Funding is vital to ensure viability

This issue includes a chilling warning to all metros that if fares are set too low, the funding shortfall will take a generation to fix — and in the case of metros this is usually 30 years or more. Recent benchmarking work by the 26 metros in the CoMET and Nova groups shows that, on average, operators require an 11% subsidy simply to cover operating costs, leaving aside the wider issue of renewals or expansion.

When times are hard, maintenance and investment are an easy target for cuts — but the effects only become apparent later.

Almost 35 years after its first line opened, Washington DC has firsthand experience of the consequences of this strategy. The metro is now embarking on a comprehensive 10-year programme of infrastructure renewal, equipment upgrading and rolling stock replacement. On June 24, WMATA approved a six-year $5bn capital plan to be financed from several sources, including federal and state governments. Faced with funding shortfalls as a result of the economic downturn, many North American and European metros are cutting services — just when they should be increasing them to meet rising demand generated by higher fuel prices and urban congestion.

According to Richard Anderson, of Imperial College London, the research suggests that increasing capacity is more effective in attracting passengers than fare reductions, and hard-won experience in Montréal bears this out. Yves Devin reports how Société de transport de Montréal’s policy of rationalising operational costs and expanding services has paid dividends, generating significantly increased ridership and higher revenue — to the point that Montréal is considered the most productive metro in its benchmarking group.

STM is in a fortunate position, as the local authorities in Montréal appear to be working hand-in-hand with public transport operators to achieve broader environmental and social goals, adopting measures designed to encourage commuters to transfer to public transport.

Alas, this is not always the case. Too often, politicians have their own agenda when deciding whether to support or impede the construction of new metro lines and extensions. And they often want to control fares policy. According to Anderson, fares have been falling in real terms in most of the cities in the review, but the potential loss of revenue was compensated by growing passenger demand during a period of strong economic growth. This suggests that the short-term benefits may have been achieved at the cost of longer-term sustainability, as it becomes politically difficult to increase fares during a recession.

New York MTA is suffering from a significant funding shortfall, yet the benchmarking shows the average fare per passenger-km is less than half that in London, as a percentage of average net pay. In an ideal world, perhaps fares should be regulated annually using a formula linked to affordability, particularly where wages rise faster than inflation.

At the same time, passengers are demanding higher levels of service quality and real-time information, but lack of funding means many operators struggle to satisfy their aspirations. The implementation of smart card and electronic ticketing schemes opens up the opportunity for operators to develop a personal relationship with their customers and understand their needs (p56). And smarter ticketing would allow the operator to break away from simplified fare structures, and perhaps charge more during peak hours when capacity is at a premium.

It should be blindingly obvious that stable and dependable funding is crucial to the long-term viability of any urban rail network.

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Managing metro fares and funding

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Recen research on behalf of CoMET and Nova highlights the key role played by fare regulation and funding regimes in ensuring the long-term viability of metro networks. In addition to covering the cost of daily operation, dependable sources of income are essential to finance planned investment in asset replacement, network expansion and service enhancements. Otherwise, falling fares and insecure funding can lead to a spiralling decline in service quality.

All metros share the same problem — how to cover the high costs of construction, operation, maintenance and renewals. Recently, this challenge has become particularly pronounced for many European and North American metros where funding crises have been triggered by faltering economies. Metros play a central role in catalysing sustainable cities, but must themselves be economically sustainable if they are to keep pace with rising passenger expectations and reflect the improving quality of city life. This article explores good practice in metro fares and funding policies identified through the CoMET and Nova research activities and highlights the key lessons learnt.

CoMET and Nova are continuous benchmarking programmes which use inputs from 26 metros. The groups are differentiated by size; CoMET includes large metros in cities such as Hong Kong and Paris while Nova comprises small to medium-sized metros from cities such as Montréal, Rio de Janeiro and Barcelona. The groups were created in 1994 to identify and share best practice in metro operations and management. The Railway & Transport Strategy Centre at Imperial College London carries out the analytical research and administers the benchmarking process.

SUSTAINABILITY Outputs from benchmarking activities can help metros to learn from past mistakes and develop sustainable funding policies.

Barcelona Line 9 is a fully-automated driverless operation. Construction has been financed with funds from several sources, including station concessions.
The longevity of these benchmarking programmes can be attributed to their clear objectives and the significant benefits that members have achieved in reducing costs, improving productivity and service quality and assisting them in their dialogue with government and other stakeholders.

**Funding regimes**

Metros operate in different environments: some are located in growing cities with large concentrations of population and employment; others serve less dense, smaller cities, but may enjoy a greater degree of integration with other public transport modes. Some are privately operated, with a degree of autonomy from government, under contracts that determine service, fares, fare changes and operator income; others are effectively arms of city government with limited autonomy.

The ability of any metro to provide a sustainable level of service quality in the medium to long term is determined by this environment. It influences the extent to which dependable and rising income from fares, other commercial revenue and government sources covers the costs of operations, renewals and, crucially, necessary enhancements to meet growing expectations and legislation.

Government plays a defining role in influencing the extent to which metro costs are covered by fares and other commercial income and the resulting level of public funding required for operations, renewals and network extensions. Government usually determines fares policy, but may grant the operator autonomy to control operating costs and generate additional non-fare revenue. Transport authorities can facilitate integration with other modes, and their choice of alignment for new lines and extensions will be crucial for the metro's future financial well-being.

Almost all metros rely on public funds to some degree, but such external funding is inherently unstable as political and macro-economic pressures can lead to rapid adjustments in funding within timescales that are too short for effective metro management. Worldwide experience shows that, without stable funding from fares or other sources, long-term planning of timely asset renewals becomes difficult. An over-reliance on subsidy can lead to government taking greater control. When times are bad, it is easy to cut back on maintenance and reinvestment as there is little impact on service quality in the short term. Stop-go funding cycles make it difficult to ensure that all assets are consistently kept in a state of good repair.

**What needs to be funded?**

Using 15 years of financial data from 26 metros, Fig 1 shows the aggregate composition of all expenditures and commercial revenues for our members. Operating expenditure comprises operations, maintenance and administration costs.

In addition, all metros need to replace assets that are life-expired or technically obsolete. Those in a stronger financial position are able to replace underperforming assets and improve service quality by installing platform screen doors or new ticketing systems. In aggregate, metros have spent 54% over and above their operating expenditure on capital investment (excluding extensions and new lines).

Unfortunately, the whole-life cost of a metro is not normally accounted for through depreciation allowances, and upgrades are often not included at all. Simple depreciation to fund like-for-like replacements will not keep pace with rising public expectations and legislation. One member of CoMET considers that replacing equipment to maintain customer satisfaction costs two or three times more than assumed depreciation.

**Sources of funding**

Underpinning any funding regime is the degree to which fare revenue covers operating costs. All metros supplement their income to some degree from advertising sales, retail and telecommunications, but benchmarking shows that in normal circumstances this rarely covers more than 15% of operating costs.

Concessionary fare support, operating revenue support and capital grants from government remain the most common mechanism to meet funding requirements. Hypothecated incomes from measures such as congestion charging in London, a levy on employers in France or a fuel tax in Canada have generated welcome and relatively dependable revenue streams. Property income is only sizeable where land values or densities are high but funding from land value capture mechanisms remains underexploited. Unfortunately, some metros simply accrue debt.

Fig 1 shows that the average metro required an 11% operating cost subsidy to cover the shortfall from its commercial revenue. There is clearly a ‘funding gap’. In addition, the public sector usually funds most capital reinvestment and all network extensions. This poses a huge problem for most metros: how to ensure a suitable and dependable flow of funding to finance renewals. PPPs (London), bonds (New York) and public or private sector operating contracts (Rio de Janeiro) all attempt to do this, with varying levels of success.

Fig 2 shows the extent to which commercial revenues cover the operating costs (excluding depreciation) of our 26 members. For reasons of confidentiality, the chart only shows the continent where each metro is located, but clearly reveals a greater need for subsidy in Europe. This is predominantly caused by lower fares...
relative to affordability, greater labour constraints and lower levels of population and employment density. Most European metros rely on government to pay for renewals.

The role of fares policy

Setting metro fares is always politically sensitive, as the fare directly affects the taxpayer and the voting passenger, and fare changes may be erratic and politically motivated. Fares policies—or lack thereof—often make matters worse, creating greater uncertainty to the detriment of long-term economic sustainability and operational quality. Many metros are arguably too reactive to fare changes imposed on them by governments, often feeling that they have no control over tariffs.

To what extent are fares more or less expensive in different cities? Fig 3 shows the average fare revenue per passenger journey and passenger km, as a percentage of average net pay, and provides a good indication of the relative affordability of fares. Comparable fares vary by a factor of 10, even adjusting for affordability. London Underground and New York City Transit have agreed to reveal their data, which shows that average fares per passenger-km in New York are less than half those in London.

Analysis in 2009 revealed that fares were falling in real terms, adjusting for inflation, in 19 of the 26 metros. Fortunately, in recent years strong economic growth in urban areas has fuelled growing passenger demand, compensating for the loss of potential revenue from cheaper fares. This may have brought short-term transport and environmental benefits, but at the detriment of longer-term quality and sustainability.

There can be sound economic, social and environmental justifications for low fares and a degree of public financial support. City governments may wish to encourage modal transfer from roads to alleviate traffic congestion, facilitate regeneration or assist deserving groups of passengers such as the poor, retired and mobility impaired. But often it is not clear what objectives are being met by policy makers who allow fares to fall in real terms year-on-year. Moreover, metros need to be properly compensated for the lower fare income.

Indeed, have policies of reducing fares to encourage ridership growth been successful? Recent research by Imperial College London using CoMET and Nova data has shown that whereas a 10% reduction in fares will, on average, result in a 3-5% increase in patronage, a 10% increase in network capacity will increase demand by 5-11%. This suggests that service improvements, rather than fare reductions, may be more effective in increasing ridership and supports a strategy of increasing fares in line with wages to fund network improvements. Moreover, as fares become cheaper, people will travel more. If a metro is already congested, this will only increase the pressure to invest in extra capacity but, if fares have fallen, paradoxically there may be insufficient revenue to fund the programme.

Therefore, evidence suggests that fares which remain constant, or fall in real terms, cause budgetary problems because wages rise faster than prices in a growing economy. Our data shows that wages typically account for 60% to 80% of operating costs. So, management must either increase the absolute volume of passengers—which in itself carries a cost—or achieve year-on-year growth in labour.

‘Too low a fare from the start of operations will take a generation to fix’

Fig 2. Metro fare and commercial revenue per operating cost for 22 CoMET and Nova metros in 2009.

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productivity, hence the continuous trend towards metro automation.

When adjusting fares, city wages indices are a better measure of public affordability than inflation indices. Moreover, higher standards of living fuel higher passenger expectations which metros must then aim to meet. It is clear that there are important relationships between the fare charged, and the need and ability to achieve appropriate and sustainable levels of service.

**Fare regulation**

There are two drivers of poor fares regulation: politics and a misunderstanding of the economics of metros. In some cases, fares are simply adjusted by government when it is politically opportune to do so, perhaps when a funding crisis arises. A significant increase in fares to avert the crisis makes future rises politically difficult, leading to real reductions over the following years until the next crisis forces the issue again. Around 40% of governments and authorities adjust fares annually in line with inflation, but this too has shortcomings for reasons previously discussed. A few are subject to a fares formula that is not rigidly followed, rendering the formula of limited value.

Successful fare regulation will depend on whether fares are specified and adjusted according to appropriate, agreed principles. Agreed annual fare formulae, implemented in only a minority of metros, generally benefit the metro, its passengers and politicians. Smaller annual increments are politically less painful than larger periodic adjustments, and changes according to agreed principles are fairer and offer greater certainty to the operator. Devolving fare-setting powers to an independent regulator or tribunal can improve transparency, increase objectivity and depoliticise fares to a certain degree.

Ideally, fare adjustment formulae need to take account of affordability, the cost base of key inputs (notably changes to the cost of labour and electricity), the metro’s ability to achieve continuous productivity growth and, crucially, a mechanism to raise fares to pay for upgrades or capacity increases. Experience from the regulated water, gas and electricity markets would lead us to an adjustment mechanism similar to that shown in Fig 4. Such a mechanism is not applied in any CoMET or Nova metro, but Hong Kong MTR has agreed an annual fare adjustment which is very similar, as shown.

Some transport authorities, particularly in Europe, have established operating contracts which take revenue risk away from the metro and effectively subsidise the fare, rather than the metro directly. A leading example is the contract between STIF and metro operator RATP in Paris. Where public funds are required to support operating costs, this approach ensures that funding is more dependable but if, in the long term, the transport authority also has insufficient fare income, ultimately the metro will suffer.

**Fare structures**

A metro’s fare structure may significantly affect its profitability. Notably, those with flat fares tend to have the lowest proportion of operating costs covered by fare revenue. The now near ubiquity of smartcards allows metros to charge in a ‘smarter’ way, reducing the justification for oversimplified prices, such as flat fares, that are not properly related to costs. Fare revenue would be optimised if adjustment formulae were applied to an average fare per passenger-km, allowing the operator to charge different prices for different markets particularly when capacity is at a premium, for example within the central business district during peak hours.

The funding regime is crucial to a metro’s long-term viability. Most could cover operating costs from fare and other commercial incomes, but various policy objectives restrict their ability to achieve this. In an ideal world, commercial incomes should exceed operating costs by at least 10% to provide a degree of certainty.

**Informed dialogue**

It is hoped that the benchmarking analysis summarised in this article provides a greater understanding of fares, funding and financing issues, and will allow a more informed and proactive dialogue between metros, governments and transport authorities. The challenge now is to mitigate the risk of future funding problems by adopting best practice. New metros should learn from the experience of established metros, as too low a fare from the start of operations will take a generation to fix.