real estate transactions (as in New York, US).[26] In general, the mix of public transport subsidies should produce a stream of revenue that is steady and reliable over time, and not subject to political and economic shifts. Strong regulatory and governing institutions are necessary to collect and distribute funds for public transport at a large scale.

In recent years, '***value capture***', the practice of linking fees and taxes on the indirect but real beneficiaries of transport access, has emerged as an attractive political approach to the challenge of creating sustainable revenue sources for public transport.[27] It is typically presented as a third method of finance, though the congestion charges and real estate transaction fees described above could fairly be interpreted as forms of value capture. The most frequently cited contemporary example of value capture is the system of sustainable finance that supports public transportation in Hong Kong (Box

Box 8.1 Public transport cost recovery from fares

In general, the situations where fare-box recovery is adequate to support the public transport system are in places where density of use is high, public transport runs on exclusive rights of way and where affluent users prefer public transport to private cars. Two types of situation fit this scenario:

- Certain Asian cities such as Hong Kong,[a] Singapore,[b] Tokyo[c] and Osaka[c] and Taipei.[d] The fare-box recovery ratio in Hong Kong in 2007 was 149 per cent.[a]
- High-speed rail lines that connect major airports to city centres, such as the Heathrow Express in London (UK); the Arlanda Express in Stockholm (Sweden); the Brussels Airport Train (Belgium); Schipol–Amsterdam train (the Netherlands) and the Shanghai Maglev (China).[e]

For cities in Europe the modal fare-box recovery ratios are in the range 30–50 per cent. The fare-box recovery ratios in North American cities with high density and strong fixed rail systems are comparable to those in Europe. However, in the lower density North American cities the rates go down to as little as 9 per cent.[d] In Burkina Faso, the public-private bus system, SOTRACO, covers 59 per cent of operating costs from fare revenues.[f]

Sources: [a] Chow, 2008, p21; [b] Hale and Charles, 2008; [c] Shoiji, 2001; [d] http://en.wikipedia.org/wiki/Farebox_recovery_ratio, last accessed 30 January 2013; [e] Crozet, 2006; [f] Godard, 2011b, p12.

8.7). The policy notion of value capture in Hong Kong is to ensure that all or a portion of the value created and embedded in the location value of land parcels that is attributable to transport is directed towards investment in transport infrastructure or operation.[28]

Public–private partnership[29] concessions have met with limited success in public transportation projects (see, for example, the experience of the London Underground,[30] New Delhi's failed privatization of buses in the early 1990s, and similar failures in Pakistan).[31]

■ *Informal motorized transport*

Informal motorized transport (minibuses, shared taxis, motorbike taxis, etc.) can operate much like public transport from the user's perspective, but is usually managed by private, for-profit companies or individuals. Each informal transport system may have its own fare structure that is not integrated with the rest of the public transport system. And, as mentioned in Chapter 6, in Tanzania (and several other countries), informal transport buses refuse to provide rides to free-fare students.[32]

Fare regimes within the informal transport system often vary by market segments and the perceived price sensitivities of customers. A study of Malaysia's trishaw industry for example found that different fare structures were charged to regular customers (lowest), casual customers, goods, prostitute runs, tourists (highest).[33] Differentiated pricing is also seen as weather or road conditions change. For instance, in Nairobi, Kenya, fares are often increased during heavy rains, as is the case in much of South-Eastern Asia during the monsoon season.[34]

Informal motorized transport uses collectively provided infrastructure, namely roads. They usually do not have built stations but avail themselves of roadside stops that often cause other traffic to be delayed and backed up. Their capital costs are thus relatively low, while operating costs are kept low through low wages and minimal administration. Motorcycle taxis are even less expensive to operate than minibuses, since fuel and repairs cost less. Due to these implicit subsidies, lack of administrative overhead and freedom from regulations (that might forestall safety and environmental problems), informal motorized transport is able to earn a profit from rider fares although profit margins may be low.[35]

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Situations such as these illustrate the ways in which uncompensated social costs subsidize the financial viability for informal sector transport providers. Legally collecting fees and taxes from informal transport modes has proven to be bureaucratically difficult, as in Cotonou, Benin,[36] although police and other officials are known to regularly extort fees from informal transport operators. Many cities in developing countries struggle with formalizing the informal public transportation sector to improve service and safety.

■ *Private motorized transport*

Private motorized transport, including cars and motorcycles, is often the most expensive mode for the traveller. As shown in the previous section, the use of private cars increases with income. Private vehicle use ranges from 7 per cent of residents of Addis Ababa[37] (Ethiopia) to 87.9 per cent of work trips in the US.[38] Travellers must purchase or lease a vehicle, buy insurance and registration, pay tolls and charges, buy fuel and maintain the vehicle.

Finally, there is a choke point of congestion when each private vehicle reduces space and diminishes the quality and speed of the trip for all other vehicles. Depending on system design, private vehicles can also interfere with the operation of public transportation. The cost of congestion is however difficult to measure.[39]

ECONOMIC VALUE OF THE TRANSPORT SECTOR

Transportation of people and goods is rarely undertaken as an end in itself

Urban transportation is a vital urban public service and an integral input into the economic life of its city-region. While the overall size of the transport sector varies from economy to economy it tends to account for a small but significant proportion of GDP. In the US, for example, transport accounted for about 8.5 per cent of the GDP in 2009,[40] compared to between 3 and 8 per cent in the countries of Asia and the Pacific.[41]

The demand for transport is what economists call a derived demand: a demand generated in pursuit of another goal. Transportation of people and goods is rarely undertaken as an end in itself.

The direct and indirect contribution of transport spending to overall productivity and employment creation is valuable. Thus, it is important to create transport systems that are as efficient and effective as possible in terms of both their monetary and social costs. In Houston (US) where over 70 per cent of commuting is done by public transport, is about one-third less of regional GDP or about 9.4 per cent.[42]

In addition to being a major factor of production and urban consumption, urban transport is a major source of employment. It has been conservatively estimated that in 2009 the formal public transport sector accounted for about 13 million full-time equivalent jobs (as transport operators) worldwide.[43] Of these jobs, some 7.3 million represent direct employment by public transport operators (Table 8.1). The rest are employed directly by public authorities (300,000 people) or involved in the provision of goods and services to public transport operators and authorities[44] (5 million people). Public transport operators are the largest employers in Amsterdam (the Netherlands), Barcelona (Spain), Brussels (Belgium), Genoa (Italy) and Dublin (Ireland). In Paris (France), Budapest (Hungary), Porto (Portugal), Madrid (Spain), Turin (Italy) and Tallinn (Estonia), public transport operators rank among the city's top-five employers.[45]

However, in many developing countries transport is primarily characterized by informal sector employment.[46] In most cities of Sub-Saharan Africa, employment in the informal urban transport industry is a mainstay of the local urban economy. In Kenya, some 40,000 *matatus* (minivans) provide 80,000 direct and 80,000 indirect jobs, mostly in urban areas.[47] In South Africa, the 'Kombi taxi' (the urban minivans) created approximately 185,000 direct jobs and 150,000 indirect jobs in 2003. In Kampala, it is estimated that the informal minivan industry employs between 40,000 and 60,000 people.[48] These numbers are suggestive of the high importance of informal transport sector employment in many developing countries.

The transport sector also often creates higher overall levels of income. In Geneva, it is estimated that for every US$1 invested, another US$3.8 of value added is created.[49] Worldwide, it has been estimated that every US$1 of value created by public transport is linked to the further value creation of US$4. In addition, 'every direct job in public transport is linked to four jobs in other sectors of the economy'.[50] Similar multipliers are observed in the US with more than 36,000 jobs created for every US$1 billion invested in public transport.[51]

Transportation is a service produced through the creation of networked infrastructure, sidewalks, streets, roads, highways and railways. The process of producing this infrastructure is thus both a contribution to present employment and future productivity. It has been estimated that some US$7.8 trillion will be spent on transport infrastructure projects globally between 2005 and 2030 (Table 8.2). Although all transport investments are creating employment, it is worth noting that the creation of public transport infrastructure in the US appears to have almost twice as much job stimulus as a

Table 8.1
Number of people employed by public transport operators, by region (2009)

Region	Number of operators (millions)
Developing countries	**4.3**
Asia-Pacific	2.8
Latin America	1.2
Middle East and North Africa	0.2
Sub-Saharan Africa	0.1
Developed countries	**1.8**
Europe	1.4
North America	0.4
Transitional countries	**1.2**
World total	**7.3**

Note: These estimates are conservative as they mainly focus on formal transport and do not provide an estimate for the significant number of jobs supported by the informal transport sector, particularly prevalent in urban areas of Asia and Africa. In addition, the estimates do not include taxi services (formal or informal), interurban and long-distance transport.

Source: UITP, 2011a.

Table 8.2
Projected transport infrastructure investment, road and rail (2005–2030)

Region	US$ billions
North America	940
Latin America	1,010
Europe	3,120
Asia-Pacific	2,110
Africa	310
Middle East	310
World total	**7,800**

Source: Morgan Stanley, 2009, p3.

comparable amount spent on highway infrastructure.[52] What is perhaps most striking about the data in this table is that the regions with the lowest projected infrastructure investments are the ones that are likely to experience the most severe urban mobility challenges, due to rapid urbanization.[53] The two regions with the lowest projected investments for example (i.e. Africa and the Middle East), are likely to more than double their urban populations between 2005 and 2030, compared to an increase of only 16 per cent in developed countries.[54]

The costs associated with road traffic accidents are often overlooked in the context of transport economics but should always be accounted for in policy-making.[55] The total annual cost of road traffic accidents has been estimated at US$518 billion, or about 1–3 per cent of global GDP.[56]

The costs associated with road traffic accidents are often overlooked in the context of transport economics but should always be accounted for in policy-making

FROM ECONOMICS OF MOBILITY TOWARDS ECONOMICS OF ACCESS

One of the most powerful justifications for the disproportionate funding of private motorized transport is that it saves time. This in turn leads to the evolution of urban transport policies that promote extensive reliance on ever more mobility to solve the urban congestion and access problems. However, in the context of urban living, mobility is just one of two means for achieving access. As noted earlier in this report, access can also be achieved through co-location of urban activities. As a practical challenge of policy-making, the attraction of enhanced mobility is that it is easy to measure and hence to value, while co-location – or mixed-use urban land arrangements – is difficult to monetize. This methodological constraint has skewed cost–benefit analyses to favour mobility-oriented infrastructure projects over ones that might enhance co-location.

This section shows how (and why) the value of mobility over access leads to the promotion of private motorized transport over more sustainable modes, and revisits the framing of cost–benefit approaches to transport project evaluation.

What has time saving got to do with it?

As a result of the problems in measuring the benefits of co-location, much of the treatment of urban transport as an economic good focuses on its mobility value, usually measured as travel time saved.[57] The presumption behind this is that if mobility promotes access, measuring the value of time saved in travel is a good proximate measure for the ultimate end product, i.e. more time in other pursuits.

Because time spent in motion (i.e. mobility) is such a relatively straightforward concept to understand and to measure, it provides a powerful basis for valuing transport improvements. If the value of the benefits exceeds the cost of the project, it is deemed worthwhile. It is from this insight that modern cost–benefit analysis for transport decision-making evolved.[58]

Cost–benefit analysis is now the primary tool through which governments, international financial institutions and bilateral donors make decisions on major public works projects. Its elements have become so standardized that few question the shortcomings of using enhanced mobility as a proxy for urban access. But at a time when the economic and environmental costs of mobility are becoming difficult to sustain, it is important to rethink this approach.

In the context of urban living, mobility is just one of two means for achieving access

A recent look at a cross-section of transport cost–benefit analyses across the UK concluded that approximately 80 per cent of the identified benefits in transport derive from the monetary value assigned to time savings. However, the amount of time spent in urban travel in the UK has remained constant at around one hour per day for three decades. Travel diary studies demonstrate that the benefit of transport improvements provide a greater range of spatial access within the same travel time budget over time.[59] If this is the case, there is a need to better assess 'the value of access' as distinct from the hypothesized benefit of 'time saved' in considering transport investments.

There is [thus] a need to better assess 'the value of access'

Measuring the value of access

To the extent that transport improves the ability of an urban area to maximize the agglomerative benefits of access – i.e. the economies of market density and supplier density – it adds significant value to the local economy. A working definition of the benefits of agglomeration would be the increase in individual per worker productivity that results from improved access. A recent study of London's Crossrail project (Box 8.2) uses such calculation methods on a large-scale public transport project, in order to capture access benefits along with travel-time saving benefits. Adding these agglomerative benefits to the more traditional time-cost savings benefits raised the traditional time savings based benefit–cost ratio between 36 and 93 per cent. While the methodologies used to measure these effects can be debated – and have led to considerable discussion – the important point is that these estimates provide an empirical sense of the sizable benefits that access conveys. Most important for matters of economic sustainability, they open up the possibility that access and hence economic wellbeing can be improved upon via the co-locational characteristics of places. This includes more reliance on pedestrian and bicycle access, as well as more and better public transport options, both of which are critical to an economics of sustainable urban transport.

Access and hence economic wellbeing can be improved upon via the co-locational characteristics of places

Box 8.2 Crossrail and agglomeration benefits, London, UK

Crossrail is a new addition to the London Underground, which is scheduled to start operations in 2018. It is intended to increase carrying capacity by 10 per cent in the portion of the system serving central London. Using conventional analysis, Crossrail yielded a strong traditional benefit–cost ratio of 2.55. Fifty-four per cent of the benefit takes the form of travel-time saving and 43 per cent from increased network carrying capacity.

By including the wider economic benefits of agglomeration, a second benefit–cost ratio was calculated. In the latter instance the ratio increases to between 3.47 and 4.91. About one-third of this increased benefit is due to higher worker productivity, due to the higher levels of urbanization and localization economies created by improved access. The remainder of the added benefit is linked to increased tax revenue generated from the transformation of less productive to more productive jobs plus the improved locational value of the areas served and increased labour force participation.

Comparing the initial benefit–cost ratio with the benefit–cost ratios that include the wider economic benefits of access and agglomeration, the ratio increases between 36 per cent (at a benefit–cost ratio of 3.47) and 93 per cent (at a benefit–cost ratio of 4.91).

Source: Jenkins et al, 2010 (see also http://www.crossrail.co.uk/).

The standard economic analysis of supply and demand . . . is a limited tool for establishing useful financial models to support urban mobility

Urban mobility is both a private and a public good

An economic analysis of sustainable urban mobility must consider the complex nature of mobility as an economic good. Mobility as a commodity lends itself to the standard economics of supply and demand, as it is conceivable in the context of private markets where buyers and sellers agree upon quantities and prices. Even the presence of 'externalities' is correctable via disincentives, such as taxes on negative externalities (like air pollution) and congestion charging and parking fees (Box 8.5) to discourage excessive car use and incentives for positive externalities, such as access to 'free' bicycles and well-designed and walkable streets.

As physical realities, cities are the co-location of activities to avoid the need to travel

In the language of economics, mobility has the two distinguishing characteristics of a private good, rivalry in consumption and excludability in ownership. Rivalry refers to the notion that what one individual consumes cannot also be consumed by another. If one individual buys a ticket to a certain seat on a train, a second individual cannot occupy the same seat for the same trip. Excludability means that the owners of the vehicle can deny entry to those not purchasing a ticket to ride.

Car users in most countries do not pay a high enough price to cover the full cost to society of this travel mode

While the case for mobility as a private good is powerful, the case for the access that it creates as a public good is more compelling, and for the same reasons. Turning the two characteristics of a private good around implies a public good: non-rivalry in consumption and non-excludability in ownership. Access is characterized by both non-rivalry and non-excludability. When one person accesses the city by working or living there, she does not harm another's ability to access the city. In fact, she increases the value of another person accessing the city. Although one can conceive of exceptions, access to a city's opportunities is likewise non-excludable, because there is no entry fee to a city. The mobility option one must use to get there, however, may be characterized by both rivalry and excludability, depending on congestion and fares. This means that the standard economic analysis of supply and demand, based as it is on the presumption of private goods, is a limited tool for establishing useful financial models to support urban mobility.

The working formulation for an economics of sustainable urban mobility is one in which the planning and policy target is maximum access and minimal mobility. An ideal sustainable city is one where the need to expend resources in movement of people and goods is at the lowest possible level. The co-locational properties of the city – the opportunities for specialization and innovation made possible by the density and diversity of people and firms – are the desired social good. Mobility serves as the means to access these goods. The economic sustainability of urban mobility relates the value created by transport in enhancing accessibility even as it minimizes the environmental and social costs of mobility. Thus, as physical realities, cities are the co-location of activities to avoid the need to travel.[60]

Road pricing is necessary but normally not sufficient to improve urban accessibility

There is considerable evidence that car users in most countries do not pay a high enough price to cover the full cost to society of this travel mode.[61] In practical terms, this implies that the society at large is in effect subsidizing private motorized transport (through the costs of addressing economic, social and environmental externalities). From the point of view of conventional microeconomics, the standard diagnosis is that the market for urban car travel is inefficient. The policy solutions to correct that inefficiency call for 'getting prices right'.

The policy recommendations that flow from 'right' pricing are the creation of methods to effectively raise the cost of car usage to better reflect the environmental and social costs that this travel mode imposes on society. 'Full cost pricing', as this

approach is known, seeks to impose licenses and fees via taxes on drivers that approximate the economic value of the social and environmental costs. An example of this can be seen in Singapore where the government has implemented a number of financial disincentives to curb car ownership,[62] and encourage a modal shift to non-motorized and public transport.

However, even if this policy worked as predicted, it is at best a partial solution, as the goal of such pricing is to decrease the use of cars. Unless the revenues raised are sufficient to cover the costs of added public transport to provide substitute service, such pricing is at best a necessary and not a sufficient condition in terms of meeting the access needs of a city-region. Furthermore, such a policy has significant risks in terms of social equity. The drivers that it prices out of the market will be the ones with the least ability to pay the higher costs. Moreover, it does nothing to meet the ongoing needs of the large mass of lower-income residents who were not driving in the first place. Thus, policies are also required that directly address the underlying reasons for urban travel, and that address the problems of those for whom, even at comparatively low market prices, car travel is out of reach.[63]

The private car versus public transport: Markets and modal choices

If one considers the data presented in Figure 8.1 and nothing else, it is easy to conclude that there is strong universal urban desire for car-based travel. If that is the wish of the world's urban population, shouldn't policy and planning goals aim to satisfy this market demand in a manner that is as environmentally sound and socially equitable as possible? It is difficult to argue with that policy interpretation given the globally poor state of public transport alternatives.

The problem with this view is technological reality. The idealized promise of the car can only be achieved in cities if certain unlikely technological changes are made: if vehicles cost little to own and maintain, use little energy, do not pollute and emit greenhouse gases, and lack the physical need for expanded road space and parking places. Lacking these conditions, pressing social and environmental concerns will continue to render the dream of personal freedom of mobility as theoretical fantasy – or as an unrelenting urban nightmare – if attempted in practice.

As the evidence presented in this report makes exceedingly clear, there are public transport alternatives – as well as pedestrian and other non-motorized forms of travel – that can make a scalable difference in terms of both personal mobility and urban sustainability. The experiences in some Asian and European cities – where public transport trip speeds exceed those of private cars – exemplify the potential of enhanced public transport.[64] In light of this, a more realistic interpretation of Figure 8.1 is that it reflects things as they are: a less than ideal choice between an often unreliable and unsafe public system and being stuck in slow-moving traffic in a car-based system.

There are public transport alternatives . . . that can make a . . . difference in terms of both personal mobility and urban sustainability

However, it is public finance, and not private market decisions, that is the final arbiter of the quantity and quality of the urban transport options. The reason that public finance becomes the crucial determinant of the choices that define private markets is that once one moves beyond walking and other forms of non-motorized transport, motorized transport modes are never fully supported by charges to travellers. Motorized transport requires funding beyond what users pay directly, as discussed in the section below. In order to develop urban public transport systems that are of sufficient quality and quantity, and that also reduce environmental and social equity problems, policy-makers must confront the reality that user charges will never be sufficient.

THE PERENNIAL FINANCIAL PROBLEM: COSTS EXCEED REVENUES

Policy-makers must confront the reality that user charges will never be sufficient

The continual fiscal challenge for any urban public transport supplier is avoiding a negative cash flow: attaining either a zero balance between income and expenditure, or a positive cash flow to finance future improvements. This requires bridging the difference between fare revenues and the full costs of service while encouraging efficient operations in a manner that is sustainable over time. This challenge is not easy nor are the solutions free of controversy. This section explores the dimensions of this chronic funding gap. The next section explores potential solutions.

User charges are never sufficient to finance public transport

There is no obvious theoretical reason that prevents urban public transport from covering its full costs via charges on its users. But in practice, as noted in Box 8.1, there are only a handful of instances where fares represent both full cost recovery and sufficient profit to permit a private market to sustainably meet the needs of passenger travel.[65] The experience in some transitional countries, such as Poland, in the early 1990s captures the essence of the problem:

> '. . . cost recovery in major cities appeared to be too low to generate sufficient funds for replacing and modernizing bus and tram fleets. It led to worsening of the quality of public transport and was another reason . . . for undesirable modal shifts.'[66]

This experience highlights the two ways that policy-makers have attempted to 'solve' the cash-flow problem: fare increases and competitive tendering. These solutions typically fall short because policy-makers are often not clear about their policy goals. Is urban transport a private good with some public benefits or is it a public good with private benefits? Depending on how one chooses to answer that question, the policy outcomes are very different. This report is built around the clear premise that urban transport, because it facilitates access, is fundamentally a public good. The policy goal is to strengthen the use of public (and non-motorized) transport. Its private good's features can be leveraged to provide some of the needed revenue, but that, by itself, will not be adequate.

Urban transport, because it facilitates access, is fundamentally a public good

If public transport is viewed solely as a means of private conveyance to satisfy private demands, it has a higher chance of success, but such success has a price. The transport system either does not operate at sufficient volume to positively impact urban spatial patterns in a sustainable or equitable manner, or – if the volume is adequate – the quality is exceedingly low and everyone who can avoid it does. Rising rates of car ownership and car use for work and education trips are the result. The starting point for confronting the financial challenge is to recognize that if urban public transport is to generate its valuable public goods benefits (i.e. to promote access), revenue sources beyond the fare box are needed.

The value of urban transport is directly related to its quality as an integrated system, distinct from a collection of independent modal options and specific routes

No matter how hard policy-makers and officials try to make public transport self-supporting through the fare box and reorganizational moves, such as competitive tendering to improve efficiency, these reforms always fall short. It is not that fare policy and organizational form are unimportant; on the contrary, they are exceedingly important. By themselves these second-order conditions are not sufficient if accessibility is the policy goal. The policy challenge is to broaden both the sustainable mass usage of the service and encourage revenue sources that go beyond the fare box. The goal is to create viable financial models that align organizational forms for service delivery with the unique transport needs of each metropolitan area.

The high private cost of transport

As discussed above,[67] the problem on the consumer side is that while travellers in developing countries do pay high transport prices relative to their income, the amount paid is insufficient relative to the revenue sums required at full cost recovery. Transportation costs for urban and low-income populations are always high, measured either in terms of money or time (Box 8.3). In developed countries, the costs tend to be in money terms. In developing countries, people tend to spend more hours of the day in moving from place to place.

Poor-quality transportation entails high costs that are often not distributed equally across the city or within households. For example, women may become stranded as they attempt to link trips for childcare and employment; the elderly may reduce the number of trips they make; and children may have dangerous or tedious trips to school. Only counting the monetary expenditure of travel, measured in terms of personal or household incomes, these costs can account for anywhere from one-tenth to one-fifth of income for high-income individuals and households. For the poor, it can account for nearly half of their income.

These income constraints limit the amount of revenue that users can contribute to the costs of maintaining the urban transport system. This problem is especially acute in developing countries. Attempts to resolve revenue shortfalls by increasing the costs to populations that are already paying a fare that severely taxes their ability to pay is clearly an extremely inequitable approach, and is thus not likely to succeed.

Good quality urban transport: The system is the solution

The value of urban transport is directly related to its quality as an integrated system, distinct from a collection of independent modal options and specific routes. The more options that urban residents have to access work, education, shopping, social connections, etc., the more value-added the city creates.[68]

Box 8.3 The high personal cost of urban transport: Anglophone Sub-Saharan Africa

Studies from Nairobi (Kenya), Lagos (Nigeria) and South Africa show that lower-income households pay from 15 to 54 per cent of their income in transportation costs. Public transportation fares are high and poorly regulated. In Lagos, for example, bus drivers often force riders to exit and re-board paying an additional fare to continue their trip. Riders must often bargain with drivers for the price of the fare. For the poor, high transport costs diminish their access to basic needs. It erodes the efficiency of individual economic activities as well as reducing national and municipal economic efficiency.

Furthermore, a 1990 study of four Eastern African cities showed that non-motorized transport – walking and cycling – was inadequately accommodated. Walking meets up to half the transport demand and accounts for only 1 per cent of the total transport costs. In contrast, private motorized transport meets less than 10 per cent of demand, yet accounts for over half the costs.

Source: Pirie, 2011.

The financial danger is that in a quest for saving money, specific routes are at times valued on an individual basis and not as part of a system. Individual routes can at times cover operating costs and occasionally some or all of their capital cost when travel demand is sufficiently intense. This typically occurs along major public transport routes serving the highest density portions of urban central business districts. Singapore and Hong Kong are the best examples of this. However, the public goods value of access derives from the existence of entire urban transport systems and not just travel on its densest routes.[69] Less-dense routes that make the entire system viable often cost more to operate than the revenue from fares can cover. But without these feeders, the diversity of opportunities that contribute to the creation of urban value would be lost. The greater the degree of system integration within and across modes, the higher the degree of valuable access the system creates. To achieve that valuable goal requires public-led investments in infrastructure, equipment and service delivery.

The public goods value of access derives from the existence of entire urban transport systems and not just travels on its densest routes

The greater the degree of system integration within and across modes, the higher the degree of valuable access the system creates

EXPANDING THE FINANCIAL OPTIONS FOR PUBLIC AND NON-MOTORIZED TRANSPORT

In what direction should the public sector proceed in order to expand financial support for urban public and non-motorized transport beyond user-generated revenues? This section examines four possible approaches (as well as combinations of these), namely:

- Direct allocations from general municipal and national revenues (i.e. from general taxations);
- Other allocations from government sources;
- Financial arrangements that allow the transport system to capture a portion of the value that they create through urban access (i.e. value capture);
- Other arrangements that allow public–private partnerships to capture the value created by transport systems.[70]

General revenue models

The most common way in which governments meet the funding gap for urban transport is via allocations from general tax receipts. It reflects a general belief in the public goods value that the service creates. To the extent that governments treat public transport as just one among many public services such as police protection and education, this arrangement can work well. This approach is widespread in China, for example. Urban transport there is typically supported through general revenue allocations from the local municipal government, with rail-based more favoured than bus-based. In Shanghai, as part of its accommodation of World Expo, the government allocated an additional US$541 million[71] to ensure smooth operations in 2009.[72]

In virtually every city there are some general revenues used to support the urban transport system in one way or another. In Curitiba, Brazil, the fares on the BRT system cover the operating costs for the private companies that supply services, including reduced and free tickets for some categories of riders. Nonetheless, the user-generated revenue does not cover all of the infrastructure costs. The municipality supports the construction and maintenance of the street-based exclusive rights of way on which the system operates from its general revenue sources.[73]

One of the weaknesses of general revenue as a financial source is its political vulnerability. In cities where public transport is viewed as a largely private good, any forms of public support are often looked upon as temporary and easily dispensed with in the belief that the fiscal problems are the self-inflicted wounds of an incompetent industry. This is especially the case in austere fiscal times (such as the current global financial crisis), when politicians can adopt this rationale as they search for a politically easy place to cut public spending. These losses of support always cause cuts in services and higher fares, just when more people need mobility to find work and have less money to spend on it.

Another form of political vulnerability that should be mentioned here is that related to changes in political leadership at the city and national level. This applies not only to changing political directions related to the rise and fall of support for specific political parties, but also to the departure of individuals that may have championed specific initiatives in the transport sector.

Figure 8.4 provides an overview of sources of operating revenue for public transport in five developed country cities. The figure indicates that three of the public transport operators – TriMet in Portland (US), Translink in Vancouver (Canada) and Sytral in Lyon (France) – collect more than three-quarters of their operating revenues from either fares or dedicated tax revenues (over which they exert some degree of control). Operators that rely on direct funding from local, provincial or national governments for their revenue streams may more easily be subject to the negative effects of changing political climates.

The most common way in which governments meet the funding gap for urban transport is via allocations from general tax receipts

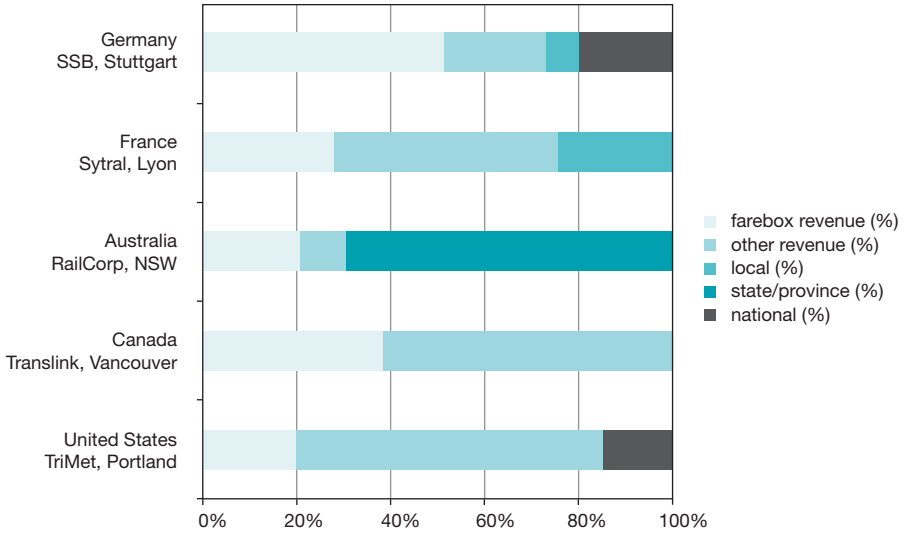
One of the weaknesses of general revenues as a financial source is its political vulnerability

Ideally, funding for non-motorized transport should come from normal operative budgets from departments dealing with transportation and public works.[74] However, funding for such infrastructure investments could also be drawn from revenues from advertising, road pricing/taxes and private-sector

Figure 8.4

Sources of operating revenue, selected cities

Source: World Bank, 2011a.



participation. It should, however, be noted that many low-income people in developing countries are so poor that they find even the cheapest bicycles prohibitively expensive. Thus, policies to encourage non-motorized transport in such countries should include funding options to enable the poorest urban residents to purchase bicycles.

Other allocations of public funds

Given the limitations of public funds to finance public transport, many governments have also appropriated funds from other revenues and tax incomes, mainly from indirect beneficiaries, i.e. individuals and organizations who are not necessarily users of public transport, but are understood to benefit from the

Box 8.4 Urban road pricing initiatives

The primary objective of most urban road pricing initiatives is to reduce congestion levels during periods of peak travel demand. However, such initiatives may have additional goals, such as generating revenue, reducing environmental impacts and encouraging public transport use. When financing is the main purpose of road pricing, the aim is to design a system that provides steady and reliable revenues. Quite often the purpose may be to finance the cost of new infrastructure, for example a new road or bridge. The manner in which these revenues are used is often the key to obtaining public acceptance for the scheme – even if the primary goal is congestion management. An overview of different types of road pricing initiatives is included in Figure 8.5.

The first modern road pricing system in the world was implemented in Singapore in 1975. The purpose of the system is to regulate traffic, by achieving a target speed that gives improved accessibility. Every three months the fees are revised upward or downward, based on whether the travel speeds are above or below the desired speed. In 2001, the project sponsors introduced an environmental component to the scheme by charging a reduced fee for electric or hybrid cars.

Oslo, Norway, introduced an electronic road toll system in 1990, with 19 tolling stations that control access to the city 24 hours a day, 7 days a week. Emphasis was placed on the generation of revenues necessary to finance new road and public transport projects. As a result, the traffic impacts of the toll system itself have been minimal, with only a 3–4 per cent reduction in traffic. The annual operating costs of the toll system account for approximately 10 per cent of annual revenues, while the remainder is used to support road and public transport investments.

Other systems have since been introduced in a number of cities around the world. In developing countries where traffic levels are low, or where construction costs are high, it is unlikely that the tolls will cover more than operation and maintenance, and perhaps a part of the construction cost. In Mexico, for example, the main reasons for the failure of road concession projects have been attributed to: lower than expected revenues due to traffic shortfalls; excessively high toll rates; and the currency crisis of 1994.

Even though urban road pricing initiatives are designed to generate socially desired benefits, experience shows that there are major obstacles encountered during the planning phases related to public acceptance, equity, politics, economics, technology and the design of the pricing scheme. In the 1980s, the city of Hong Kong considered the introduction of an electronic congestion scheme. The public response, however, was unfavourable, as there were significant privacy concerns about the government's ability to track users' movements and identities, and the initiative failed.

Sources: Transportation Research Board, 2005; Eliasson and Lundberg, 2002; Tanaka et al, 2005. See also http://en.wikipedia.org/wiki/Road_pricing, last accessed 15 February 2013.

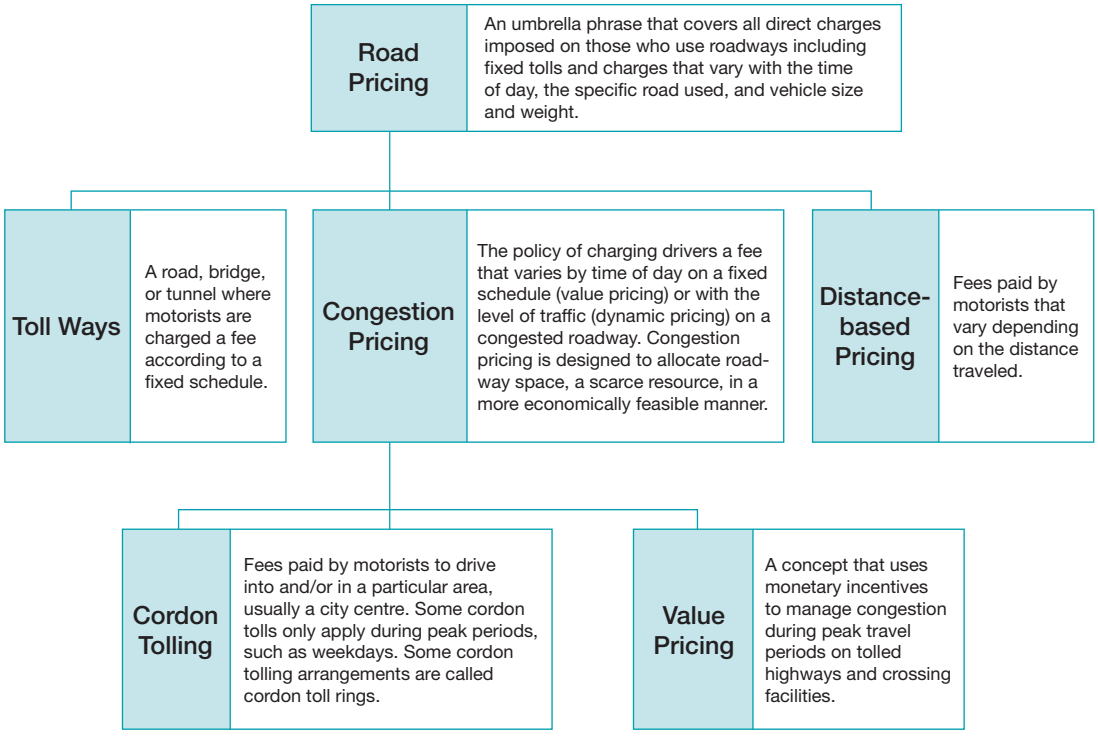


Figure 8.5
Urban road pricing terminology
Source: Aecom Consult, 2006.

availability of urban transportation services. Examples of such funding (which are in effect cross-subsidies to public and non-motorized transport[75]) include, *inter alia*: various forms of road pricing (Box 8.4 and Figure 8.5); parking fees (Box 8.5); advertising; sales taxes (Box 8.12); taxes on fuels and vehicle ownership; employer contributions (Box 8.6); and grants from international funding agencies.[76] However, the allocation of such public funding is also frequently exposed to political considerations, and may get diverted to other purposes, particularly during periods of economic austerity or changes in leadership.

A well-known example of such economically derived revenue charges is the *versement transport* implemented in France, a tax levied directly on employers within the urban area (Box 8.6) on the rationale that they benefit from increased productivity as a result of employees and customers having better access to work and commercial locations.[77] Other

Public funding is . . . frequently exposed to political considerations, and may get diverted to other purposes, particularly during periods of economic austerity or changes in leadership

Box 8.5 Parking charges: A promising source of finance for public and non-motorized transport

Parking charges have been introduced in many local authorities in cities across the world, as a source of revenue to finance local transport services. In Milton Keynes (UK), revenues from parking fees are dedicated to supporting public transport. Similar implementations worldwide include Aspen (Colorado, US), Miami (Florida, US), La Spezia, Verona and Milan (Italy).

Current parking planning practices tend to favour generous parking supply and minimal parking places, which have unintended and undesirable consequences: they increase development costs, reduce housing affordability, increase private car use and contribute to urban sprawl. As result, everyone but the motorist pays for parking. Consequently, problems such as traffic congestion, road infrastructure costs, road traffic accidents and pollution emissions are further exacerbated.

Recognizing the need for parking planning and management reforms, urban planners have proposed the introduction of various forms of parking fees and taxes. Such taxes can help raise funds and achieve various planning objectives, including more compact development and increased use of alternative modes. In Barcelona (Spain), 100 per cent of the revenue gathered from parking tariffs goes to operate 'Bicing', the city's public bike system.

Parking is increasingly being linked to public transport, and park-and-ride schemes have been introduced in many cities across the world, as an efficient means of managing car travel demand. This also allows for increased flexibility and enhanced intermodality for travellers, in particular women who tend to have several destinations for their trips, as they may need the car to drop off their children at school, but might prefer to use public transport to get to work. In Prague (Czech Republic), park-and-ride facilities are established near metro and railway stations. These car parks offer low all-day prices, which include the fare for the public transport system.

Sources: Shoup, 2005; Litman, 2006b; Victoria Transport Policy Institute, 2011.

Box 8.6 *Versement transport*, Paris, France

Versement transport was first introduced in 1971 for the Ile de France (Paris) region, with the purpose of providing a consistent funding base to operate and invest in public transport. *Versement transport* is a compulsory tax levied on public and private companies with more than nine employees, with rates collected as a percentage of a company's total payroll costs (although with a fixed ceiling imposed by the state). Over the years, the geographical coverage of this scheme has extended to all metropolitan areas with a public transport authority. The tax rate is determined by local authorities but varies from region to region, ranging from 0.5 per cent to 2.6 per cent.

Before this tax was implemented, public transport in France was mainly funded through user fares. However the revenue base generated from *versement transport* now represents a major source of finance, which has lowered the costs of public transport while also supporting large-scale infrastructure projects, such as Strasbourg's light-rail system and the implementation of the metro in Marseille. In 2007, the incomes from *versement transport* in the Paris region accounted for a third of all funds allocated to public transport.

However, critics believe that *versement transport* adds more to the cost of labour, something which is undesirable given the high rates of unemployment. It has also been criticized for encouraging urban sprawl, as companies relocate their business outside the main urban area to avoid paying such taxes.

Sources: CODATU, 2009; Cabinet Alain Thomas, undated; Bouf and Hensher, 2007; Allen, 2011b.

benefits include increased property values where land is serviced by public transport and for other road users who experience less congestion.

Value-capture models

Since direct public funding is almost always politically vulnerable (particularly in periods of financial austerity), it is preferable to link publicly sponsored forms of financial support as directly as possible to the benefits urban mobility bestows upon indirect beneficiaries. It is within that context that location-based taxes and assessments to support transport service have become popularly labelled as value-capture systems. The term reflects the reality that urban transport does, via external benefits, create value for parties not directly using the service. This approach is politically appealing because it is able to explain how the charge relates to the benefit and to provide qualitative support commensurate with the needs of a growing city.

Value-capture approaches work best in cities where there is initially low per capita car use and where the population is growing

Hong Kong is undoubtedly the best-known instance where a provider of public transport covers the full costs and attains a profit through the use of a value-capture model.[78] The essential elements of this unusual situation result from the unique, public-private, corporate structure of the service provider, i.e. the Mass Transit Railway Corporation (MTRC) (Box 8.7). It has both a public mission to provide transport to a major city, but at the same time (thanks to the public trading of its minority shares) it is strongly governed by the earnings considerations of the private market. This arrangement bestows important urban access benefits on the entire Hong Kong region. And, due to a direct linkage to the ongoing real estate yields, the MTRC is able to sustain urban public transport via the process of value capture.

The practice as it has evolved in Hong Kong is unique to the institutional arrangements there. However, the underlying principle has widespread applicability. Although the term value capture is of recent vintage, the principle has long been understood as an important element in the creation of urban public transportation (Box 8.8). The lesson learned from the Hong Kong experience is that it is possible to practice value capture in service to the public interest. However, other cities also have a tradition of financing transportation projects by taxing real estate that benefits from infrastructure projects. In Bogotá, Colombia, for example, road expansion, improvement of public space, bicycle paths and TransMilenio lines have all benefited from this kind of financing.[79]

It is the principle of creating an agency that is capable of bridging the land use and transport divide in the service of enhanced urban access that is the important lesson to draw from the experience. The range of experiments with parking fees, highway tolls, congestion charges and land taxes are all variations on the principle of value capture (Box 8.4). Tax-increment financing also works according to the same principle: when a site's value increases due to the implementation of new transport infrastructure, the government can anticipate an additional increment in real estate taxes, and can borrow against this anticipated tax revenue to finance implementation of the transport infrastructure.[80] Similarly, private investors may provide capital for transportation projects in exchange for a share of revenue over time.[81]

Value-capture approaches work best in cities where there is initially low per capita car use and where the population is growing.[82] The first condition means that there is less resistance to overcoming car dependence and the second means that there is a strong potential customer base for the system. These conditions hold almost universally in the rapidly growing cities of Sub-Saharan Africa and Asia. In cities where population growth is stable or even

Box 8.7 Hong Kong and its Mass Transit Railway Corporation, China

Hong Kong's MTRC builds, owns and operates all the rail lines in Hong Kong. MTRC is unique among public transportation providers, in that it is a private for-profit corporation that is 76.7 per cent owned by the Hong Kong Special Administrative Region, which in turn owns all land in Hong Kong. The rest of the shares are publicly traded on the Hong Kong stock exchange. Due to its relationship with MTRC, the government is able to capture the monetary value of the access and agglomeration economies that its transport service generates.

Hong Kong's unique financial model works as follows. The Hong Kong government makes land around future station stops available to the MTRC on long-term lease at pre-transport development prices. The MTRC then sells the rights to develop these sites – at post-development prices – to designated private developers, who leverage the station locations for the creation of shopping malls and housing. The substantial difference between the two prices pays for the capital cost of the new rail infrastructure.

Furthermore, and most importantly, MTRC also negotiates a share of future property-development profits and/or a co-ownership position from the highest bidder, i.e. the MTRC retains a long-term claim on the rental income stream of these projects. Thus, MTRC is paid up front for land, plus a post-development share of the development's revenues, in addition to collecting fares. It is that long-term claim on urban value that turns this enterprise from just another struggling provider of public transport into a sterling corporate performer.

Between 2001 and 2005, property developments – i.e. development, investment and management – produced 62 per cent of MTRC's revenues. Railway income, made up mainly of fare-box receipts, generated 28 per cent of total income. The remaining 10 per cent of income was generated from advertisement and ownership of other assets (i.e. telecommunication leases and convenience retail shops).

One of the strong factors in the success of MTRC is that – in addition to satisfying initial conditions (there is a strong financial disincentive to car ownership, and population density is quite high) – more than 40 per cent of Hong Kong's population resides within 500 metres of an MTRC station and one in five households live within 200 metres of a station.

Sources: Pan et al, 2011; Cervero and Murakami, 2008b; MTRC, undated.

Box 8.8 Value capture has a long history to ensure private sector profits

In the early days of modern public transport, the late nineteenth and early twentieth centuries, private developers who built the first street railway systems understood the connection between the public transport improvements they were creating and land values in the streets that abutted the systems. They purchased land at the outskirts of the city and gained franchises to operate public transport over the streets running through the parcels of land they owned. They then installed the street rail infrastructure and as soon as the land had been developed and sold, the revenue-losing public transport routes were abandoned to the public sector to maintain from that time forward.

Starting in the 1910s, these systems began to falter and because they were by then vital public services, they soon became publicly owned and operated systems with the difference between costs and fare revenues provided by municipal general funds. The history of urban public transport in North America is replete with examples of this. In 1917, for example, the Commonwealth of Massachusetts passed its first public control act, taking over the public transport routes running through the City of Boston to its suburbs.

Sources: Edel et al, 1984; Schrag, 2000; Schaeffer and Sclar, 1980.

declining and car use is extensive – as is the case in many cities of North America and Europe – value capture via claims on rising real estate revenues will typically be disappointing, no matter how well they are organized.

Assuming that the right demographic and modal use conditions exist, the next most critical factor is the distance between places of residence and public transport stops, whether they are BRT or rail. It has been estimated that for every 10 per cent increase in distance from a public transport station, there is a 1 per cent decline in property values.[83] Hence the closer the target population is to the public transport stops, the higher is the relative real estate value and the larger is the potential base of support for the system (Box 8.7).

Three institutional factors in particular are vitally important in the successful deployment of value-capture mechanisms:

- Municipal governments need strong capability to value land and levy land taxes as well as impose fees on car users in the form of congestion charges and parking fees.
- These governments need a strong ability to regulate (if not control) the assembly of land parcels that line up with plans for building transport infrastructure.

- The capacity of government to act as a knowledgeable business partner is critical if the public–private partnership's ability to manage the attendant real estate developments is to be sustainable.

Other public–private partnerships

Value capture as practised in Hong Kong is a highly specific application of a more general approach to the provision of public services, called public–private partnerships. A public–private partnership is a contractual agreement between a public sector entity – such as a ministry, a department or agency – and a private sector partner to deliver a specific facility or service that is a public responsibility. A public–private partnership model is not a single model. Rather it is a flexible concept that runs across a continuum of contractual arrangements ranging from traditional forms of government procurement all the way to total private ownership of publicly used infrastructure (Box 8.9).[84]

Public–private partnership . . . is a flexible concept that runs across a continuum of contractual arrangements

In terms of infrastructure, these arrangements can include design, construction, renovation operation, maintenance or financing of practically any public facility or public service. In terms of urban mobility, the purpose of these arrangements – from the perspective of the public partner – is to obtain the benefits of expensive elements of networked transport infrastructure, while avoiding the costs and risks inherent in both construction and maintenance. For the private partner the ultimate goal is a healthy return on the capital invested. Such arrangements involve contracts that may extend over decades.

However, economists term such contractual situations as 'incomplete contracts'[85] because it is impossible to write a binding legal agreement that can foresee all the possible permutations of circumstance in which the parties to the arrangement might find themselves. As a result, the parties usually make provisions such as requiring arbitration or some other form of third-party governance to (hopefully) resolve differences of opinion and circumstance, as they will inevitably arise over the term of the agreement. Nonetheless the difficulty of negotiating such changing circumstances makes these arrangements far less stable in practice than they appear in theory. As a result this requires that public partners ask careful questions before engaging in such arrangements.

One major unstated but powerful motivation for the public partners in such situations is to pass the risks of construction and maintenance off to the private party. The private party's motivation for incurring the risk is to gain a positive return on their investment. Because the private party has a significant amount of capital at risk they go to great lengths to limit the extent of their risk and liability.[86]

In a typical infrastructure public–private partnership the private partner is actually a consortium of firms that form what are known as 'special purpose vehicles', which are independent, stand-alone entities tailored to the specific public-sector request. These vehicles help insulate and contain the scope of project-related risk to the parent companies. The basic problem from a public perspective is that ultimately the public sector can never fully off-load the risk (see also Box 8.10). The private party always has the option of bankruptcy to unburden themselves of an untenable situation. But because the investment involves vital elements of public infrastructure, the public partner can never walk away. The result is that

Box 8.9 Types of public–private partnerships

Public-private partnership projects attempt to provide options between the extremes of full public and full private control. There are a wide variety of potential public–private partnerships, as shown in the table below. In fact, a 'partnership' begins whenever the government decides to allow the private sector to control one or more of the activities that it traditionally managed on its own.

	More public ←			→ More private
	Traditional government procurement	Private operation with:		Totally private ownership
		public financing	private financing	
New facilities	Separate bids for design and for construction	Private sector designs and builds facility in one bid	Private sector finances, designs and builds facility	Private sector controls entire process
Existing facilities	Operated by public agency	Operation and maintenance contract	Long-term lease	Private sector buys facility from the public
Hybrid	N/A	Contract to develop and operate facility		N/A
Ownership	Public	Public	Public	Private sector

Source: Office of the State Comptroller, New York State, 2011, pp3–5.

Box 8.10 Economic rationale for using public–private partnerships

How can a public agency know if a public–private partnership is a better arrangement than the more traditional way of creating public infrastructure? The typical valuation process employed to provide a proximate answer to this question is a process called value-for-money analysis.

As public sector borrowing costs are normally less than those of private parties, a straight comparison of construction costs alone almost always favours public construction over a public–private partnership. To avoid this problem, value-for-money analysis justifies the use of a public–private partnership when it can be shown that the discounted financial costs, over the life of the project, are lower than the costs of conventional procurement.

However, it is virtually impossible to know if these lifecycle costs will be lower. To get around this challenge, public agencies often construct a hypothetical projection of what the operation would cost if it remained public (based on comparable past experiences from elsewhere). The basic problem for such a comparative cost analyst is deciding which partner bears that risk over time; the more risk that can be apportioned to the public sector, the higher are the costs of the public sector comparator. Public–private partnership proponents argue that risk should be borne by the party most able to carry it. Invariably, that is the public sector, so value-for-money analysis almost always demonstrates that the public–private partnership is less costly.

In practice, there are no ways to know in advance if a specific public–private partnership will be cost effective. In effect, public–private partnerships ***proceed more often as a matter of faith than experience***. However, this having been said, it is important to also note that a 'value for money assessment should also take into account the potential non-financial benefits of PPPs [public–private partnerships] such as the accelerated and enhanced delivery of projects'.[a]

Sources: ACCA, 2004; Central PPP Unit in the Department of Finance Government of Ireland, 2007; [a] EPEC, 2012.

the public sector often finds itself in the position of buying out the private partner at great cost to the public treasury (Box 8.11).

In 1997, the UK Government decided to overhaul the London Underground, the world's oldest metro system, through a public–private partnership (Box 8.11). When the public–private partnership was put in place in 2002, the net present value of the 30 years long arrangement was estimated at £15.7 billion.[87] However, within just a few years, the private sector partners went bankrupt.[88] It has been estimated that the legal and other consulting costs

Box 8.11 The use of a public–private partnership to upgrade the London Underground, UK

When the UK government decided to upgrade the London Underground in 1997 it was decided to undertake this infrastructure upgrading as a public-private partnership. The government believed this was a sensible move following years of underfunding and financial instability. Furthermore, it was also believed that while the weak management of London's underground led to cost and time inefficiencies, the operation of trains had been satisfactory.

A complex public–private partnership structure was developed, whereby the three public–private partnership consortia were set up to carry out different parts of the maintenance and rehabilitation of the underground infrastructure. The public sector retained ownership and responsibility for the delivery of transportation services.

Specific and carefully written contracts meant that the infrastructure 'companies' (infracos) would be fully invested through performance-based incentives and penalties, tied to the specifications of the contracts. To account for possible unanticipated costs, as a result of age of the metro system, a public arbiter was appointed to adjudicate claims for such unforeseen costs during the maintenance and renewal of train systems. Provisions were also made for a periodic review of contractual arrangements every 7.5 years.

However, the project was at a disadvantage from the outset as infracos used private capital to finance the public–private partnership that was to be repaid through the annual loan payments made by the government. This was a more costly option as the cost of private borrowing was greater than raising capital through public bonds. In addition private lenders demanded a public guarantee of 95 per cent on their loans. Thus, as the risk borne by lenders was minimal, there was little or no incentive to review the efficiency of infracos or hold them accountable for the use of the money given to them. If the project failed, which it eventually did, risk fell upon the public sector.

Two major problems undermined this public–private partnership agreement. The first was the fragmentation of operations and construction between public and private partners. The infracos were seeking to carry out work that maximized their profits but didn't necessarily address London Underground's mission of service delivery. Construction work, for example, was continually carried out at inconvenient times. The second problem was the lack of coordination and fragmentation between the two main consortiums involved. This resulted in inefficient implementation, without a clear corporate governance structure. In hindsight it may thus be said that the long-term survival of this project was doomed from the outset.

Sources: National Audit Office, 2004; House of Commons Transport Committee, 2008; Wolmar, 2009 and 2010.

involved in designing the structure for this public–private partnership amounted to almost £500 million.[89] Between these start-up transactions costs and losses caused by guarantees to private banks, plus cost overruns on the contracts, it is estimated that this public–private partnership cost UK taxpayers over £2 billion of unnecessary loss, and left London with a large number of subway stations in various states of disrepair. This was the result of a 'deal that was forced on their city by the central government . . . And this is just the beginning: costs for the City of London are . . . expected to grow by an additional £1 billion'.[90]

The underlying generic problem is that public–private partnerships . . . are dealing with situations in which information is always incomplete and future situations uncertain and changing

As a result of the care put into constructing the public–private partnership model, this project exemplifies the forethought required to implement such major urban transport public works via public–private partnerships. At the same time, the fact that this 30-year project was completely dissolved one quarter of the way through, in 2010, also makes it an important cautionary experience about the inherent limits of such an approach to major public works. Presently the refurbishment of the London Underground is proceeding as an in-house project of transport for London, the London Underground's parent agency. All indications are that it is generally proceeding on time and on budget.[91]

This London experience is instructive on several levels:

- It demonstrates the problems that arise when the public and private partners have different perceptions of the mission.
- It demonstrates the fact that the start-up costs of establishing a public–private partnership – in terms of consultant and operating costs – can be much higher than expected when these processes begin. These transaction costs are typically either ignored or badly underestimated when the public–private partnership is being designed and politically promoted.
- One of the promises of bringing in private partners to manage public infrastructure is that they will introduce new and innovative technology. Although that can happen in some cases, in general once contracts are signed, entities (be they public or private) become risk averse and seek to protect profits from assured revenue streams.
- Finally, it demonstrates that even when there is an attempt to overcome the problems of incomplete contracting with highly specified contract terms, in regard to deliverables, dates and penalty clauses, the problem of contract compliance becomes a serious impediment.

The most important lesson from this experience is that the simpler and clearer the terms of engagement in a public–private partnership are, the more likely it is for the public sector to achieve its goals.

When public–private partnerships fail, they always do so for reasons unique to the individual situation. This leads to a temptation to say that the next effort will avoid those problems and everything will go as planned. Indeed international consulting firms publish 'how to' guides in which they state that there is a need for knowledge and transparency all around.[92] However, the underlying generic problem is that public–private partnerships, if they are dealing with significant urban transport challenges, are dealing with situations in which information is always incomplete and future situations uncertain and changing.

Combination models

Finance for most urban transport systems is typically a combination of sources that resemble value capture in some aspects and general revenue funding approaches in others. It is likely that for most systems some combination of these along with direct user charges is the most realistic financial arrangements. The specific financial structure of any particular system will depend greatly on the historic context in which it operates and local norms and values with regard to the structure of the public sector. The challenge is to understand how models that combine elements of user and public revenues can successfully operate in practice. This section reviews experiences from New York and India.

Finance for most urban transport systems is typically a combination of sources that resemble value capture in some aspects and general revenue funding approaches in others

The New York Metropolitan Transportation Authority (MTA) provides an example of ways in which diverse revenue sources can be collected by a single agency and focused on providing a multi-modal regional transport system (Box 8.12). The agency relies on a diverse mix of revenues from federal, state and local governments and a collection of taxes earmarked for transportation. Lastly, the revenue surplus from tolls on bridges and tunnels is an important part of the MTA finances and an implicit cross-subsidy from car and truck users to public transport customers.

The attractiveness of New York's regionally and modally integrated urban transport system is that it facilitates an easy distribution of costs and revenues across modes. This in turn provides a potentially easily used policy tool with which to encourage the pursuit of a sustainable urban mobility system. However, it is important to understand that timing and institutional context matter greatly. The first decade of the New York experience was fraught with many political difficulties, as each agency fought to protect its existing autonomy within the new organizational format. Hence while the model provides some promise for the potential of integration and movement towards a true 'urban transport system', it also requires strong governmental administrative capacity and dedication to succeed.

Responding to the poor quality of public transport in India, the Government of India is actively

Box 8.12 Multiple funding sources: The New York Metropolitan Transportation Authority, US

New York has one of the oldest and largest urban transport systems in the world and its evolution over the past century is instructive in terms of how metropolitan systems can adapt over time to multiple funding streams. In 1968, New York State consolidated the administration and financing of all transport infrastructure and rolling stock in the metropolitan region into a single transport agency, the MTA. The main motivation for this administrative consolidation was to consolidate the planning and finances for all modes.

The MTA is responsible for regional transport for an area extending over 130,000 square kilometres and containing a population of about 20 million. The responsibilities include New York City's metro system comprised of both elevated and subway lines and fixed-route bus system, suburban buses, Long Island Railroad, Metro-North Railroad, Long Island Bus and the principal bridges and tunnels that carry car and truck traffic in and around the region.

As metro fares cover only 60 per cent of operations, other revenue sources are required. The MTA collects tolls on its bridges and tunnels too, but incomes are still insufficient. As a result, the State of New York permits the MTA to derive other revenues from four different taxes:

- a small (0.25 per cent) tax on all transactions in the 12 counties of the MTA region;
- a regional franchise tax levied on certain business activities;
- a transportation-oriented tax called the 'long lines tax', which is levied on trucking, telegraph and telecommunications companies;
- a 'petroleum business tax', which is levied on refining or selling petroleum state-wide.

The first two of these are regional taxes, which provide the majority of non-fare revenue operating funds. Such taxes are, however, not good sources of stable funding, as they are highly sensitive to fluctuations in the economy during recessionary times. The last two taxes are imposed state-wide, and as a result, the MTA gets only a portion of them: 48 per cent of the long lines revenue and 55 per cent of the petroleum tax.

Source: King, 2011.

Box 8.13 Funding of public transport investments: Lessons from Delhi and Ahmedabad, India

India's National Urban Transport Policy (NUTP) explicitly shifted the focus of transport policy away from reactive congestion relief through road and highway expansion to the proactive promotion of non-motorized transport and improvement of public transport systems. NUTP is funded under the seven-year (2005–2011) JnNURM, which provided centrally financed grants to urban transport projects in specific cities that complied with NUTP guidelines. The Janmarg BRT in Ahmedabad and the Delhi Metro (Phase II) are among the first projects funded under this programme.

At the level of practice, several key principles for investing in economically sustainable urban transport development can be extracted from this experience. These include:

- ***Local buy-in***: Both Janmarg and Delhi Metro demonstrate the importance of local ownership of projects. Political commitment at all levels is vital to implementation success, but local-level buy-in – particularly at the agency and bureaucratic level – is also essential. Local ownership can generate cost savings through better utilization of local resources, and improves the responsiveness of the design and construction process to local conditions. A firm belief by local implementation teams in the benefits of their schemes is also important in building public acceptance.
- ***Multi-tiered financing***: Financing of urban transport systems should be multi-tiered, combining various funding options according to the relative comparative advantages of different funding actors and the short-term and long-term financing needs of the schemes (e.g. capital investment versus recurrent expenditures). Delhi in particular was effective in drawing in alternative financing options from a variety of international, national, state and local stakeholders.
- ***Dedicated agency***: The creation of a single purpose agency to implement and operate public transport schemes minimized the need for coordination across multiple agencies. However, under this arrangement extra care needs to be taken to ensure proper integration with other modes of mobility.
- ***Incremental implementation***: There are both physical and financial advantages to carefully planned, incremental implementation. Pay-offs include improved design, time savings, cost savings through feedback and modification as well as greater public acceptance and increased ridership. Ahmedabad provided a particularly effective example of this.
- ***Innovative technology***: Technology can play an important role in public acceptance of a scheme. Modern communication and ticketing technology has the potential to greatly facilitate integration of different modes of transport. But the value of 'modernization' also lies in its visual association with cleanliness, safety and comfort. This is particularly important in developing countries where aspirations for modernization are often synonymous with the use of private cars (or motorbikes).
- ***Affordability/equity***: Affordable fares are absolutely critical and should never be sacrificed in a quest for financial cost recovery.

Sources: Rizvi, 2011; Mohan, 2008.

promoting sustainable urban transport development, formalized in the National Urban Transport Policy (of 2006), through the use of strong financial incentives targeted at local governments. The Janmarg BRT and Delhi Metro projects present two alternative responses to this new policy (Box 8.13). Although they differ in terms of scale, mode and specific approaches, the different solutions made by the two projects reflect similar common successful principles for financing sustainable urban mobility systems.

High-density and mixed-use locations reduce the need for mobility and provide access through co-location of important urban activities

The two Indian projects illustrate the ways in which national governments can organize finance to stimulate local investments in urban public transport. Both cases show how supportive national policies, accompanied by financial incentives, can play a critical role in the adoption and implementation of more sustainable forms of urban transport. Furthermore, both experiences were backed by significant grant contributions towards capital costs. The experiences demonstrate the importance of inter-governmental cooperation and the need for a clear local public authority over the operation of public transport systems.[93]

Cities should strive towards full cost pricing for cars

Overall, there is an important lesson here concerning the need to ensure that – as a general rule of thumb – operating costs should be tied to fares, but capital costs need a broader source of revenues, a source that relates to the broader access values that the system creates. The MTRC in Hong Kong provides a good example of this (Box 8.7).

CONCLUDING REMARKS AND LESSONS FOR POLICY

In order to be sustainable, urban mobility systems must be organized by a financial model that is designed to protect the important public goods aspect of public transport. As the experiences recounted in this chapter make clear, there is a wide and flexible range of ways in which these models can be organized. However, there is no simple 'best-practice' approach to designing such financial models. Instead, one should look beyond the individual experiences and look for principles that can be replicated in another setting. This section presents seven principles that should inform the evolution of sustainable urban transport finance.

Schemes that successfully permit urban transport to be supported by the value of the access that they create can provide a strong basis for sustainable urban mobility

The goal of an urban mobility system, as a public good, is to promote ***access and not mobility***. Mobility is merely one means to the achievement of that larger end. Consequently, policies should reflect the value of access and not the time saved through enhanced mobility systems.

High-density and mixed-use locations reduce the need for mobility and provide ***access through co-location*** of important urban activities. In terms of modal options, it is important that these be integrated so that users can move easily from one mode to another. For example, park-and-ride lots at the periphery of a dense urban settlement can allow travellers to easily leave cars and enter public transport for the final legs of journeys into these places.

An urban area with good public transport is more likely to also have urban spaces conducive to pedestrian access and non-motorized transport. Only ***public transport developed as a public good*** can make this happen. Once that is in place, the challenges from private motorized transport are reduced to a point where they are practically solvable.

Urban public transport should aim to be a high-quality service. An urban public transport system that is viewed largely as a system for the use of the poor quickly becomes a poor system. If government is seeking to induce car drivers to use public transport, it is important that the alternative be safe, reliable, comfortable and plentiful. A system used by residents from all walks of life is a system that is politically (as well as economically) sustainable.

Cities should strive towards full cost pricing for cars. Cars do not pay prices that match the full value of the economic and social costs that they impose in the pursuit of access. Revenues collected via congestion pricing and licensing fees should reflect the costs that private car use imposes on urban life. However, it is both short sighted and ineffective to attempt to sustain public transport systems via monies raised by car-based charges. These monies alone will almost never be sufficient to allow for the creation and financial sustainability of high-quality urban public transport.

Schemes that successfully permit urban transport to be supported by the value of the access that they create can provide a strong basis for sustainable urban mobility. ***Value capture*** can be done via real estate taxes that reflect the value of location as well as through complex land investments. The more exclusive and high density the modes of travel, such as rail and BRT, the higher will be the capture-able values. Furthermore, in terms of land use, the closer the places of residence and other activities are to terminals, the higher values and volume of use can be expected. Value capture does not work as well on more ordinary bus routes or in places where car use is already very high and/or where populations are stagnant or shrinking.

Good public transport requires a capable public sector. The debate about the relative efficiency of public and private agents in the production of public transport has been an irrelevant distraction. Regardless of organizational form, the key to success in creating effective urban mobility systems is always a capable public governing authority operating in a transparent manner.

NOTES

1 See discussion in Chapters 6 and 7.
2 See Chapter 2.
3 Jirón, 2011, pp3–4.
4 http://data.worldbank.org/indicator, last accessed 23 January 2013.
5 Darido et al, 2009.
6 Jirón, 2011, p8.
7 It should here be noted that the number of car registrations may overstate the number of cars in regular use. Individuals may use public transportation for daily trips and still own cars that they use only occasionally. Residents of cities with high-quality public transport systems, amenable land uses, and tolls or congestion charges (such as in Stockholm, Sweden, for example) may own cars, but may not use those cars for their journeys to work or other regular travel.
8 And without active efforts to improve both the quality and quantity of urban public transport.
9 Crozet, 2006.
10 Jain, 2011, p16.
11 Pirie, 2011, p35.
12 See Chapter 2.
13 Pirie, 2011.
14 The issue of co-modality is highlighted in other chapters of this report.
15 World Bank Independent Evaluation Group, 2007.
16 See Chapter 2.
17 See section below on 'The Perennial Financial Problem: Costs Exceed Revenues'.
18 Flyvbjerg et al, 2008; Railway-technology.com, undated; Chandran, 2010.
19 Capital costs for buses using 'high occupancy vehicle lanes' and arterial streets were found to be US$5.6 million and US$0.4 million, respectively. However, the study also showed that BRT capital costs vary considerably – from US$4.3 million to US$34.2 million – due to factors such as cost of the roadway, station structures, park-and-ride facilities, traffic signal systems and vehicles (United States General Accounting Office, 2001).
20 Chandran, 2010.
21 Flyvbjerg et al, 2008.
22 Chapter 6 discusses the issue of fare affordability as part of the wider discussion on equitable access to urban mobility.
23 Godard, 2011b, p52.
24 See the section below on 'General revenue models'.
25 The section below on 'Other allocations of public funds' provides a further discussion on various forms of road pricing.
26 King, 2011.
27 See the section on 'Value-capture models'.
28 Value capture is discussed in more detail below in the section in 'Value-capture models'.
29 Public–private partnerships are discussed in more detail below in the section in 'Other public–private partnerships'.
30 See Box 8.11.
31 Jain, 2011, p33.
32 Pirie, 2011, p4.
33 Rimmer, 1982.
34 Cervero, 1991.
35 Pirie, 2011, p13.
36 Godard, 2011b, p21.
37 Pirie, 2011, p18.
38 Pucher and Renne, 2003.
39 As discussed in the section on 'From Economics of Mobility Towards Economics of Access' below, cost–benefit analyses often measure the value of time according to average wages. Using similar methods, the cost of vehicle congestion has been estimated at US$0.845 per litre of petrol in the US, and US$0.190 in the UK. By comparison, pollution contributes comparatively less to the total marginal external cost of driving (US$0.048 and US$0.053, in each country respectively) (Parry and Small, 2005).
40 US Census Bureau, 2012.
41 UN-ESCAP, 2006b.
42 Vivier and Mezghani, 2001.
43 UITP, 2011a.
44 Such as management, technical/maintenance, ticket inspectors, customer advisors and other tasks.
45 UITP, 2011.
46 See Chapter 6.
47 Chitere and Kibua, 2004.
48 Pirie, 2011.
49 Mueller, 2011.
50 UITP, 2009, p3.
51 Weisbrod and Reno, 2009, p31.
52 SmartGrowthAmerica, 2010.
53 See Chapter 1.
54 UN, 2012a.
55 See also discussion on road traffic accidents in Chapter 6.
56 WHO, 2009.
57 See for example Small and Verhoef, 2007; Goméz-Ibañez et al (eds), 1999.
58 Two studies in particular played a major role, both of which were completed in 1962: the comprehensive study of transport and land-use planning for post-War Chicago (see for example Black, 1990) and the cost–benefit analysis of London's Victoria Line (see Foster and Beesley, 1963; Beesley and Foster, 1965).
59 Metz, 2008.
60 Jacobs, 1970; Schaeffer and Sclar, 1980; Glaeser, 2011.
61 Parry and Small, 2005.
62 Bertaud et al, 2009; CODATU, 2009.
63 Typically, advocates for raising the cost of car usage also argue for transferring the revenues received to public transport. While this is a reasonable step, it has never been demonstrated that these revenues alone are sufficient to address the full costs of adequately enhanced public transport. Furthermore, by only going that far in policy terms, these advocates avoid the more politically charged but still underlying substantive issues of urban equity.
64 Crozet, 2007.
65 The case of the Hong Kong transport system is discussed in Box 8.7 below. It does make a profit, but that comes largely from its ability to leverage the value of the real estate around its stations. See also Figure 8.4.
66 Suchorzewski, 2011, p40.
67 See the section on 'Public transport' above.
68 Schaeffer and Sclar, 1980; Glaeser, 2011.
69 It is import to note that this problem is endemic to passenger transport in general and not to urban public transport in particular. Intercity passenger rail systems do not cover full costs through fares. Individual airlines do make profits on individual routes, though even these are not steady. Profits fluctuate with fuel costs and business cycles. Most importantly, the air traffic control system, on which individual private routes depend, is publicly maintained.
70 This chapter does not include a discussion of the role of official development assistance and foreign direct investments for the financing of urban transport, although this may play an increasing role in the future. 'A global development partnership should promote the flow of longer-term investment, including FDI [foreign direct investment], to a greater number of developing countries and into critical sectors such as transport' (UN System Task Team on the Post-2015 UN Development Agenda, 2013, p10). However, from an analytical point of view, such finance should be considered primarily as direct public allocation, subject to considerations beyond the control of local authorities, or subject to arrangements similar to those of private–public partnerships. Chapter 7 includes a discussion on international funding mechanisms for environmentally sustainable transport.
71 Cost in local currency was RMB 3.7 billion. Exchange rate of US$1 = RMB 6.83 (in 2009).
72 Pan et al, 2011.
73 Interview with Mayor Cássio Taniguchi in the spring of 2004 at Curitiba City Hall. See also CODATU, 2009, p37.
74 Hook, 2005.
75 This is discussed in Chapter 7, from the perspective of changing the modal split.
76 CODATU, 2009; Hook, 2005. In developing countries, there may also be some potential for funding through the clean development mechanism discussed in Chapter 7.
77 See also Figure 8.4, which indicates that *versement transport* funding contributes about a quarter of the total revenue stream for the public transport company Sytral, in Lyon, France.
78 As noted earlier, only a handful of public transport providers worldwide are making a profit (Box 8.1).
79 Bocarejo and Tafur, 2011.
80 See, for example, Denver Urban Renewal Authority, undated; Dye and Merriman, 2006. The City of Chicago, US, for example, has a large number of tax increment districts (http://en.wikipedia.org/wiki/Tax_increment_financing, last accessed 30 January 2013).
81 Jain, 2011.
82 Salon and Shewmake, 2011.
83 Salon and Shewmake, 2011.
84 This report does not provide a detailed analysis on how public–private partnerships in the transport sector work. For that, see, for example: EPEC (2012); Office of the State Comptroller, New York State (2011); EC (2003); Central PPP Unit in the Department of Finance Government of Ireland (2007).
85 Salanie, 2005; Sclar, 2000.
86 See for example Sullivan and Burris, 2006; Holeywell, 2011; Wolf, 2011.
87 National Audit Office, 2004, p1.
88 Metronet in 2007 and Tube Lines in 2009 (House of Commons Transport Committee, 2008, p5).
89 House of Commons Transport Committee, 2008, p15.
90 Sanger and Crawley, 2009.
91 Transport for London, 2011.
92 See for example, http://www.deloitte.com/partneringforvalue, last accessed 29 July 2013.
93 Rizvi, 2011; Mohan, 2008.