**Turn the Tables on Excel**
**An Introduction to the power of Data Tables**

White Paper

# Introduction

This document outlines how Data Tables in Excel can be used to save hours, even days of time when performing "What if?" analysis on financial forecasts.

If you use financial forecasting models in your business then Data Tables can be very powerful tools in identifying key profit drivers.

Where scenarios are used in making investment decisions Data Tables can save hours of running and collating results. The risks of maintaining multiple spreadsheets for multiple scenarios can be avoided and neatly collated results can easily be produced.

Data Table results are automatically updated when the underlying formulae or assumptions in a model change. This saves hours of re-work where "What if?" analysis has previously been performed.

In the pages that follow, you'll find details on what Data Tables are, how to set up a Data Table, and how they can be used in conjunction with scenarios to provide a powerful time-saving tool.

We encourage you to share this document with your colleagues and pass it on to anyone you know who may benefit from understanding how their everyday tasks can be made easier.

Data Tables are just one of the features in Excel that once understood can provide valuable insight into key business drivers and save hours of unnecessary work.

So turn the Tables on and you'll be amazed at the results.

**About the Author:**

Wyn Hopkins is a Senior Business Analyst at Access Analytic

Wyn gained his Chartered Accountant qualification at PricewaterhouseCoopers in the UK in 2000.

Wyn is a certified Excel Expert, skilled in financial analysis, strategic financial modelling, management reporting and forecasting

He has extensive Business Analyst experience in FTSE 100 financial services companies (HBOS and Barclays in the UK) as well as a range of industries in Perth and Sydney.

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# Contents

# Before you begin

Data Tables (Sensitivity Tables) allow you to quickly see the result of trying various different inputs in a formula or model without having to manually re-run the formula or model each time.

They are highly effective tools in assessing which are the most sensitive inputs of a model (i.e. have the greatest impact on the outputs of the model).

Unfortunately, when used in large models, Tables will take a while to run and will run every time a change is made to the spreadsheet which can be very frustrating.  To avoid this, the following first step is very important:

Tools -> Options -> Calculations Tab -> Select Automatic except tables
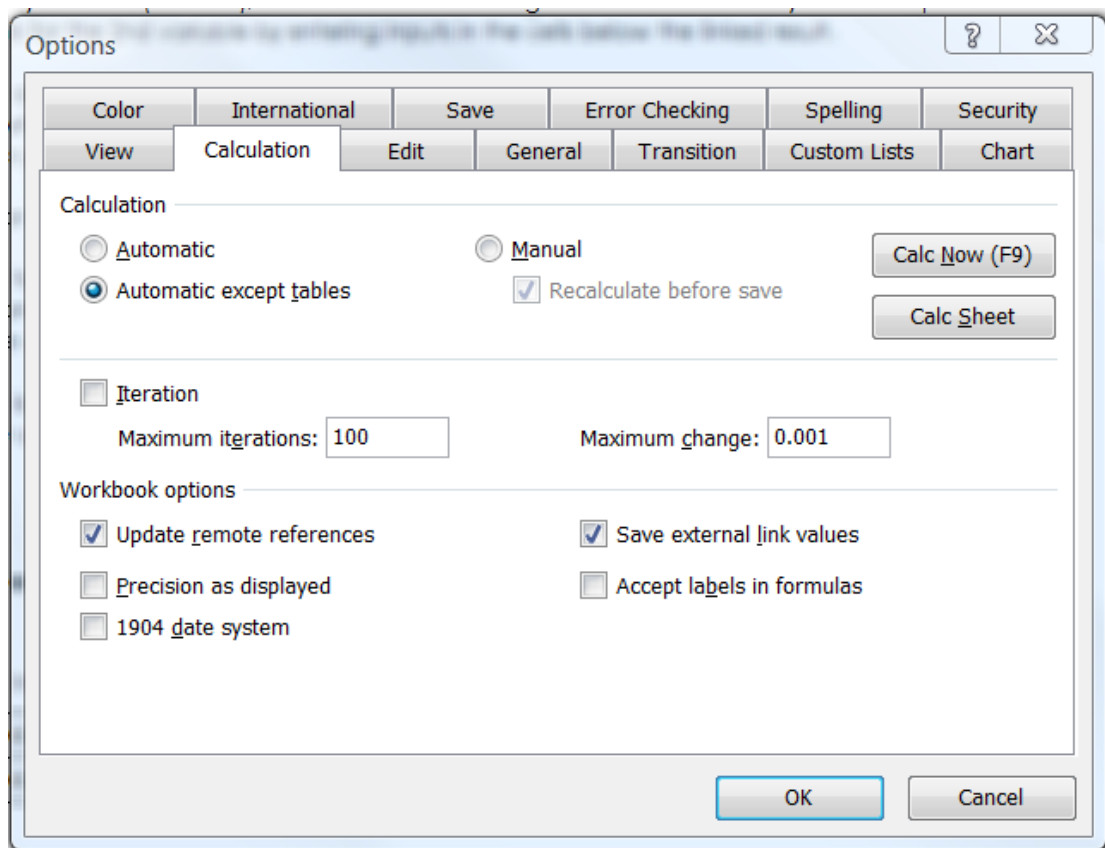


You will then need to remember to press F9 to manually recalculate your tables whenever required.

# Setting Up a Data Table

The "Table" functionality in Excel allows you to show how changing inputs affect the results of a calculation or model.

For Example, a simple formula with 2 inputs A and B gives a single result of $61.00

| | A | B | C |
|---|---|---|---|
| 1 | | | |
| 2 | Input A | $4.00 | Row Inputs |
| 3 | Input B | $7.00 | Column Inputs |
| 4 | | | |
| 5 | C = 10A + 3B | $61.00 | Result (Cell B5) |

Data Tables are used to vary the inputs and run through the formula instantaneously rather than you having to manually type over the inputs each time

The following steps will take you through how to set up a Data Table that will run multiple inputs through the formula above and collate the resulting output.

## 3 STEPS TO SET UP YOUR TABLE

1. Firstly set up a link to your result (i.e. =B5), then in the cells to the right of this enter as many different inputs as you like (Row Inputs). Repeat this for the 2nd variable by entering inputs in the cells below the linked result (Column Inputs)

   It's good practice to set the expected input as the middle figure and then have increasing / decreasing values either side.

2. Highlight the range of cells from the top left corner of your table (i.e. the cell linked to the results) to the bottom right corner (which therefore highlights your column and row input cells). The dotted line illustrates this in Fig 1.0

**Note**: The table will be empty until you finish Step 3

*(Fig 1.0)*

1) Linked to the formula result (=B5)

Row Input

Column Input

| $61.00 | $2.00 | $3.00 | $4.00 | $5.00 | $6.00 |
|---|---|---|---|---|---|
| $3.00 | $29.00 | $39.00 | $49.00 | $59.00 | $69.00 |
| $5.00 | $35.00 | $45.00 | $55.00 | $65.00 | $75.00 |
| $7.00 | $41.00 | $51.00 | $61.00 | $71.00 | $81.00 |
| $9.00 | $47.00 | $57.00 | $67.00 | $77.00 | $87.00 |
| $11.00 | $53.00 | $63.00 | $73.00 | $83.00 | $93.00 |

2) Highlight Range

3. Then on the menu bar select Data followed by Table.

You will be prompted to enter a reference to the row input cell and the column input cell.

**Row Input** - This is one of the input cells that you want to vary in the formula (e.g. Input A). The values that you have entered into the same **row** as the linked result will be used in this cell.

**Column Input** - This is one of the input cells that you want to vary in the formula (e.g. input B). The values that you have entered into the same **column** as the linked result will be used in this cell.

The Table is then automatically populated with the results of combining the various column and row inputs and running them through the formula / model.

As you can see this is vastly quicker than manually amending the inputs and collating the results.

The beauty of Tables is that, should the formula change, a simple press of F9 (recalculate) will quickly provide you with an updated table of results. This can save hours if not days of time re-running scenarios when calculations or assumptions change.

**Additional flexibility can be introduced by adding a simple sensitivity range table**

|  | Actual Input | Middle Value | Incremental Change |
|---|---|---|---|
| Input A | $4.00 | $4.00 | $1.00 |
| Input B | $7.00 | $7.00 | $2.00 |

The mid-row input of the DATA Table is then linked to the "Middle Value" in the sensitivity range table

The cells either side of this mid-row cell are then linked to this mid-row cell + or - a link to the incremental change

This is repeated for the column inputs

This sensitivity range table can then be used to quickly update the Data Table with a change of inputs / incremental values.

**But that's just the start…..**

Most commonly the figures entered in the Data Table row and column are actually used in the calculation.

Alternatively, Tables become very powerful when used to run multiple scenarios in conjunction with the Offset function.

# Instant Scenario Analysis

Data Tables provide a shortcut for calculating multiple "What if?" scenarios in one operation and a way to view and compare the results of all of the different variations together on your worksheet.

Major Advantages

- Speed

- Automatic re-working if underlying assumptions / calculations change

- Ability to apply probability % easily to get a probability weighted outcome.

**Simple Income and Cost Scenarios:** *(Fig 2.0)*

| Income | | 2008 | 2009 | 2010 | 2011 | *Likelihood* |
|---|---|---|---|---|---|---|
| 1 | Best Case | 180 | 300 | 300 | 500 | *5%* |
| 2 | Base Case | 100 | 200 | 200 | 300 | *50%* |
| 3 | Low Case | 80 | 70 | 70 | 80 | *40%* |
| 4 | Worst Case | 20 | 20 | 18 | 12 | *5%* |
| | | | | | | **100%** |

| Cost | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Best Case | (60) | (80) | (70) | (100) | *5%* |
| 2 | Base Case | (80) | (100) | (110) | (130) | *50%* |
| 3 | Low Case | (100) | (200) | (210) | (300) | *40%* |
| 4 | Worst Case | (170) | (280) | (260) | (400) | *5%* |
| | | | | | | **100%** |

A simple Net cashflow calculation is then created using the Offset function to select which scenario is used for Income and Cost. A discount factor is then applied and the NPV of the cashflows is calculated giving $776.

| Cashflow | | Offset Switch | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Income | Best Case | 1 | 180 | 300 | 300 | 500 |
| Cost | Best Case | 1 | (60) | (80) | (70) | (100) |
| **Net** | | | **120** | **220** | **230** | **400** |

| | | | |
|---|---|---|---|
| Discount Rate | | 8% | |
| NPV Calc (on Net C/flow) | | *$776* | per Best Case Income and Best Case Costs |

The Data Table is then set up with the Offset Switches for Income and Cost as shown below in Fig 3.0. An offset of 1 gives the best case; an offset of 2 gives the expected case etc.

Each scenario will then be automatically run through the calculation and an NPV produced for each combination.

*(Fig 3.0)*

| Data Table: $ NPV | | Best | Base | Low | Worst | |
|---|---|---|---|---|---|---|
| | | | Offset Switch (Income) | | | |
| *776* | | 1 | 2 | 3 | 4 | |
| Best | Offset Costs — 1 | 776 | 390 | (5) | (194) | |
| Base | 2 | 687 | **301** | (94) | (284) | |
| Low | 3 | 378 | (8) | (403) | (592) | |
| Worst | 4 | 132 | (255) | (649) | (839) | **Σp** |
| | | | | | | **(13.9)** |

| | = most likely outcome (based on probabilty table - see workings) |
|---|---|

| **Σp** | = Probabilty weighted NPV (see workings) |
|---|---|

So in the situation above the most likely result is $301 but the overall probability weighted NPV is negative indicating a high risk result.

The probability weighted NPV calculation is detailed in the following section:

# Workings: Probability Weighted NPV

A single figure is easier to focus on so a probability or risk weighted result is often a useful figure to identify, along with the "most likely" result.

Probabilities of occurrence can be assigned to each scenario. Where there are two non-mutually exclusive variables, as is the case here, these can be combined by multiplying one probability by the other.

These probabilities can then be multiplied by the expected results to give probability weighted outcomes. These are then summed up to give an overall probability weighted result.

**Assigned Probability** (per Likelihood inputs on figure 2.0)

|  |  | Income | | | | |
|---|---|---|---|---|---|---|
|  |  | 5% | 50% | 40% | 5% | 100% |
| Costs | 5% | 0.3% | 2.5% | 2.0% | 0.3% | |
|  | 50% | 2.5% | **25.0%** | 20.0% | 2.5% | |
|  | 40% | 2.0% | 20.0% | 16.0% | 2.0% | |
|  | 5% | 0.3% | 2.5% | 2.0% | 0.3% | |
|  | 100% | | | | | **100%** |

**Probabilty Weighted NPV** (Probabilty % above x NPV per Data Table)

|  |  | Income | | | |
|---|---|---|---|---|---|
|  |  | Best Case | Expected Case | Low Case | Worst Case |
| Costs | Best Case | 1.9 | 9.8 | (0.1) | (0.5) |
|  | Expected Case | 17.2 | 75.2 | (18.8) | (7.1) |
|  | Low Case | 7.6 | (1.6) | (64.5) | (11.8) |
|  | Worst Case | 0.3 | (6.4) | (13.0) | (2.1) |

$\sum =$ **(13.9)**

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# Summary

Hopefully, this paper has provided you with an understanding of how to set-up Data Tables in Excel.   Once you apply this to a real-life model you'll be able to see the fantastic potential they offer.

- Data Tables allow you to quickly collate the results of flexing model inputs

- Accessed via Data -> Tables on the menu bar

- Row input cell will use the figures in the **top row** of the data table

- Column input cell will use the figures in the **left column** of the data table

- Flexibility can easily be added using a sensitivity range

- Use in conjunction with scenarios to provide speedy insightful analysis

For further assistance with Data Tables or any Financial Modelling, Reporting or Excel training requirements, please contact Access Analytic on +61 8 6210 8500 or www.accessanalytic.com.au

# Access Analytic Overview

## OVERVIEW

Access Analytic provides AMAZING Excel solutions to enable companies to grow, control their costs and reduce their risks.

| I never knew Excel could do that! | | | | |
|---|---|---|---|---|
| | **Process Improvement** | **Financial Modelling** | **Reporting** | **Training** |
| **Assist Growth** | Flexibility | Forecasting & Capital Raising | Dashboards & Power BI | Tailored Courses |
| **Control Cost** | Efficiency | Budget Systems | Finance, HR & Operations | Productivity |
| **Reduce Risk** | Automation | Model Audit | Confidence | Best Practice |

**Figure 1: Access Analytic Solutions Overview**

Our Services fall into three groups:

**Helping Companies Grow**:

- **Process Improvement**: streamlining processes to create flexible, scalable processes.

- **Financial Modelling**: to forecast results (e.g. equity/loan capital raising, business planning, feasibility studies, project economics etc.) with sensitivity and scenario analysis to support decision-making with confidence.

- **Reporting**: tailored dashboards and KPIs using Excel and Power BI to connect to both cloud and on-premise data, thereby allowing companies to keep on top of their operations, gain insights, and make data-driven decisions.

- **Training**: training in all of these areas to transfer skills to support further growth.

**Helping Companies Control Cost**

- **Process Improvement**: efficient Excel-based processes that reduce the need for manual input.

- **Financial Modelling**: Excel-based budgeting and forecasting systems that enable companies to efficiently control and monitor their costs.

- **Reporting**: reporting to assist Finance, Human Resources and Operations with their areas of responsibility for cost control.

- **Training**: assisting staff to become more productive and reduce the need for additional resources.  Courses are provided on an in-house basis, which often results in a cost saving of 50% or more compared to public courses.

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**Helping Companies Reduce Risk**

- **Process Improvement**: by automating processes, companies not only save time, they also reduce the errors and risks that result from manual inputs. This results in more accurate data, which can provide better analysis.

- **Financial Modelling**: independent model auditing services to provide assurance that key models are producing accurate results and can be relied upon.

- **Reporting**: reporting that focuses on the right data at the right time to provide transparency & visibility.

- **Training**: financial modelling best practices to reduce risk and improve quality.

We are based in Perth, Western Australia and the business was established in 2000.

Access Analytic provides services to clients located in: Australasia, Asia, Africa and the Middle East. A selection of our clients is shown below:



## ACCESS ANALYTIC: RISING STAR



Access Analytic was named as one of the WA Business News' Rising Stars for 2012, recognising the success and achievements of our company.

Further details regarding Access Analytic Solutions have been included *at Appendix A: Access Analytic Details* on page 15 below.

## KEY STAFF

### Jeff Robson, Principal Business Analyst

**Masters (Applied Finance), BCom (Accounting & Information Systems), CISA, MAICD, FAIM, F Fin, Microsoft Excel Expert**

Jeff is the founding Director and Principal Business Analyst at Access Analytic Solutions. He has over 20 years' experience in chartered accounting, business management and consulting.

Jeff holds a Masters in Applied Finance and is a Certified Information Systems Auditor. He is highly regarded and recognised around the world as an expert in the field of financial modelling.

His achievements have been recognised by his peers and he is a Fellow of both the Financial Services Institute of Australasia and the Australian Institute of Management.

Jeff has extensive experience in best practice financial modelling, management reporting, business analysis, and spreadsheet auditing and is also an entertaining international presenter and trainer on these subjects.

### Wyn Hopkins, Senior Manager

**B.Sc. (Hons) Accounting & Financial Management, CA, MS Excel Expert**

Wyn gained his Chartered Accountant qualification at PricewaterhouseCoopers in the UK in 2000.

He has extensive Business Analyst experience in FTSE 100 financial services companies (HBOS and Barclays in the UK) as well as GESB in Perth and telecommunications companies industry in Australia.

Wyn is skilled in financial analysis, strategic financial modelling, management reporting and forecasting, and value-based management techniques.

### Yury Tokarev (Manager)

**CA, PhD (Finance & Economics), GradDip (Accounting), BBS, Microsoft Excel Expert**

Yury joined Access Analytic from WHK Chartered Accountants, where he was involved in business services and advisory for four years.

Prior to this, he worked as a Corporate Finance Consultant at one of the top European Investment Banks.

Yury has highly advanced skills in Excel and financial modelling, including complex financial models and the development of VBA macro solutions.

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### Anthony Kitson, Senior Business Analyst (Contract)

**Chartered Accountant (CA), B.Bus (Accounting & Finance), B.Eng (Electronics & Comms), CISA, Prince2 Practitioner**

Anthony has extensive expertise in consulting and business management, with over 25 years in combined experience.

He specialises in the areas of Financial Modelling, Data Analytics, reporting, revenue leakage, Business Intelligence, and Information Management.

Anthony's experience has been gained across the Government, Energy, Power & Natural Resources, Financial Services, and Industrial sectors.

He has specialised expertise in financial modelling for mining, including building and reviewing models for Bank Feasibility Studies, project finance, consolidated corporate models, production planning and workforce planning.

### Neale Blackwood, Senior Business Analyst (Contract)

**CPA, B.Bus (Accounting), Microsoft Excel Expert**

Neale is a CPA with over 20 years' experience in accounting, budgeting, management reporting, and developing spreadsheet applications.

Neale has extensive experience across a broad range of industries including mining, education, property, forestry, government, and construction.

Neale is the CPA magazine's authority on spreadsheets and related subjects, and writes a monthly column for this publication.

He is also a sought-after speaker and trainer regarding the use of Excel, particularly by accountants.

### Brett Rawcliffe, Senior Database Analyst (Contract)

**MACS**

Brett is a highly experienced database analyst and is regularly in contact with Microsoft regarding their database software.

Over the last 13 years Brett has developed hundreds of database solutions for companies of all sizes, from sole traders needing a simple contact manager to multi-nationals needing to develop specialised systems to complement their organisation-wide systems.

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# Appendix A: Access Analytic Details

| Access Analytic Solutions Details | |
|---|---|
| **Full Name:** | Access Analytic Solutions Pty Ltd |
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