



ECONOMIC
STATISTICS
CENTRE
OF
EXCELLENCE

A COLLABORATION WITH



A Democratic Measure of National Income Growth

Andrew Aitken (National Institute of Economic & Social Research and ESCoE)
and
Martin Weale (King's College London and ESCoE)

ESCoE Conference on Economic Measurement 2019
May 2019

Disclaimer: This work contains statistical data from ONS which are Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

The results presented here are preliminary. Please do not quote them.

“That’s your bloody GDP, not ours” - Newcastle heckler

It is well-known that GDP growth is not a good measure of growth in welfare.

1. It is gross of depreciation. A welfare measure has to be net.
2. Account needs to be taken of net income from abroad.
3. Money net income should be deflated by the price of consumption, not the price of output.
4. Some adjustment for population growth is needed.
5. But there is still a difference between output and welfare.

Democratic Growth

- Sig Prais (1959) developed a democratic price index. It calculates the change in prices based on the spending pattern of an average household. CPI uses total spending, so high spenders have more influence.
- Tony Atkinson (1970) developed “inequality-averse” measures of income.
- We take the geometric mean of household income (A special case of Atkinson’s inequality aversion) and deflate using Prais democratic price index.
- The output is the growth rate in real household income averaged across all households.
- Use democratic CPI produced by Tanya Flower and Philip Wales at ONS and extend this to take account of consumption of public goods and those provided by NPISH

Consumption or Income?

- Immediate welfare comes from consumption.
- Consumption may represent permanent income.
- But saving also adds to welfare and people are often more interested in the distribution of income than the distribution of consumption.
- Aitken and Weale show that a coherent welfare definition can be given to $\log(\text{real income})$ with a democratic deflator used to produce real income.
- Utility from income equals utility from consumption plus (saving \times marginal utility of consumption).
- First order it is fine to apply to utility function to real income per household.

Household Income or National Income?

- Most distributional work focuses on household income.
- Distributional national accounts (Piketty, Saez, Zucman, 2018). Focus predominantly on individuals rather than household.
- We keep the household as the reference unit allowing us to adjust for household size.
- But we allocate the whole of net national disposable income to households.

Primary Household Incomes (£m Fin Year 2015)

	National Accounts	LCFS	Modelling
Wages and Salaries	780,009	721,072	S
Net Operating Surplus (Imputed rent)	119,914		M
Self-employment Income	144,007	73,439	S
Employers' Contributions	155,357	Nets out	
Interest receipts	24,305	6,668	M
Dividend receipts	76,674	7,669	M
Attr. to insurance holders	23,078	Proportional to insurance	S
Payable on pension rights	74,068		M
Less interest paid	-25,943	-28,399	S
EQUALS Net Primary Income	1,371,469		

Secondary Redistribution (£m Fin Year 2015)

	National Accounts	LCFS	Modelling
Net Primary Income	1,371,469		
Social benefits in cash	97,364	82,788	S
Other social benefits	129,223	107,968	S
Social assistance	121,404	89,926	S
Misc transfers received	8,700	2,813	S
Hhld social contributions	-68,752	-60,299	S
Misc transfers paid	-33,041	-37,539	S
Taxes on employment	-143,438	-74,923	M
Other income tax	-24,203	-5,318	M
Other current taxes	-44,214		M
Pensions supplement	-54,308		
Employers' contributions	-155,357		
EQUALS			
Hhldnet disposable income	1,204,847		

National Disposable Income (£m Fin Year 2015)

	National Accounts	LCFS	Modelling
Hhld net disposable income (A)	1,204,847		
Employer contributions	64,451		S
Household contributions	12,454	21,008	S
Supplement less service charge	54,308		M
LESS Benefits received	-84,725		S
EQUALS Pensions adjustment (B)	46,419		
Retained earnings of companies (C)	-18,894		
Net income of NPISH (D)	50,882		
Consumption of government	363,480		
PLUS Net saving of government	-50,932		
Net income of government (E)	312,548		
Residual income (F)	2,618		
Net National Disposable Income (A+B+C+D+E+F)	1,598,420		

Imputed Rent (Operating Surplus)

- Log monthly rent is explained by log income, house type, council tax band, socioeconomic status, time and NUTS1 region.
- The decision to rent or own is explained by the same variables
- The model is identified by the assumption of normality

Rent: Data and Estimates (£m)

	LCFS		Blue Book	From Model	
	Rent Paid	Rent Received	Imputed Rent	Imputed Rent	Fitted rent paid
2006	38,986	3,874	157,939	114,838	37,414
2007	41,953	4,530	162,273	118,882	39,820
2008	43,658	3,947	166,822	121,623	43,202
2009	49,466	5,180	167,868	131,182	47,553
2010	53,150	5,102	169,783	139,036	50,107
2011	58,740	5,474	171,296	134,246	57,182
2012	61,513	7,236	177,171	146,379	58,437
2013	65,374	6,983	183,412	151,274	63,650
2014	63,392	9,069	191,679	149,926	61,241
2015	67,629	8,809	199,826	153,967	64,679

Categorical Imputation using Ordered Probit Models (i)

- We adopt a more flexible approach structured round an ordered probit model for everything except imputed rent.
- We convert the data in our source datasets (SPI for interest & dividend income/WAS for pensions) into a large number of categories (89 for interest & dividend income and 32 for pensions) and fit ordered probit models to these
- Covariates have to be variables available both in the source surveys and in LCFS
- Simulating these models provides stochastic categorical estimates which can be imputed into LCFS

Categorical Imputation using Ordered Probit Models (ii)

- Compute a fitted value for each latent variable, and add on random terms from the multivariate normal distribution
- Each latent variable is allocated to the relevant category underpinning the probit model
 - Where it lies between 2 cut points, the distance between 2 categories is interpolated on the basis of the latent variable

The Upper Tail

- Reconciliation with the macro data requires appropriate handling of the upper tail, even though the upper tail has little impact on democratic income.
- Use a Pareto type-1 distribution for observations in the top category

Taxation

- The LCFS grossly under-records tax payments.
- We calculate the income tax due on the basis of the allowances and rates of the time, and apply this after income figures have been aligned to the national accounts.
- Gives better, but still low figure.
- Likely to omit some allowances and reliefs- e.g. assumes all dividends are taxed while those in shares held in ISAs are not.

Pension income

- Use ordered probit with waves 3 and 4 of WAS to allocate pension and insurance income to categories
 - Include age, age², No. adults, No. children, tenure type, marital status, labour or pension income
 - Estimate separately for under 65 (with & without labour income) and over 65 (with & without pension income)

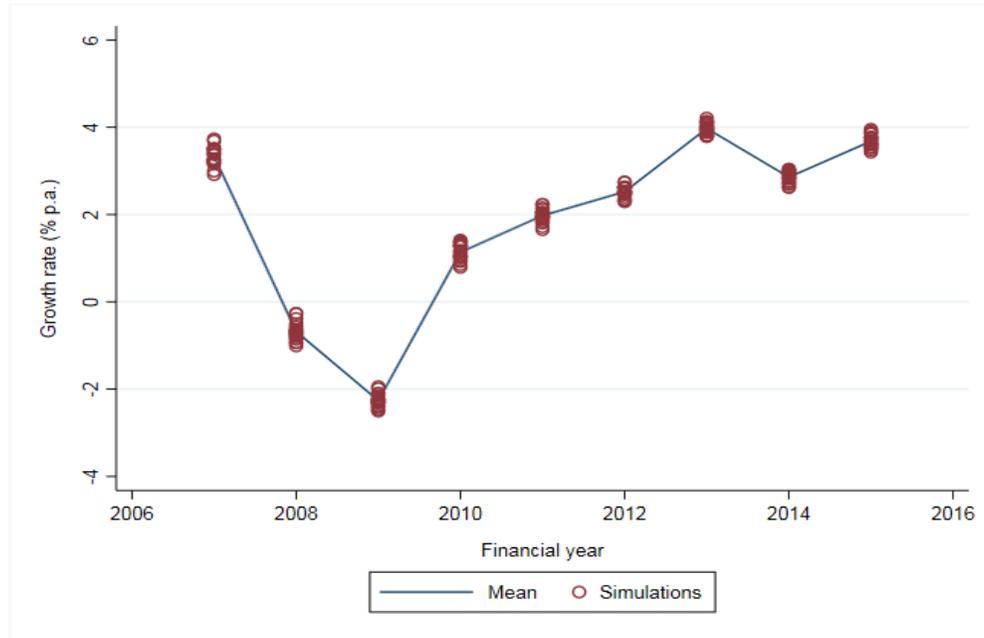
Covariances

- Need to take into account correlation between random components of imputed variables
- Use best source of data for pension wealth (WAS) and interest & dividend income (SPI), therefore not able to jointly estimate our models to estimate correlations simultaneously with parameters
- Estimate a correlation matrix using WAS (which does allow joint estimation but is not the ideal source) for the random components

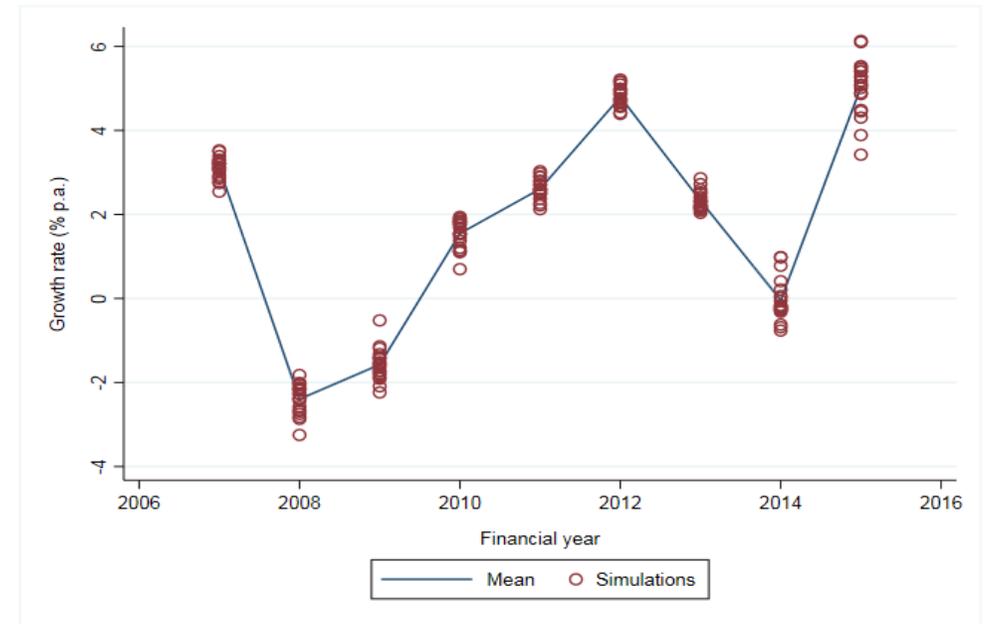
Simulations

- Examine the effect of including imputed pension and investment income on measures of inequality such as Gini & geometric mean of income
- Present indicative results from 20 simulations

Growth Rates of Income per Household



Plutocratic Nominal Income Growth per Household



Democratic Nominal Income Growth per Household

Real Income Growth per Household (adjusted for household size)

Average Growth Rates 2006-2015

	Plutocratic	Democratic	Difference
Nominal Growth	1.6%	1.5%	0.1%
Standard deviation (% pts)	0.15	0.09	0.07
Growth in Deflator	2.1%	2.3%	-0.2%
Growth in Real Income	-0.5%	-0.8%	0.3%

Conclusions

- The paper shows a practical means of producing a welfare indicator on a regular basis.
- Democratic growth can be explained to the public as the average of each household's income growth rate.
- Drawing on a range of sources, we have allocated national disposable income across households.
- The broad income measure shows declining inequality as do official measures of inequality.
- But we have to address the implications of different definitions of household, and verify that our plutocratic figures align with the macro data.

Future Work

- Democratic indicators of income growth by originating industry, and by sub-national areas
- Need to classify labour income to industrial sector for each household (LCFS, FRS, or PAYE possible sources)
- Dividends and retained earnings allocated on proportional basis.
- Need a model of redistribution (IGOTM) to allocate taxes to a common pot.
- Eventually democratic growth accounting may be possible.