Amendments to 12 June 2020

1. New parameters included to allow alternative test concerning wages

Amendments to 03 December 2019

1. Improved completeness of inheritance allocation
2. Adjusted housing model to account for associated transactions
3. Added inheritance receipt, value of house sale, and value of house purchase to tax inputs
4. Updated for new Intel compiler

Amendments since 04 December 2017:

1. New code to check for marital status at load of population cross-section
2. Up-date to 2015 wave of WAS

Amendments since 20 November 2017:

1. Allow for endogenous inheritance receipt.
2. Population projection completely revised and parallelised.
3. Fixed indexing problem in Excel front-end for setting up new base files
4. Budget balance routines revised
5. Added error check for maximum period projected back in time
6. Altered checks on time span covered by birth cohorts
7. Omitted critical region in storage of grid solutions
8. Limit evolving cross-section to time horizon considered for birth cohorts
9. Fixed bug in definition of yrexog and cs\_year
10. Replaced all instances of rand(0) with random\_number()

Amendments since 17 July 2017:

1. Fixed Personal Savings Allowance in tax functions for 2016
2. Use UK\_6 for 2016 by default – tax function implemented in thread-safe variant.
3. Omitted commoncohort globals from tax\_prep routine, to facilitate thread-safe variant
4. Omitted adjustment of tax\_par4 parameters in model code
5. UK tax functions altered to avoid wage indexing before value allocated
6. Generic Bus Dekker zero algorithm altered to omit pole
7. Altered routines to search for budget balance tax adjustments
8. Fixed problem with excel write for decile analysis
9. Fixed bug in CSV write routine
10. Revised check\_bound subroutine, and brent optimisation routine

Amendments since 12 May 2017:

1. Validated write routines to Excel
2. Adjusted code to permit consideration of small simulated populations

Amendments since 04 April 2017:

1. Fixed clean-up of COM routine in C#
2. Fixed bug permitting an immigrant couple when only space in simulated population for a single
3. Completely revised communications with excel to address problems with Fortran COM routines.
4. Added switch to simulate population using grids from another simulation, useful for replicating results with alternative random draws.

Amendments since 05 January 2017:

1. Introduced new wage factors to FINANCIAL PARAMETERS.xls to proxy the effects of alternative inflation assumptions
2. Fixed flag for error 141
3. Improved treatment of population where limited birth cohorts considered for utility maximisation, and adjustments to age of private pension access are enabled.
4. Corrected error in evaluation of wage factors related to health and education
5. Corrected error in routine that enables “stacked” job files
6. Definition of prett income adjusted to match net income (omitting mortgage interest payments)
7. Corrected some errors in routine that loads in parameters outside of Excel
8. Revised Solution structure
9. Revised Excel routines to address problems raised by Windows update
	1. Revisions under (8) failed, and so will now implement C# communications with Excel

Amendments since 12 October 2016:

1. Corrected errors complicating replication of simulated population
2. Suppress search for innovations matching number of children in simulation base when simulation innovations loaded in

Amendments since 27 August 2016:

1. Parameters re-organised to ensure that main model executable does not reference any parameters in the three tax parameter columns.
2. Checked indexing of flat-rate pensions.
3. Added comments to “poverty analysis.xls” excel file to explain use of “init” and “diff” worksheets.
4. Added check to ensure that decile analysis of cross-sections falls within simulated sample.
5. Fixed some errors in inflation indexing of UK tax function
6. Fixed error in benefit cap of UK tax function
7. Added new UK tax function to make taxes.dll thread-safe, increasing computational efficiency by 60%

Amendments since 18 July 2016:

1. Altered model base parameters to suppress long-file format by default
2. Corrected error when loading in innovations from another simulation
3. Expanded User manual to include description of simulated tax and benefit payments
4. Added code to macro to clear poverty analysis.xls sheet before copying in csv data
5. Changed user manual to omit reference to 32 bit version and omitted 32bit format (32 bit fully deprecated)
6. Wage parameters extended to permit work to age 79
7. Altered parameter load so that wage and employment parameters are projected for ages that are not explicitly loaded in.
8. Altered parameter check so that age of pension take-up is automatically adjusted to permit simulation to run.
9. Altered memory check so that model automatically considers whether the problem is computationally tractable on available computing resources.
10. Fixed some bugs when CP1 is endogenous.

Amendments since 23 June 2016:

1. Minor change to “check” worksheet of job file.xls
2. Added negative calibration, altering parameters for forward projections
3. Allow for unemployment rates out of sample to be user defined
4. Allow interest rates to be exogenously defined out of sample
5. Altered imputation of mortality rates over age 100
6. Re-organised parameter check to accommodate variation in response to reduced form simulations
7. Differentiated between error codes for alternative file opening fails
8. Omitted adults and children from year of emigration

Amendments since 17 June 2016:

1. Benefits take-up rules imported into tax code
2. Adjusted code to respond to error in reading formatted innovations

Amendments since 14 June 2016:

1. Altered rule for benefits take-up

Amendments since 06 May 2016:

1. Fixed problem with implicit allowance of state pensions in tax function

Amendments since 19 Apr 2016:

1. Added MPI parallelisations
2. Corrected error when simulating health states only post working lifetime
3. Omitted possibility of person in poor health receiving low wage offer
4. Added option to exogenously up-grade education levels
5. Distinguish state contributory pensions from private pensions in tax function
6. Fixed problem with initialisation of risky interest rate

Amendments since 06 Apr 2016:

1. Altered sorting routine to avoid stack-overflow on large populations

Amendments since 23 Mar 2016:

1. Introduced possibly to distinguish between two immigrant population subgroups (EU/non-EU)
2. Corrected error preventing immigration and emigration
3. Corrected error whereby value of BenefitAgg was not uprated to prices of stated year
4. Added sort routine to avoid stack-overflow on large populations
5. Adjusted forward projection of wage parameters
6. Included new analysis routine to evaluate budget balance
7. Fixed error returning false errors for carers in tax\_comms routine

Amendments since 19 Mar 2016:

1. Fix tax credits in 2016 to limit number of children eligible for support
2. Fixed error in front-end treatment of childcare costs
3. Fixed problem when yrexog\_rp > maximum year of simulated horizon

Amendments since 15 Feb 2016:

1. Fixed issue with 2016 base, which didn’t auto-populate in Form 01 of the Excel front-end
2. Added check to ensure that SIDD macro is being run with file named “job file.xls”
3. Defined units of budgetary figures reported in poverty\_analysis.xls spreadsheet
4. Fixed error when projecting population with flexible labour options
5. Fixed error when analysing (calbn routine) with flexible labour options
6. Some adjustments to treatment of disabilities
7. Allowance for dampening effect on health states
8. Adjusted job file.xls to improve indexing of parameters
9. Updated of UK\_4.f90 to reflect policy as at April 2016.

Amendments since 04 Feb 2016:

1. Altered tax analysis in Excel front-end
2. Altered take-up test for UK\_3 and UK\_4
3. Augmented Excel form C3 to include additional directions
4. Allow for static projection of taxes and benefits
5. Fixed problem where simulation includes user defined tax output and base does not
6. Allow for upper limit to be set on the year of birth of the youngest birth cohort in the model
7. Augmented long-file output to include benagg and benX variables
8. Corrected error in warning message for check concerning model version
9. Corrected bug in 2016 tax structure in relation to the BenefitCap subroutine
10. Corrected error in reporting of parameter inconsistencies (job file not closed)
11. Fixed problem with loading in of risky\_r from saved base
12. Fixed some problems with loading of innovations (where maximum size of simulated population is smaller than base)

Amendments since 04 Jan 2016:

1. Fixed error in initialised child states (internal region set to parental region in preceding year)
2. Set yrexog equal to projected time horizon where simulated population size equal to base population size
3. Add in identifier for model variant into job file.xls, and add check into model code
4. Birth cohorts increased to ensure youngest birth cohort included in analysis
5. Corrected error in demog evaluation, concerning treatment of widows
6. Multiple errors corrected affecting projections where horizon extends beyond the period of the projected population cross-section
7. Repaired some errors when projecting forward without time iteration

Amendments since 12 Dec 2015:

1. Re-enabled Excel writes
2. Fixed error in load of children with disabilities

Amendments since 25 Nov 2015:

1. Introduced new macro to job file.xls, which exports all model parameters from Excel
2. Altered procedures that import parameters and export results, so that all comms with Excel can be suppressed
3. Fixed some minor errors with routines that load in model parameters

Amendments since 26 Oct 2015:

1. Introduced DLA state
2. Introduced Carer state
3. Introduced child disability state
4. Allowed greater flexibility in definition of growth rates
5. Increased detail of saved benefits data
6. Corrected bugs in routines that project micro-data
7. Corrected bugs in analysis\_hilevel
8. Added in Winter Fuel Payments

Amendments since 09 Oct 2015:

1. Altered heading of user form C8
2. Corrected coding error in evaluation of companion AHC equivalence scale for calculating poverty rates.
3. Introduced health state

Amendments since 25 Sep 2015:

1. Added disability status in base data
2. Added disability related benefits to model
3. Added structure for reading in disability related parameters
4. Fixed problem with maturing children who marry maturing children

Amendments since 23 Sep 2015:

1. Added option to save simulated micro-data as unformatted output
2. Added option to save simulated micro-data in exogenously defined year (independent of start year from which simulation projections are made)

Amendments since 15 Sep 2015:

1. Amendments to:
	1. Definition of net\_income (now gross of hsg\_mr and net of Council Tax)
	2. Disaggregated non-discretionary expenditure measures (comexcc, comexhs, comexot)
	3. Definition of benefit altered (now net of council tax)
2. Amended analysis routine reporting poverty rates
3. Amended model parameters to improve alignment between model and HBAI reported poverty in base cross-section
	1. Added distinction for rents paid by retirees
4. Error corrected in front end to generate new base for the model
5. New structure implemented for indexing.
6. Fixed error in loading of unformatted grid slices

Amendments since 30 Aug 2015:

1. Amended format for grid saving to permit output in unformatted binary.
2. Amended front-end to accommodate new options for education
3. Amended model to allow for individual specific consumption
4. Amended front-end to include option to simulate individual specific consumption

Amendments since 24 Aug 2015:

1. Whole code revised to ensure that graduate level education referenced to top qualification level (implemented to permit more than 2 education levels)
2. Some bugs associated with conflicting variables in global modules found by new compiler and fixed
	1. Italian tax code cleaned up a little
3. Errors in job file fixed (especially default variables for take-up of benefits)
4. Altered front-end so that number of forward years for projections adapts to changes in start year
5. Bugs corrected in 2016 Tax code, both in Job file, and in FORTRAN.

Amendments since 12 Aug 2015:

1. Corrected bug in routine to save data in long-file format, where real variables sometimes input as integers, resulting in “\*” output
2. Altered method used to accommodate benefits take-up, to refer to cash on hand (non-housing / non-pension wealth + post tax income).
3. Allow for different bequest parameters between singles and couples
4. Augmented model for imputing rent payments

Amendments since 11 Aug 2015:

1. New routine added to save data in long-file format, to increase efficiency when loading data into stata
2. New age bands added to permit greater variation over childcare costs (designed to accommodate 2015 budget announcements)

Amendments since 28 Jul 2015:

1. Fixed errors in way that characteristics at simulation entry were maintained for children and immigrants
2. Fixed error in temporal indexing in routine that calculates income moments
3. Fixed minor error in front-end for creating a new simulation base
4. Altered income floor for private pension contribution, to reference maximum income earner where member of couple (rather than combined benefit unit income).
5. Fixed error in Excel front end for switch enabling UC in Form 01
6. Allow difference between discount factor for singles and couples
7. Additional age threshold included for evaluation of minimum wage

Amendments since 13 Jul 2015:

1. Model adjusted to avoid writing to Excel
2. Fixed error in evaluation of education status in backward projections
3. Fixed errors in Excel front-end for implementing reduced-forms
4. Reduced form parameters estimated for 2006 included in model
5. Job file.xls cleaned up so that it saves faster

Amendments since 15 Jun 2015:

1. Job file.xls updated to fix bug in Form 2 of front-end
2. Job file.xls altered so that macros from file in base model directory are preserved
3. Timing of pension receipt in base population data checked to determine if it is consistent with simulation parameters, and adjusted if it is not.
4. STATA program that compiles WAS data for analysis updated to reflect 2011 state pension limits
5. Routine that loads in cross-section data altered, so that S2P is now allowed for pensioners in excess of SPA.
6. Wage regression on WAS data expanded to include panel data for wages.
7. Model adjusted to allow for unemployment status in cross-sectional data at population load.
8. Model adjusted to permit consumption, employment, timing of pension access, and pension participation to be projected using reduced form regression equations.

Amendments since 21 Apr 2015:

1. Evolving population cross-section fully implemented. Includes:
	1. Maturation of children
	2. Emigration
	3. Immigration
	4. Ring-fence of initial population projection

Amendments since 17 Apr 2015:

1. Incorporated “other essential expenditure” in simulated profiles
2. Allowed for exogenous age specific limits on unsecured debt

Amendments since 07 Apr 2015:

1. Slight change to income moments analysis routine, to omit self-employed from graduate/non-graduate moment evaluations
2. Added switch to ex-post suppress employment decision when simulating population through time – useful for calibrating income parameters
3. Added switch to suppress innovations associated with transitions between labour/education states
4. Corrected small error in determination of rental costs (reference to 140, not 139)
5. Fixed problem with model front-end, which did not save “MIGRATION PARAMETERS.xls” when creating new base
6. Fixed problems with simulation initilialisation routines, which crashed when forward simulations were set to 1.
7. Fixed a problem with saving of model output, which crashed when the SamplePeriodsAll < 5

Outstanding issues:

1. Adapt model to permit sensitivity analysis around assumed rate of wage growth
2. Need to re-design routines for specifying marriage and divorce parameters
3. Wealth mis-match is better considered to be a problem with the projected wage profiles, than due to omitted bequests received. Essentially this is a more complicated version of a similar problem encountered in relation to evaluation of demographic innovations to reflect numbers of children in reference cross-section
4. Annuity rate looks too high
5. Self-employment parameters not really fixed
6. Problem with backward simulation of pension take-up without wage effect
7. Parallelise population simulation
8. Add green progress bar to icon on task bar
9. Problem in differences evaluation in test set-up