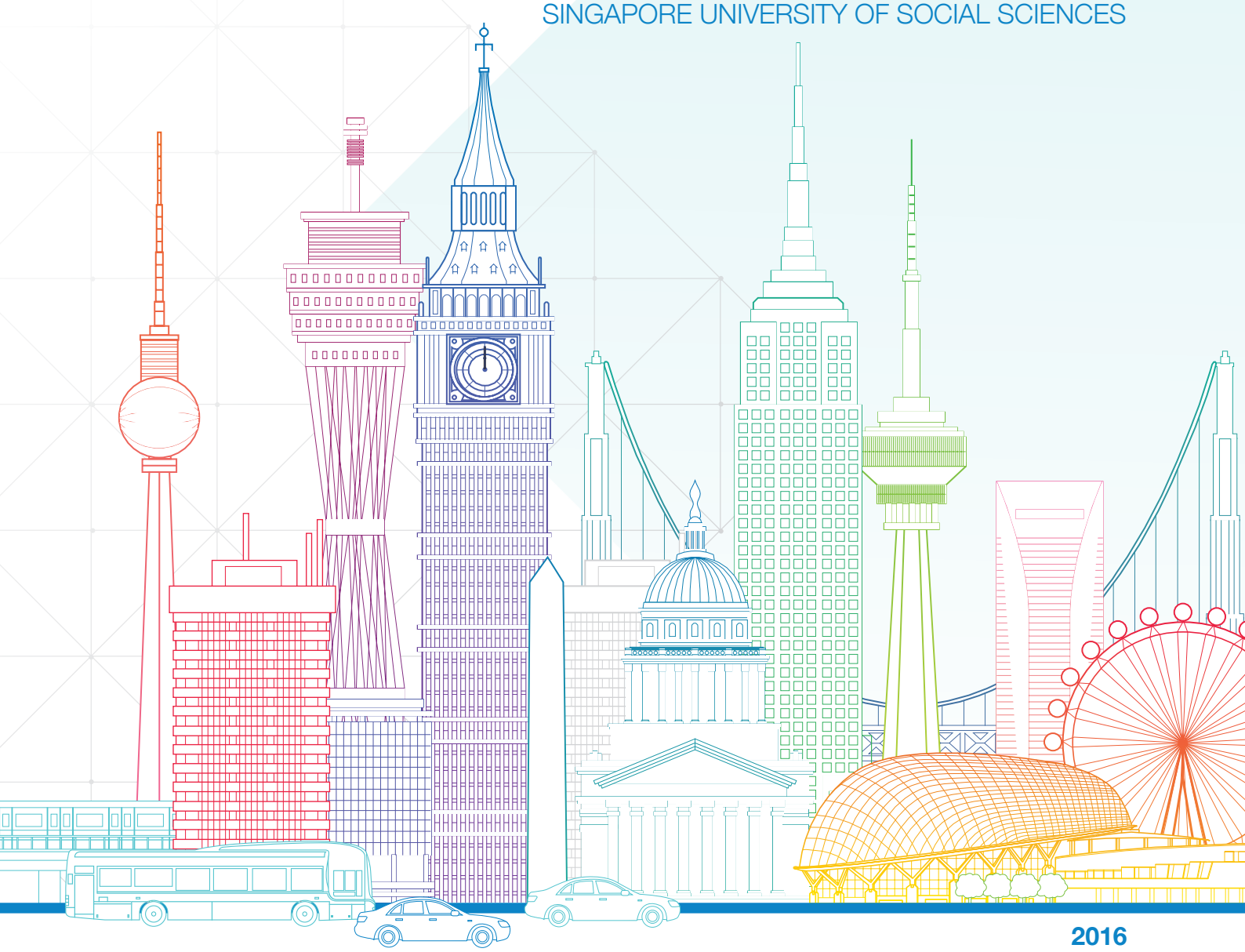
PUBLIC TRANSPORT COUNCIL

Better Rides • Affordable Fares • Sustainable Public Transport

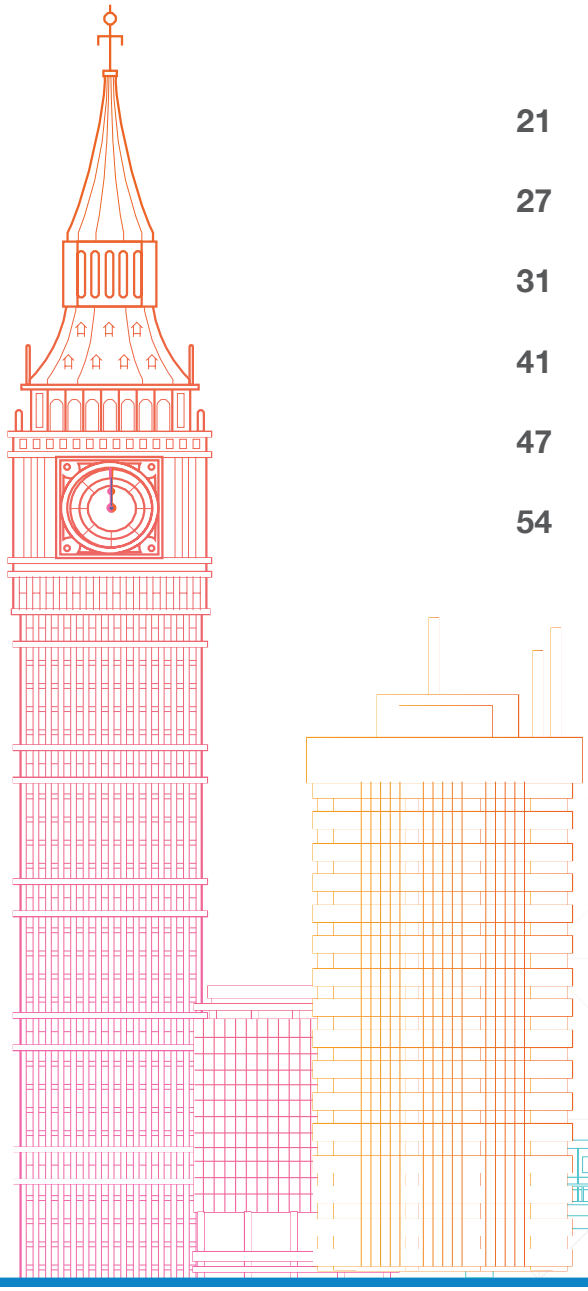
COMPARISON OF RAIL FARES BETWEEN **SINGAPORE** AND **35 MAJOR CITIES** AROUND THE WORLD

ASSOCIATE PROFESSOR VINCENT CH CHUA,
HEAD (RESEARCH), OFFICE OF THE PRESIDENT,
SINGAPORE UNIVERSITY OF SOCIAL SCIENCES

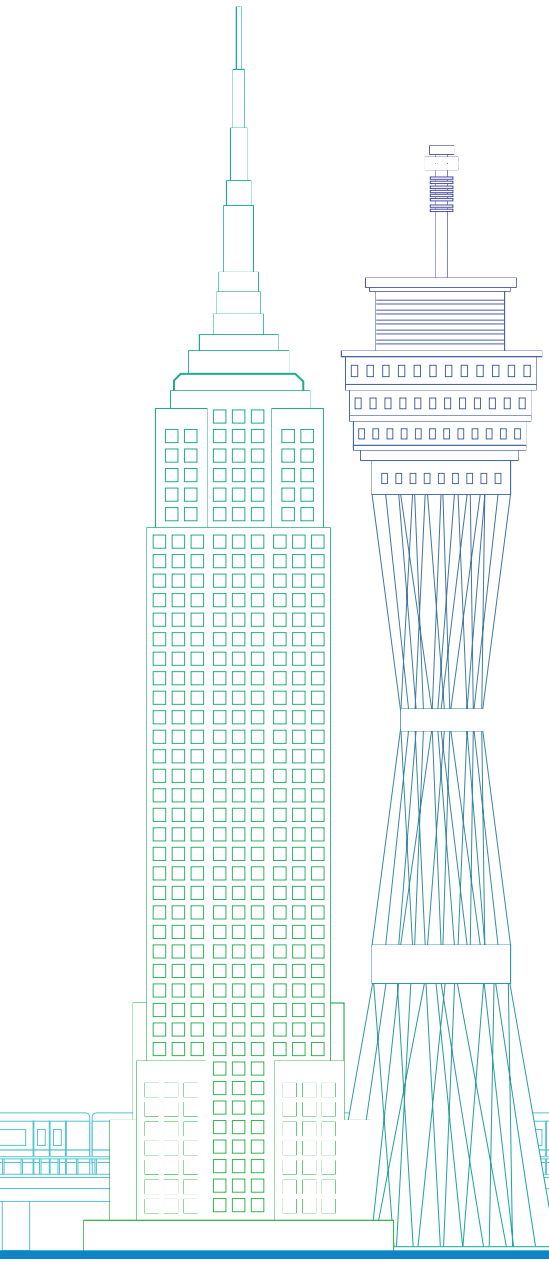


2016

CONTENTS



I. INTRODUCTION



This report on rail fares brings together in one single document fares currently charged for travel on rail Mass Rapid Transit (MRT), subway and Light Rail Transit (LRT)) systems in major cities around the world. Such a document is useful resource when forming a perspective on the fares charged for travel on the Singapore Rail system, in comparison with fares charged in other major cities around the world.

It is an exploratory study that seeks to provide a preliminary benchmark between Singapore's rail fares with comparable cities around the world, and is in no way an exhaustive and definitive comparison of the different rail fare structures.

In the present document, the fare comparison has been restricted to 35 cities spread across four continents, namely, Asia, Australia, Europe and North America. These cities are listed below.

Asian Cities
Beijing
Guangzhou
Hong Kong
Seoul
Shanghai
Shenzhen
Taipei
Tokyo

Australian Cities
Adelaide
Melbourne
Perth
Sydney

European Cities
Amsterdam
Barcelona
Berlin
Copenhagen
Frankfurt
Hamburg
Helsinki
London
Madrid
Munich
Oslo
Paris
Stockholm
Vienna
Zurich

North American Cities
Boston
Chicago
Montreal
New York
San Francisco
Toronto
Vancouver
Washington DC

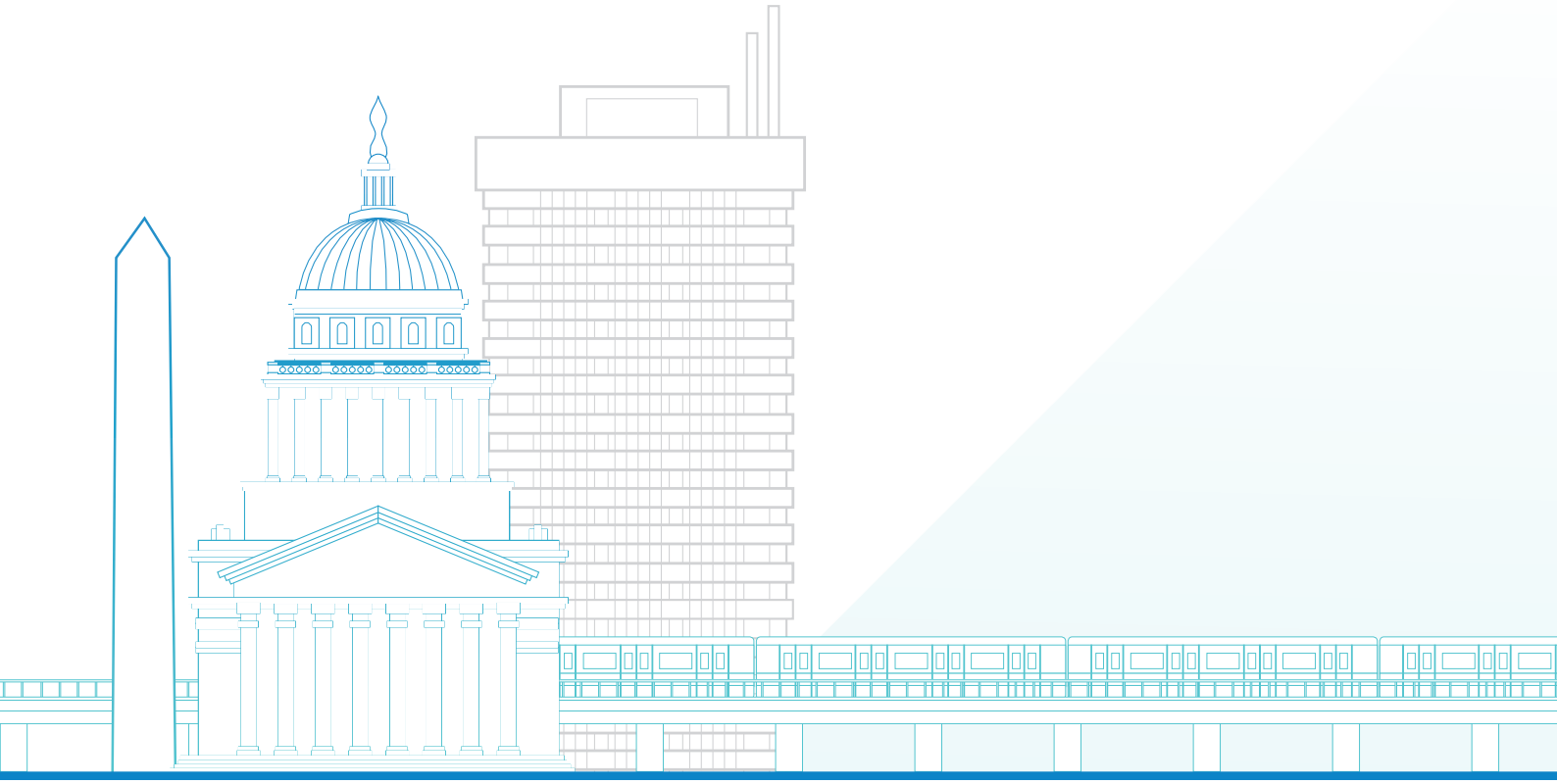
It is important to note that for this exercise, only developed cities which bear the most relevance to Singapore in terms of comparability of rail systems were included. As far as is possible, Contactless Smart Card (CSC) fares are used in the comparison.

The methodology used for comparison of fares across different cities and fare-charging systems is detailed in the technical notes. With the methodology in place, extending coverage of the exercise to cities not presently included in this document can be accommodated in future studies. Likewise, fare levels can be updated with relative ease as fares charged are adjusted over time.

All fares reflected in this report are valid as at 31 October 2016. For Singapore, the new fares take effect on 30 December 2016.

This study is the first of its kind for the Singapore rail system and is the result of a continuing research collaboration between the Public Transport Council and SIM University, now renamed Singapore University of Social Sciences (SUSS).

The main findings based on fares computed using Purchasing Power Parities, Private Consumption (PPPs) are reported in the following section. The findings are to be read together with the technical notes that follow. Supporting charts and tabulations provided in the annexes together with the footnotes provide detailed information supporting the findings.



II. MAIN FINDINGS

The key finding that emerges from this comparison exercise is that rail fares in Singapore are relatively low when compared to the 35 other cities included in the study, after accounting for differences in purchasing power.

In comparison to rail fares in Singapore, the North American cities as well as the majority of European cities have comparatively higher fares. This is also the case for Sydney and Melbourne, two of the four Australian cities included in the comparison exercise. Among Asian cities, it is observed that fares in Tokyo are higher than those in Singapore.

From this study, a preliminary observation made when comparing the fare curves between the different cities and Singapore's is that the Singapore fare curve is relatively lower that the fare curves of 22 cities, out of the 35 cities studied.

Of the remaining cities, Adelaide and Copenhagen have fares that are higher than Singapore's during their peak hours. However, fares for longer-distanced journeys in these cities are lower than Singapore's because of off-peak discounts.

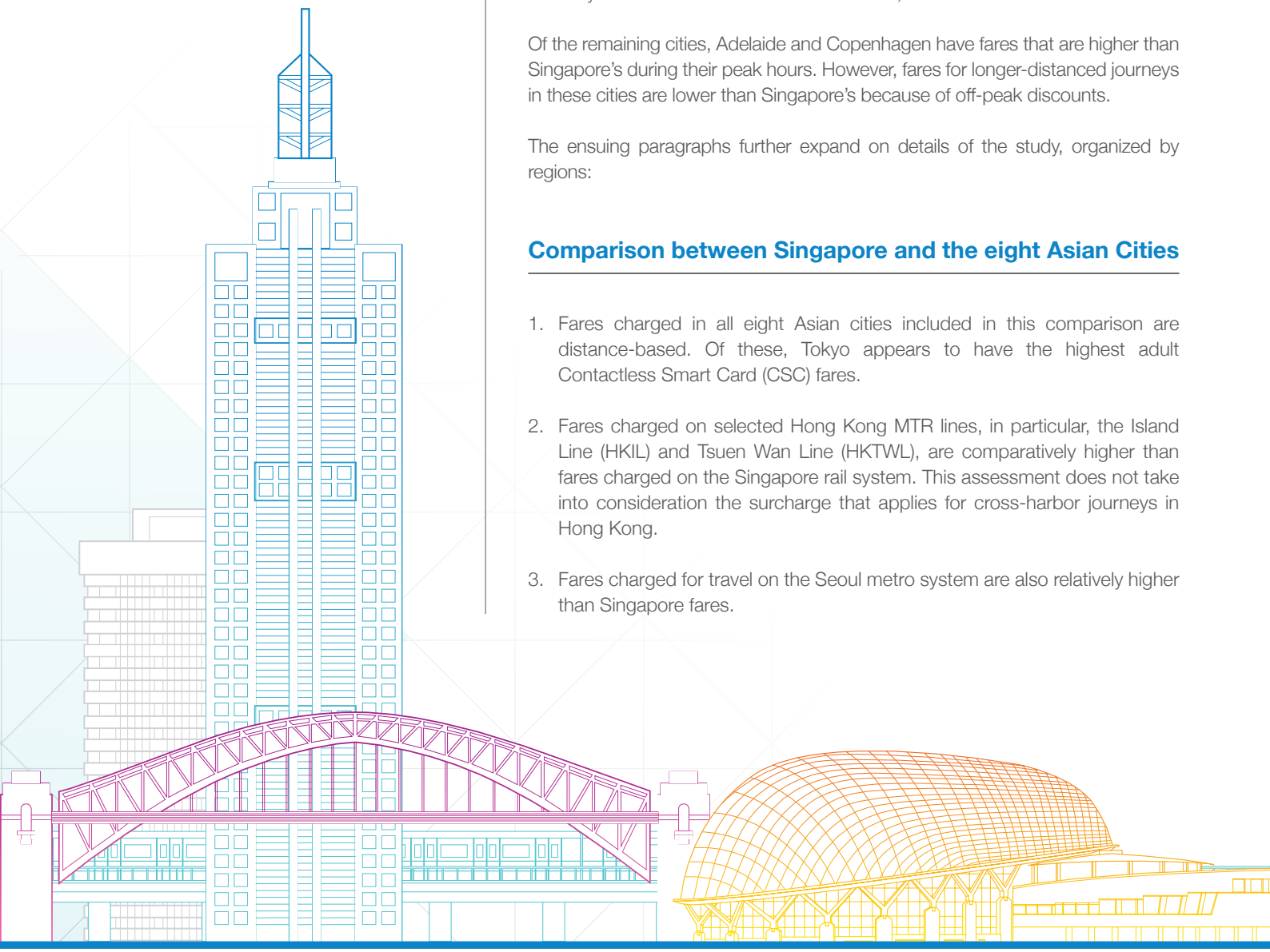
The ensuing paragraphs further expand on details of the study, organized by regions:

Comparison between Singapore and the eight Asian Cities

1. Fares charged in all eight Asian cities included in this comparison are distance-based. Of these, Tokyo appears to have the highest adult Contactless Smart Card (CSC) fares.

2. Fares charged on selected Hong Kong MTR lines, in particular, the Island Line (HKIL) and Tsuen Wan Line (HKTWL), are comparatively higher than fares charged on the Singapore rail system. This assessment does not take into consideration the surcharge that applies for cross-harbor journeys in Hong Kong.

3. Fares charged for travel on the Seoul metro system are also relatively higher than Singapore fares.



4. Taipei fares are lower than Singapore fares for journeys of less than 23 km. For journeys of 23 km and beyond, Taipei fares are comparatively higher. It is important to note that this evaluation is based on fares determined at the market exchange rate. As the cost of living in Taiwan is lower than that in Singapore, the use of the PPP will result in higher fares for Taipei when expressed in Singapore dollars. Unlike the other cities in the comparison, however, a PPP (Private Consumption) conversion factor for Taiwan is not readily available in the World Bank database.

5. Fares charged for travel on the mass rapid transit networks in Beijing, Guangzhou, Shanghai and Shenzhen are comparable to those charged in Singapore.

Comparison between Singapore and the Australian Cities

6. Sydney Trains adopts a fare-charging principle that is distance-based, with peak hour fares fixed for journeys of up to 10 km and rising in steps, reaching a maximum for journeys beyond 65 km. A 30% discount applies for off-peak travel. It is noted that the off-peak discount fares in Sydney are relatively higher than fares charged for equivalent journeys in Singapore.

7. Melbourne adopts a simple 2-zone fare-charging scheme. Journeys requiring travel through Zone 1 will attract a higher fare compared with travel restricted exclusively to Zone 2. The fare charge per journey for Zone-2-only travel is the lowest zonal fare, and this is relatively higher than the maximum fare charged for travel on the Singapore rail network.

8. Perth has a much more elaborate zone-based fare-charging scheme with the city divided into nine circular bands or zones. This zone-based fare charging scheme is supplemented by a lower SmartRider fare that applies to journeys of up to 3.2 km, regardless of the number of zones travelled through. Compared with fares charged for equivalent journeys in Singapore, fares in Perth are relatively higher.

9. Adelaide adopts a flat fare-charging scheme with fares differentiated by peak and off-peak periods. Like Perth, there is a separate lower fare for travel up to approximately 3 km. Taken as a whole, Adelaide peak hour fares are comparatively higher than fares charged in Singapore. Off-peak fares are however comparable to those for equivalent journeys in Singapore.

II. MAIN FINDINGS

Comparison between Singapore and the European Cities

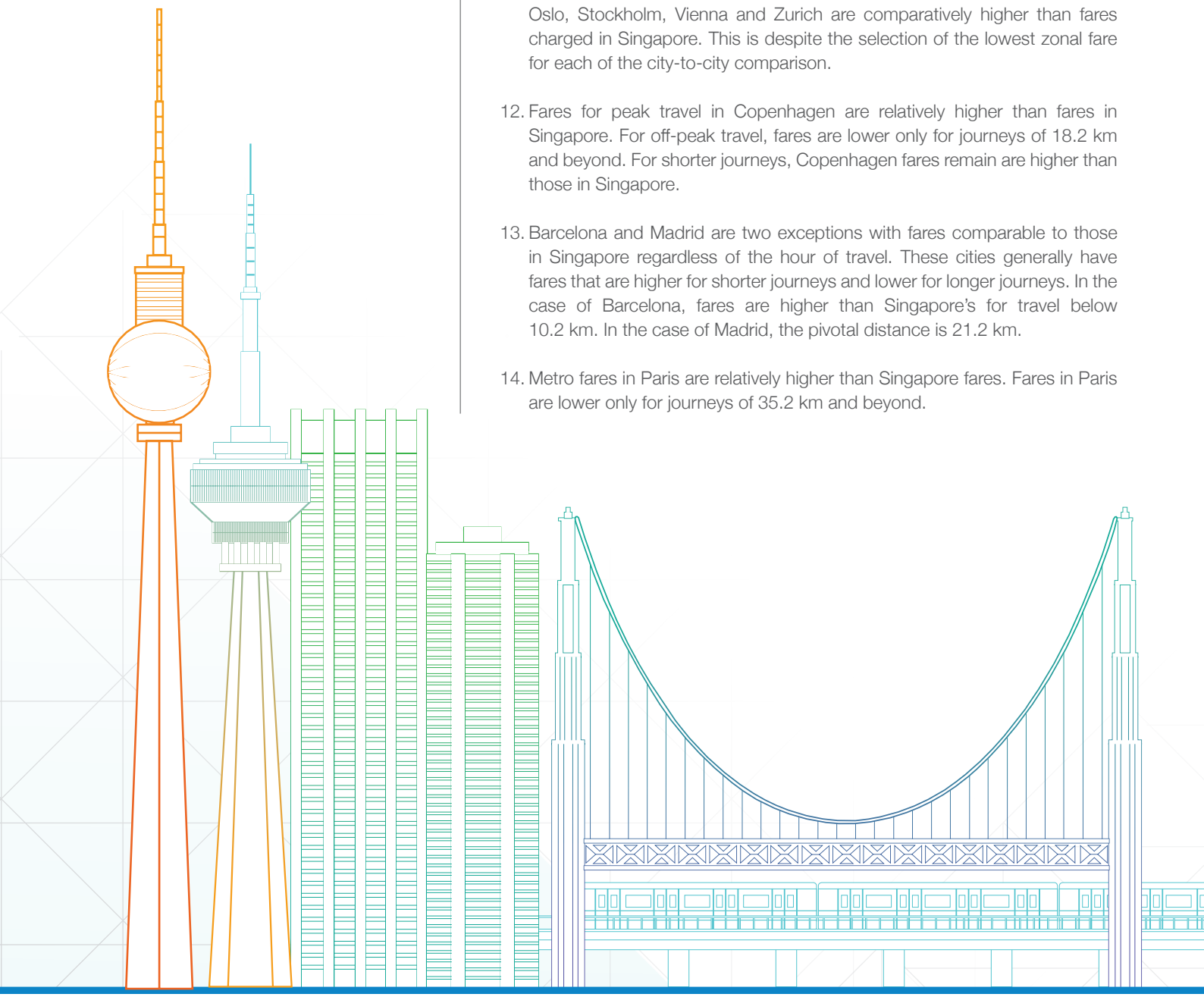
10. Of the 15 European cities in the comparison, 14 have adopted a zone-based fare-charging scheme though with varying degrees of complexity. Amsterdam is the sole exception, adopting a linear fare structure with fares directly varying with distance travelled.

11. Fares in Amsterdam, Berlin, Frankfurt, Hamburg, Helsinki, London, Munich, Oslo, Stockholm, Vienna and Zurich are comparatively higher than fares charged in Singapore. This is despite the selection of the lowest zonal fare for each of the city-to-city comparison.

12. Fares for peak travel in Copenhagen are relatively higher than fares in Singapore. For off-peak travel, fares are lower only for journeys of 18.2 km and beyond. For shorter journeys, Copenhagen fares remain are higher than those in Singapore.

13. Barcelona and Madrid are two exceptions with fares comparable to those in Singapore regardless of the hour of travel. These cities generally have fares that are higher for shorter journeys and lower for longer journeys. In the case of Barcelona, fares are higher than Singapore's for travel below 10.2 km. In the case of Madrid, the pivotal distance is 21.2 km.

14. Metro fares in Paris are relatively higher than Singapore fares. Fares in Paris are lower only for journeys of 35.2 km and beyond.



Comparison between Singapore and North American Cities

15. Of the eight North American cities in the comparison, five have adopted a flat fare structure for travel on their public transit systems, namely, Boston, Chicago, Montreal, New York City and Toronto. San Francisco and Vancouver embrace a zone-based fare structure while the fare structure for the Washington DC Metro is distance-based.

16. The eight cities, regardless of the fare-charging scheme adopted, have comparatively higher fares than fares for equivalent travel on the Singapore rail system.

Comparison at Market Exchange Rate

17. Qualitatively, the findings detailed above remained largely intact even if fares were converted to Singapore dollars at existing market exchange rates instead of PPP. For 27 of the 35 cities, fares would be higher at these exchange rates.

18. Fares would have been slightly lower for Barcelona, Hong Kong and Madrid when converted to Singapore dollars at the prevailing market exchange rates. Notwithstanding this, the resulting changes in fares for these three cities do not alter the observation that fares in these cities are relatively comparable to those in Singapore.

19. Where the use of market exchange rates results in a qualitatively different outcome is in the four Chinese cities of Beijing, Guangzhou, Shanghai and Shenzhen. When converted at the existing market exchange rate, fares in these four cities are comparatively lower than fares in Singapore.

20. For the city of Taipei, conversion of fares is already carried out using the S$ to NT$ market exchange rate as the PPP (Private Consumption) conversion factor for Taiwan is not available.

III. TECHNICAL NOTES

1 FARE-CHARGING SCHEMES

1.1 When charging fares for travel on the mass rapid transit network, cities typically adopt one of three fare-charging schemes; flat rate, zone-based or distance-based.

1.2 When a flat rate charging scheme for travel on a transit network is in place, a fixed fare applies regardless of distance travelled on the network. Boston, Chicago and New York City, among others, have adopted such a scheme.

1.3 With a zoned-based fare-charging scheme, a fixed fare applies regardless of distance travelled so long as the journey is made within a given fare zone. Fares will typically change when a journey involves travel through two or more fare zones, even when the origin and destination are located within the same fare zone. London, Stockholm and Zurich are among the cities that have adopted zoned-based fare-charging schemes.

1.4 With distance-based charging scheme, the fare charged will vary according to the distance travelled. Asian cities such as Beijing, Hong Kong, Seoul, Shanghai, Taipei and Tokyo have adopted this scheme for travel on their mass rapid transit systems.

1.5 Under each of these fare-charging schemes, fares charged will also vary across commuter type and across time.

2 COMPARING FARES ACROSS CITIES

Comparison Using Fare Curves

2.1 The fare comparison exercise detailed in this report uses a fare curve comparison method, and differs in a way from fare comparison exercises which compare the price of a standard trip ticket or the fare for journey of a given distance, for example, a 20-km journey. As the fare curve details the fare charged by distance travelled, focusing on the fare curve allows for a holistic assessment of how fares compare across cities.

Contactless Smart Card (CSC) Fares

2.2 As far as is possible, the comparison exercise makes use of adult Contactless Smart Card (CSC) fares to reflect the day-to-day experience of the typical commuter in each of the selected cities.

Currency Conversion

2.3 A necessary element of this comparison exercise is the conversion of fares to a common currency. In this regard, fares denominated in a foreign currency are converted to Singapore dollars at the rate determined by Purchasing Power Parity, Private Consumption (PPP) considerations and at the market exchange rate.

Purchasing Power Parities (PPPs)

2.4 When using PPPs for currency conversion, focus is directed at the purchasing power of currencies with regard to a reference basket of goods –in doing so, particular attention is given to the differing cost of living across cities in the comparison. The following example using the British pound illustrates the derivation of the PPP and how it is used in this report.

Example: If one unit of the reference basket costs £0.80 in London and the same unit costs S$1.20 in Singapore, then it follows that S$1.20 in Singapore has the same purchasing power as £0.80 in London. In purchasing power parity terms, therefore, £1.00 would have the same purchasing power as S$1.20/0.80 or S$1.50. Thus, the PPP for the British pound is S$1.50 to a British pound. Under Purchasing Power Parity therefore, charging a fare of £1 in London equates, in PPP terms, equates to charging S$1.50 in Singapore. If the fare charged in London is £1.50, then that equates to S$2.25 in Singapore.

2.5 For this exercise, the PPPs are derived using the 2015 country-level PPP conversion factors for private consumption goods published by the World Bank. See http://data.worldbank.org/indicator/PA.NUS.PRVT.PP. For ease of reference, these derived PPPs are detailed in Column 2 of Table 1.

2.6 As the PPP (Private Consumption) conversion factor for Taiwan is not included in the World Bank database, the PPP for the New Taiwan dollar (NT$) has not been derived. For this reason, for the Taipei-Singapore fare comparison, Taipei fares used are those converted to Singapore dollars using the market exchange rate. When making an assessment of how Taipei fares differ from fares in Singapore, this point must be borne in mind. The use of the market exchange rate tilts the comparison in favor of lower fares in Taipei, a natural consequence of the differing cost of living in the two cities.

III. TECHNICAL NOTES

Table 1: Purchasing Power Parities and Market Exchange Rates (S$ per unit of foreign currency)

	Purchasing Power Parity [1]	Market Exchange Rate [2]
Australian $	0.758285096	1.0223600
Canadian $	0.901549760	1.0413500
Chinese RMB (CNY)	0.312687516	0.2078400
Danish Krone	0.139570920	0.2074117 [4]
Euro (€): Amsterdam	1.305729364	1.5266200
Euro (€): Barcelona, Madrid	1.580031261	1.5266200
Euro (€): Berlin, Frankfurt, Hamburg, Munich	1.427616652	1.5266200
Euro (€): Helsinki	1.190521392	1.5266200
Euro (€): Paris	1.351210678	1.5266200
Euro (€): Vienna	1.354106914	1.5266200
Hong Kong $	0.187349044	0.1768300
Japanese Yen	0.010533602	0.0127413
Korean Won	0.001167030	0.0011880
New Taiwan $	0.042551300 [3]	0.0425513
Norwegian Krone	0.116018974	0.1654510 [4]
Pound Sterling	1.494330000	1.8777000
Swedish Krona	0.125573366	0.1643179 [4]
Swiss Franc	0.817002258	1.3963000
United States $	1.195262048	1.3728600

[1] Purchasing Power Parities are computed using the 2015 conversion factors for private consumption goods published by the World bank. See http://data.worldbank.org/indicator/PA.NUS.PRVT.PP
[2] Market exchange rates are averages of monthly exchange rates for the period January 2016 to October 2016 published by the Monetary Authority of Singapore. See https://secure.mas.gov.sg/msb/ExchangeRates.aspx
[3] This rate is the market exchange rate. The PPP (Private Consumption) conversion factor for Taiwan is unavailable.
[4] Market exchange rate is an average of daily exchange rates for the period 1 January 2016 through 31 October 2016 derived from information contained in the IMF database. See http://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx

Market Exchange Rates

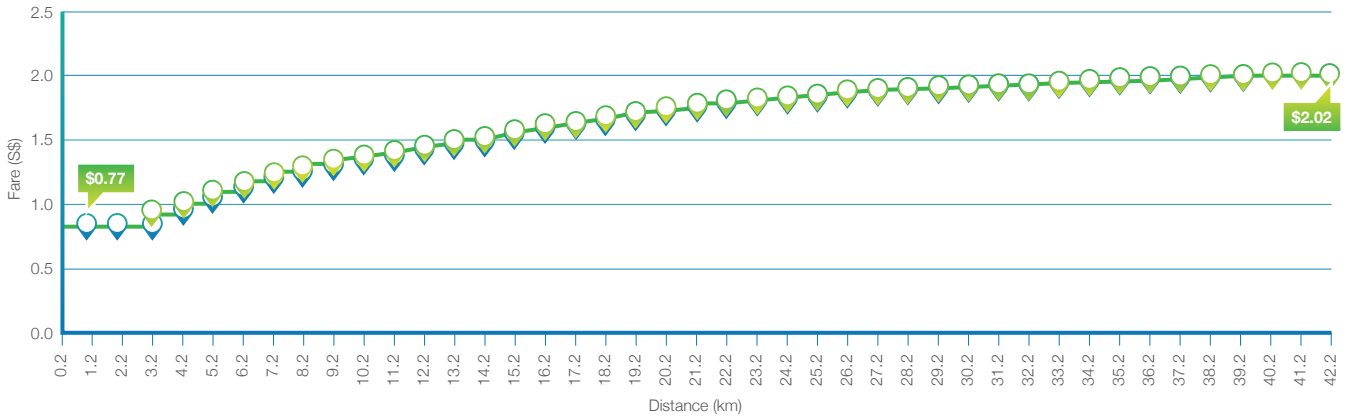
2.7 The use of the market exchange rates emphasizes what a unit of foreign currency can exchange for in the international currency market without regard to the price level or cost of living in the different cities. When using these exchange rates, we take reference from the monthly data on exchange rates published by the Monetary Authority of Singapore (MAS). The actual rates used in performing the currency conversion, averages of monthly rates for the period January 2016 through October 2016, are detailed in Column 3 of Table 1. For details, see https://secure.mas.gov.sg/msb/ExchangeRates.aspx.

2.8 The MAS database however does not cover the Danish krone, the Norwegian krone and the Swedish krona. For these Scandinavian currencies, we turn to the exchange rate information that resides in the IMF database. See http://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx. The derived exchange rates for these three currencies, averages of daily exchange rates over the period 1 January 2016 through 31 October 2016, are similarly detailed in Column 3 of Table 1.

Singapore Fare Curve

2.9 Like many of its Asian counterparts, fares for travel on the Singapore rail system is distance-based with adult Contactless Smart Card (CSC) fares starting at $0.77 for travel up to 3.2 km and rising in small incremental amount for every extra kilometer travelled to $2.02 for travel beyond 40.2 km. Figure 1 is a graphical depiction of the Singapore fare curve.

Figure 1: Singapore Fare Curve



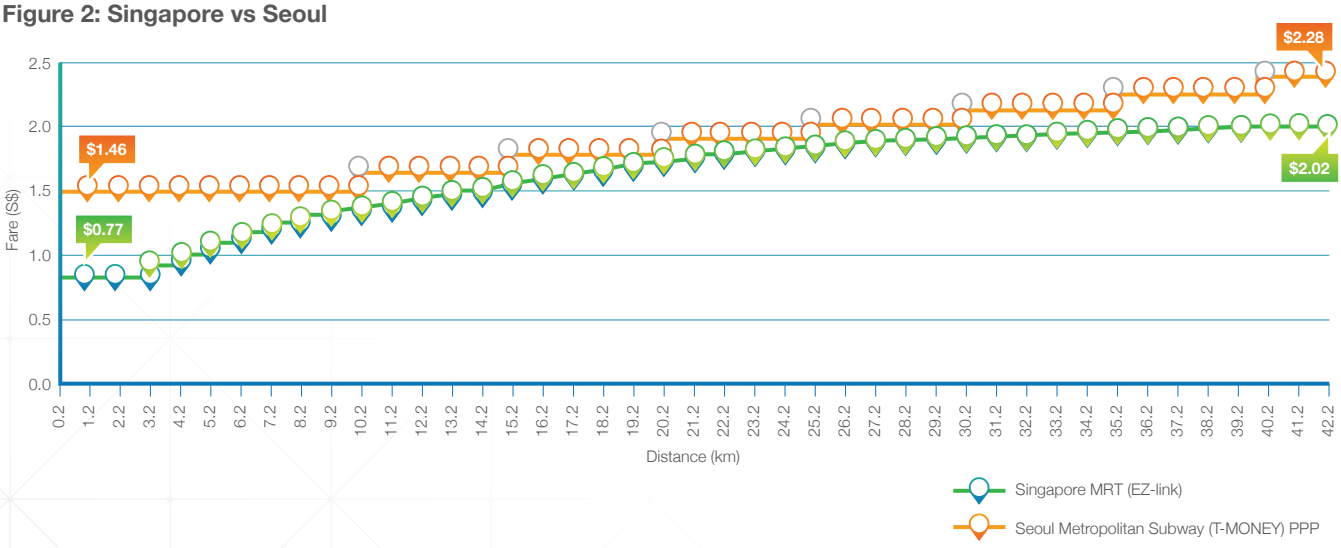
III. TECHNICAL NOTES

Cities with Distance-based Fares

2.10 Comparing rail fares in Singapore with fares in cities that also adopt a distance-based charging scheme is a direct exercise of a comparison between two fare curves. It is straightforward if a clear dominance relation exists: that fares in one city are generally higher (or lower) than fares in Singapore. In the absence of a clear dominance relation, a clear and compelling statement may still be possible, as illustrated the following example.

2.11 Figure 2 below charts the fare curves for Singapore and Seoul. Except for fares charged over a very limited distance range, from 18.2 km to 20.2 km and from 22.2 km to 25.2 km, fares for travel on the Seoul Metropolitan Subway system are higher than fares in Singapore at every comparison point. Fares in Seoul are the same or only marginally lower for the distances highlighted in the preceding. In such an instance, the conclusion drawn is that fares are, with minor exceptions, relatively higher in the comparison city than in Singapore.

Figure 2: Singapore vs Seoul



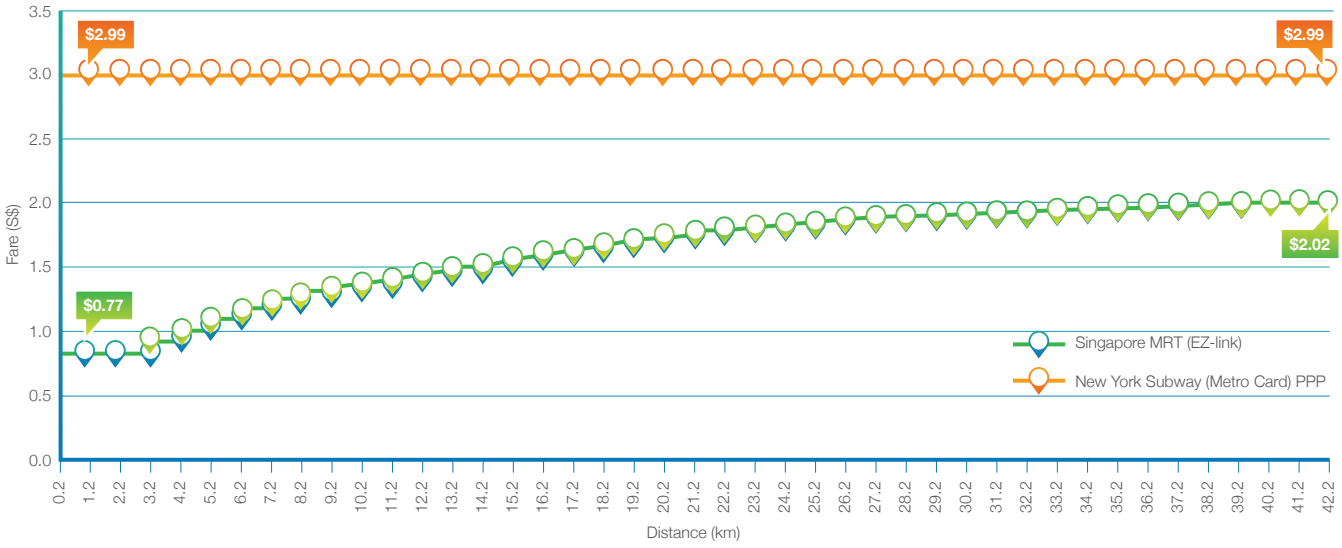
2.12 In a city where there are two or more transit operators and where the operators adopt distance-based fares with different fare curves, the approach adopted is to select the lowest fare applicable for each distance for comparison.

2.13 A case in point is the Tokyo Subway. The subway system comprises 13 lines, nine of which are operated by Tokyo Metro while the remaining four are operated by Toei Subway. Fares charged for travel on the different networks are all distance-based but the two operators have differing fare curves. Travel on Toei-operated lines incurs a higher charge for the same distance travelled in comparison with Tokyo Metro. In this instance, the fare curve used by Tokyo Metro is used for the purpose of the study.

Cities with Flat Fares

2.14 The comparison is the most direct for cities that use a flat fare-charging scheme. In this instance, the fare curve in the comparison city takes the form of a horizontal line. Figure 3 illustrates the case of New York City which charges a flat fare of S$2.99 (US$2.50) for travel on the New York Subway. In this instance, the inference is straightforward. Fares in New York City are distinctly higher than fares charged for travel on the Singapore rail system.

Figure 3: Singapore vs New York City



III. TECHNICAL NOTES

Cities with Zonal Fares

2.15 For cities that use a zone-based charging scheme, the exercise is more complex. Conceptually, for such cities, journey distance and fare charged for each Origin-Destination (OD) pair on the network may be established and, for each journey length, a lower bound and an upper bound for the fare charged may be established with the former being associated with journeys that require travel through the least number of fare zones and the latter the most. This information may then be used for comparison purpose. The establishment of a lower bound fare and an upper bound fare for each journey length however requires very detailed information about the network configuration, information which, in general, is not readily available and would require considerable time and effort to estimate. For this reason, in cities where zonal fares are in place, the approach followed in this exercise is, given the available information, to focus attention only on the lowest zonal fare charged for travel on the system regardless of the number of zones travelled through. The following example suffice to clarify the approach adopted.

2.16 For the first six fare zones of the London Underground, Zone 1 through Zone 6, Table 2 details the minimum peak and off-peak fares for a single journey by an adult commuter using the Oyster card. For travel during the peak period, fares range between £1.70 for travel within two zones (excluding Zone 1) and £5.10 for travel from Zone 1 through Zone 6. The approach adopted selects the lowest peak hour fare of £1.70 for the comparison. Likewise, for off-peak travel, fares range between £1.50 for travel anywhere within Zones 2-6 and £3.10 for travel from Zone 1 to Zone 5 (or 6). In this instance, the lowest off-peak fare of £1.50 is the fare selected for the comparison.

Table 2: Minimum Adult Fares (£) for the London Underground System with Oyster Card*

From \ To	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Zone 1	2.40 (2.40)	2.90 (2.40)	3.30 (2.80)	3.90 (2.80)	4.70 (3.10)	5.10 (3.10)
Zone 2	2.90 (2.40)	1.70 (1.50)	1.70 (1.50)	2.40 (1.50)	2.80 (1.50)	2.80 (1.50)
Zone 3	3.30 (2.80)	1.70 (1.50)	1.70 (1.50)	1.70 (1.50)	2.40 (1.50)	2.40 (1.50)
Zone 4	3.90 (2.80)	2.40 (1.50)	1.70 (1.50)	1.70 (1.50)	1.70 (1.50)	2.80 (1.50)
Zone 5	4.70 (3.10)	2.80 (1.50)	2.40 (1.50)	1.70 (1.50)	1.70 (1.50)	1.70 (1.50)
Zone 6	5.10 (3.10)	2.80 (1.50)	2.40 (1.50)	2.80 (1.50)	1.70 (1.50)	1.70 (1.50)

* Off-peak fares are in parentheses. Peak hour fares apply Monday to Friday from 6:30 am to 9:30 am and from 4:00 pm to 7:00 pm and the lowest fare for peak travel is marked in red while the lowest fare for off-peak travel is marked in blue.

2.17 Such an approach may result in an understatement of the fares charged for travel within Zone 1. It will also have the tendency to cause fares for journeys outside Zone 1 but requiring travel through more than one fare zone to be understated. When forming an impression of how Singapore rail fares measure up with fares charged in these other cities, as presented in this report, it is important that one is aware of this bias.

III. TECHNICAL NOTES

3

ESTIMATING FARE CURVES

3.1 To estimate the fare curves for the Hong Kong Island Line (HKIL) and the Hong Kong Tsuen Wan Line (HKTWL) used in this report, information relating to fares charged for travel on these lines and corresponding journey distances are required. Fares charged for travel on these lines are published by MTR and are readily available. However, distances travelled corresponding to the fares charged are not available and had to be estimated. This estimation is carried out using an online distance calculator (see http://www.distancesfrom.com) that provides estimates of journey distances by train or subway for every OD pair on the HKIL and HKTWL. Matching the published fares with the estimated distances allows the fare curves for the two MTR lines to be estimated. It is important to note that the track length for both lines is less than 40.2 km. For the Hong Kong Island Line (HKIL), its total track length is 16.3 km, while the approximate track length on Kowloon Peninsula for the Hong Kong Tsuen Wan Line (HKTWL) is 12 km.

3.2 To illustrate the procedure, Table 3 details the fare matrix applicable to travel on the HKIL while Table 4 contains the estimated distances for each OD pair on the HKIL. By matching the information contained in these two matrices, the HKIL fare curve is estimated. For the purpose of this exercise, the lower envelope of the distance-fare plot is used as the estimate for the HKIL fare curve. This is graphed in Figure 4 (page 19).

3.3 The fare curve for the HKTWL line is similarly derived.

Table 3: Fare (HK$) Matrix for the Hong Kong Island Line*

HKIL	KT	HKU	SYP	SW	CT	AD	WC	CB	TH	FH	NP	QB	TK	SWH	SKW	HFC	CW
Kennedy Town		4.5	4.5	5.3	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2	8.2	10.1	10.1	10.1
HKU	4.5		4.5	4.5	5.3	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2	8.2	10.1	10.1
Sai Ying Pun	4.5	4.5		4.5	4.5	5.3	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2	8.2	10.1
Sheung Wan	5.3	4.5	4.5		4.5	4.5	5.3	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2	8.2
Central	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2
Admiralty	5.3	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7	6.7	8.2	8.2	8.2	8.2
Wan Chai	6.7	5.3	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7	8.2	8.2	8.2	8.2
Causeway Bay	6.7	6.7	5.3	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7	8.2	8.2	8.2
Tin Hau	6.7	6.7	6.7	5.3	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7	8.2	8.2
Fortress Hill	8.2	6.7	6.7	6.7	5.3	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7	8.2
North Point	8.2	8.2	6.7	6.7	6.7	6.7	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7	6.7
Quarry Bay	8.2	8.2	8.2	6.7	6.7	6.7	6.7	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3	6.7
Tai Koo	8.2	8.2	8.2	8.2	6.7	6.7	6.7	6.7	5.3	5.3	4.5	4.5		4.5	4.5	5.3	5.3
Sai Wan Ho	8.2	8.2	8.2	8.2	8.2	8.2	8.2	6.7	6.7	5.3	5.3	4.5	4.5		4.5	4.5	4.5
Shau Kei Wan	10.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	6.7	6.7	5.3	5.3	4.5	4.5		4.5	4.5
Heng Fa Chuan	10.1	10.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	6.7	6.7	5.3	5.3	4.5	4.5		4.5
Chai Wan	10.1	10.1	10.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	6.7	6.7	5.3	4.5	4.5	4.5	

* The above data is obtained from http://www.mtr.com.hk/archive/en/tickets/octopus_fare201611.pdf. Note that abbreviations used for the column headings of this table correspond in a natural way with the station names listed for the rows.

III. TECHNICAL NOTES

Table 4: Estimated Distances (km) between Stations for the Hong Kong Island Line*

HKIL	KT	HKU	SYP	SW	CT	AD	WC	CB	TH	FH	NP	QB	TK	SWH	SKW	HFC	CW
Kennedy Town		1	1	2	3	4	5	6	7	7	8	9	10	11	12	13	15
HKU	1		1	2	2	3	4	5	6	7	7	9	10	10	11	12	14
Sai Ying Pun	1	1		1	1	3	3	4	5	6	7	8	9	9	10	12	13
Sheung Wan	2	2	1		1	1	2	3	4	5	6	7	7	8	9	10	12
Central	3	2	1	1		1	1	2	3	4	5	6	7	7	8	10	11
Admiralty	4	3	3	1	1		1	2	3	3	4	5	6	7	8	9	11
Wan Chai	5	4	3	2	1	1		1	2	2	3	4	5	6	7	8	9
Causeway Bay	6	5	4	3	2	2	1		1	1	2	3	4	4	5	7	8
Tin Hau	7	6	5	4	3	3	2	1		1	1	2	3	4	5	6	7
Fortress Hill	7	7	6	5	4	3	2	1	1		1	1	2	3	4	5	7
North Point	8	8	7	6	5	4	3	2	1	1		1	1	2	3	4	6
Quarry Bay	9	9	8	7	6	5	4	3	2	1	1		1	1	2	3	5
Tai Koo	10	10	9	7	7	6	5	4	3	2	1	1		1	1	2	4
Sai Wan Ho	11	10	9	8	7	7	6	4	4	3	2	1	1		1	2	2
Shau Kei Wan	12	11	10	9	8	8	7	5	5	4	3	2	1	1		1	2
Heng Fa Chuan	13	12	12	10	10	9	8	7	6	5	4	3	2	2	1		1
Chai Wan	15	14	13	12	11	11	9	8	7	7	6	5	4	2	2	1	

* Estimated using the distance calculator available at http://www.distancesfrom.com/. Abbreviations used for the column headings of this table correspond in a natural way with the station names listed for the rows.

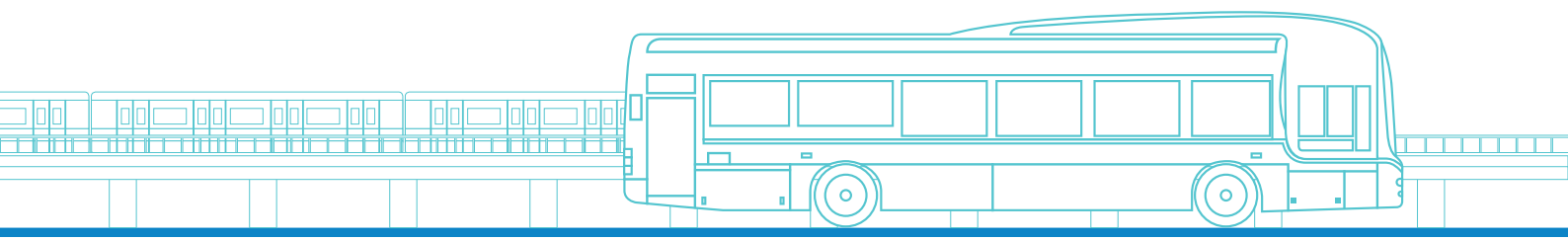
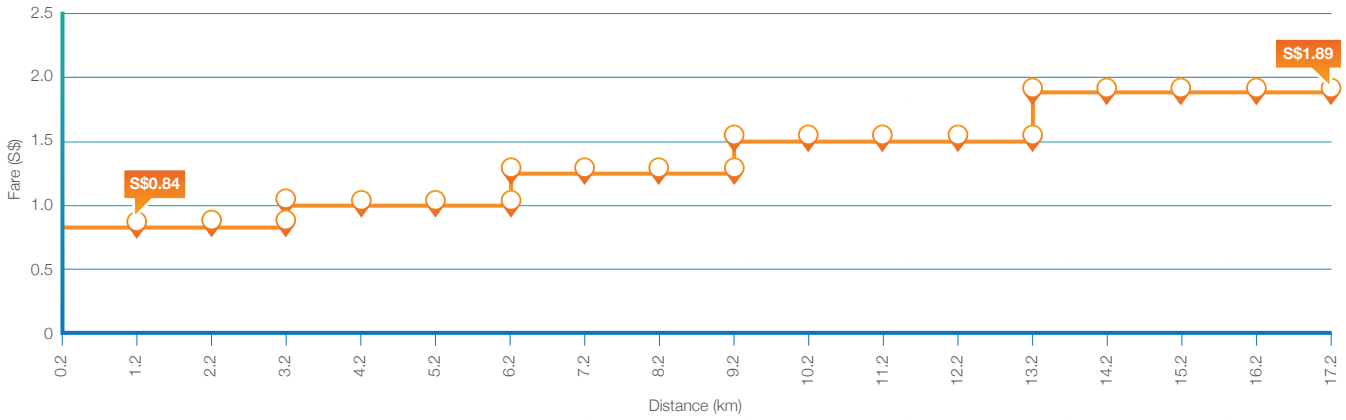


Figure 4: Estimated Fare Curve for Hong Kong Island Line, Track Length 16.3 km



3.4 The fare curve for the Washington DC Metro used in this report was also estimated using the same procedure. The major difference in this case, however, has to do with the fact that both fare and distance information used in the estimation of the Washington DC fare curve came from the online fare calculator provided by the Washington DC Metropolitan Area Transit Authority. For details, see http://www.wmata.com/rail/stations.cfm.

III. TECHNICAL NOTES

4 NOTE ON AUSTRALIAN CITIES

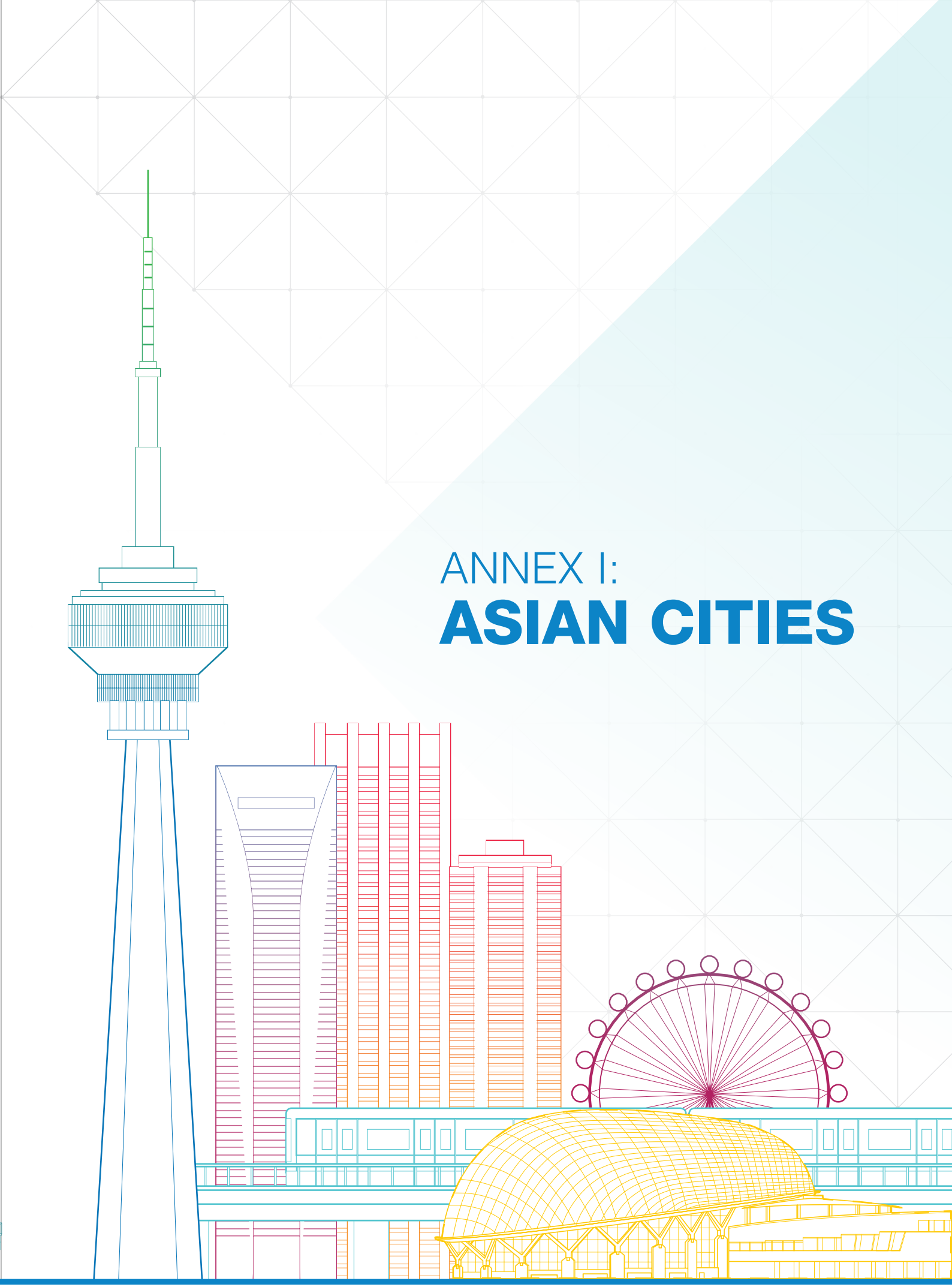
4.1 At the current time, there are no operational rapid transit systems in Australia. Sydney Metro Northwest is the first but it is still under construction and is expected to be completed only in 2019.

4.2 For Australian cities, therefore, the comparison exercise involves comparing Singapore rail fares with fares charged on the urban rail network in the four selected Australian cities of Adelaide, Melbourne, Perth and Sydney.

5 READING THE ANNEXES

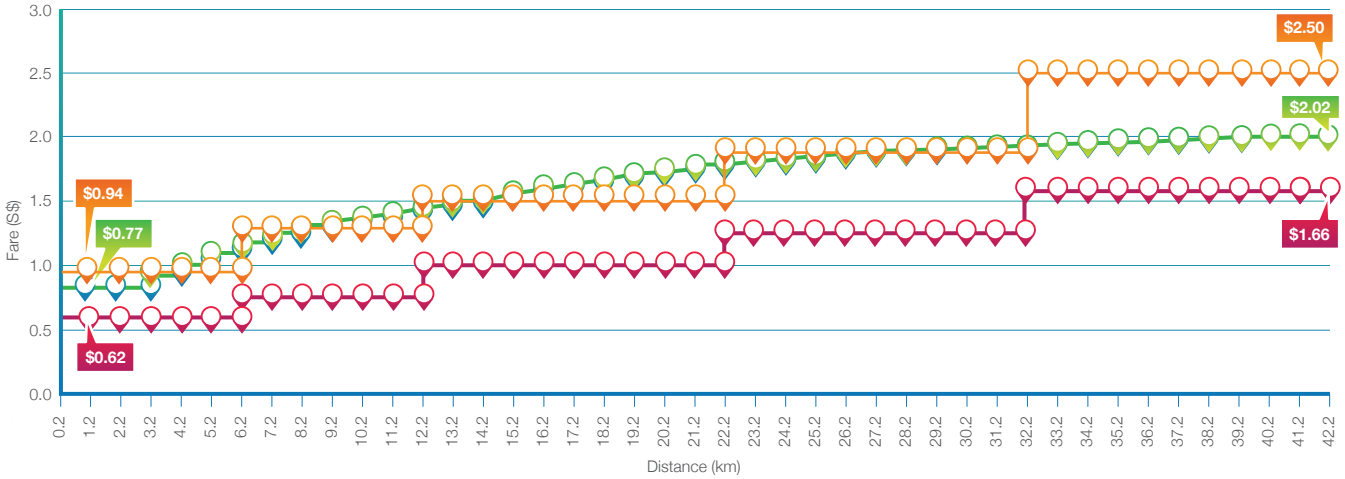
5.1 In Annexes I through IV, comparison charts for the 35 different cities are provided. These charts and tabulations, together with the footnotes, support main findings by providing detailed information on fares in each city. With the exception of the city of Taipei, all charts contain three fare curves; the Singapore fare curve and two fare curves for the comparison city. The curve marked PPP refers to the fare curve derived from using Purchasing Power Parity and the curve marked MER refers to the fare curve arrived at through the use of the prevailing market exchange rate. For the city of Taipei, only the MER curve is charted.

5.2 In Annex Tables I through III, fares across the distance domain at 5-km interval are reflected. In Annex Table I, the fares reflected are in the currency of the comparison city. In Annex Table II and Annex Table III, these fares have been converted to Singapore dollars using MERs and PPPs respectively.



ANNEX I:
ASIAN CITIES

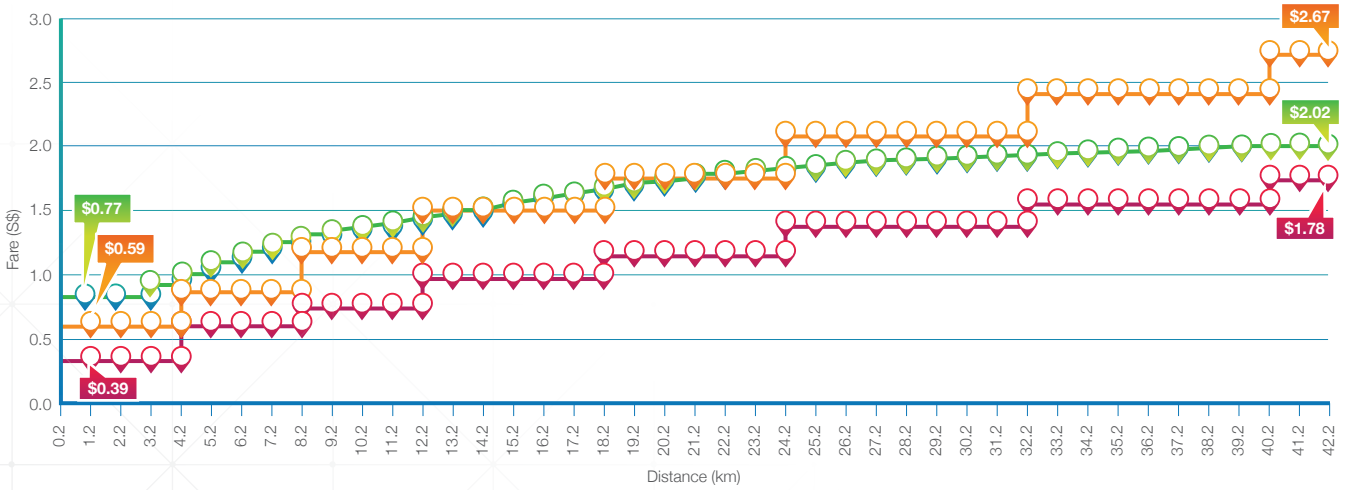
Asian Cities I: Beijing



Note: Fares are distance-based with base fare set at CNY3. With the Yikatong Card, monthly public transport expenditure between CNY100 and CNY150 will enjoy a 20% discount. From CNY150 onwards, a 50% discount applies. These discounts have not been factored into the computation.

- Singapore MRT (EZ-link)
- Beijing Subway (Yikatong) PPP
- Beijing Subway (Yikatong) MER

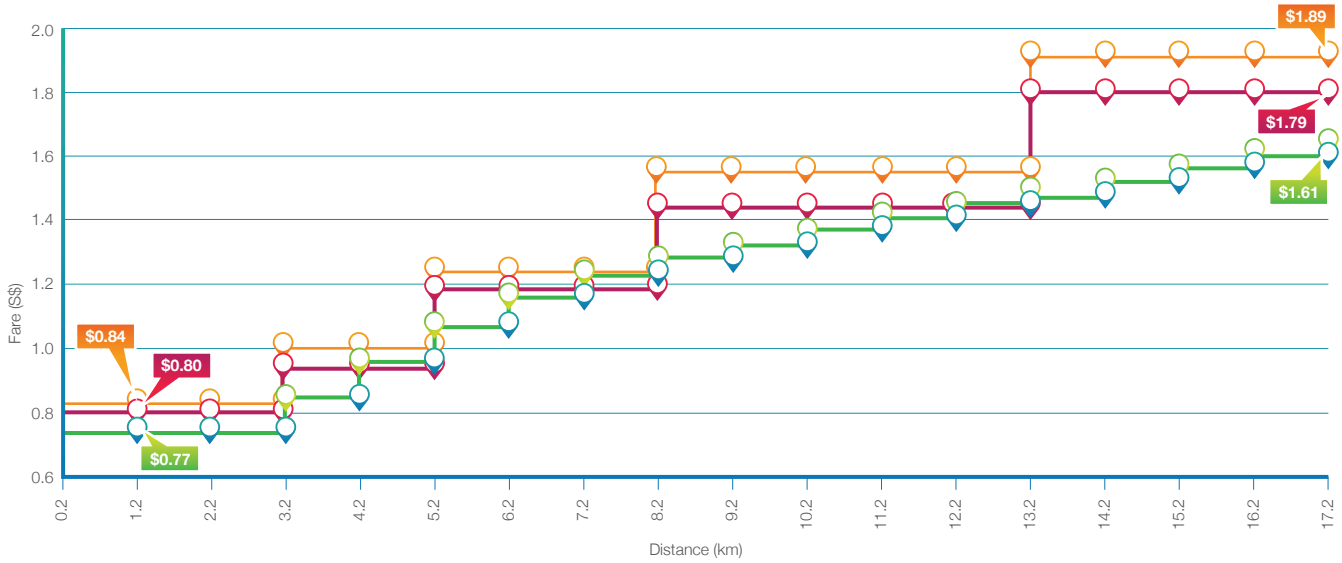
Asian Cities II: Guangzhou



Note: Fares are distance-based with base fare set at CNY2.Commuters enjoy a 5% discount on the Guangzhou Metro when using the Yang Cheng Tong Card. This discount has been factored into the above chart.

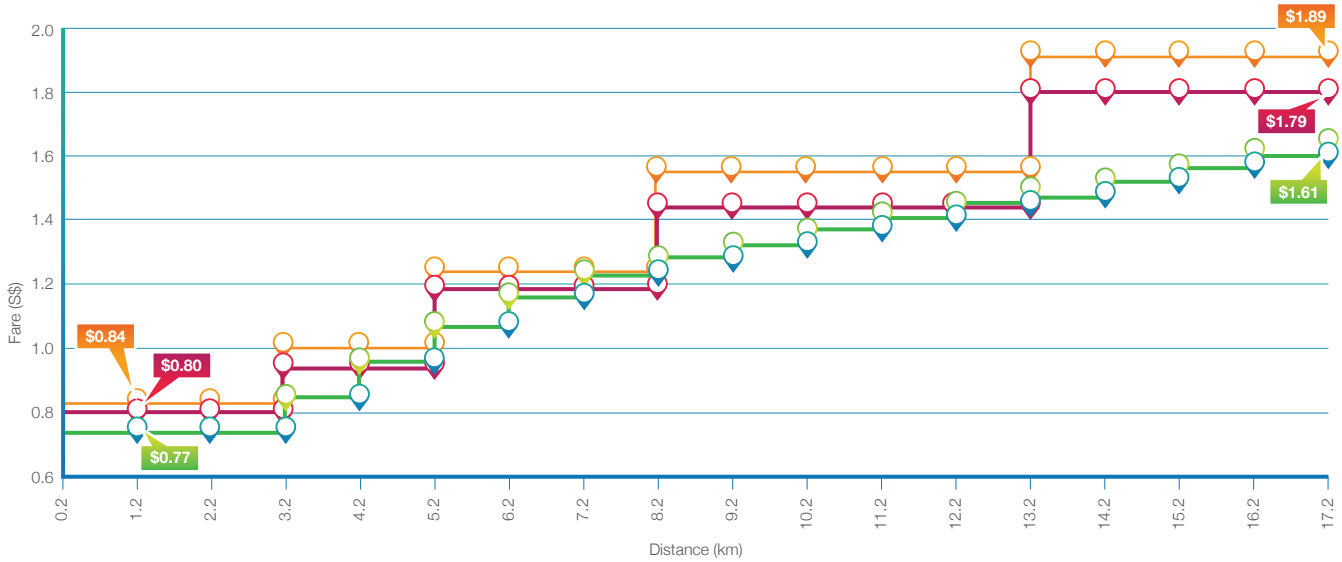
- Singapore MRT (EZ-link)
- Guangzhou (Yang Cheng Tong) MER
- Guangzhou (Yang Cheng Tong) PPP

Asian Cities III: Hong Kong (Island Line), Track Length 16.3km



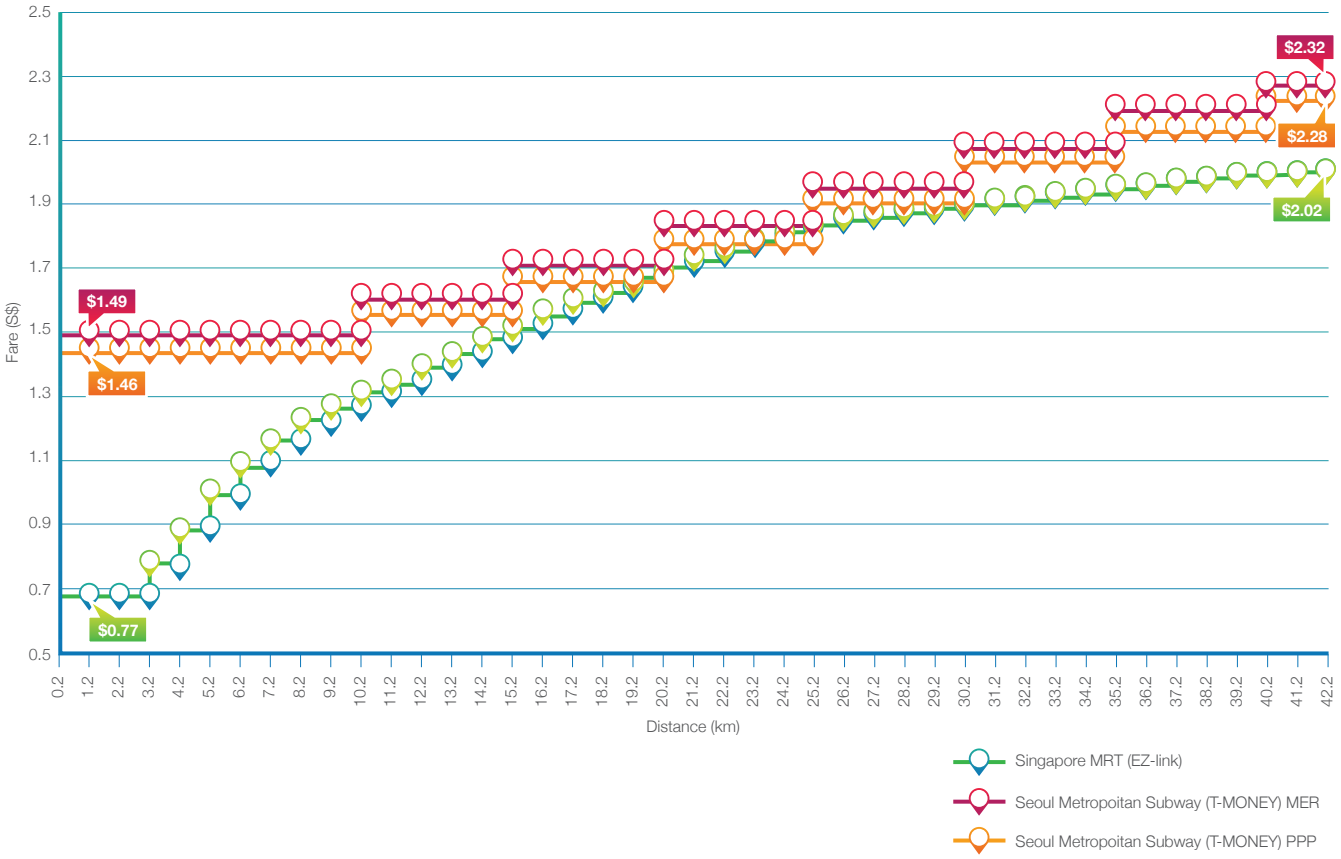
Note: Distances between MTR stations on the HK Island Line are estimated using an online distance calculator (see http://www.distancesfrom.com/hk/). Track length is only 16.3 km and estimated distance-based fares are: 1 km (HK$4.5), 2 km (HK$4.5 to HK$5.3); 3 km (HK$5.3); 4 km (HK$5.3 to HK$6.7); 5 km (HK$6.7 to HK$8.2); 6 km (HK$6.7 to HK$8.2); 7 km (HK$6.7 to HK$8.2); 8 km to 11 km (HK$8.2); 12 km (HK$8.2 to HK$10.1); and ≥ 13 km (HK$10.1). In the above comparison, where a range of fares apply for a given journey length, the lowest fare is used. Fare information is obtained from http://www.mtr.com.hk/archive/en/tickets/octopus_fare201609.pdf.

Asian Cities IIIa: Hong Kong (Tsuen Wan Line), Track Length Approx. 12km

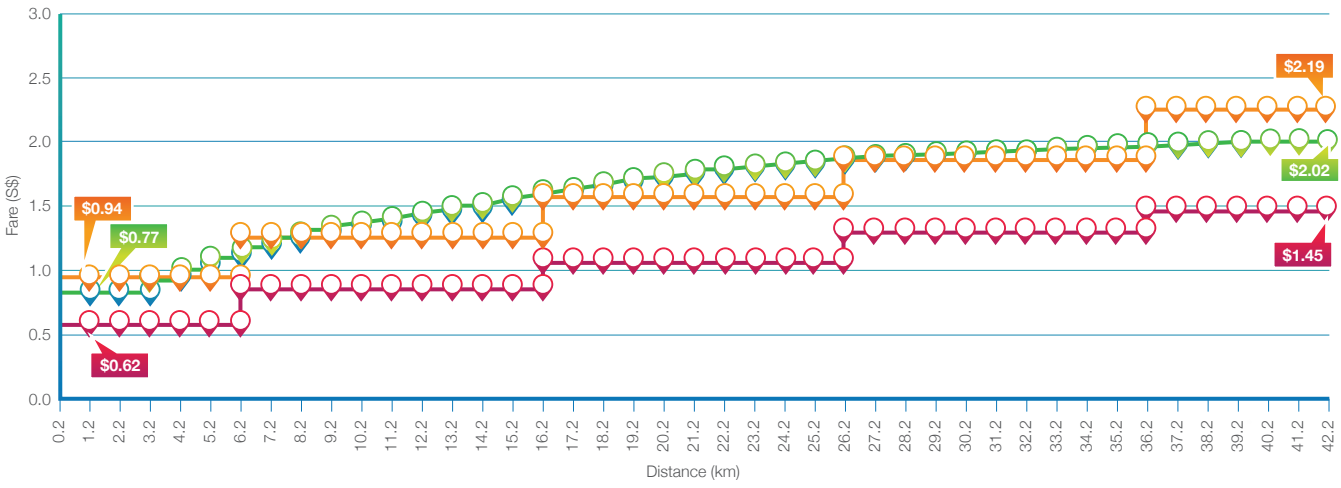


Note: Distances between MTR stations on the HK Tsuen Wan Line are estimated using an online distance calculator (see http://www.distancesfrom.com/hk/). Track length on Kowloon Peninsula is approximately 12 km and estimated distance-based fares are: 1 km (HK$4.5), 2 km (HK$4.5 to HK$5.3); 3 km (HK$4.5 to HK$5.3); 4 km (HK$5.3 to HK$6.7); 5 km (HK$5.3 to HK$8.0); 6 km (HK$6.7); 7 km (HK$6.7 to HK$8.2); 8 km to 10 km (HK$8.2 to HK$10.1); and ≥ 11 km (HK$10.1). In the above comparison, where a range of fares apply for a given journey length, the lowest fare is used. Fare information is obtained from http://www.mtr.com.hk/archive/en/tickets/octopus_fare201609.pdf. Track length including the section from Tsim Sha Tsui Station to Central Station on Hong Kong Island is 16.0 km. For cross- harbour trips, fares on the Tsuen Wan Line will be much higher due to the cross-harbour surcharge.

Asian Cities IV: Seoul

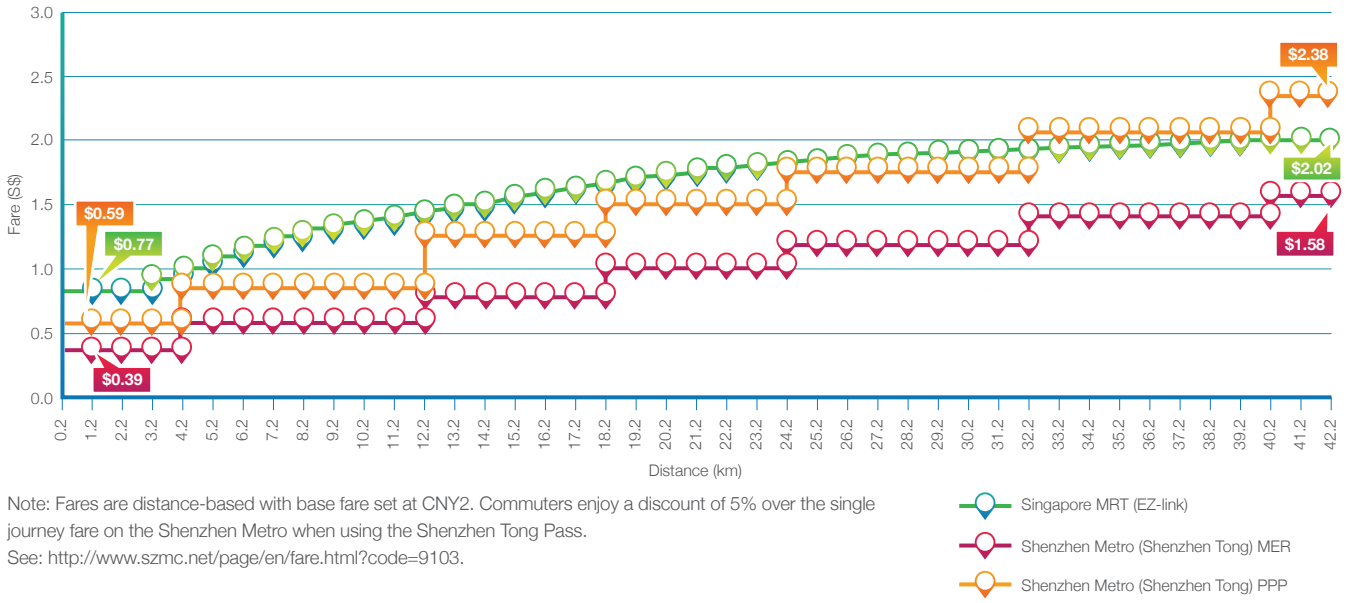


Asian Cities V: Shanghai



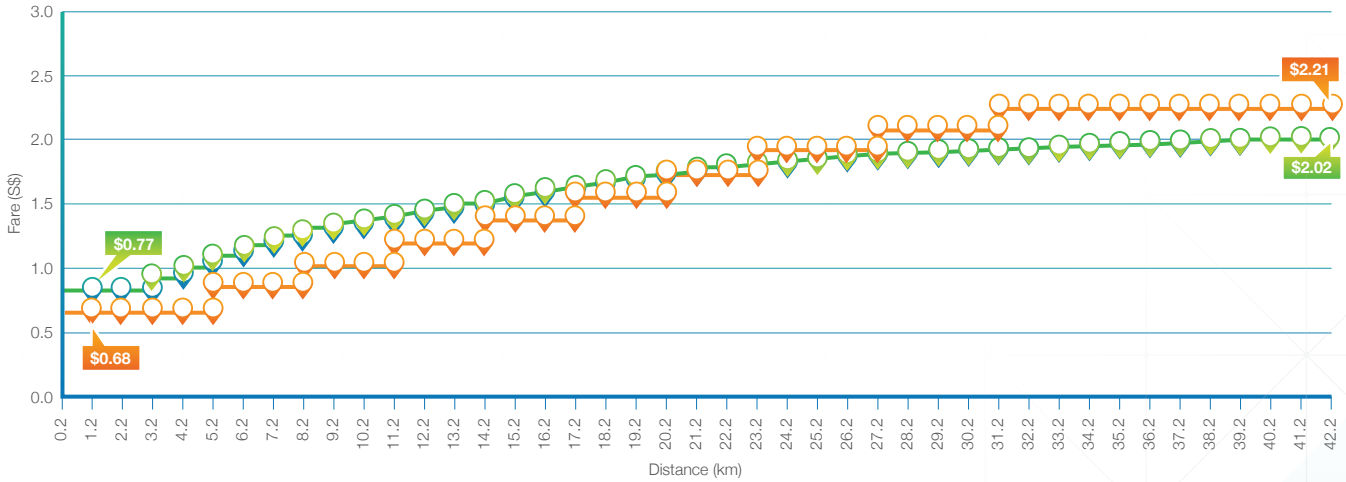
Note: Fares detailed here apply to travel on Lines 1 through 16 excluding Line 5 which is priced CNY1 lower. Commuters enjoy a 10% discount if total metro fare spent with the Shanghai Public Transportation Card (SPTC) reaches CNY70 or above in a month. Source: http://service.shmetro.com/en/cphc/12.htm. This discount has not been factored into the above fare structure.

Asian Cities VI: Shenzhen



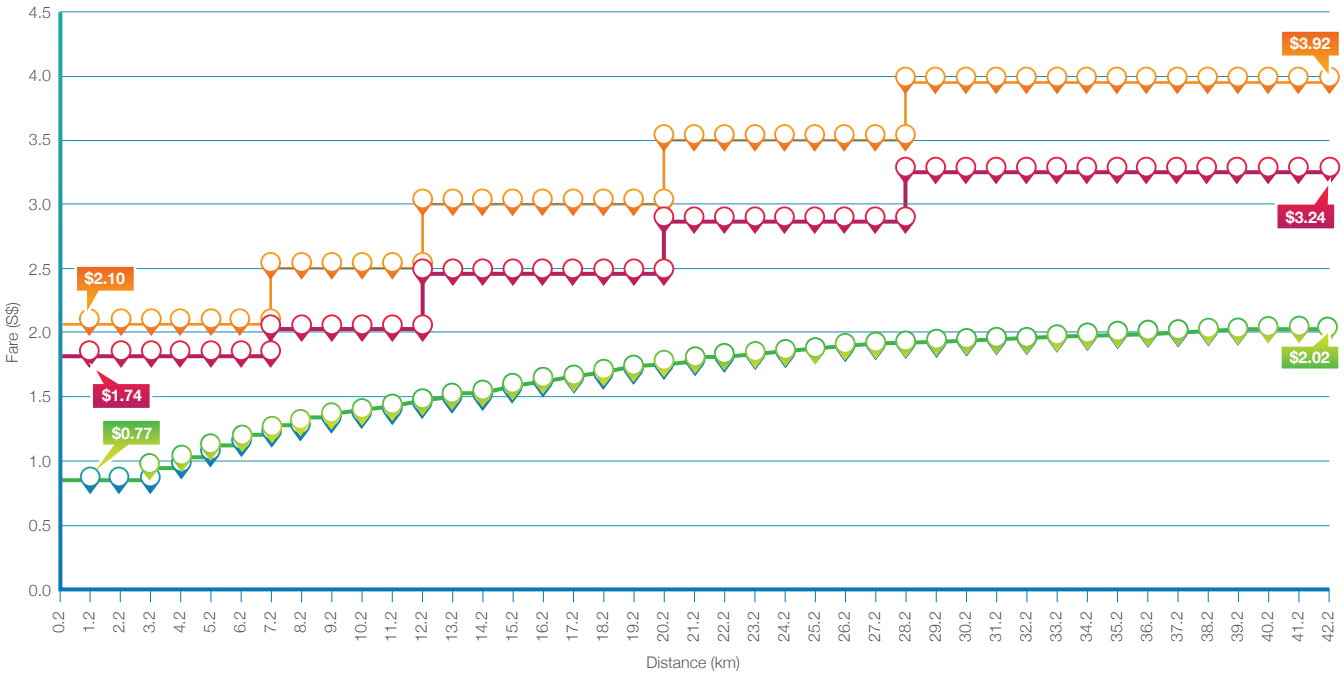
Note: Fares are distance-based with base fare set at CNY2. Commuters enjoy a discount of 5% over the single journey fare on the Shenzhen Metro when using the Shenzhen Tong Pass.
See: http://www.szmc.net/page/en/fare.html?code=9103.

Asian Cities VII: Taipei



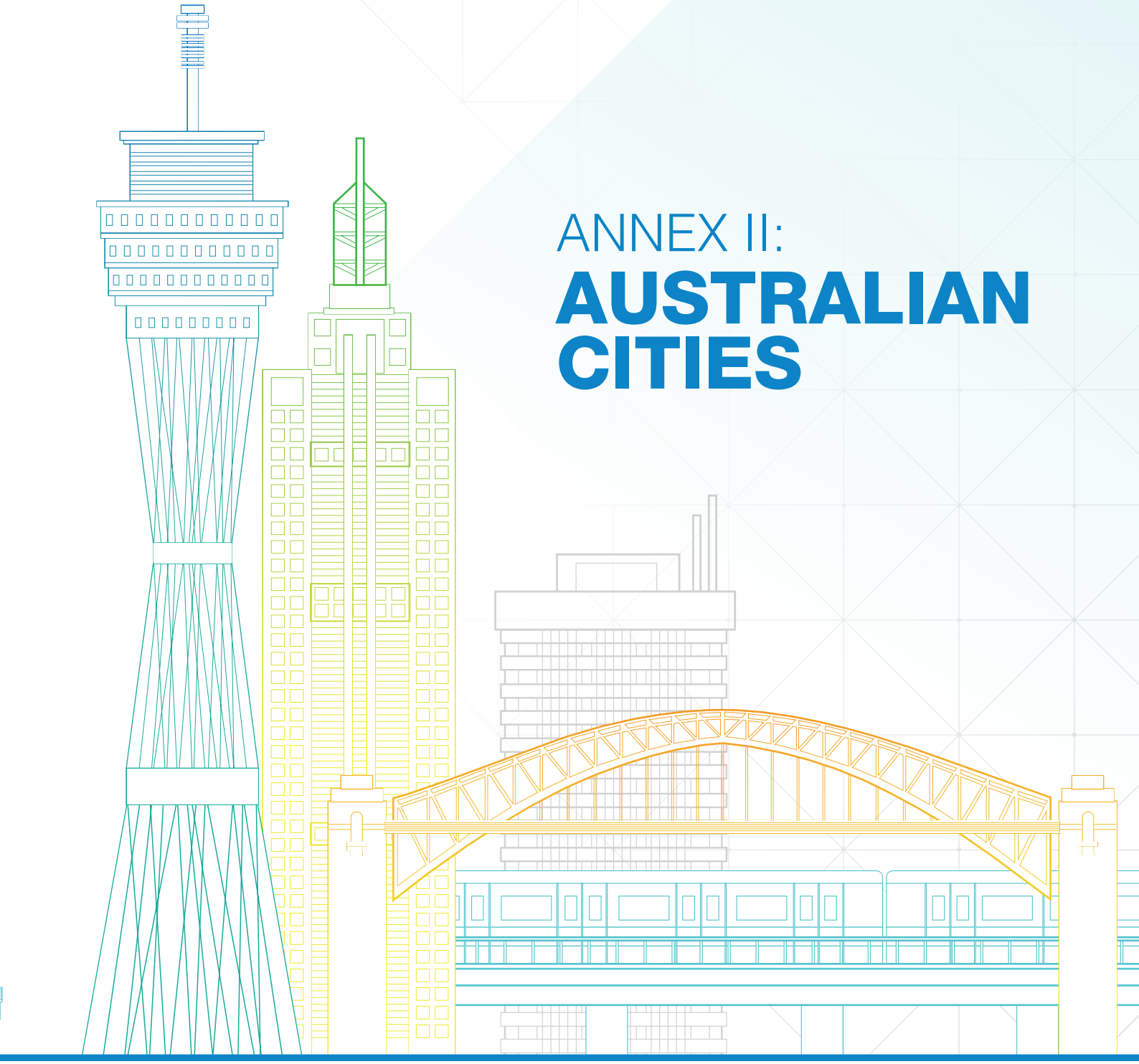
Note: Fares are distance-based with base fare with the EasyCard set at NT$16, a 20% discount to the token fare. As the PPP (Private Consumption) conversion factor for Taiwan is not available, the PPP-adjusted fare curve has not been computed and hence not displayed in the above chart.

Asian Cities VIII: Tokyo



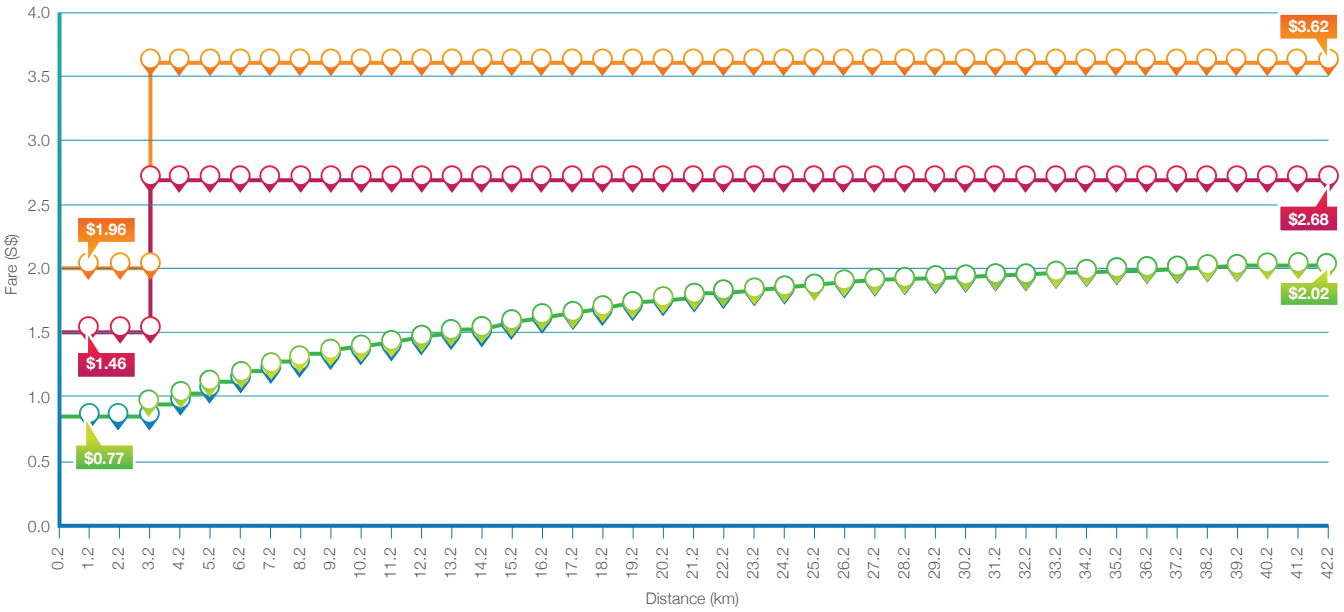
Note: Fares on the Tokyo Subway are distance-based. The fares used in the above chart are those charged by Tokyo Metro, the main operator. Fares charged by Toei Subway which operates four of the 13 subway lines are generally higher.

- Singapore MRT (EZ-link)
- Tokyo Subway (PASMD/SUICA) MER
- Tokyo Subway (PASMD/SUICA) PPP

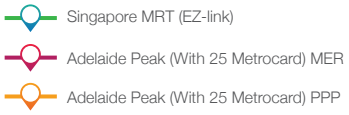


ANNEX II:
AUSTRALIAN CITIES

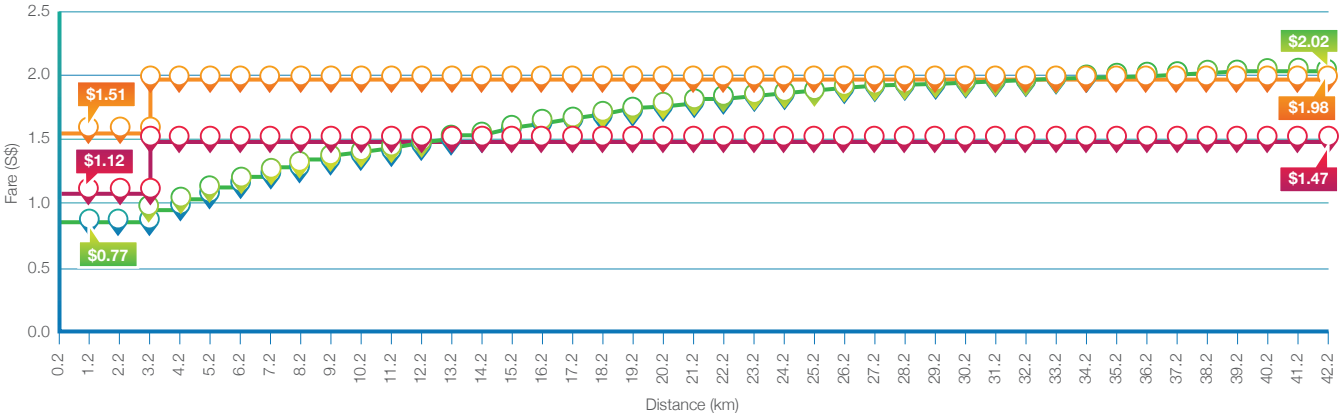
Australian Cities I: Adelaide (Peak)



Note: For journeys of approximately 3 km or less, the fare that applies with a 2-section Metrocard is A$1.92. For journeys exceeding two sections, a flat-fare of A$3.54 is charged during peak periods, before 9 am and after 3 pm on weekdays and Saturdays.

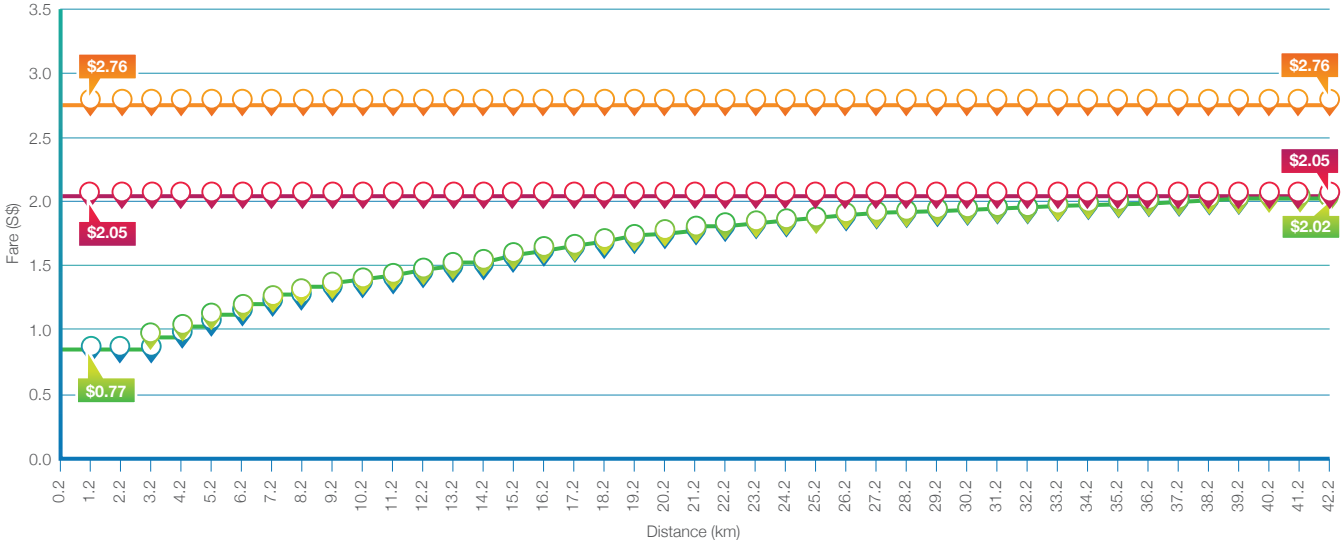


Australian Cities Ia: Adelaide (Off-Peak)



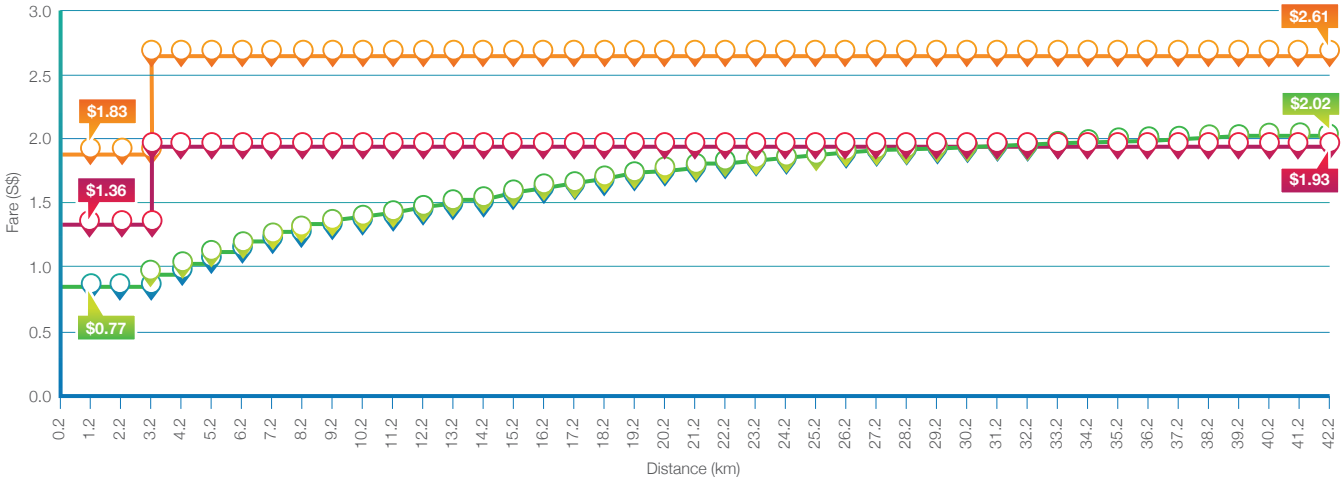
Note: For journeys of approximately 3 km or less, the fare that applies is A$1.48. Beyond 3.2 km, a flat-fare of A$1.94 is charged during the inter-peak period, which is the period from 9.01 am to 3.00 pm on weekdays and Sundays and public holidays.

Australian Cities II: Melbourne



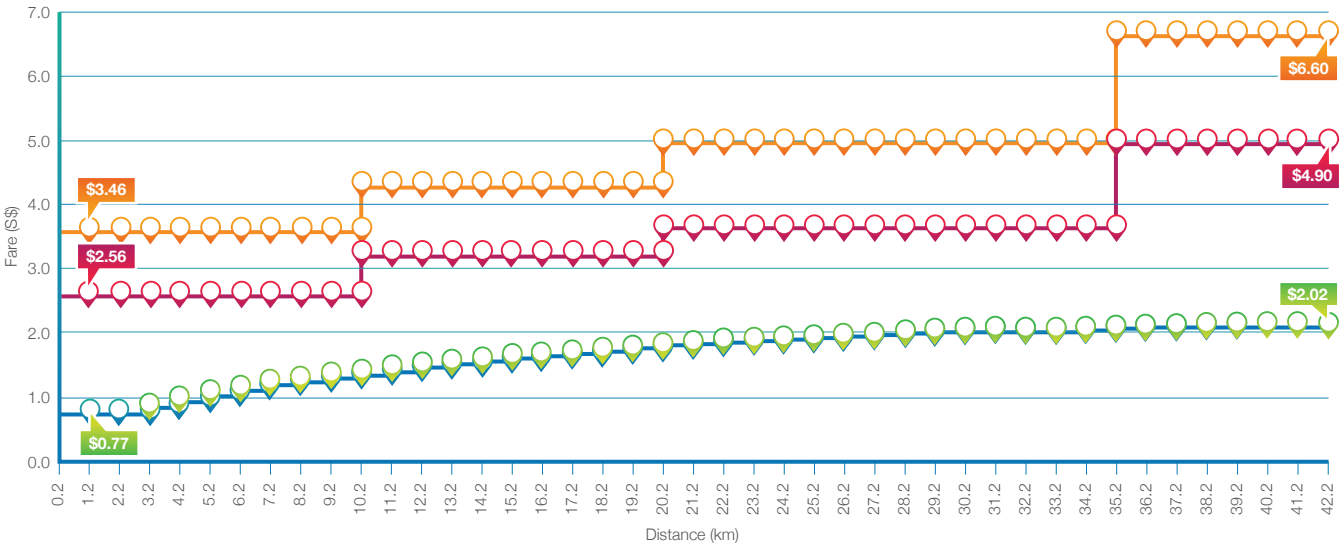
Note: A daily cap equal to the cost of two journeys apply. For travel in Zone 1 and Zone 1+2, the cap is A$7.80 (A$3.90 per trip) and for travel in Zone 2 only, the daily cap is A$5.40 (A2.70 per trip). The lowest zonal fare is reflected in the above chart.

Australian Cities III: Perth

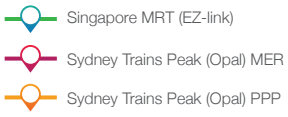


Note: Perth has a mixed system similar to Adelaide. For journeys of 3.2 km or less, the standard SmartRider fare is A$1.79 (referred to as a 2-section fare). Beyond 3.2 km, fares charged will depend on the number of zones travelled. SmartRider fare for travel within one zone is A$2.55. Fares for two or more zones are A$3.91 (two zones), A$4.68 (three zones), A$5.53 (four zones) rising to a maximum of A$10.54 for nine zones. The width of each zone is roughly 8 to 10 km. Fares used in the above comparison are based on the 2-section SmartRider fare for journeys of 3.2 km or below and the one-zone fare for journeys in excess of 3.2 km. If a commuter uses the auto-load feature on the SmartRider, an additional 10% discount off the cash fare applies. This further discount has not been factored into the calibration of the fare curve for Perth.

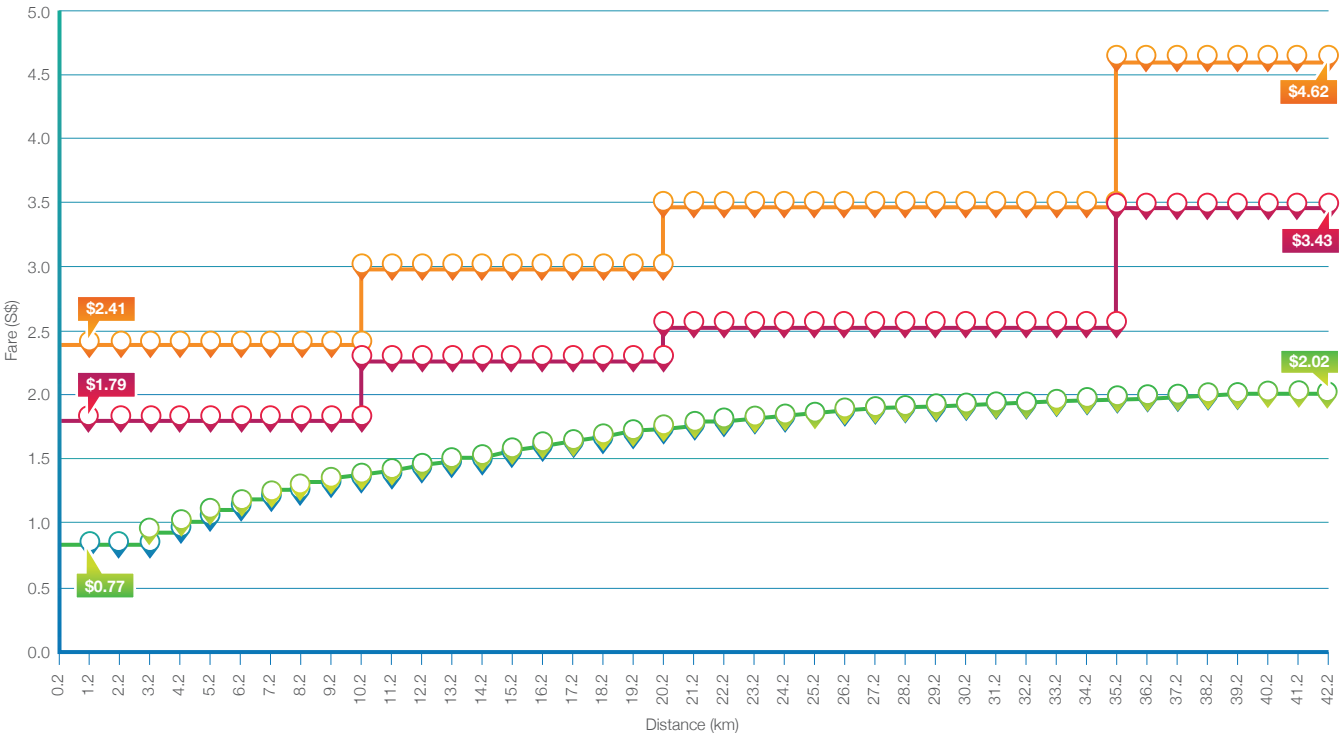
Australian Cities IV: Sydney (Peak)



Note: Fares in Sydney are distanced-based and differentiated by time (Peak: 7am - 9am and 4pm – 6:30pm). Peak Opal card fares are A$3.38 up to 10 km, A$4.20 from 10km to 20 km, A$4.82 from 20km to 35 km, A$6.46 from 35 km to 65 km and A$8.30 for distance beyond 65 km.



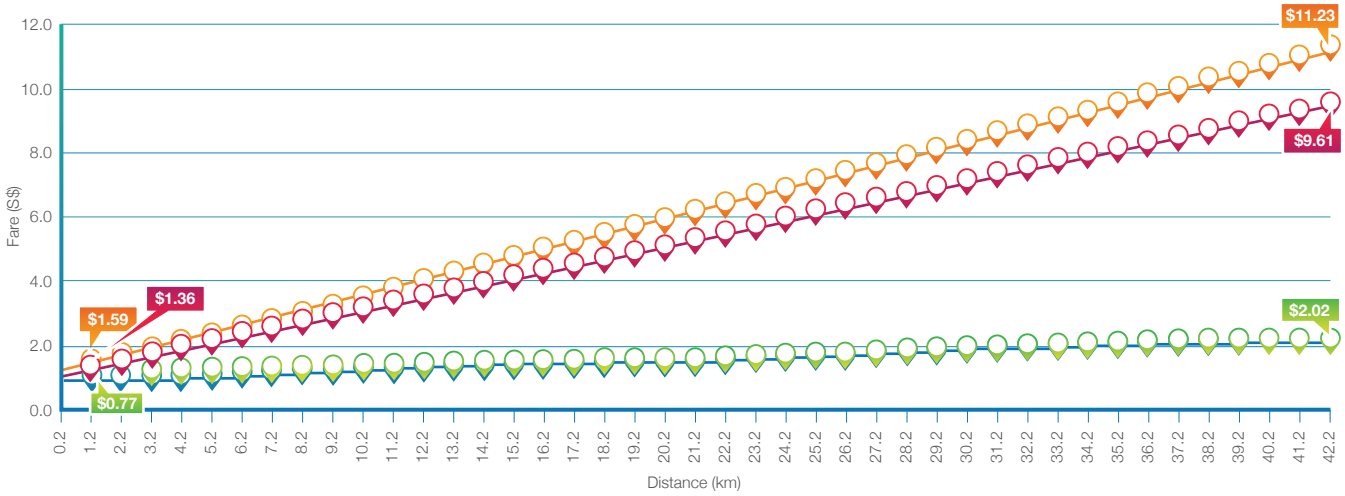
Australian Cities IVa: Sydney (Off-Peak)



Note: Off-peak fares are respectively A$2.36, A$2.94, A$3.37, A$4.52 and A$5.81. These fares represent a 30% discount to the corresponding peak fares.

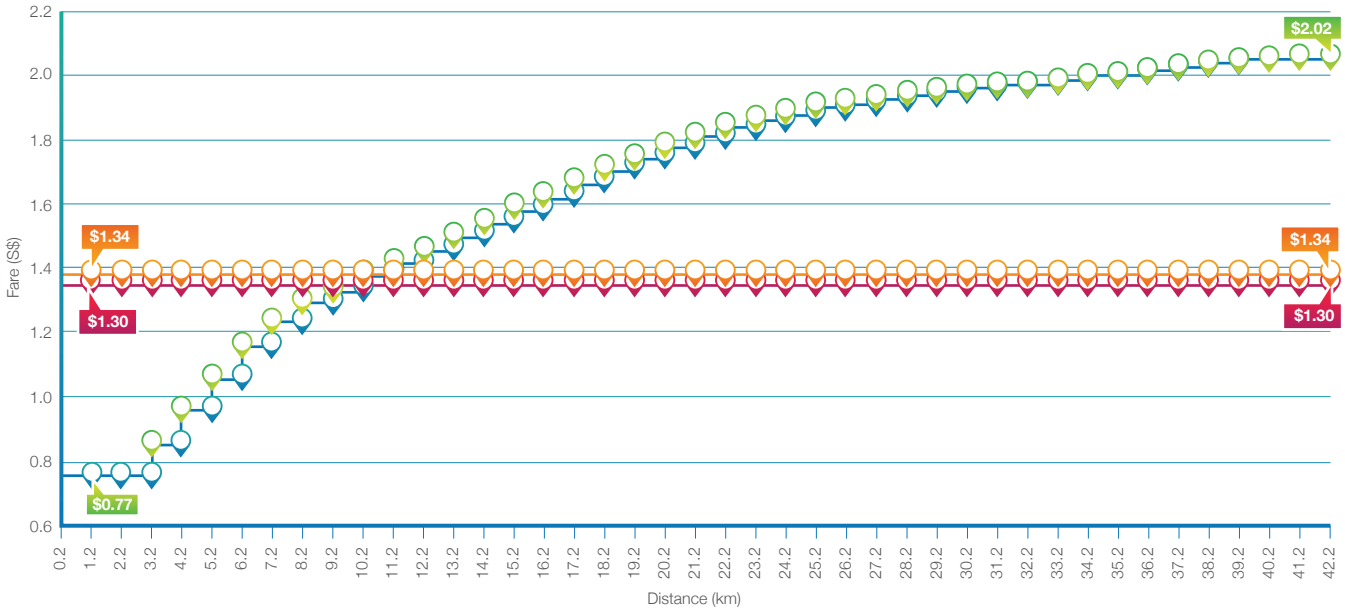
ANNEX III:
EUROPEAN CITIES

European Cities I: Amsterdam



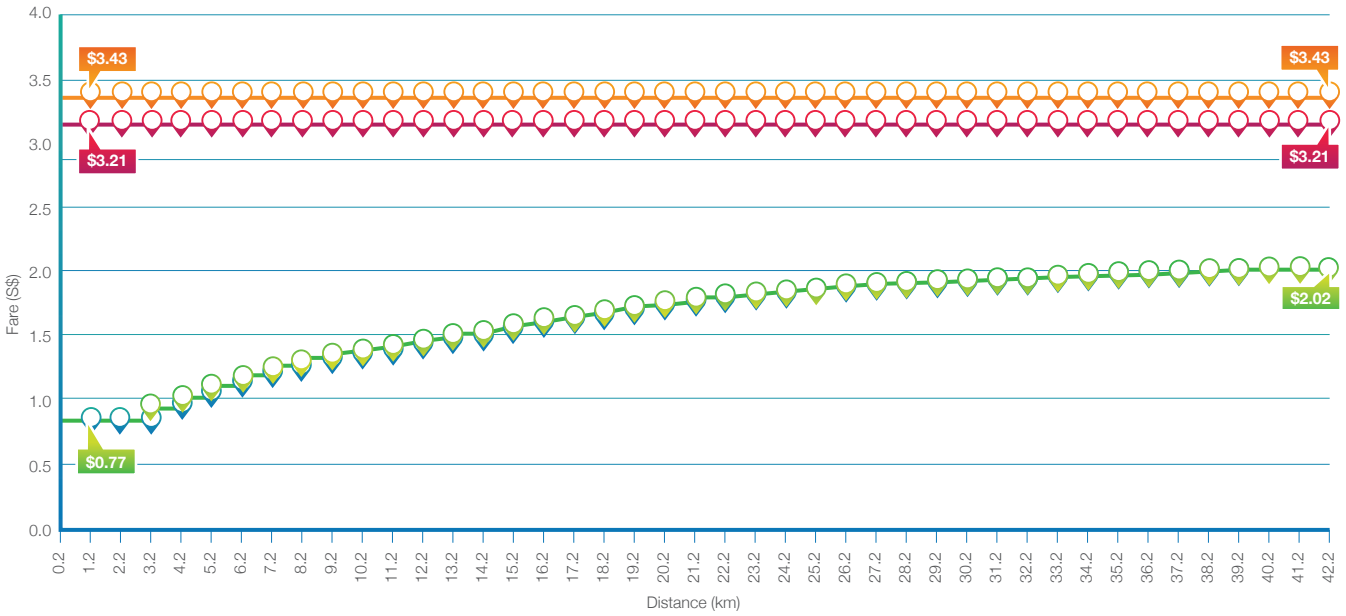
Note: There is a fixed boarding charge of €0.89 on the Amsterdam Metro system. Actual fare charged is this fixed boarding charge and a variable charge €0.154 per km calculated to every 50m of travel. A 10-km journey thus cost €0.89 + €1.54 = €2.43.

European Cities II: Barcelona



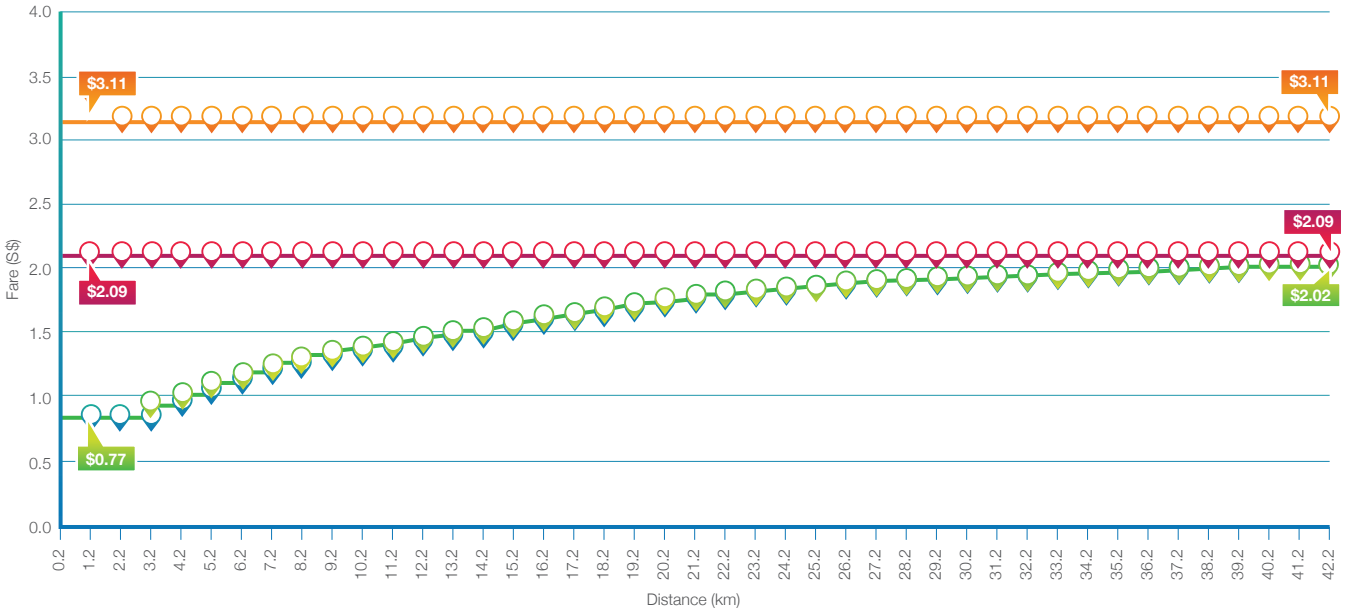
Note: The Barcelona area including neighbouring cities is divided into nine zones but service coverage of the Barcelona Metro is only within Zone 1. Single trip tickets, tickets in bundles of 10, 50 (T-50/30) and 70 (T-70/30) as well as season passes of varying duration for use in Zone 1 are available for Metro users. The fare used in the above comparison is the cheapest Zone 1 ticket based on the prices charged for ticket bundles of 50 and 70. This fare works out to €0.85 as compared with a regular single trip ticket fare of €2.15.

European Cities III: Berlin



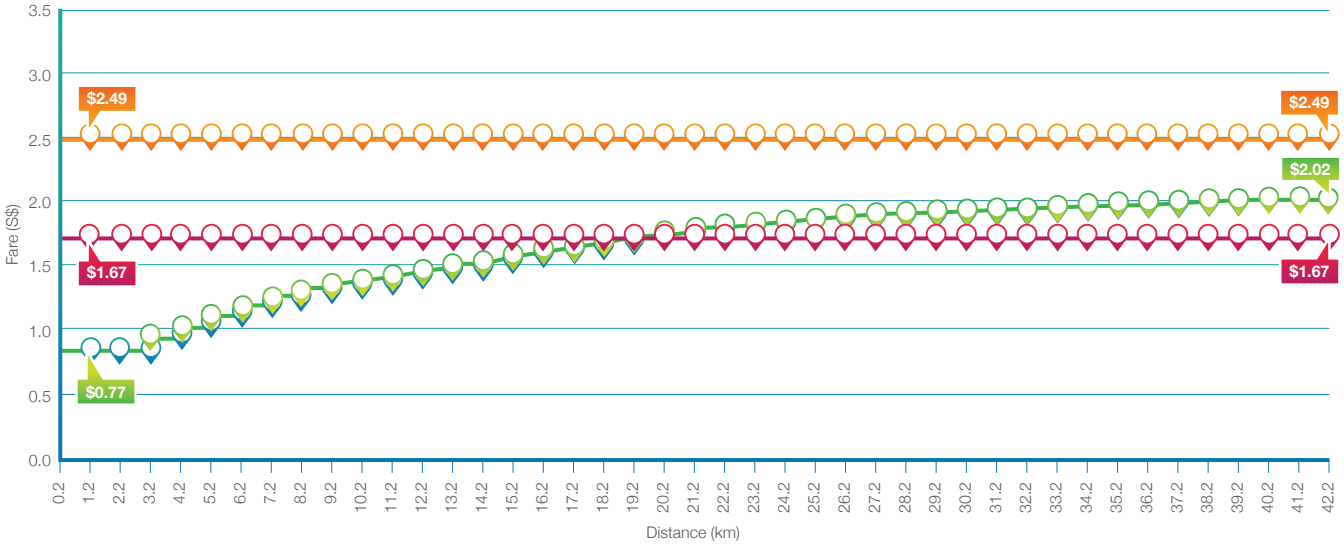
Note: Berlin Metro has three zones A, B and C and fares are charged according to travel within the AB zone, BC zone and ABC (all Berlin) zone. The lowest fare applies to travel in the AB zone. A single adult ticket for travel in this zone costs €2.70. However, a 4-trip ticket is available to regular commuters travelling in the zone. This 4-trip ticket costs €9.00 which translates to a per trip fare of €2.25. This is the fare used in the above chart. There is also the short- distance single trip ticket costing €1.70 (S$2.60; S$2.43 PPP-adjusted) that allows travel for up to three stops on the U-/S-Bahn. This short trip fare has not been factored into the above chart.

European Cities IV: Copenhagen (Peak)



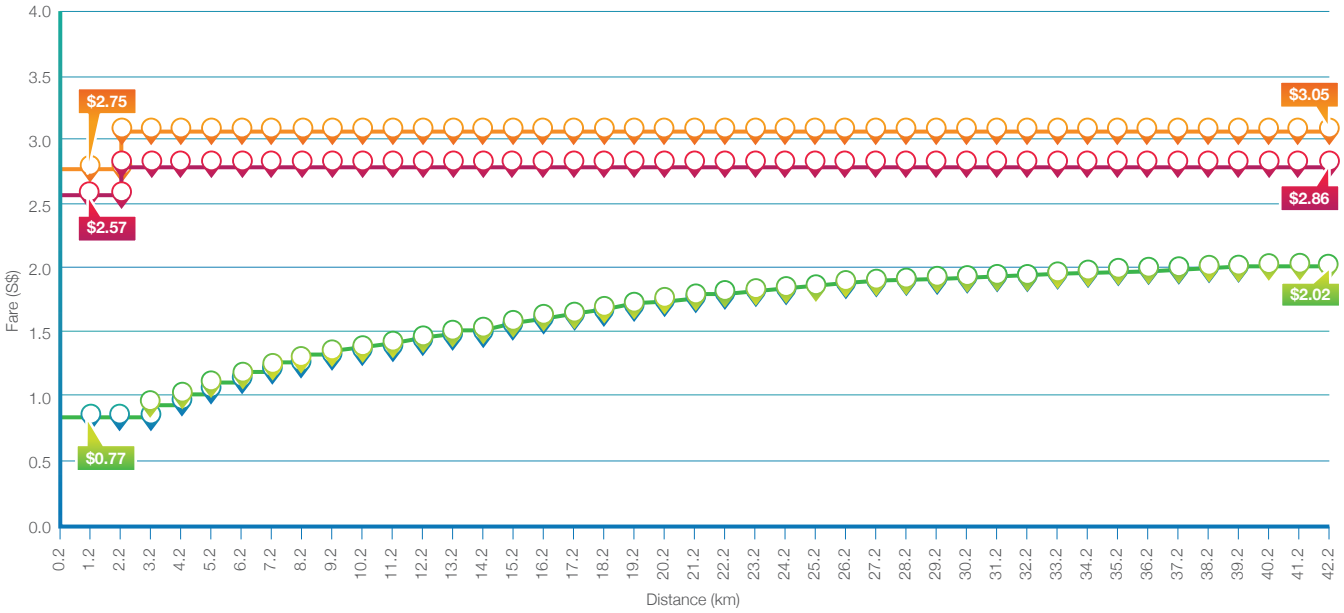
Note: Metro fares in Copenhagen using the Contactless Rejsekort Anonymous card vary with the number of zones travelled. Fares start at 15 krone (kr) for travel of up to two zones; 20 kr for three zones, rising to 49 kr for a 21-zone journey. Peak hours are from 7 am to 10:59 am and from 1 pm to 5:59 pm. The fare use in the above comparison is the up-to-2-zones fare which costs 15 kr.

European Cities IVa: Copenhagen (Off-Peak)



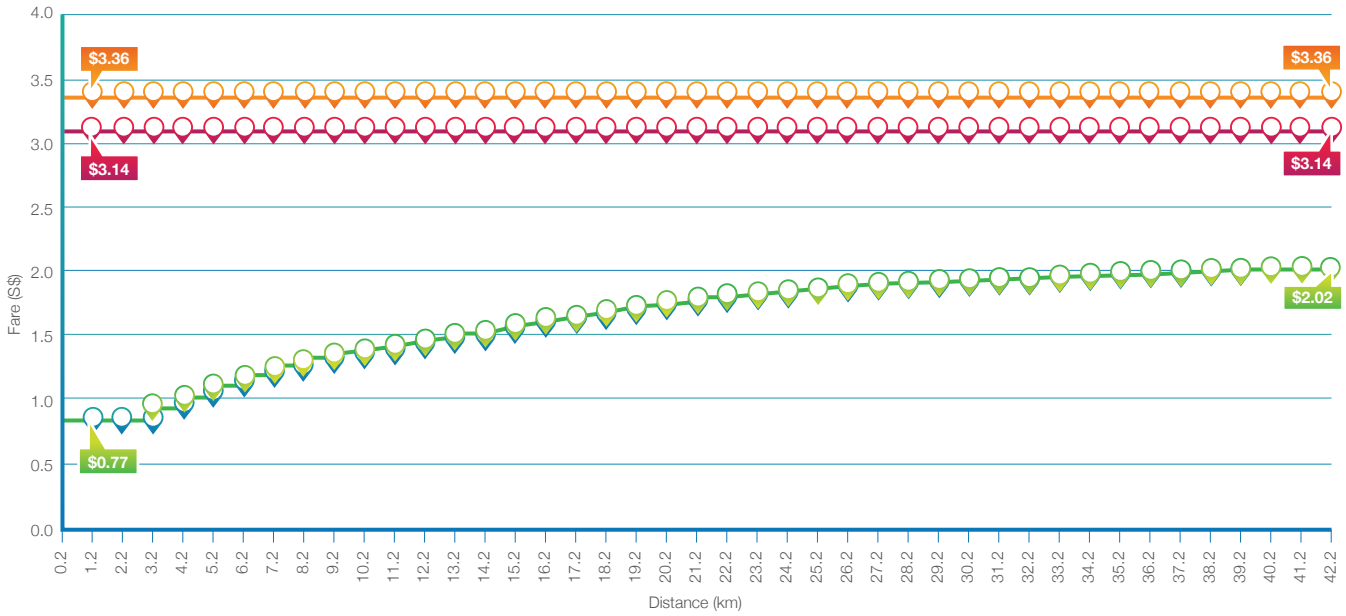
Note: For off-peak travel, a 20% discount applies. Off peak hours are from 6 pm in the evening to 6.59 am in the morning and from 11 am to 12.59 pm. The fare use in the above comparison is the up-to-2-zones fare which costs 12 kr.

European Cities V: Frankfurt



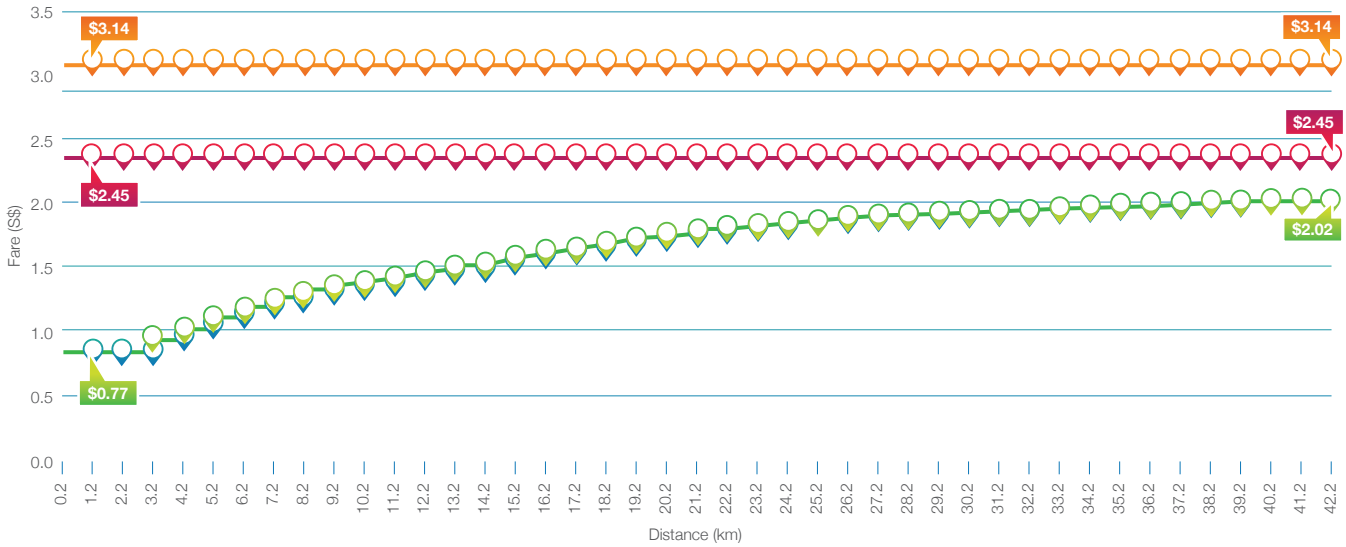
Note: Frankfurt and its surrounding areas are divided into several zones with U-Bahn and S-Bahn fares varying across zones and the number of zones travelled through. Frankfurt Metro falls, by and large, into Zone 50 and travel within Zone 50 entails a Zone 50 fare of €2.80. There are zones in the surrounding urban areas where within-zone fares are as low as €2.00. An example will be the fare for a journey from Oberursel-Hohemark to Oberursel-Bahnhof. In addition, there is also a short-trip ticket that costs €1.80 for travel up to 2 km. The short trip fare and the lowest zonal fare of €2.00 are used in the above comparison.

European Cities VI: Hamburg



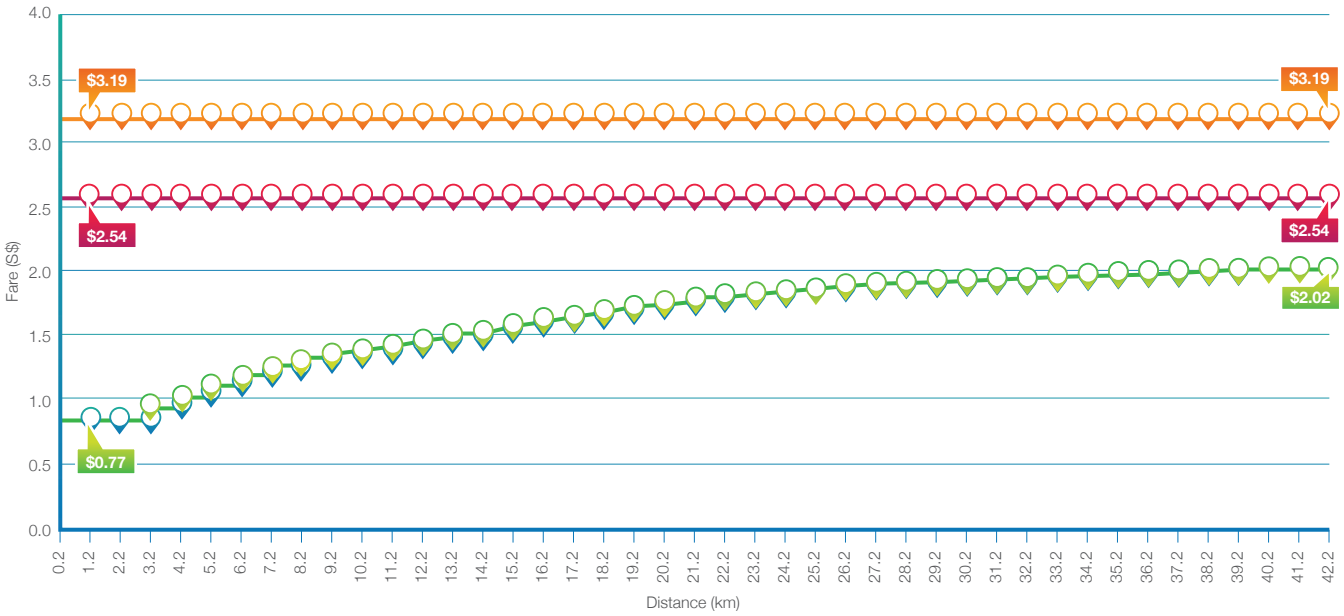
Note: Hamburg is divided into several zones. These zones are re-combined to form five rings A, B, C, D and E and a single trip adult ticket for travel within the inner rings (AB) costs €3.20. A single trip ticket for travel in three or more rings will naturally entail a higher fare. A single trip fare of €8.70 applies for travel across all five rings. Travel within a zone typically cost €2.20. Across two zones, the fare is €2.80. The lowest zonal fare €2.20 is the fare used in the above comparison. USAR is an acronym for U-Bahn, S-Bahn, A (AKN) trains and R (RB-regional) trains. There is also the short-distance single trip ticket costing €1.50 (S$2.30; S$2.14 PPP-adjusted) but the distance allowed for this ticket is unclear and hence not factored into the above chart. This however does not alter the outcome of the above comparison.

European Cities VII: Helsinki



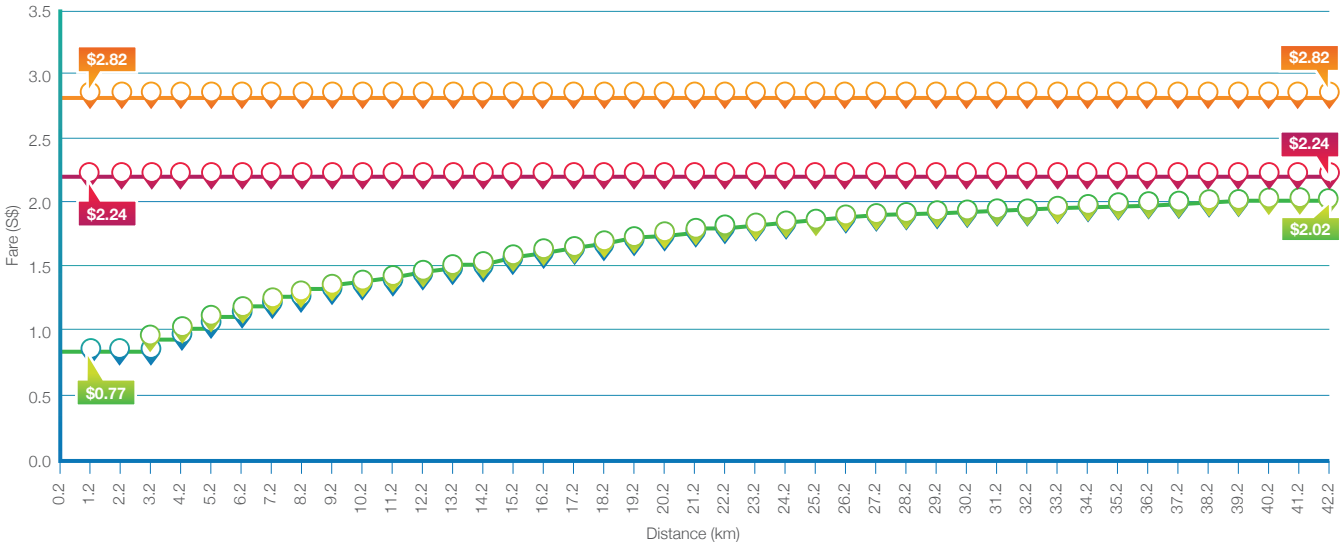
Note: Helsinki and its surrounding municipalities are combined into zones: Helsinki (A), Vantaa (B), Espoo-Kauniainen (C); Kirkkonummi (D) and Kerava-Sippo (E). Adult single trip Travel Card fare in one zone costs €2.06. Adult regional ticket valid for travel within ABC or two-zone extended regional ticket valid in BCDE costs €4.04 and a 3-zone extended regional ticket covering ABCDE costs €6.09. The zonal fare used in the above comparison is the 1- zone Travel Card fare of €2.06.

European Cities VIII: London (Peak)

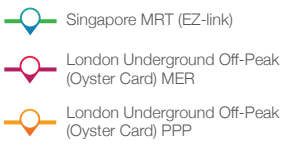


Note: Lowest zonal Oyster card fare for the London Underground is £1.70 for peak period travel of up to two zones within Zones 2 through 6. This is the fare that is used in the above comparison.

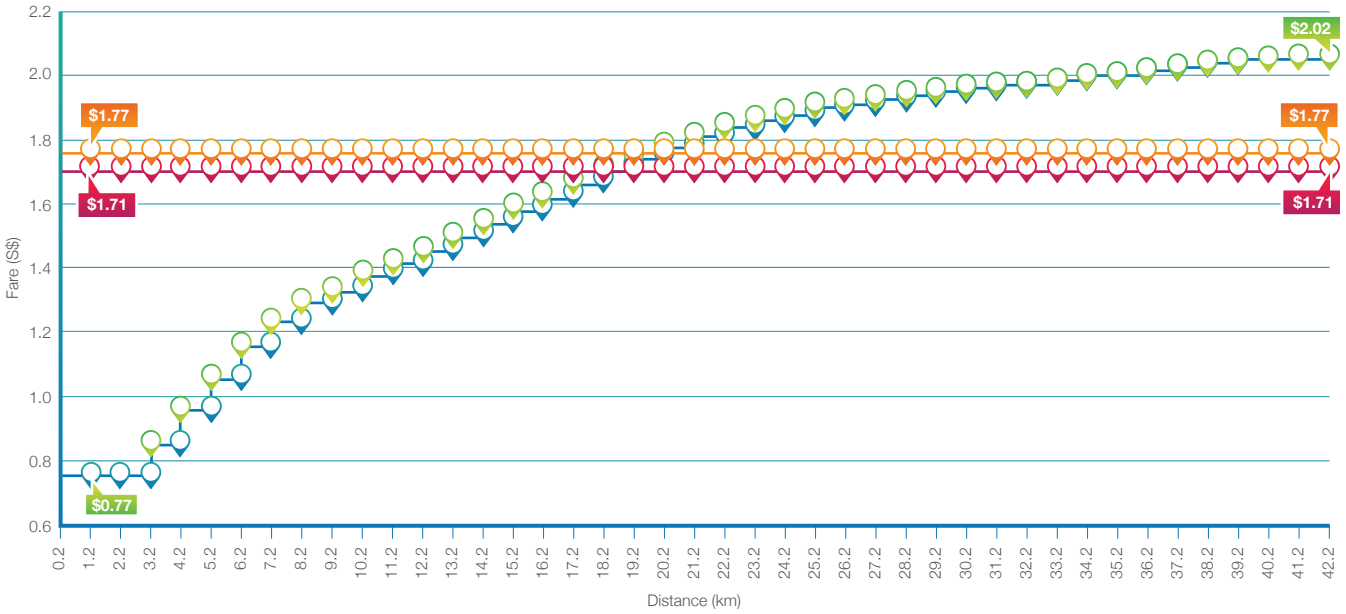
European Cities VIIIa: London (Off-Peak)



Note: Lowest zonal Oyster card fare for the London Underground is £1.50 and this fare applies for off-peak travel in Zones 2 through 6. This is the fare that is used in the above comparison.

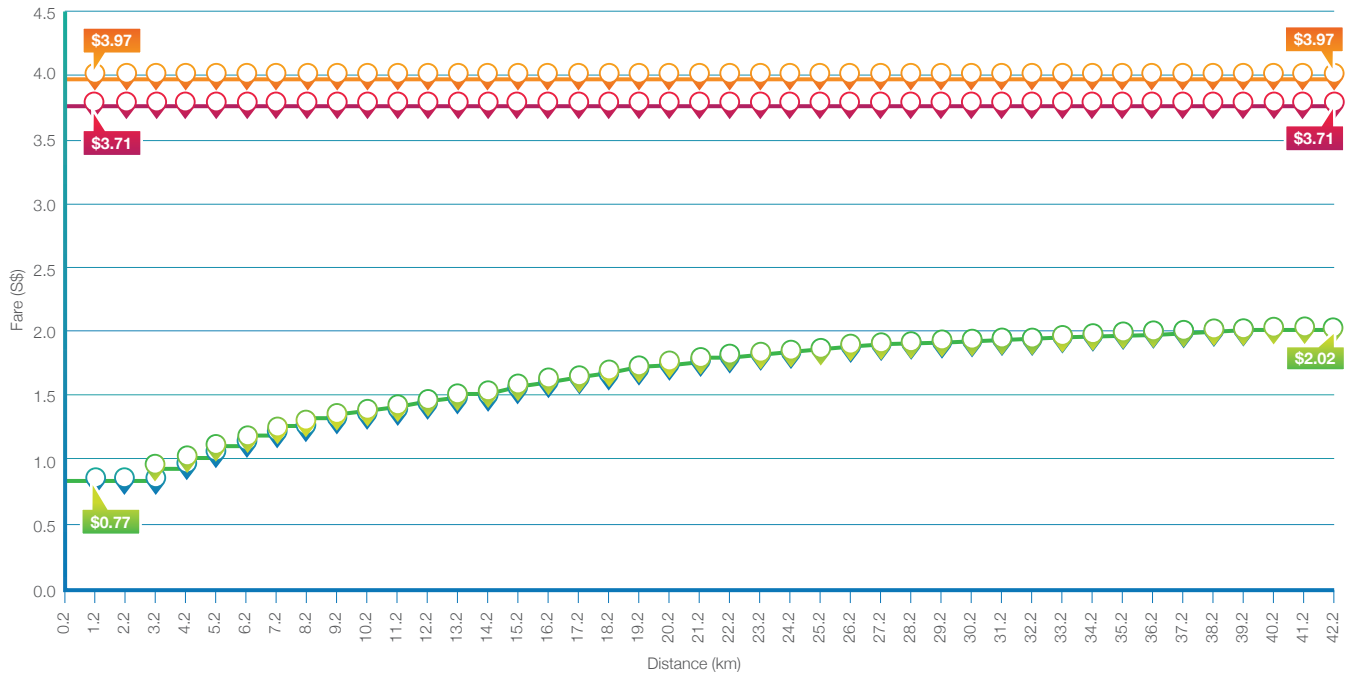


European Cities IX: Madrid



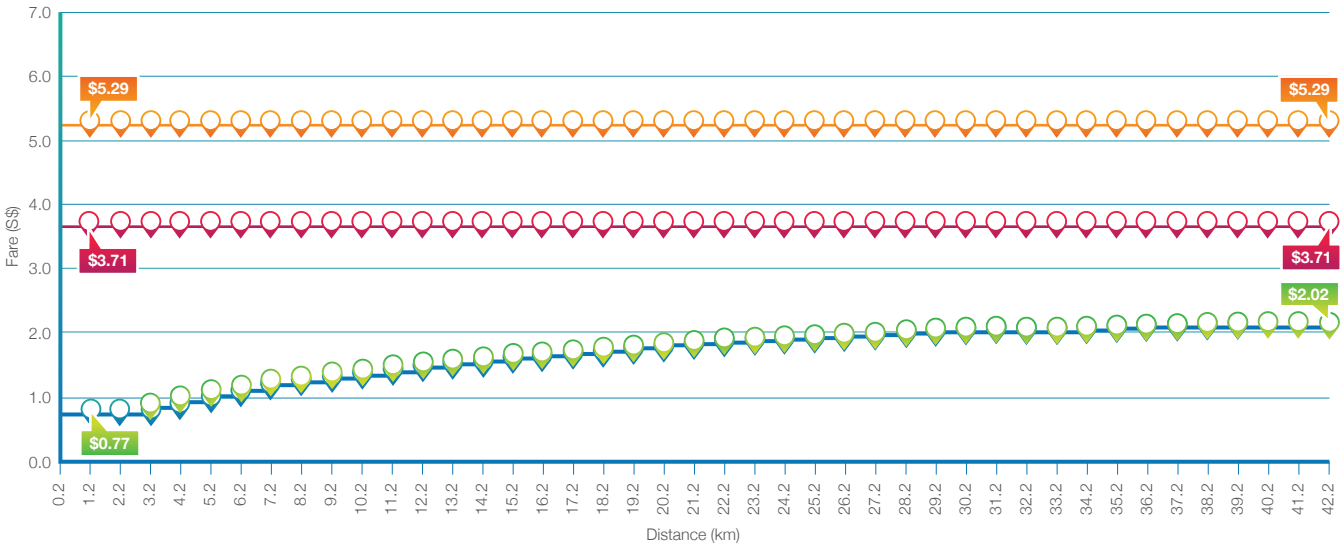
Note: Madrid is divided into Madrid Zone A, Madrid South, Madrid North and Madrid East. Generally, travel within Zone A entails a higher fare than travel within the other three zones of Madrid and a single trip fare of €1.50 applies in these other zones. However, with a 10-journey ticket, the effective fare is €1.12 per trip. This is the fare used in the above comparison. A single trip ticket for the entire network costs €3.00 (€1.83 with a 10-journey ticket).

European Cities X: Munich



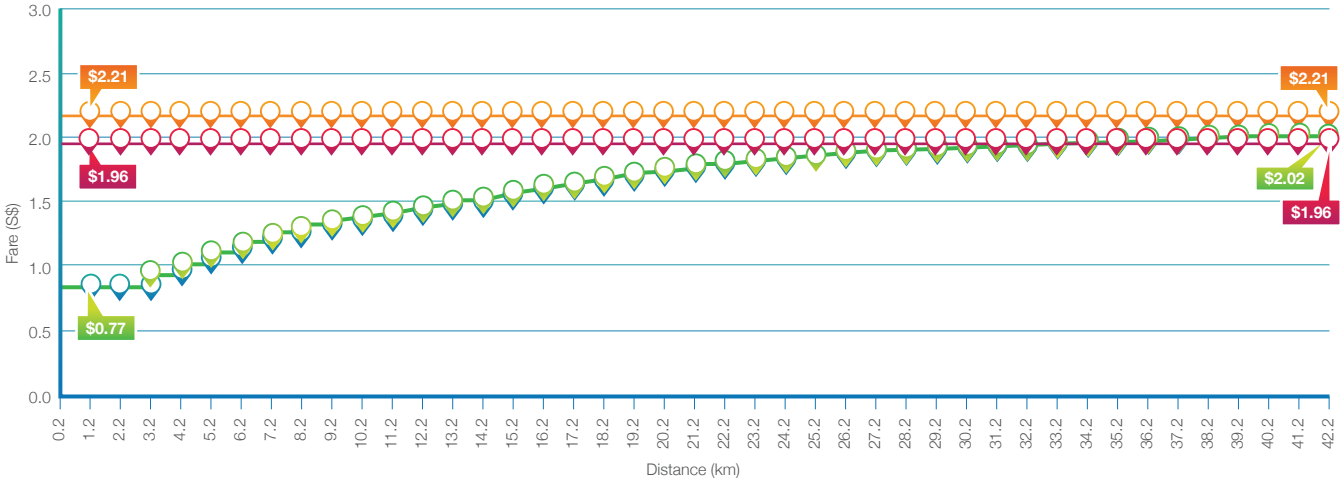
Note: Munich is divided into zones and travel within a zone when using a Stripe ticket is €2.60, within two zones €5.20, within three zones €7.80 and for four or more zones €10.40. Stripe tickets (10 stripes in one ticket) are slightly cheaper than the regular single trip tickets. Each stripe carries a value of €1.30. Thus, travel within a zone will require the validation of two stripes and within two zones, four stripes. There is also a short trip fare of one stripe or €1.30 (S$1.99, S$1.86 PPP-adjusted) but this only allows travel of up to two stations on the U-Bahn or the S-Bahn. This short trip fare is not reflected in the above comparison.

European Cities XI: Oslo



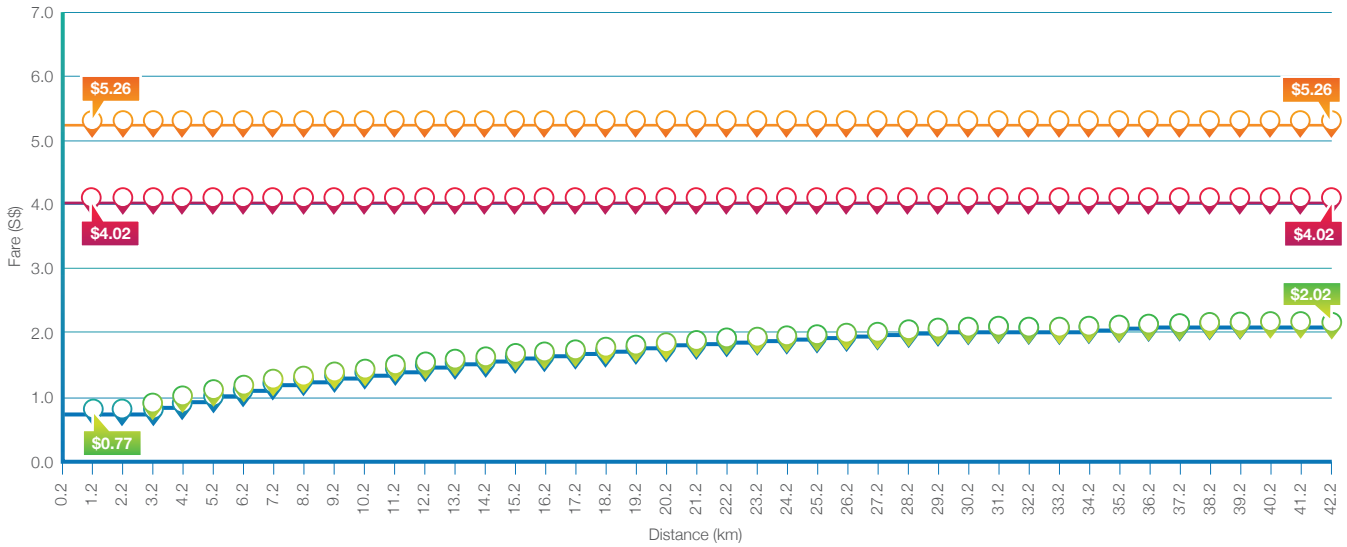
Note: Oslo uses a zone-based fare-charging system with the city divided into eleven zones labelled 1, 2 East, 2 West, 2 South, 3 East, 3 West, 3 South, 4 East, 4 West, 4 North and 4South. Travel within a zone entails a charge of 32 Norwegian Krone (NOK). For travel within two, three and four zones, the fares charged are respectively 52 NOK, 72 NOK and 92 NOK. A fare of 112 NOK applies for travel through all zones. The fares are the same regardless of use of a TravelCard or otherwise. The fare used in the above comparison is the lowest fare applicable for travel within the system, 32 NOK.

European Cities XII: Paris



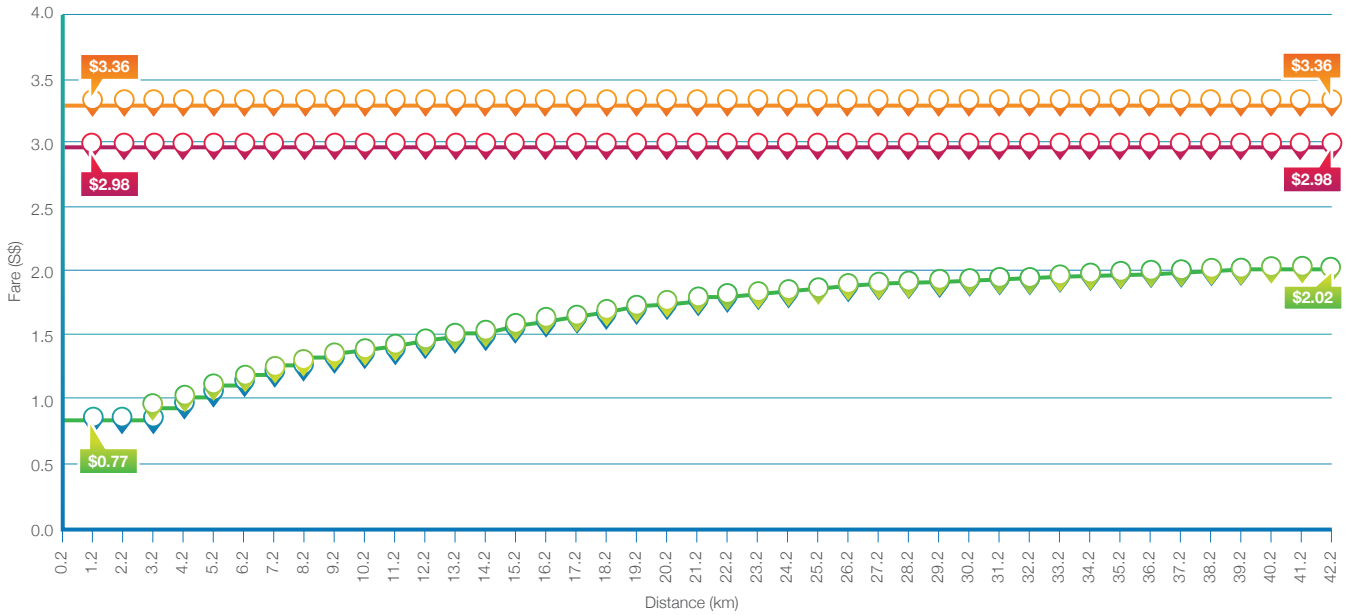
Note: Paris has a zone-based fare-charging system but the area covered by the 14 (+2) metro lines falls within the coverage of Zones 1 and 2 and a flat-fare of €1.90 applies for travel within these two zones. The same journey would cost €1.45 if tickets are purchased in a pack of 10. Travel on the RER in the same two zones also attracts the same charge. The fare used in the above comparison is the 10-ticket bundle fare, that is, €1.45.

European Cities XIII: Stockholm

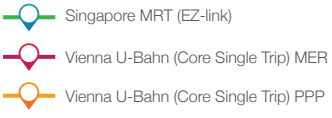


Note: Stockholm is divided into three zones (A, B and C) and the fare charged varies with the number of zones travelled and the mode of payment. With the use of the SL Access card, a fare of 20 SEK (Swedish krona) applies to travel within a zone, 30 SEK within two zones and 40 SEK in three zones (ABC). The subway stations all lie within Zone A and the SL Access card fare applicable is 20 SEK. This is the fare used in the above comparison.

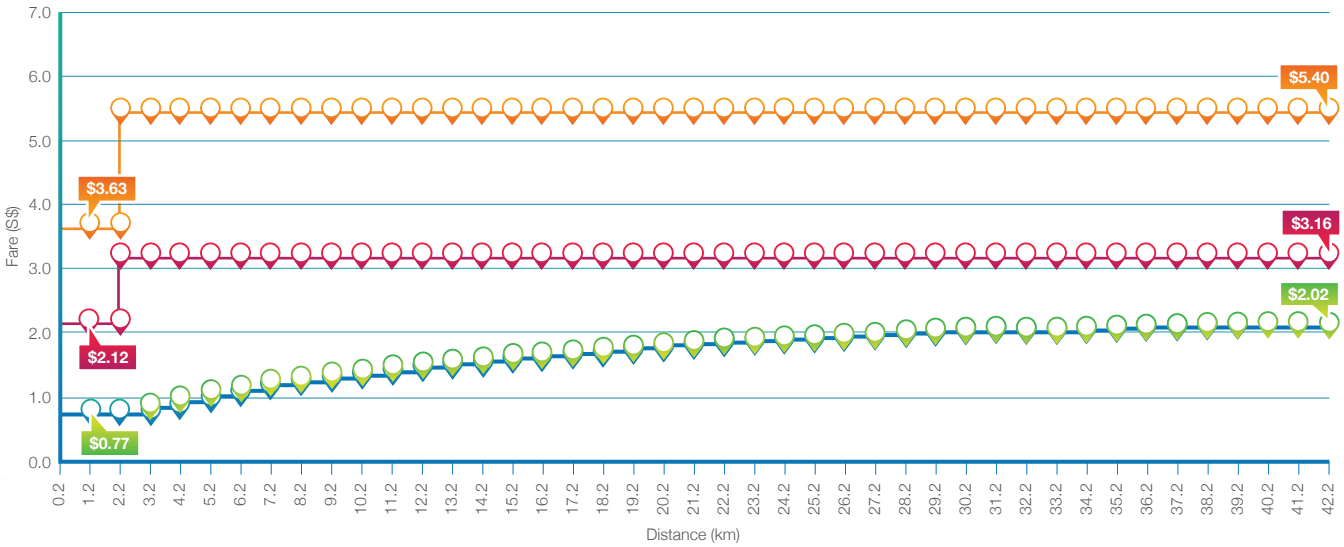
European Cities XIV: Vienna



Note: Zonal fares apply for the Vienna metropolitan area but for travel within the Vienna Core Zone, a single trip ticket fare of €2.20 applies. This fare is applicable on all five U-Bahn lines and all public transport in Vienna.



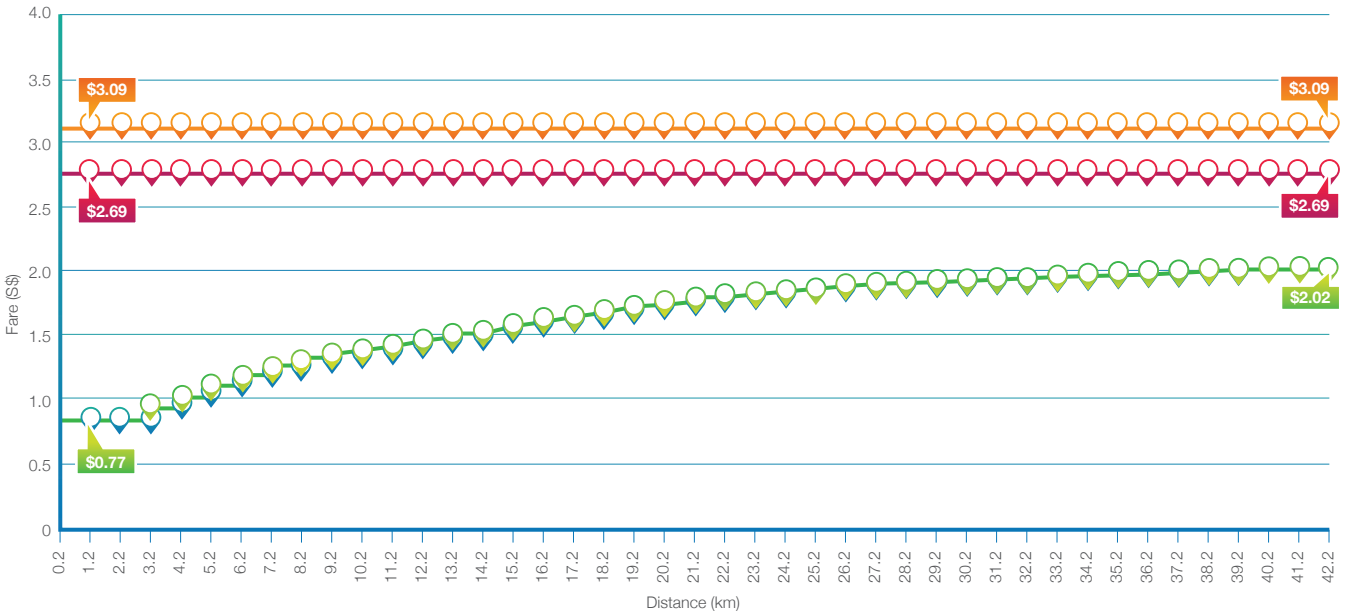
European Cities XV: Zurich



Note: Fares charged in Zurich are calculated on the basis of the number of zones travelled through. A feature of the Zurich system is the widespread use of monthly and annual passes. This aside, fares are lower when purchased in a bundle of six (multiple-journey tickets) compared with single trip tickets. The lowest zonal fare applies to travel within two zones: CHF3.87 per trip. But there is also a short-distance within Zurich that costs as low as CHF2.60 per trip. This fare, good for a 2-km journey within zones 110 and 120, is reflected in the above comparison.

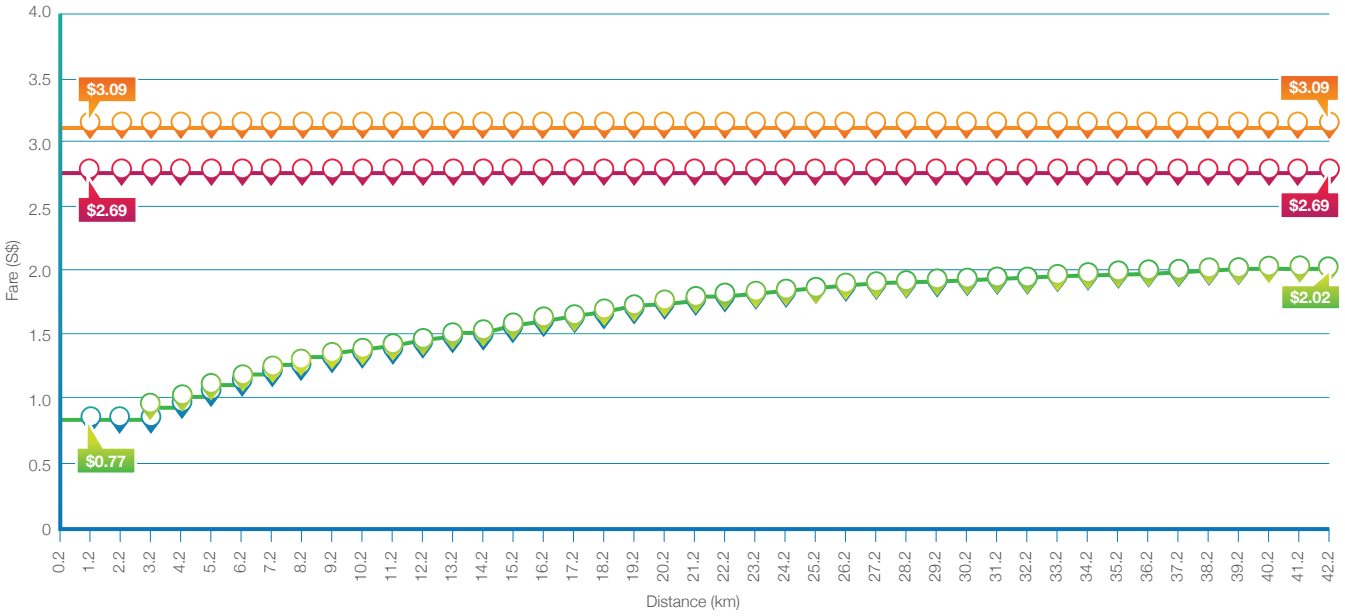
ANNEX IV:
NORTH AMERICAN CITIES

North American Cities I: Boston



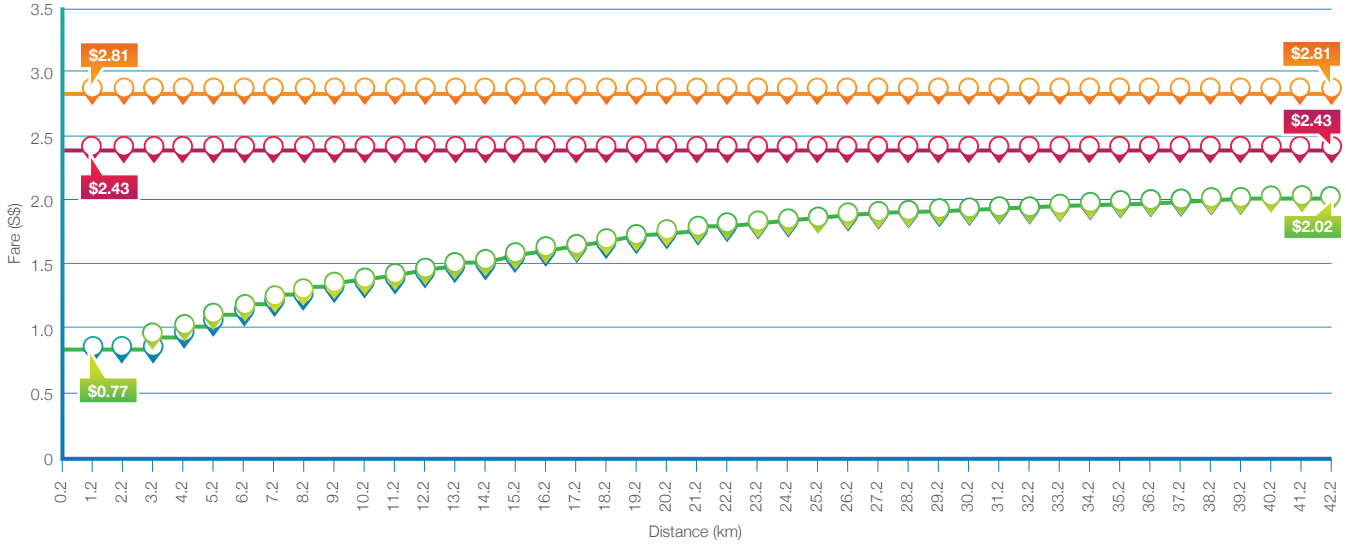
Note: Boston Subway (the 'T' system) uses a flat-fare system. A journey on the subway costs US$2.25 with the Charlie Card and US$2.75 with the Charlie Ticket. Zonal fares are charged for journeys that also used the commuter train service outside of the Boston area. The US$2.25 Charlie Card fare is used in the above comparison.

North American Cities II: Chicago



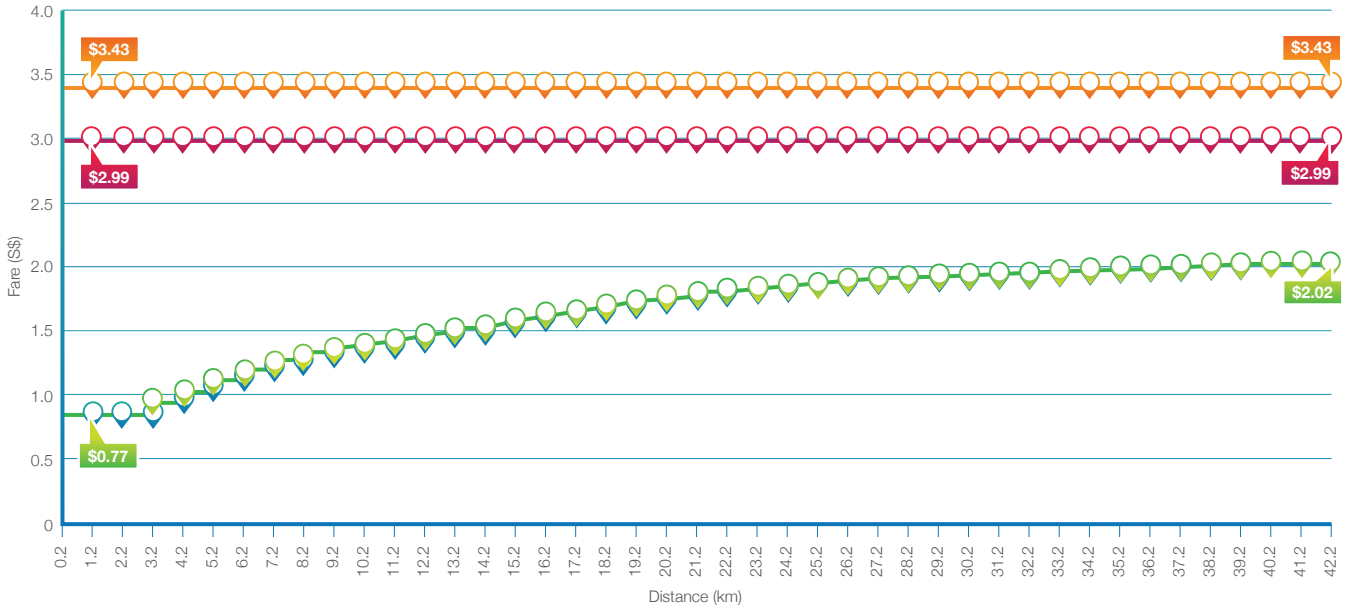
Note: The Chicago Elevated Subway (the 'L' system) charges a flat-fare for travel on the system. A journey on the system costs US$2.25 with the Ventra Card. Single trip ticket fare is US$3.00 which comprises the US$2.25 fare, US$0.25 transfer and US$0.50 limited-use media fee (convenience fee). On the Chicago METRA (which also covers the greater Chicago Metropolitan Area), zonal fares are charged and the lowest zonal fare charged is US$3.50. Fares from O'Hare Airport cost US$5.00. The US$2.25 Ventra Card fare is used in the above comparison.

North American Cities III: Montreal



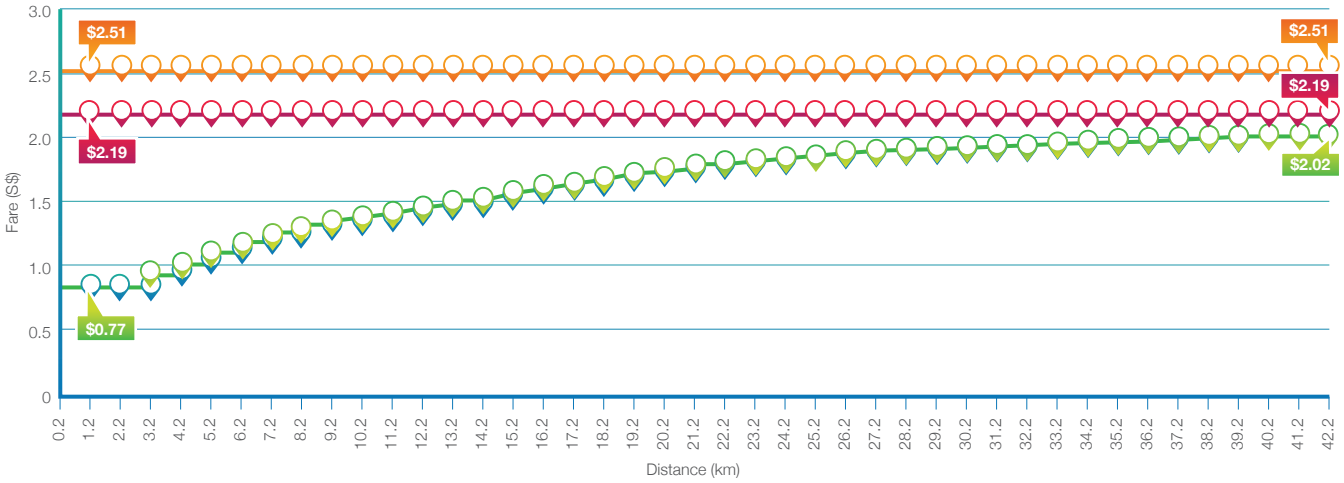
Note: Montreal Metro uses a flat-fare-charging system. A single journey on the system is CAN$3.25 with the OPUS card. For a 2-trip bundle, the fare per trip is CAN$3.00 and for a 10-trip bundle, the fare per trip is CAN$2.70. This CAN$2.70 fare is used in the above comparison.

North American Cities IV: New York City



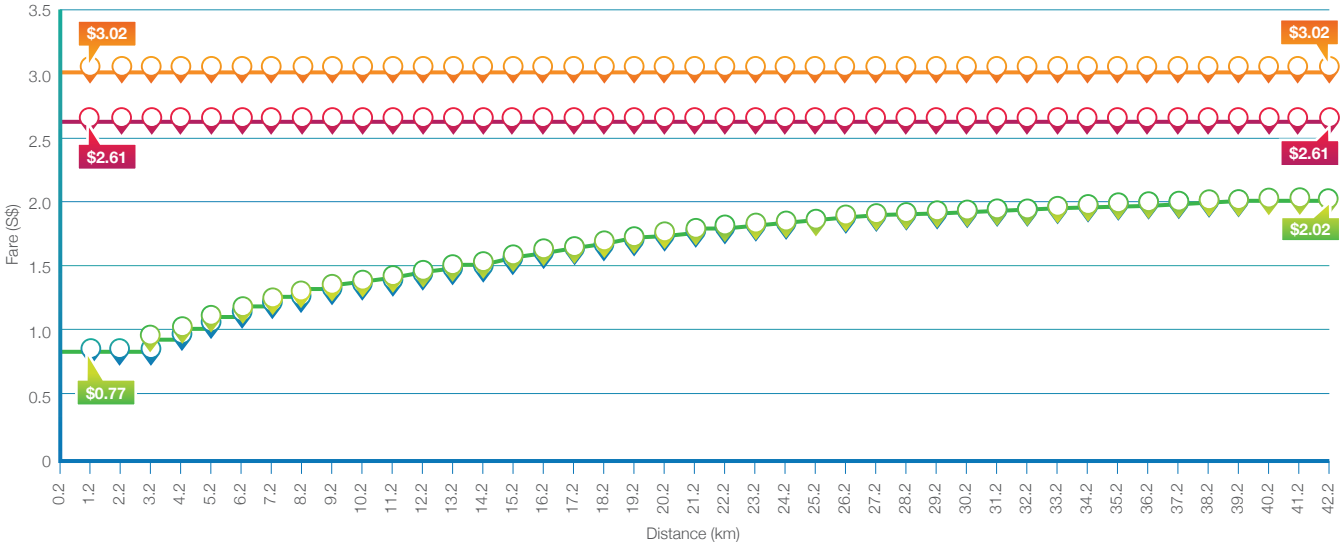
Note: The New York Subway charges a flat-fare for travel on the system. A journey costs US$2.75 with the MetroCard but an 11 percent bonus is given for top-ups making the fare per trip for regular commuters US$2.50. Single ticket fare is US$3.00. The US$2.50 MetroCard fare is used in the above comparison.

North American Cities V: San Francisco



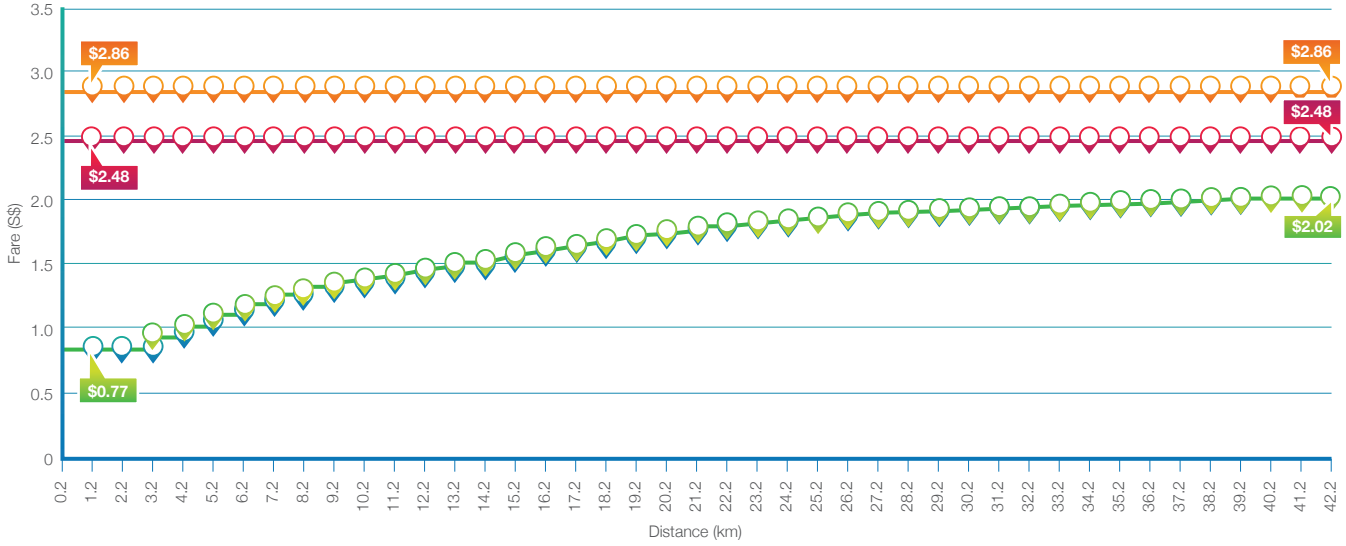
Note: The San Francisco Subway (the BART) uses a zonal fare-charging system starting with a fare of US$1.95 for travel in the downtown area and ranging to a fare in excess of US$15.00 for travel between the two major airports (SFO and OAK) with the Clipper card. There is a 6.25% discount that applies for top-ups making the lowest fare per trip for regular commuters US$1.83 and this is the fare that is used in the above comparison.

North American Cities VI: Toronto



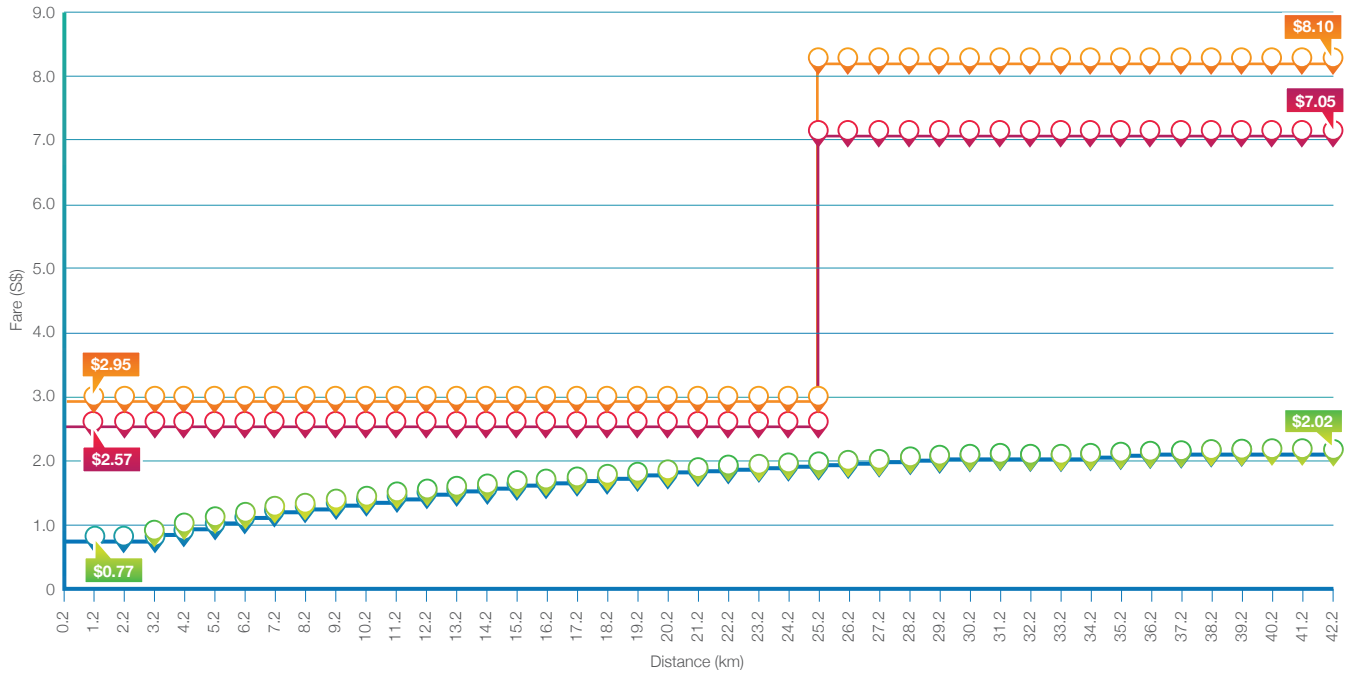
Note: Toronto Metro uses a flat-fare-charging system. A single journey on the system is CAN$2.90 with the PRESTO card.

North American Cities VII: Vancouver



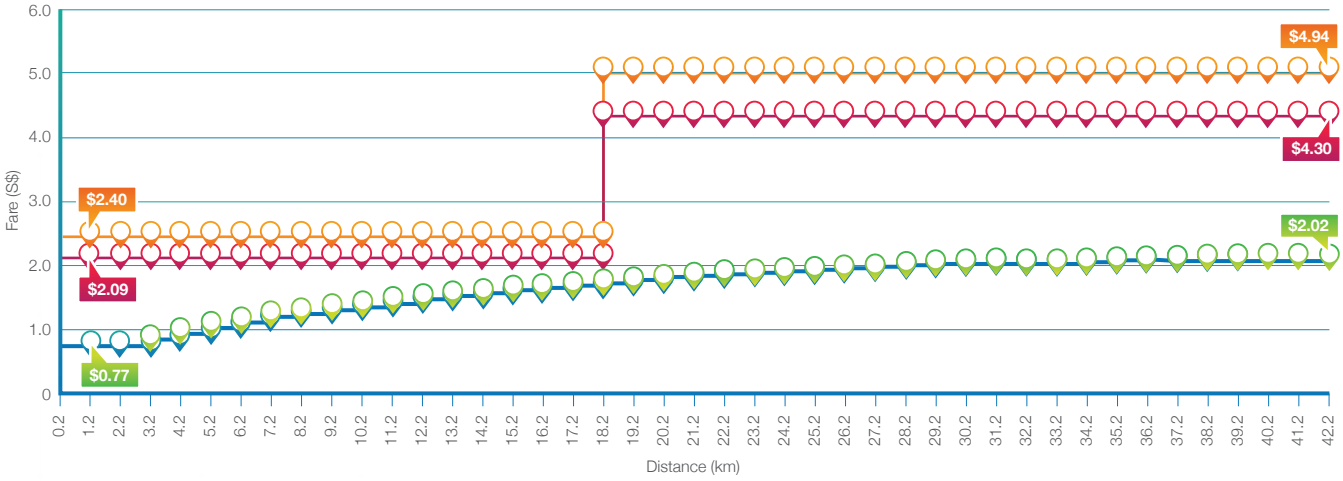
Note: Vancouver Skytrain uses a zonal fare system with fares charged varying with the number of zones travelled through. A 1-zone journey with the Compass card costs CAN$2.75; a 2-zone journey cost CAN$4.00; and a journey that requires travel through all three zones costs CAN$5.50. The 1-zone fare is used in the above comparison.

North American Cities VIII: Washington DC (Peak)



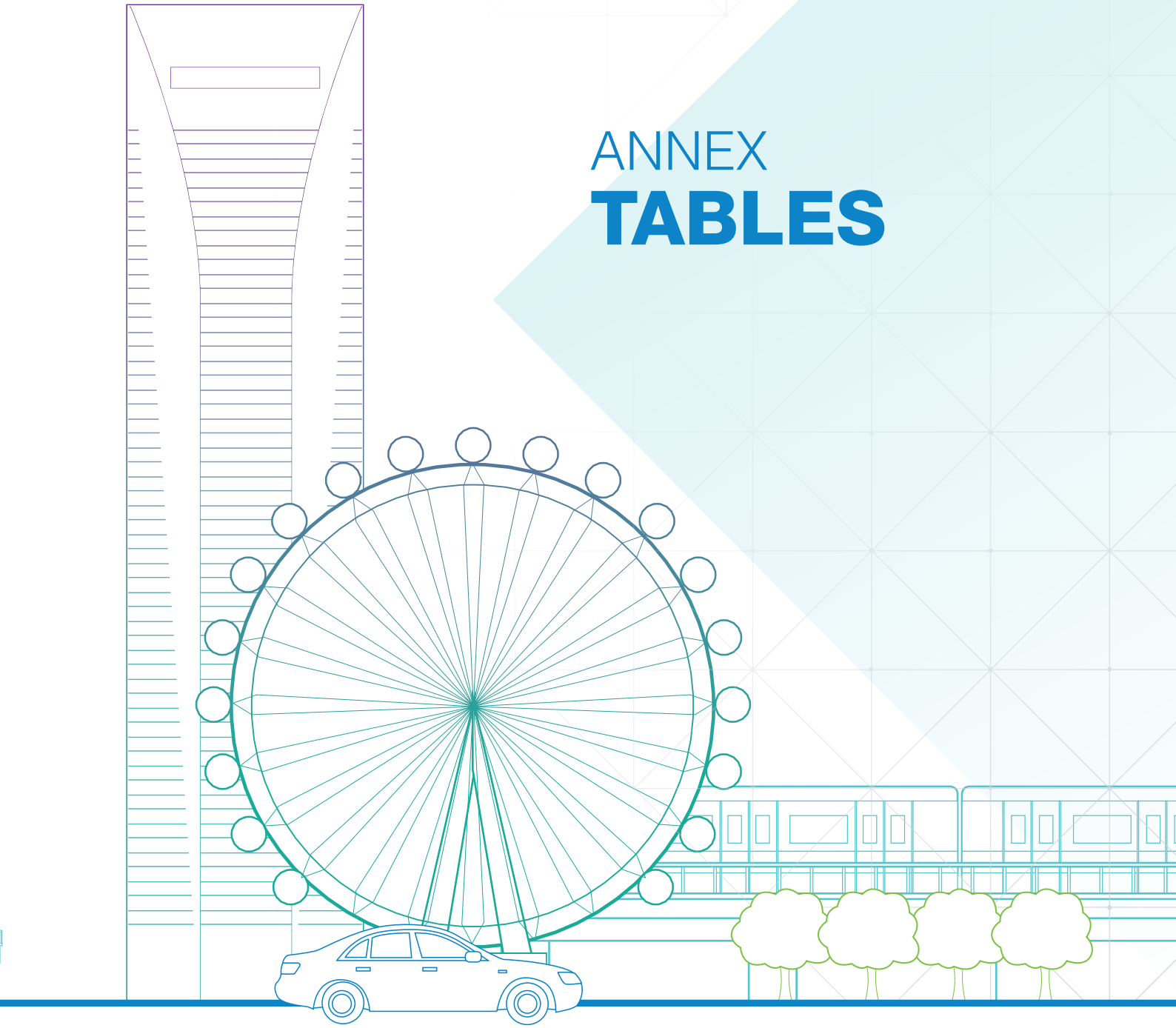
Note: Washington DC Metrorail uses a distance-based charging system. Peak hour fare (Peak period: opening to 9:30 am and 3:00 pm to 7:00 pm) with the SmarTrip® card starts at US$2.15 and rises to a maximum of US$5.90. The first fare band of US$2.15 covers the first three miles (approximately 5 km) and the fare rises to US$5.90 for journeys above 15.5 miles (approximately 25 km). The fare structures shown are for these two bands only. Actual fares over the "dotted" range of the two curves are higher than the level shown but below the maximum fare. The estimated fare for a 10-km journey during peak hours is US$3.15 (S$4.32, S$3.77 PPP-adjusted). More details are provided in the Annex Tables.

North American Cities VIIIa: Washington DC (Off-Peak)



Note: Off-Peak fares apply at all other times; from 9:01 am to 2:59 pm and after 7 pm. The first fare band of US$1.75 covers the first three miles (approximately 5 km) and the fare rises to US$3.60 for journeys above 11 miles (approximately 18 km). The fare structures shown above are for these two bands only. Actual fares over the "dotted" range of the two curves are higher than the level shown but below the maximum fare. The estimated fare for a 10-km journey off-peak is US$2.35 (S$3.23, S$2.81 PPP-adjusted). More details are provided in the Annex Tables.

ANNEX
TABLES



Annex Table I: Fares in Local Currency across Major Cities (by Distance)

	City	Currency	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	Singapore	S$	EZ-Link	0.77	0.97	1.33	1.53	1.72	1.85	1.91	1.96	2.01	2.02
	Cities with Distance-Based Fares												
1	Amsterdam	€	OV-Chip Card	0.89	1.66	2.43	3.20	3.97	4.74	5.51	6.28	7.05	7.82
2	Beijing	CNY	Yikatong	3.00	3.00	4.00	5.00	5.00	6.00	6.00	8.00	8.00	8.00
3	Guangzhou	CNY	Yang Cheng Tong	1.90	2.85	3.80	4.75	5.70	6.65	6.65	7.60	7.60	8.55
4	Hong Kong (Island Line)	HK$	Octopus Card	4.50	5.30	8.20	10.10	10.10	*	*	*	*	*
4a	Hong Kong (Tsuen Wan Line)	HK$	Octopus Card	4.50	5.30	8.20	10.10	*	*	*	*	*	*
5	Seoul	Won ('000)	T-Money	1.25	1.25	1.25	1.35	1.45	1.55	1.65	1.75	1.85	1.95
6	Shanghai	CNY	SPTC	3.00	3.00	4.00	4.00	5.00	5.00	6.00	6.00	7.00	7.00
7	Shenzhen	CNY	Shenzhen Tong	1.90	2.85	2.85	3.80	4.75	5.70	5.70	6.65	6.65	7.60
8	Sydney (Peak)	A$	Opal Card	3.38	3.38	3.38	4.20	4.20	4.82	4.82	4.82	6.46	6.46
8a	Sydney (Off-Peak)	A$	Opal Card	2.36	2.36	2.36	2.94	2.94	3.37	3.37	3.37	4.52	4.52
9	Taipei	NT$	EasyCard	16.00	16.00	24.00	32.00	36.00	44.00	48.00	52.00	52.00	52.00
10	Tokyo	¥ ('00)	PASMO/SUICA	1.65	1.65	1.95	2.37	2.78	2.78	3.08	3.08	3.08	3.08
11	Washington DC (Peak)[1]	US$	SmarTrip®	2.15	2.15	3.15	4.15	5.05	5.90	5.90	5.90	5.90	5.90
11a	Washington DC (Off-Peak)[1]	US$	SmarTrip®	1.75	1.75	2.35	3.15	3.60	3.60	3.60	3.60	3.60	3.60
	Cities with Flat Fare Structure												
12	Adelaide (Peak)[2]	A$	Metrocard	1.92	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.54
12a	Adelaide (Off- Peak)[2]	A$	Metrocard	1.48	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
13	Boston	US$	Charlie Card	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
14	Chicago	US$	Ventra Card	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
15	Montreal	CAN$	Opus Card	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
16	New York City	US$	MetroCard	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
17	Toronto	CAN$	Presto	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90

[1] Estimated using the WMATA fare calculator
[2] Base fare is based on short-trip journey fare

Annex Table I: Fares in Local Currency across Major Cities (by Distance) – cont'd

	City	Currency	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	Singapore	S$	EZ-Link	0.77	0.97	1.33	1.53	1.72	1.85	1.91	1.96	2.01	2.02
	Cities with Zonal Fare Structure (Lowest Zonal Fare)												
18	Barcelona	€	T-50/T-70	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
19	Berlin[1]	€	4-Trip Fare	1.70	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
20	Copenhagen (Peak)	DKK	(Rejsekort)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20a	Copenhagen (Off-Peak)	DKK	(Rejsekort)	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
21	Frankfurt[1]	€	4-Ticket Fare	1.80	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
22	Hamburg[1]	€	Single Ticket Fare	1.50	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
23	Helsinki	€	Travel Card	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06
24	London (Peak)	£	Oyster Card	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
24a	London (Off-Peak)	£	Oyster Card	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
25	Madrid	€	10-Journey Fare	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
26	Melbourne	A$	MYKI Card	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
27	Munich[1]	€	Stripe Ticket Fare	1.30	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
28	Oslo	NOK	TravelCard	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
29	Paris	€	10-Ticket Fare	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
30	Perth[1]	A$	SmartRider Card	1.79	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
31	San Francisco	US$	Clipper Card	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.83
32	Stockholm	SEK	SL Access Card	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
33	Vancouver	CAN$	Compass Card	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
34	Vienna	€	Vienna Core Single Trip	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
35	Zurich[1]	CHF	Short Distance Fare	2.60	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87

[1] Base fare is based on short-trip journey fare

Annex Table II: Fares in S$ at Market Exchange Rate (MER) across Major Cities (by Distance)

	City	MER (S$/FX)	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	**Singapore**	**1.0000000**	**EZ-Link**	**0.77**	**0.97**	**1.33**	**1.53**	**1.72**	**1.85**	**1.91**	**1.96**	**2.01**	**2.02**
Cities with Distance-Based Fares													
1	Amsterdam	1.5266200	OV-Chip Card	1.36	2.53	3.71	4.89	6.06	7.24	8.41	9.59	10.76	11.94
2	Beijing	0.2078400	Yikatong	0.62	0.62	0.83	1.04	1.04	1.25	1.25	1.66	1.66	1.66
3	Guangzhou	0.2078400	Yang Cheng Tong	0.39	0.59	0.79	0.99	1.18	1.38	1.38	1.58	1.58	1.78
4	Hong Kong (Island Line)	0.1768300	Octopus Card	0.80	0.94	1.45	1.79	1.79	*	*	*	*	*
4a	Hong Kong (Tsuen Wan Line)	0.1768300	Octopus Card	0.80	0.94	1.45	1.79	*	*	*	*	*	*
5	Seoul	0.0011880	T-Money	1.49	1.49	1.49	1.60	1.72	1.84	1.96	2.08	2.20	2.32
6	Shanghai	0.2078400	SPTC	0.62	0.62	0.83	0.83	1.04	1.04	1.25	1.25	1.45	1.45
7	Shenzhen	0.2078400	Shenzhen Tong	0.39	0.59	0.59	0.79	0.99	1.18	1.18	1.38	1.38	1.58
8	Sydney (Peak)	1.0223600	Opal Card	3.46	3.46	3.46	4.29	4.29	4.93	4.93	4.93	6.60	6.60
8a	Sydney (Off-Peak)	1.0223600	Opal Card	2.41	2.41	2.41	3.01	3.01	3.45	3.45	3.45	4.62	4.62
9	Taipei	0.0425513	EasyCard	0.68	0.68	1.02	1.36	1.53	1.87	2.04	2.21	2.21	2.21
10	Tokyo	0.0127413	PASMO/SUICA	2.10	2.10	2.48	3.02	3.54	3.54	3.92	3.92	3.92	3.92
11	Washington DC (Peak)[1]	1.3728600	SmarTrip®	2.95	2.95	4.32	5.70	6.93	8.10	8.10	8.10	8.10	8.10
11a	Washington DC (Off-Peak)[1]	1.3728600	SmarTrip®	2.40	2.40	3.23	4.32	4.94	4.94	4.94	4.94	4.94	4.94
Cities with Flat Fare Structure													
12	Adelaide (Peak)[2]	1.0223600	Metrocard	1.96	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62
12a	Adelaide (Off- Peak)[2]	1.0223600	Metrocard	1.51	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
13	Boston	1.3728600	Charlie Card	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
14	Chicago	1.3728600	Ventra Card	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
15	Montreal	1.0413500	Opus Card	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81
16	New York City	1.3728600	MetroCard	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43
17	Toronto	1.0413500	Presto	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02

[1] Estimated using the WMATA fare calculator
[2] Base fare is based on short-trip journey fare

Annex Table II: Fares in S$ at Market Exchange Rate (MER) across Major Cities (by Distance) – cont'd

	City	MER (S$/FX)	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	Singapore	1.0000000	EZ-Link	0.77	0.97	1.33	1.53	1.72	1.85	1.91	1.96	2.01	2.02
	Cities with Distance-Based Fares												
18	Barcelona	1.5266200	T-50/T-70	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
19	Berlin[1]	1.5266200	4-Trip Fare	2.60	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43	3.43
20	Copenhagen (Peak)	0.2074120	(Rejsekort)	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11
20a	Copenhagen (Off- Peak)	0.2074120	(Rejsekort)	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
21	Frankfurt[1]	1.5266200	4-Ticket Fare	2.75	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05	3.05
22	Hamburg[1]	1.5266200	Single Ticket Fare	2.30	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
23	Helsinki	1.5266200	Travel Card	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
24	London (Peak)	1.8777000	Oyster Card	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19
24a	London (Off-Peak)	1.8777000	Oyster Card	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82
25	Madrid	1.5266200	10-Journey Fare	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
26	Melbourne	1.0223600	MYKI Card	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
27	Munich[1]	1.5266200	Stripe Ticket Fare	1.99	3.97	3.97	3.97	3.97	3.97	3.97	3.97	3.97	3.97
28	Oslo	0.1654510	TravelCard	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29
29	Paris	1.5266200	10-Ticket Fare	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21	2.21
30	Perth[1]	1.0223600	SmartRider Card	1.83	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61
31	San Francisco	1.3728600	Clipper Card	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
32	Stockholm	0.1643180	SL Access Card	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26
33	Vancouver	1.0413500	Compass Card	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
34	Vienna	1.5266200	Vienna Core Single Trip	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
35	Zurich[1]	396300	Short Distance Fare	3.63	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40

[1] Base fare is based on short-trip journey fare

Annex Table III: Fares in S$ across Major Cities in S$ at PPP (by Distance)

	City	PPP (S$/FX)	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	Singapore	1.0000000	EZ-Link	0.77	0.97	1.33	1.53	1.72	1.85	1.91	1.96	2.01	2.02
	Cities with Distance-Based Fares												
1	Amsterdam	1.305729	OV-Chip Card	1.16	2.17	3.17	4.18	5.18	6.19	7.19	8.20	9.21	10.21
2	Beijing	0.312688	Yikatong	0.94	0.94	1.25	1.56	1.56	1.88	1.88	2.50	2.50	2.50
3	Guangzhou	0.312688	Yang Cheng Tong	0.59	0.89	1.19	1.49	1.78	2.08	2.08	2.38	2.38	2.67
4	Hong Kong (Island Line)	0.187349	Octopus Card	0.84	0.99	1.54	1.89	1.89	*	*	*	*	*
4a	Hong Kong (Tsuen Wan Line)	0.187349	Octopus Card	0.84	0.99	1.54	1.89	*	*	*	*	*	*
5	Seoul	0.001167	T-Money	1.46	1.46	1.46	1.58	1.69	1.81	1.93	2.04	2.16	2.28
6	Shanghai	0.312688	SPTC	0.94	0.94	1.25	1.25	1.56	1.56	1.88	1.88	2.19	2.19
7	Shenzhen	0.312688	Shenzhen Tong	0.59	0.89	0.89	1.19	1.49	1.78	1.78	2.08	2.08	2.38
8	Sydney (Peak)	0.758285	Opal Card	2.56	2.56	2.56	3.18	3.18	3.65	3.65	3.65	4.90	4.90
8a	Sydney (Off-Peak)	0.758285	Opal Card	1.79	1.79	1.79	2.23	2.23	2.56	2.56	2.56	3.43	3.43
9	Taipei	0.042551[1]	EasyCard	0.68	0.68	1.02	1.36	1.53	1.87	2.04	2.21	2.21	2.21
10	Tokyo	0.010534	PASMO/SUICA	1.74	1.74	2.05	2.50	2.93	2.93	3.24	3.24	3.24	3.24
11	Washington DC (Peak)[2]	1.195262	SmarTrip®	2.57	2.57	3.77	4.96	6.04	7.05	7.05	7.05	7.05	7.05
11a	Washington DC (Off-Peak)[2]	1.195262	SmarTrip®	2.09	2.09	2.81	3.77	4.30	4.30	4.30	4.30	4.30	4.30
	Cities with Flat Fare Structure												
12	Adelaide (Peak)[3]	0.758285	Metrocard	1.46	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.68
12a	Adelaide (Off- Peak)[3]	0.758285	Metrocard	1.12	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47
13	Boston	1.195262	Charlie Card	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69
14	Chicago	1.195262	Ventra Card	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69
15	Montreal	0.901550	Opus Card	2.43	2.43	2.43	2.43	2.43	2.43	2.43	2.43	2.43	2.43
16	New York City	1.195262	MetroCard	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99
17	Toronto	0.901550	Presto	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61

[1] S$-NT$ Market exchange rate;
[2] Estimated using the WMATA fare calculator
[3] Base fare is based on short-trip journey fare

Annex Table III: Fares in S$ across Major Cities in S$ at PPP (by Distance) – cont'd

	City	PPP (S$/FX)	Type of Fare	Base Fare	5km	10km	15km	20km	25km	30km	35km	40km	45km
1	Singapore	1.0000000	EZ-Link	0.77	0.97	1.33	1.53	1.72	1.85	1.91	1.96	2.01	2.02
	Cities with Zonal Fare Structure (Lowest Zonal Fare)												
18	Barcelona	1.580031	T-50/T-70	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34
19	Berlin[1]	1.427617	4-Trip Fare	2.43	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21
20	Copenhagen (Peak)	0.139571	(Rejsekort)	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
20a	Copenhagen (Off- Peak)	0.139571	(Rejsekort)	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
21	Frankfurt[1]	1.427617	4-Ticket Fare	2.57	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
22	Hamburg[1]	1.427617	Single Ticket Fare	2.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
23	Helsinki	1.190521	Travel Card	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45
24	London (Peak)	1.494330	Oyster Card	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54	2.54
24a	London (Off-Peak)	1.494330	Oyster Card	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24
25	Madrid	1.580031	10-Journey Fare	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
26	Melbourne	0.758285	MYKI Card	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
27	Munich[1]	1.427617	Stripe Ticket Fare	1.86	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71
28	Oslo	0.116019	TravelCard	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71
29	Paris	1.351211	10-Ticket Fare	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
30	Perth[1]	0.758285	SmartRider Card	1.36	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93
31	San Francisco	1.195262	Clipper Card	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19
32	Stockholm	0.125573	SL Access Card	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02
33	Vancouver	0.901550	Compass Card	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48
34	Vienna	1.354107	Vienna Core Single Trip	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98
35	Zurich[1]	0.817002	Short Distance Fare	2.12	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16

[1] Base fare is based on short-trip journey fare

SELECTED REFERENCES

(Online Sources by Cities)

City	Website
Adelaide	https://www.adelaidemetro.com.au/Tickets/Fares#Regular\
Amsterdam	http://en.gvb.nl/reizen/producten-en-tarieven/tarieven-2016
Barcelona	https://www.fgc.cat/eng/bitllets_integrats.asp
Berlin	https://www.bvg.de/de/Tickets
Beijing	https://www.travelchinaguide.com/cityguides/beijing/transportation/subway.htm http://www.bjsubway.com/subwaymap/station_map.html
Boston	http://www.mbta.com/fares_and_passes/subway/
Chicago	http://www.transitchicago.com/travel_information/fares/
Copenhagen	http://dinoffentligetransport.dk/billetter-og-priser/priser-og-zoner/priser/
Frankfurt	http://www.rmv.de/
Guangzhou	https://www.travelchinaguide.com/cityguides/guangdong/guangzhou/subway/ http://cs.gzmtr.com/ckfw/pwzy/index.html?framesrc=class
Hamburg	http://www.hvv.de/en/tickets/single-day-tickets/overview/ http://www.hvv.de/pdf/service/downloads/hvv_public_transport_flyer.pdf
Helsinki	https://www.hsl.fi/en/tickets-and-fares
Hong Kong	http://www.mtr.com.hk/archive/en/tickets/octopus_fare201611.pdf
London	https://tfl.gov.uk/farese-and-payments/
Madrid	https://www.metromadrid.es/en/viaja_en_metro/Tarifasybilletes/billetes/
Melbourne	http://ptv.vic.gov.au/tickets/regional-fares-2016/
Montreal	http://www.stm.info/en/info/fares/transit-fares/1-trip
Munich	http://www.mvv-muenchen.de/en/tickets-fares/tickets/single-trips/single- ticket/index.html
New York	http://web.mta.info/metrocard/mcgtreng.htm
Oslo	https://ruter.no/en/buying-tickets/tickets-and-fares/single-tickets/
Paris	http://www.ratp.fr/en/ratp/r_61584/tickets/
Perth	http://www.transperth.wa.gov.au/tickets-fares/fares
San Francisco	https://www.bart.gov/sites/default/files/docs/2016%20Fare%20Chart.pdf
Seoul	https://www.seoulmetro.co.kr/eng/page.jsp?code=D030010000
Shanghai	http://service.shmetro.com/en/cphc/12.htm
Shenzhen	http://www.szmc.net/page/en/fare.html?code=9103
Stockholm	http://sl.se/en/fares--tickets/
Sydney	https://www.opal.com.au/en/opal-fares/
Taipei	http://english.metro.taipei/ https://en.wikipedia.org/wiki/Taipei_Metro
Tokyo	http://www.tokyometro.jp/en/ticket/types/regular/index.html
Toronto	https://www.ttc.ca/Fares_and_passes/Prices/index.jsp
Vancouver	http://www.translink.ca/en/Fares-and-Passes/Single-Fares.aspx
Vienna	http://homepage.univie.ac.at/horst.prillinger/ubahn/english/fares.html
Washington DC	http://www.wmata.com/fares/metrorail.cfm
Zurich	https://www.stadt-zuerich.ch/vbz/en/index/tickets/tickets_prices/day_pass_single_ticket.html

NOTE

NOTE

PUBLIC TRANSPORT COUNCIL
510 Thomson Road,
#12-03, SLF Building,
Singapore 298135

www.ptc.gov.sg

UEN: T08GB0044D