IPF Visual Basic for Applications program user instructions

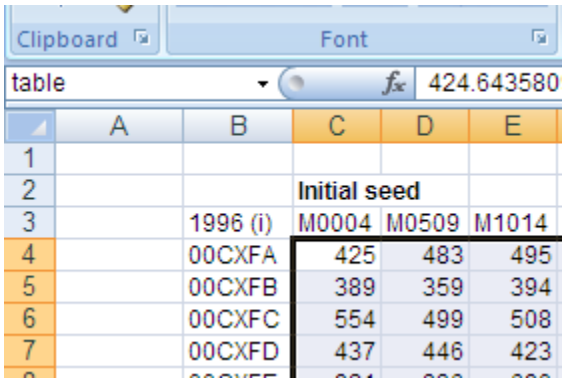
This document updates instructions in Norman P (1999) Putting iterative proportional fitting on the researcher's desk, *Working Paper 99/3,* School of Geography, University of Leeds, Leeds
Available online via http://eprints.whiterose.ac.uk/5029/

Many researchers have programmed IPF for use in their particular application. So that the procedure can be more readily accessible, particularly with the widespread use of spreadsheets, IPF has been programmed in Visual Basic for Applications (VBA) (running in Excel 97 onwards but *must* retain .xls file types). The program carries out two-dimensional IPF, automatically determining the size of the input data. Within the limits of Excel spreadsheets, any size of data can be handled. The iterations start with whichever is the larger adjustment by the row or the column constraints. The user can set the maximum number of iterations and convergence statistic, the latter being an absolute value by which no cell in the next iteration would change by more than the given amount.

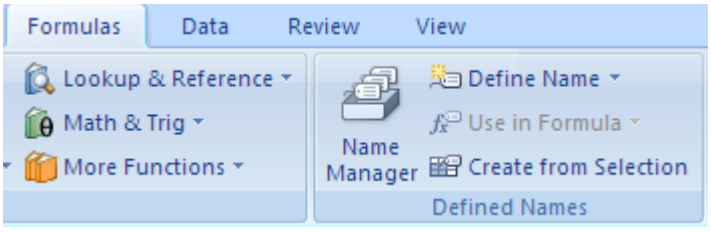
Preparing the data for IPF (using ipfdata.xls)

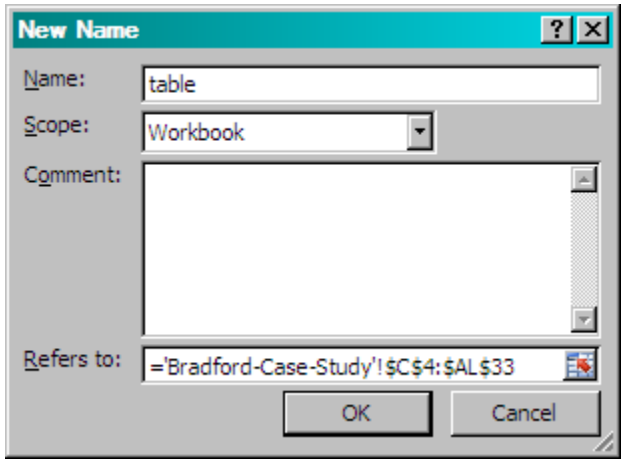
- The data to be used by the IPF VBA program must be entered on an Excel workbook saved as 'ipfdata.xls'. Data can be real numbers, probabilities or percentages, but the row and column constraints must be consistent.

- On the ipfdata.xls worksheet the original table of data, row constraints and column constraints need to be named as the Excel ranges 'table', 'rows' and 'cols' respectively. To do this, highlight the table of data using the mouse and enter the name 'table' in the 'Name Box' and press the 'enter' key.
- Repeat this for the 'rows' and 'cols' ranges.



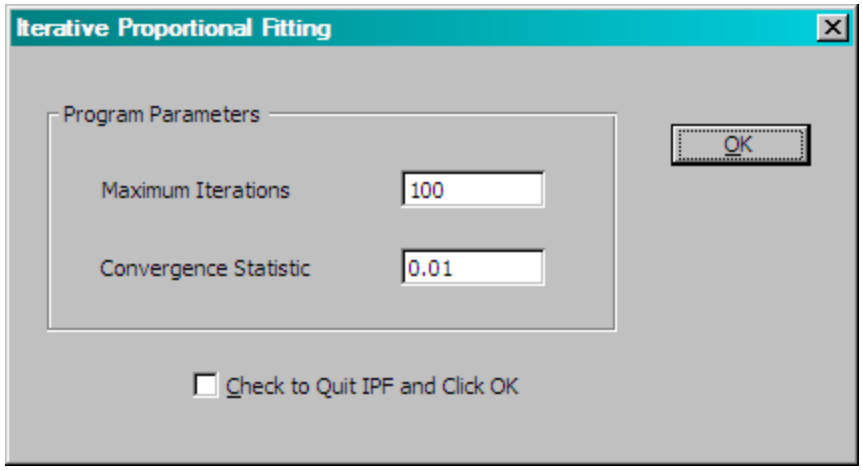
- Or use Formulas > Define Name > New Name.





Running IPF (using ipfprog.xls)

- With the ipfdata.xls file still open, open the Excel file 'ipfprog.xls' to run the IPF program. An Excel dialogue box will appear: click on 'enable macros'.
- As the iterations potentially continue *ad infinitum* a convergence statistic is set as a cut-off point when the fit of the datasets is considered close enough. The iterations continue until no absolute value would change by more than the specified amount. The program parameters dialogue box is used to set values for the maximum number of iterations (default 100) and convergence statistic (default 0.01).



- The program checks for errors in the input data that would prevent the calculation from being carried out successfully. If errors are identified the user is informed of their nature and the program quits so that amendments can be made. Checks are made for the following:
  i. The named ranges table, rows and cols are available
  ii. The sum of rows equals the sum of cols (to within 0.0000001)
  iii. The table is equivalent in size to the rows and cols ranges
  iv. There are no blank cells in the table, rows or cols
  v. There are no zero cells in the rows or cols
  vi. There is no text in the table, rows or cols (blank cells are interpreted as text)
  vii. There are no negative numbers in the table, rows or cols
- If no errors are found the program uploads the named ranges and the IPF procedure is carried out. Excel's 'Status Bar' will indicate the operation that is being carried out.
- The IPF program ends when either the convergence statistic is achieved or the maximum number of iterations is reached.
- A worksheet is added to the 'ipfdata.xls' file containing the amended data, the number of iterations that occurred, the value of the convergence statistic set and the cross-product ratios of cells in the original and adjusted data.

- **N.B.** To run the program with alternative data, the existing tables, rows and cols 'names' must be deleted: use Formulas > Name Manager
  - Or use the following macro (Alt + F11 calls the VBA interface):

```
Sub IPF_names()
    ActiveWorkbook.Names("table").Delete
    ActiveWorkbook.Names("rows").Delete
    ActiveWorkbook.Names("cols").Delete
End Sub
```