FACT SHEET

Guide to the taxi cost index model

The Independent Pricing and Regulatory Tribunal (IPART) makes annual recommendations on maximum fares for taxi services. In making decisions on appropriate fare changes for these services we consider the change in costs faced by the industry over the past year. We do this using the Taxi Cost Index (TCI).

The TCI model is now available from our website as an Excel file (www.ipart.nsw.gov.au). This paper is a guide to the Excel file. It provides some background on how cost indices work and then steps users through the Excel file. We recommend that this paper is read in conjunction with the Excel file.

This paper does not explain our decisions on inputs to the cost indices – this information is included in our annual review reports, which are also available on our website.

1   Background on how cost indices work

A cost index measures, in percentage terms, how much the overall cost of providing a particular type of transport service has changed in the 12 months since our last review. There are 2 parts to the index:

▼ a list of costs faced by the industry and their relative importance (weightings)

▼ an estimate of how each of these costs changes over time (inflators).

1.1   Weightings

The index costs and weightings are designed to represent the cost structure for a typical taxi. The cost index consists of a 'basket' of cost items that a typical taxi faces in providing taxi services – such as fuel, labour and insurance costs. These items are weighted according to the proportion of the overall cost of providing services that they represent (eg, if driver labour is half of total costs then it has a weighting of 50%). Typically only significant costs are listed separately; the index usually has an 'other' cost item to capture smaller costs.

Initially the weightings are established by surveying the industry and working out a representative set of costs. We also seek to periodically review the weightings (every 5 years or so) to make sure that the index continues to reflect the cost structure of the industry. Reviewing the weightings every 5 years allows the index to account for changes in the structure of the industry's costs over time.

In between these reviews, the weights are adjusted each year for changes in the relative costs of each input – costs that increased by more than the average this year will have a higher weighting next year and costs that increased by less than the average, or fell, this year will have a lower weighting next year. Adjusting the weightings in this way ensures that the index continues to reflect the costs faced from year to year.

1.2   Inflators

We estimate the change in each cost item using a cost 'inflator', which is expressed as a percentage change. Each cost item has its own 'inflator', which aims to track the movement in this particular cost item over time. Wherever possible, we select inflators that are:

▼ based on independent and verifiable data that is publicly available

▼ a reasonable estimate of cost changes for operators.

For example, in the taxi cost index, the relevant inflator for insurance costs is the change in the insurance services component of the CPI, which is published quarterly by the Australian Bureau of Statistics.

1.3   Calculating the change in costs

At the start of each review, we establish the relative weighting for each cost item in the cost index, and the value of its inflator. We then multiply the weighting by the inflator value for each cost item individually, to calculate the change in overall costs that cost item represents (ie, the contribution of any increase or decrease in the cost item since the last review to the overall change in the cost of providing the service). The sum of all these provides the increase in overall costs faced by the industry. This is the total change in the cost index.

2   What the TCI model does

The purpose of the TCI model is to:

1. Calculate the increase in costs of providing taxi services via the TCI.

2. Calculate new weightings that will apply next year as the base weightings for the TCI.

The Excel model sets out all the inputs and calculations that are necessary to fulfil this purpose.

Base weightings in the model are determined according to the previous years TCI. Cost item growth rates are measured using pre-determined inflators and updated every year.

3   How the TCI model works

The calculations in the model are based on a number of steps:

▼ Step 1 – Input base weightings from previous year's TCI

▼ Step 2 – Input inflator values

▼ Step 3 – Calculate the change in the inflator values over the past year

▼ Step 4 – Calculate the change in costs faced by the industry over the past year

▼ Step 5 – Calculate the change in fares based on the outcomes of the TCI

▼ Step 6 - Calculate the new weightings to be used as base weightings next year.

Each of these steps is explained in more detail below.

These steps are also set out on the 'Cover' worksheet in the model and are further explained via comments in the model.

3.1   Step 1 – Input base weightings

The starting point for each index is a list of costs and relative weightings. The costs and weightings are obtained from last year's TCI model (see Step 6 for information on how they are calculated) and are published in the previous year's final report. We enter the weighting for each cost item as a percentage of total costs. The sum of weightings for the TCI adds to 100%.

The weightings are input into worksheet 1, in cells D13-D25 for the Urban TCI and cells F13-F25 for the Country TCI.

3.2   Step 2 – Input inflator values

The next step is to fill in the values of the various cost inflators. The urban and country TCI's use the inflators listed in cells B30-B38 of worksheet 1.

The values of each of these inflators are found in cells C30-D38 of worksheet 1. These values are calculated from data in the individual input worksheets 2-5.

Table 3.1   Inflators used in the taxi cost indices

Inflator	Worksheet	What the inflator value is based on
WPI-X (Operator)	Worksheet 2: ABS data	Wage price index using quarterly index numbers released by the ABS. The relevant WPI is the total hourly rates of pay excluding bonuses; NSW; all industries and occupations. ABS catalogue 6345.0. The WPI is adjusted for productivity gains available to taxi operators.
WPI-X (Driver)	Worksheet 2: ABS data	WPI using quarterly index numbers released by the ABS. The relevant WPI is the total hourly rates of pay excluding bonuses; NSW; all industries and occupations. ABS catalogue 6345.0. The WPI is adjusted for productivity gains available to taxi drivers.
CPI Repair and Servicing	Worksheet 2: ABS data	Repair and servicing component of the CPI using quarterly index numbers released by the ABS. The relevant CPI measure is the motor vehicles repair and servicing expenditure class for Sydney. ABS catalogue 6401.0.
CPI Insurance	Worksheet 2: ABS data	Insurance services component of the CPI using quarterly index numbers released by the ABS. The relevant CPI measure is the insurance services sub group for Sydney. ABS catalogue 6401.0.
CPI Motor Vehicles	Worksheet 2: ABS data	Motor vehicles component of the CPI using quarterly index numbers released by the ABS. The relevant CPI measure is the motor vehicles expenditure class for Sydney. ABS catalogue 6401.0.
CPI	Worksheet 2: ABS data	Consumer Price Index using quarterly index numbers released by the ABS. The relevant CPI measure is the all groups index for Sydney. ABS catalogue 6401.0.
IRC Determination cost	Worksheet 3: IRC Determination	Change in annual leave and sick leave payments required in the Contract Determination determined by the NSW IRC.
LPG Fuel costs	Worksheet 4: Fuel data	NSW LPG fuel prices as tracked by FUELtrac an independent provider of information on fuel costs.
Licence plate leases	Worksheet 5: Plate lease costs	Change in average lease costs for a taxi licence plate leased from Premier Cabs and CCN. Quotes are provided by the NSW Taxi Council.

3.3 Step 3 – Calculate the change in each inflator value

Worksheets 2-5 in the model calculate the values of the inflators used in the cost indices. This section explains how each inflator is calculated.

The final inflator values are summarised in Table 1.1 on worksheet 1 and are used in the calculation of the change in industry costs set out in step 4.

3.3.1 ABS Data

Several inflators are based on ABS data. For each of these inflators, we input quarterly index numbers released by the Australian Bureau of Statistics. We then calculate the change in these values over the past year. This calculation is done in worksheet 2 of the model. Table 3.2 summarises which cost items are inflated by ABS data.

Table 3.2 Cost items inflated by ABS data in the taxi cost index

Cost item	Inflator
Notional drivers' wages	Productivity adjusted WPI
Driver entitlements[a]	Productivity adjusted WPI
Driver provision for super	Productivity adjusted WPI
Operators' salary equivalent	Productivity adjusted WPI
Maintenance costs	CPI - Repair and servicing
Insurance	CPI - Insurance
Vehicle lease payments	CPI - Motor vehicles
Other costs[b]	CPI

[a] Driver entitlements are inflated by productivity adjusted WPI, however this cost item is split between driver and operator costs according to the IRC contract determination.
[b] Other costs are split between drivers and operators according to the 2007 survey of taxi costs.

The change in the inflator value is based on the following formula, which compares the average of the 4 quarters of the review period to the average of the 4 quarters in the base period:

$$\Delta PI_t = \left(\frac{PI_{Jun(t)} + PI_{Sep(t)} + PI_{Dec(t)} + PI_{Mar(t)}}{PI_{Jun(t-1)} + PI_{Sep(t-1)} + PI_{Dec(t-1)} + PI_{Mar(t-1)}} - 1 \right) \times 100\%$$

Where:

▼ ΔPI is the change in the price index between review periods (this is the value used in the inflator)

▼ $PI_{x(y)}$ is the price index value at the time of the x quarter of y year

▼ t is the review year and $t\text{-}1$ is the base year.

For the cost items inflated by CPI inflators, the value of ΔPI is the final inflator value. This is given in the following cells in worksheet 2 of the model:

▼ the value of CPI repair and servicing is given in cell F45

▼ the value of CPI insurance is given in cell I45

▼ the value of CPI motor vehicles is given in cell L45

▼ the value of CPI is given in cell O45.

WPI based inflators are calculated differently because WPI does not account for improvements in the productivity of labour. We adjust the WPI inflator to account for productivity gains over the review period using a productivity adjustment which is informed by information relating to improvements in labour productivity over the past year.

To adjust for productivity gains, the labour cost inflator is reduced by the chosen level of the productivity adjustment as follows:

$$\Delta PAWPI_t = \frac{(1 + \Delta WPI_t)}{(1 + PA)} - 1$$

where:

▼ ΔPAWPI is the productivity adjusted wage price index

▼ PA is the value of the productivity adjustment.

There are 2 productivity adjustments for taxis, 1 for drivers and 1 for operators. This reflects the differences in potential productivity gains faced by operators and drivers. Driver related labour costs are inflated by the WPI adjusted for driver productivity and operator related labour costs are inflated by the WPI adjusted for operator productivity.

The calculation of WPI is given in cell C44 of worksheet 2. The calculation of productivity adjusted WPI for drivers is given in cell C45 of worksheet 2 and productivity adjusted WPI for operators is given in cell C46.

Driver entitlements

Like other driver labour costs, driver entitlements are inflated by productivity adjusted WPI. In the urban TCI, driver entitlements are allocated between drivers and operators to reflect legal obligations on operators to provide entitlements to permanent full time drivers. These obligations are imposed by the *Taxi Industry (Contract Drivers) Contract Determination 1984* made by the NSW Industrial Relations Commission (IRC).

Costs are allocated by calculating the total cost to operators of meeting these obligations and deducting this value from drivers' costs.

The method of allocating the costs to drivers and operators does not affect the final fare recommendations. The total value of driver entitlements is the same as if it was considered a single item. Applying it to drivers and operators is done solely to identify changes in drivers and operators costs over the review period to assist in the IRC determination.

The cost to operators is calculated in worksheet 3 of the model. The residual calculation which shows the annual change in, and the total cost of the portion of the cost item which is allocated to drivers is shown in cells F48 and H48 of worksheet 1.

The equation below shows how entitlements are split between drivers and operators:

$$DE_t = TE_t - \left(OE_{t-1} \times \left(1 + \Delta IRC_t \right) \right)$$

Where;

▼ DE_t is the value of entitlements allocated to drivers in year t

▼ TE_t is the value of total driver entitlements in year t

▼ OE_{t-1} is the value of entitlements in the contract determination in the previous year, which is allocated to operators

▼ ΔIRC_t is the increase in the entitlements specified in the contract determination over the review period

▼ OE_t is the value of entitlements in the current year, t, and is equal to $\left(OE_{t-1} \times \left(1 + \Delta IRC_t \right) \right)$.

3.3.2 Fuel Data

Fuel costs in the index are inflated by actual LPG prices provided by FUELtrac.[1] The fuel prices used are LPG prices observed in Sydney, Newcastle and Wollongong for the urban TCI and various towns for the country TCI.[2] These prices are then adjusted to remove the cost of GST, which is not met by the taxi industry. The average LPG fuel price for the review period is then compared to the average price in the base year to obtain an estimate of the change in fuel costs face by drivers/operators over the review period. This calculation is shown by the following equation:

$$\Delta Fuel_t = \left(\frac{L_t - G_t}{L_{t-1} - G_{t-1}} - 1 \right) \times 100\%$$

---

[1] FUELtrac is an independent organisation which provides a fuel price monitoring service.

[2] The country towns included are as follows: Albury, Armidale, Batemans Bay, Bathurst, Bega, Broken Hill, Canberra, Casino, Coffs Harbour, Cooma, Dubbo, Forbes, Forster, Goulburn, Grafton, Griffith, Kempsey, Lismore, Maitland, Moree, Orange, Parkes, Port Macquarie, Tamworth, Taree, Ulladulla and Wagga Wagga.

Where:

▼ L_t is the average price of LPG in year t

▼ G_t is the amount of GST paid in year t

The responsibility of paying for fuel depends on the taxi bailment method agreed to by the driver and operator of the taxi. Under the fixed pay-in method which is the typical method used in urban areas, drivers are responsible for the cost of fuel. Under the proportion of fares method used in country areas, operators are responsible for the fuel cost. For this reason LPG fuel is considered a driver cost in the urban TCI and an operator cost in the country TCI.

Because of copyright, we are unable to provide the LPG fuel price information as part of the cost index spreadsheet. This information is available to those interested from FUELtrac upon payment of a fee. However the aggregate calculation is found in worksheet 4 of the model. The changes in fuel costs are given in cells C16 (urban) and C25 (country) of this worksheet.

3.3.3 Plate lease costs

Currently, plate lease costs in the index are inflated by changes in the lease costs for plates offered by Premier Cabs and CCN. This information is provided each year by the NSW Taxi Council.

As this information is provided on a commercial-in-confidence basis, we have not included the lease rate for each network in the model. The annual change in this cost is shown in worksheet 5 of the model.

3.4 Step 4 – Calculate the change in costs

The TCI estimates the change in taxi costs by using the inputs and results of the calculations to derive the overall cost of providing taxi services. The TCI is found in worksheet 1 of the model, in Tables 1.2 (urban) and 1.3 (country).

Columns C and D in the tables input the weightings and costs from step 1. Column F consists of the final inflator values from step 3. The weightings and inflators for each cost item are multiplied by each other in column G to provide each cost item's contribution to the total change in costs.

The overall change in taxi costs is the sum of each cost item's contribution to the index. For urban taxis this is found in cell G63 of worksheet 1, for country taxis it is found in cell G85.

3.5   Step 5 – Calculate the change in fares

We set the change in fares equal to the change in the TCI (calculated in step 4). Our recommended changes in fares are applied to the current fare schedules (made up of various different fare components) in order to obtain the new recommended fares. Some fare components need to be rounded to the nearest 10 cents which means that increasing each component by the change in the TCI is not possible. To obtain an overall increase consistent with the change in the TCI, we apply the change in the TCI to the average fare. The average fare under existing fares is calculated using a set of assumptions on typical taxi use. The average fare is shown in worksheet 6 of the model in cells E31 (urban) and H31 (country). The assumptions behind the average fare were determined as part of the 2008 review of taxi fares and are provided in table 3.3 below.

All fare components except the distance rate are increased by the change in the TCI and then rounded if necessary. The distance rate is then used as a balancing item to ensure that the increase in the average fare is consistent with the change in the TCI.

Table 3.3   Components of the average fare

	Urban	Country
Distance (km)	7	5
Waiting time (min)	5	3
Share of trips that are phone bookings (%)	20	65
Share of trips that are night trips	20	15

Recommended fares are calculated in worksheet 6 of the model. Columns D and G represent last years fares in urban and country areas respectively. Columns E and H are the recommended fares from July 1, 2010. These are obtained by applying the change in the TCI (found in cells F16 and I16) to each fare component except the distance rate and then rounding as required. The distance rate is then set so that the change in the average fares (cells F31 and I31) are equal to the change in the TCI (cells F16 and I16).

3.6   Step 6 – Calculate the new weightings for next year's model

As discussed in section 2, after we have estimated the change in taxi costs using the TCI, we update the weightings to be used in the next year's TCI.

The weightings are adjusted to account for changes in the price of each cost input over the review period. In this way the relative amount of each input remains constant while the weighting of each cost compared to total costs changes to account for changes in relative prices.

The weightings and costs for next year's review are calculated in tables 1.2 and 1.3 (columns H and I) in worksheet 1 of the model. These weightings will be the base year weightings for the 2011 taxi fare review.

4   Further detail on this guide and the model

If you have any inquiries regarding this guide or the accompanying Excel file, please contact the following staff member:

Dion Jackomas   (02) 9290 8442

                                 dion_jackomas@ipart.nsw.gov.au