Redistributive effect and the progressivity of taxes and benefits: evidence for the UK, 1977–2018

by Nicolas Hérault and Stephen P. Jenkins

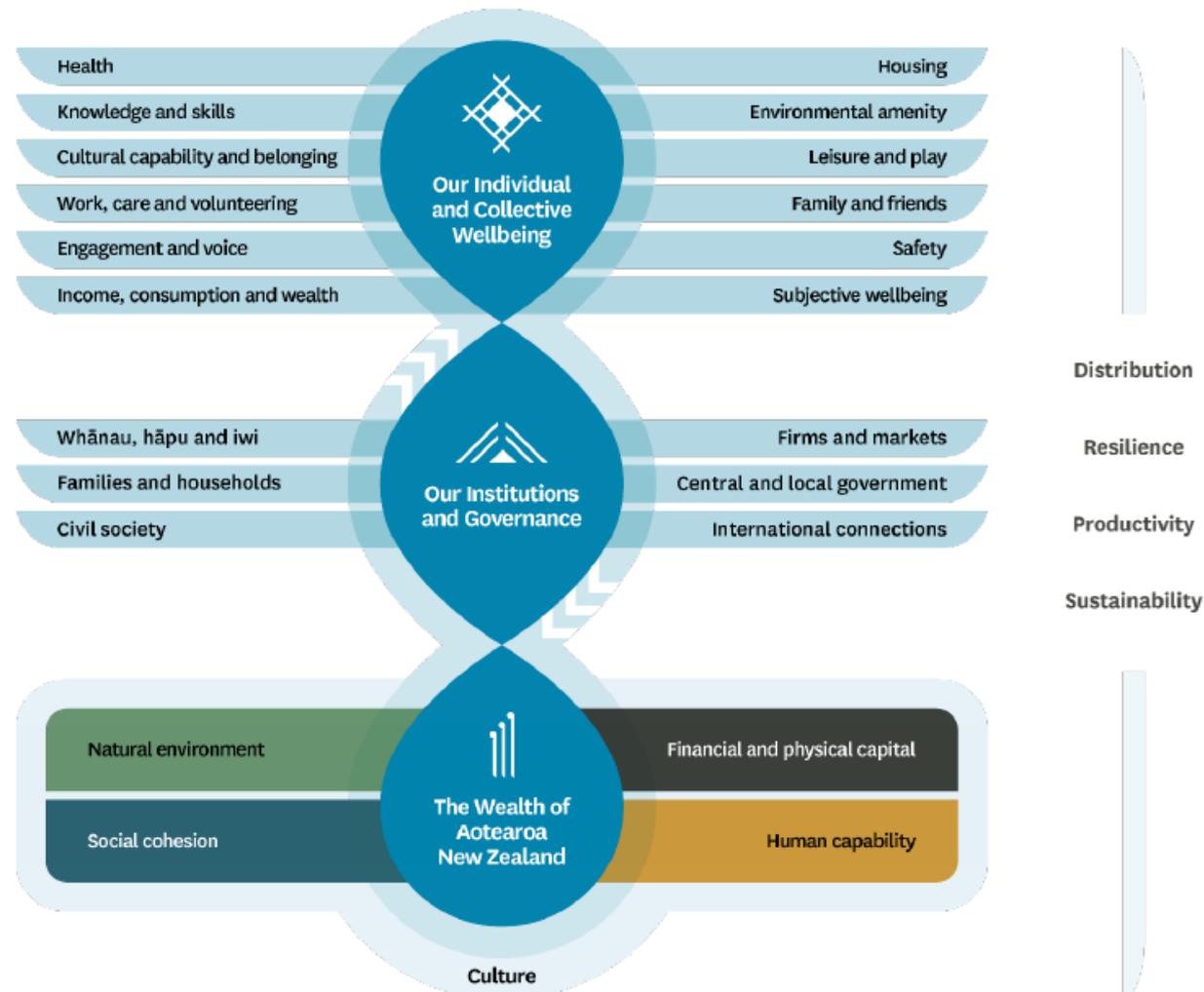Stephen P. Jenkins
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Living Standards Framework 2021, Dashboard 2022, Well-being report(s)

Figure 1: The 2021 LSF

There are three levels to the LSF, which correspond to the three sections of the LSF Dashboard.

LSF and dashboards: this talk is a deep dive, focusing on one dimension (income)

Figure 1: The 2021 LSF
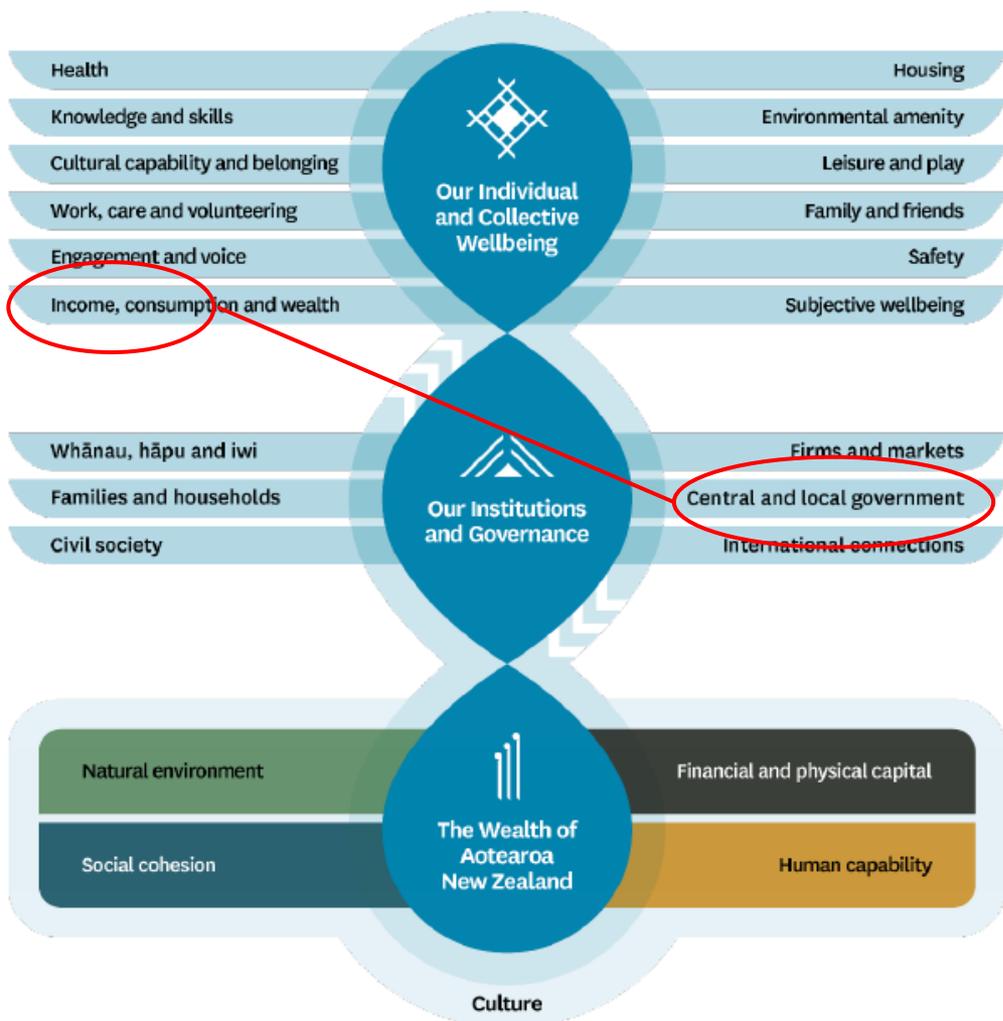
There are three levels to the LSF, which correspond to the three sections of the LSF Dashboard.

The key ideas

1. To link well-being outcomes (income distribution) to the government's redistributive tools (the tax-benefit system)

   ▪ What effects do taxes and benefits have on the distribution of income, at a point in time and (especially) trends over time

2. To exploit the framework proposed by Nanak Kakwani to do this and, relatedly, …

3. To propose and apply a counterfactual approach to understand which tax-benefit system feature played the dominant role in accounting for observed trends

What's new?

1. Detail (yearly) and long period (40 years): UK, 1977–2018
   - Same data as used by Office for National Statistics (ONS) official 'Effects of Taxes and Benefits' (ETB) statistics and reports: a fresh look providing a Big Picture perspective
   - No previous research for any country exploits such a long time series of data
   - NB no similar studies for NZ to date (afaik)
     – Closest is: Matt Nolan (2018), 'Horizontal and vertical equity in the New Zealand tax-transfer system: 1988-2013', VUW Working Paper in Public Finance 1/2018

2. We examine cash and in-kind benefits, and direct and indirect taxes
   - Most research looks at either direct taxes, or cash benefits, but not all four components
   - But focus today on direct taxes and cash benefits (for brevity)

3. The counterfactual approach
   - It's basic but informative; we've not seen it before

4. Highlight an empirical implementation issue – the definition of the reference ('pre-fisc') distribution – and show that it matters
   - Discussed only if time

The Kakwani decomposition: the idea

The Redistributive Effect of taxes (or benefits) – the degree to which inequality is affected by the tax-benefit system – depends on 3 factors:

1. The average rate overall

2. The progressivity of the tax (benefit) system
   - How average rates vary with income (proportionality?)

3. The reranking of individuals between the pre- and post-fisc income parades

The Kakwani decompositions: detail

- Summarize inequality by the Gini coefficient
- Pre-fisc income Gini, G_X; post-fisc income Gini, G_Y
- Redistributive effect, $R = G_X - G_Y$

- **Taxes**: redistributive effect

$$R_T = [t/(1-t)] K_T + D_Y$$

  - t is average tax rate; K_T is Kakwani tax progressivity index (deviation from proportionality); $D_Y = C_Y - G_Y \leq 0$ is reranking index
  - Vertical redistribution effect is neatly expressed in terms of two components; and each component can change independently
  - Horizontal redistribution related to D_Y

- **Benefits**: $R_B = [b/(1+b)] |K_B| + D_Y$
- **Taxes & benefits**: $R_N = [tK_T + b|K_B|]/(1 - t + b) + D_Y$

We use the ONS's ETB historical dataset

- Same data as used in the ONS's annual ETB articles, as recently updated by them
  - Coverage: nationally representative of UK private household population
  - Variables: exactly the same as the ONS's (discussed shortly)
- Derived from Living Costs and Food Survey (LCFS, from 2008) and its predecessor, the Family Expenditure Survey (FES, to 2007)
  - Continuous household surveys with a focus on household spending and income
  - Annual sample size ~ 5,000 households
  - Survey years refer to financial years (12-month periods starting 5 April each year) from 1993/94 onwards and to calendar years before that
    - We label financial years by the first part: '2016' refers to financial year 2016/17, etc.)
  - The FES and LCFS include sample weights from 1997 onwards; we use these to derive our estimates
  - Cf. NZ's Household Economic Survey (HES), but note UK also has Family Resources Survey (FRS)

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Table 1. ETB income concepts

Label	Income concept	Definition	Relationships
O	Original	Income from the labour market, investments and savings, including private pension income	
G	Gross	Original *plus* **B** (cash benefits including state retirement pensions)	**G = O + B**
D	Disposable	Gross *minus* **T** (direct income taxes, i.e., income tax payments, employee National Insurance contributions, local taxes such as Council Tax)	**D = G – T,** i.e., **D = O + B – T**
P	Post-tax	Disposable *minus* **I** (indirect taxes, i.e., estimated payments of VAT, excise duties, intermediate taxes, etc.)	**P = D – I,** i.e., **P = O + B – T – I**
F	Final	Post-tax income *plus* **S** (in-kind benefit income from education, health and social care, and assorted other sources such as transport subsidies)	**F = P + S,** i.e., **F = O + B – T – I + S**

- Incomes equivalised using the modified-OECD scale, and distributed among all individuals

- **O**, **G**, **D** definitions are widely used: Canberra Expert Group recommendations, statistics and reports by Eurostat, OECD, NZ MSD (Brian Perry)

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Table 2. Reference distributions for assessment of redistributive effect

| Tax-benefit instrument	Reference (pre-fisc) distribution	Average income of reference distribution (£ per year), 2018
Cash benefits (**B**)	Original income (**O**)	28,034
Direct taxes (**T**)	Gross income (**G**)	31,760
Indirect taxes (**I**)	Disposable income (**D**)	24,442
In-kind benefits (**S**)	Post-tax income (**P**)	20,387

Hence, Redistributive Effect comparisons are:

- For **B**, original income (pre-) and gross income (post-)
- For **T**, gross income (pre-) and disposable income (post-)
- Standard in literature, but can be questioned

Figure 1. Gini coefficients (%)
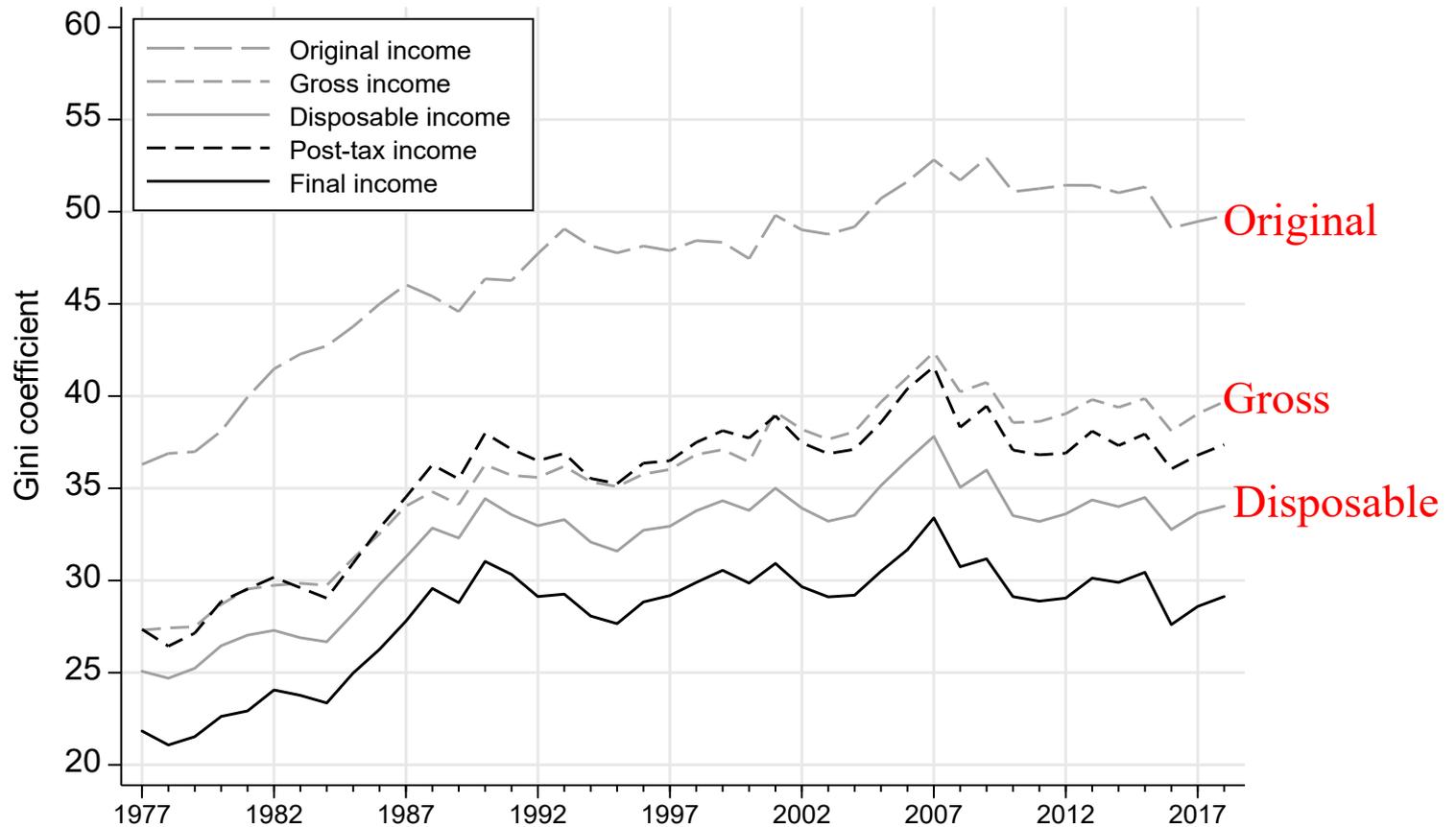
Figure 2. Redistributive effects (*R*) of taxes and benefits
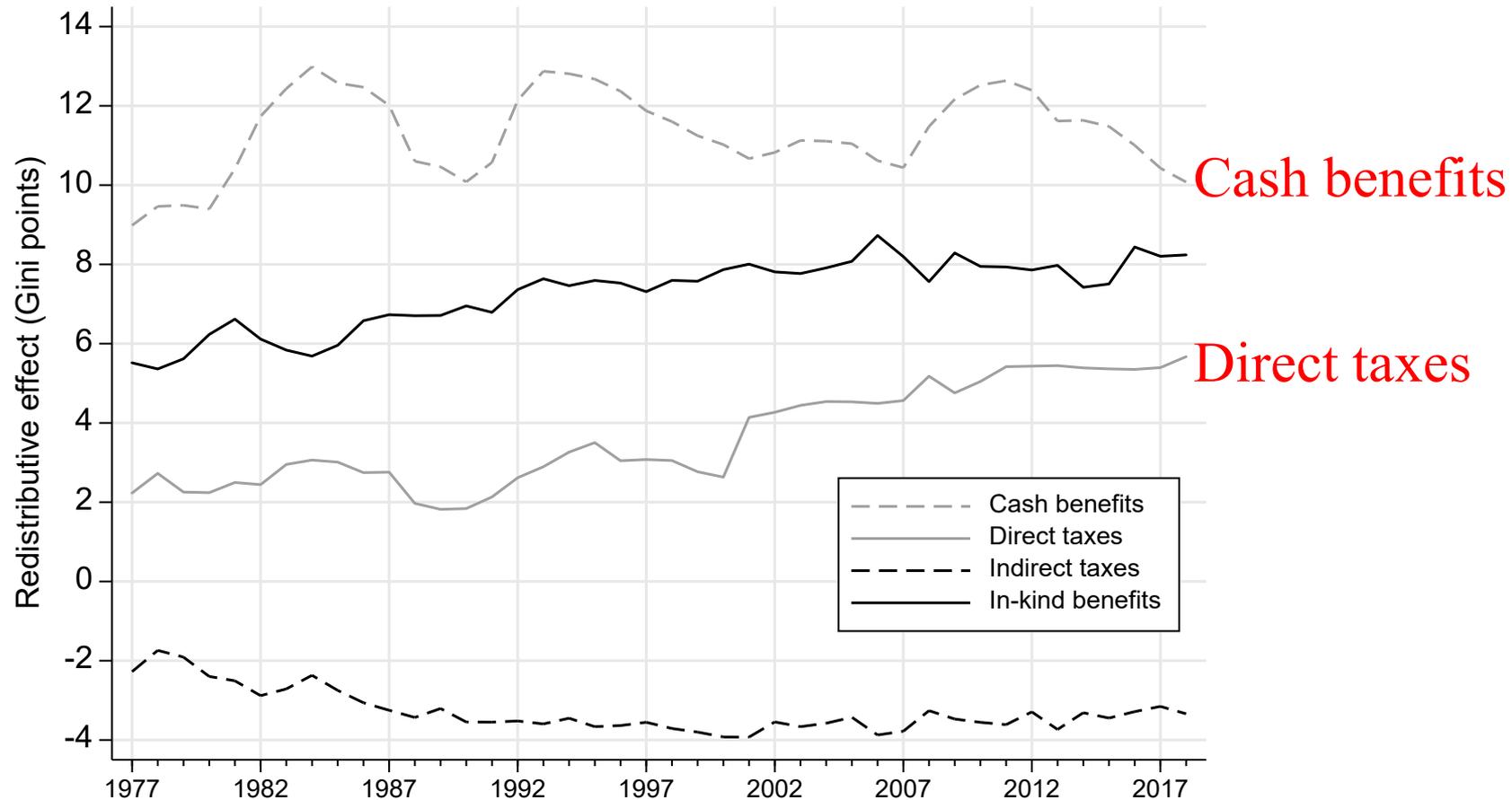
UK recessions: early 1980s, early 1990s, early 2010s

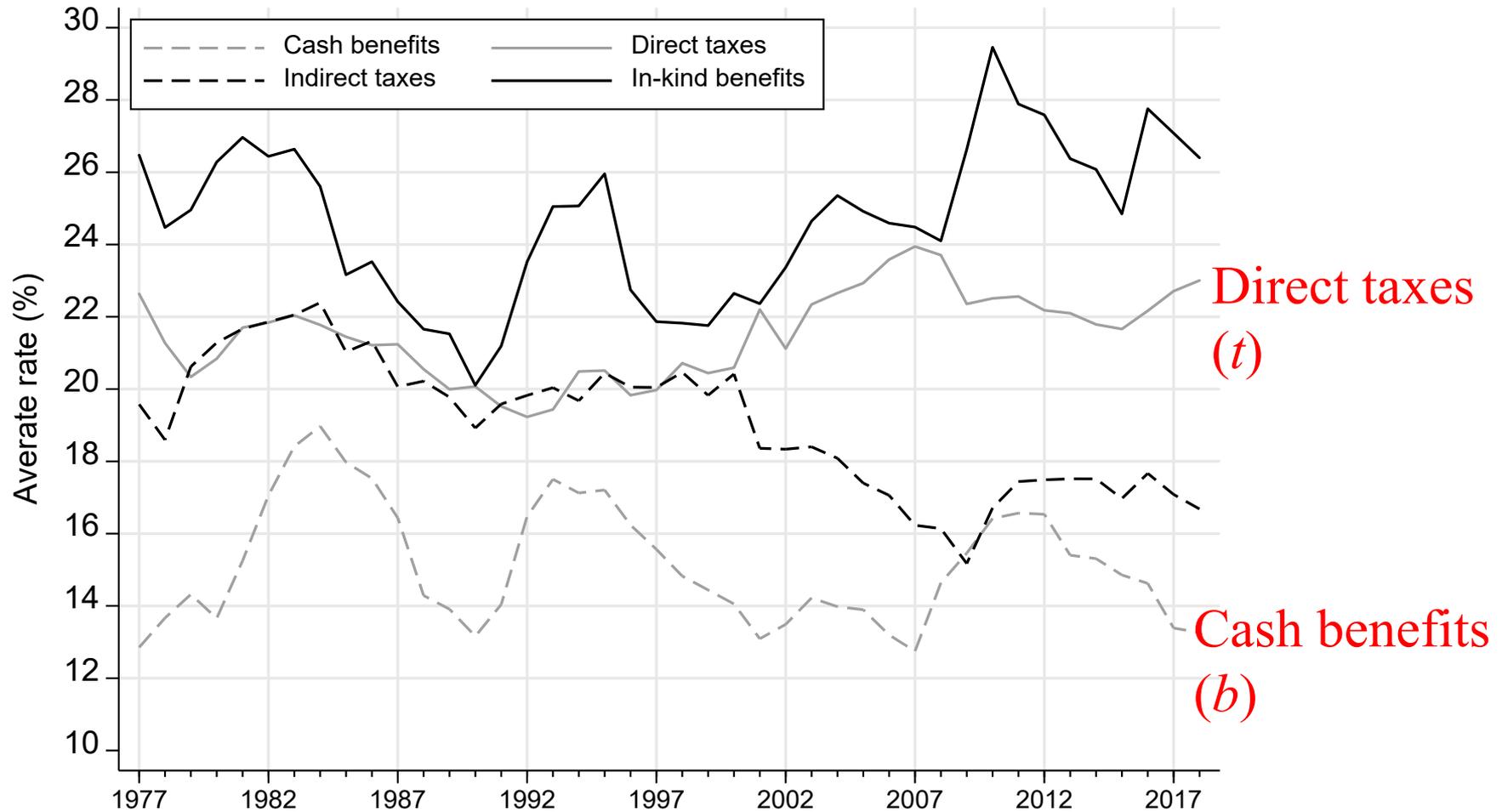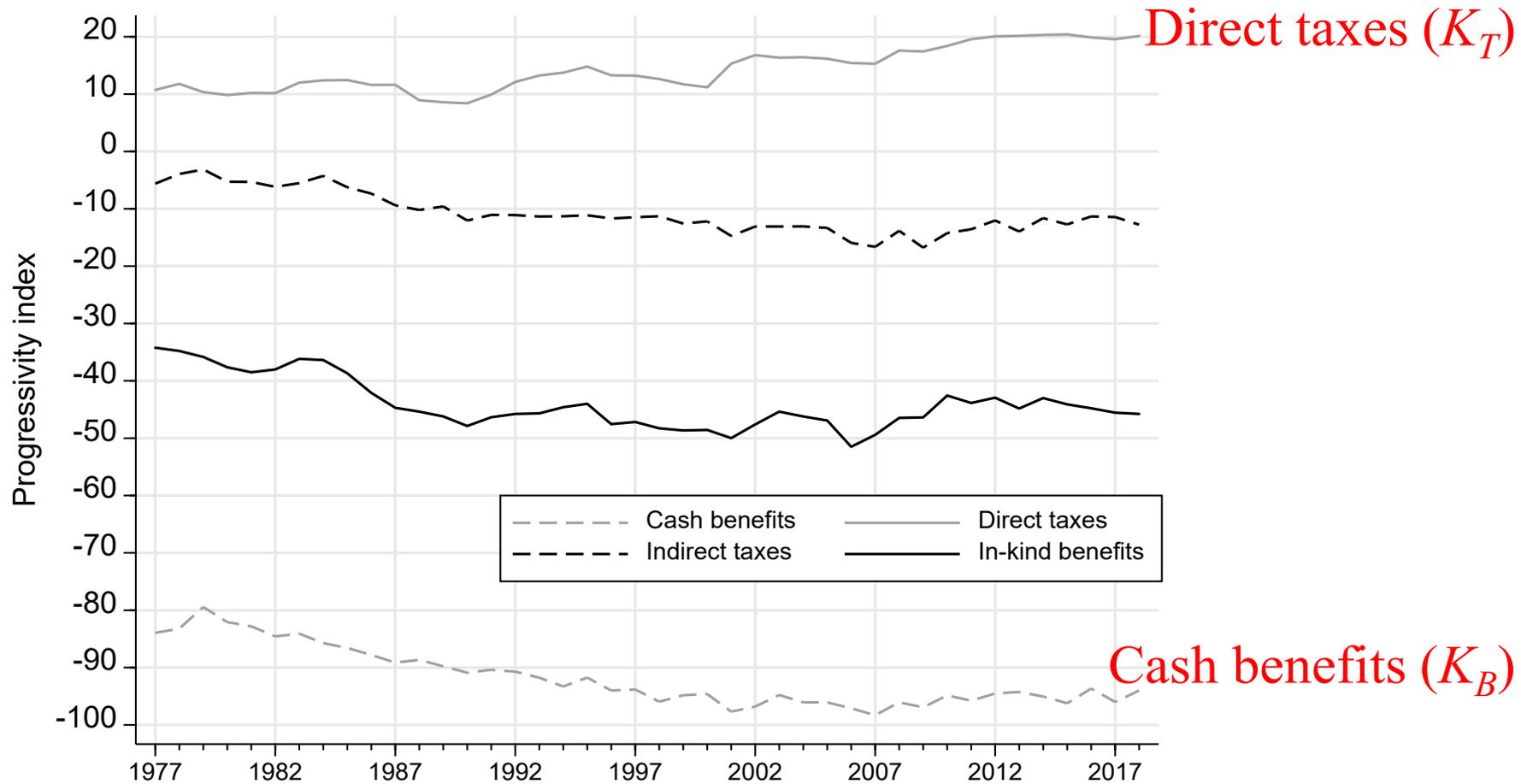# Figure 3. Average tax rate (*t*) and average benefit rate (*b*)

Figure 4. Kakwani progressivity indices (K_T, K_B)

Figure 6. Reranking as % of redistributive effect

- For direct taxes and cash benefits, reranking is a small component of total Redistributive Effect and largely constant from 1990s onwards
  - I.e., the average rate and progressivity and their changes are the most important, and I focus on these going forward
  - Direct taxes before 1990s: tax unit was 'family', not individual
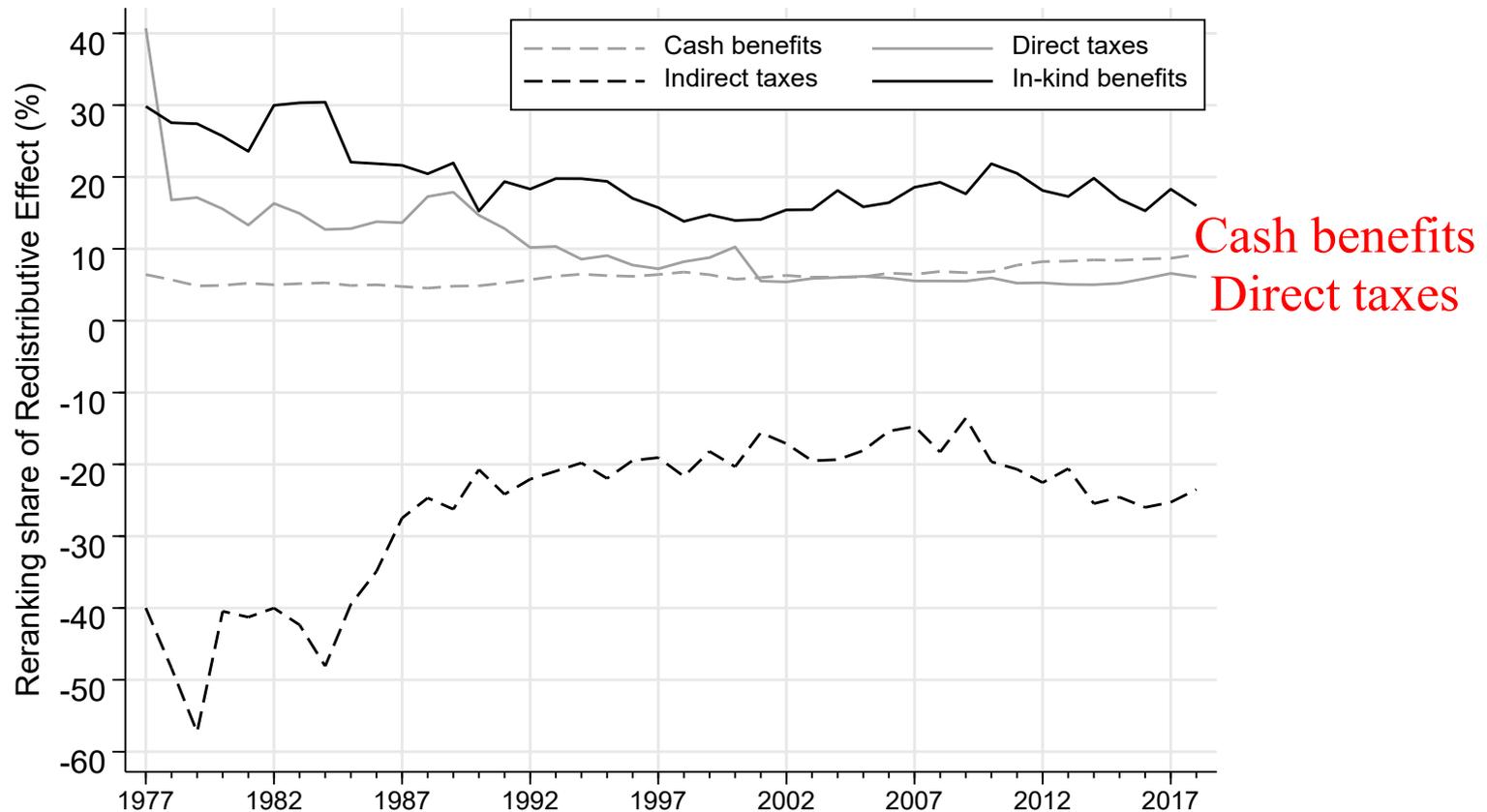
Was it changes in average rates or changes in progressivity that drove changes in R?
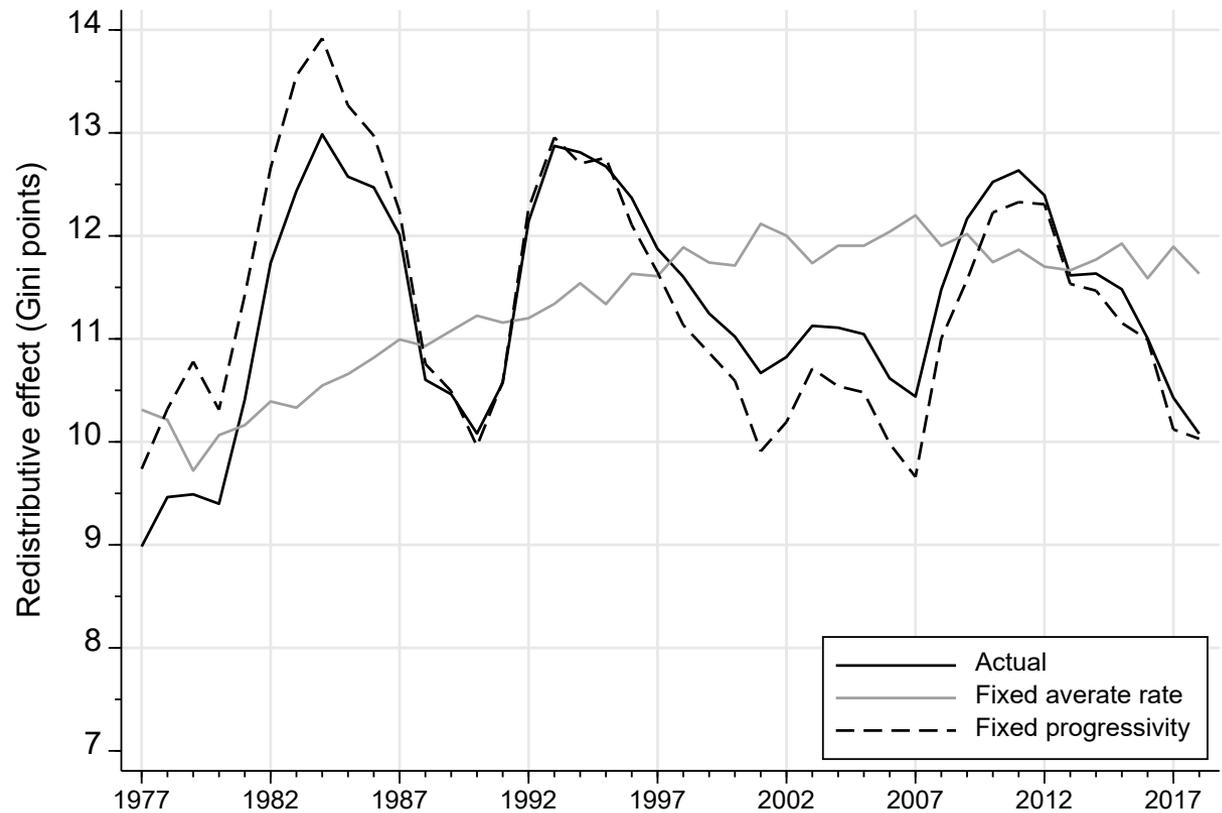
$$R_T = [t/(1-t)] K_T + D_Y$$

- Counterfactual exercise #1: fix average rate (and reranking) at historical average values, but allow progressivity to change as observed. If counterfactual R tracks observed R, this indicates that progressivity changes accounts for observed R trends

- Counterfactual exercise #2: fix progressivity (and reranking) at historical average values, but allow average rate to change as observed. If counterfactual R tracks observed R, this indicates that average rate changes accounts for observed R trends

- Repeat for each of taxes and benefits

Figure 7. Counterfactual calculations of the redistributive effect of cash benefits

$$R_B = [b/(1+b)] |K_B| + D_Y$$

'Fixed progressivity' series tracks 'actual' series

Trends in redistributive effect of cash benefits are largely associated with cyclical changes in average benefit rates (b)

Figure 8. Counterfactual calculations of the redistributive effect of direct taxes

$$R_T = [t/(1-t)] \, K_T + D_Y$$

'Fixed average rate' series tracks 'actual' series

Trends in redistributive effect of direct taxes are largely associated with trends in progressivity of direct taxes (K_T)

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Figure 11. Direct taxes: sensitivity to the definition of the reference distribution (R, t, K_T)

- The chart shows redistributive effects, average tax rates, and progressivity using two different reference (pre-fisc) distributions: (i) gross income (as earlier), and (ii) original income (as in many academic studies)

- Changes in levels not trends, and same conclusion from counterfactual analysis
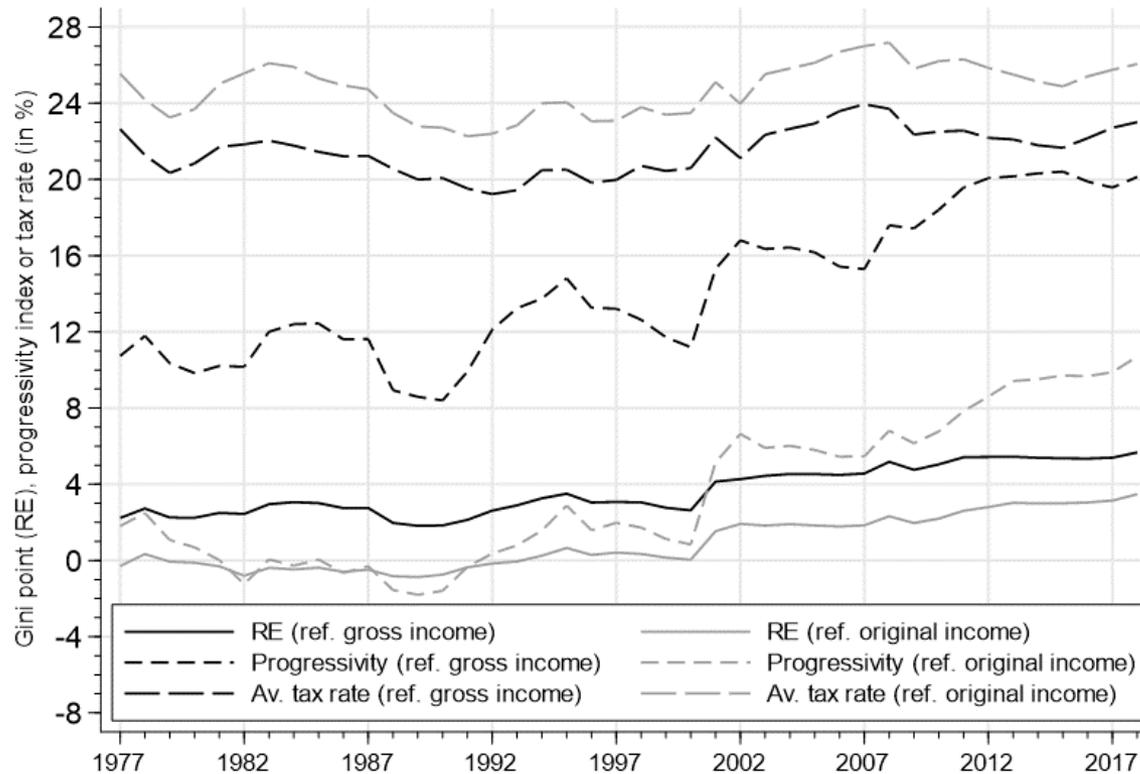
Black: gross as pre-fisc
Grey: original as pre-fisc

Figure 12. Direct taxes: sensitivity to the definition of the reference distribution (R, D_T)

- The chart shows redistributive effects and reranking indices using two different reference (pre-fisc) distributions: (i) gross income (as earlier), and (ii) original income
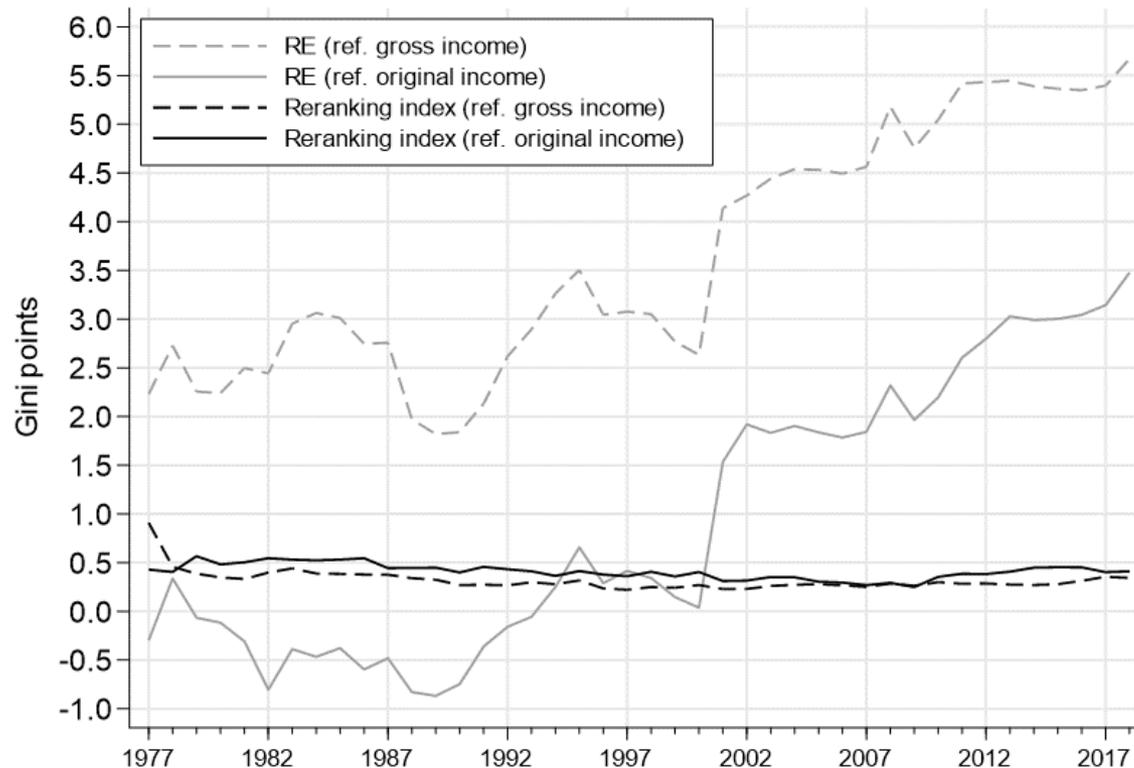
Conclusions (1/4)

- Kakwani's decomposition formulae provide a straightforward and succinct way of summarizing changes in redistribution and progressivity over a long period of time – here the UK, yearly, over the period 1977–2018

- Reranking generally plays a relatively minor role throughout, but …

- Counterfactual analysis reveals that whether changes in average rates or changes in progressivity plays the major role depends on the income component considered

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Conclusions (2/4): cash benefits

- Redistributive effect at end of period much the same as at the start; most noticeable is its cyclical nature

- Reflects changes in average rates rather than changes in progressivity and this, in turn, …

- Reflects the crucial automatic stabilisation role of cash benefits
  - When the economy enters recession, cash benefit spending for workless people rises, and cash benefits form a larger fraction of household incomes on average, with the reverse occurring when the economy recovers

- Although there has been a long-run decline in the real value of benefits for workless people in the UK relative to average earnings, this factor does not show up as a driver of trends in redistributive effect

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Conclusions (3/4): direct taxes

- Redistributive effect relatively stable from end of 1970s until 1990s (at 2 to 3 Gini points), but thereafter increased to reach nearly 6 Gini points by 2018

- Changes primarily reflect changes in progressivity, i.e., average direct tax rates rise with income to a greater extent than previously, and these trends …

- Reflect multiple changes in tax rates on earned income and employee National Contribution rates (NICs): e.g., …

  - 1980s and 1990s: top tax rate capped at 40% in 1988 (previously between 40% and 60%) but thereafter the maximum rate, source-dependent, was 50% (2010–2012), then 45% (2013 on)

  - Whole period: NIC contribution rates increased gradually from 5.75% in 1977 to 12% by 2018, *plus* new higher marginal rate (1% more) in 2003 rising to 2% in 2011

  - Result: difference between average tax rate for 9th and 10th decile groups widened significantly by comparison with earlier decades

Conclusions (4/4)

- The analysis does not directly reveal which precisely tax change or which benefit change was responsible
  - There are multiple direct taxes, and multiple cash benefits
- Address issue by reducing breadth in terms of time span and tax-benefit components
  - Counterfactual analysis based on tax-benefit microsimulation models is useful for this (see references in paper to examples)
- Also: what determines changes in the pre-fisc distribution?
  - For cash benefits, citing the business cycle as responsible for changes in the distribution of original income is not particular 'deep'
- Nor have we considered any potential behavioural responses to changes in taxes or benefits
- Hence, the decomposition approach is a complement to other approaches
- Reminder: income not only the aspect of 'wellbeing'!

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Figure 9. Counterfactual calculations of the redistributive effect of indirect taxes

For indirect taxes, the figure compares yearly observed redistributive effect (as in Figure 2) with two counterfactual calculations of redistributive effect: (a) R calculated by fixing the average rate (t) and reranking (D) at their 1977–2018 average values and setting K_T at the observed values ('fixed average rate'); and (b) R calculated by fixing progressivity (K_T) and reranking (D) at their 1977–2018 average values and setting the average rate (t) at the observed values ('fixed progressivity').

'Fixed average rate' series tracks 'actual' series

Trends in redistributive effect of indirect taxes are largely associated with cyclical changes in progressivity of indirect taxes
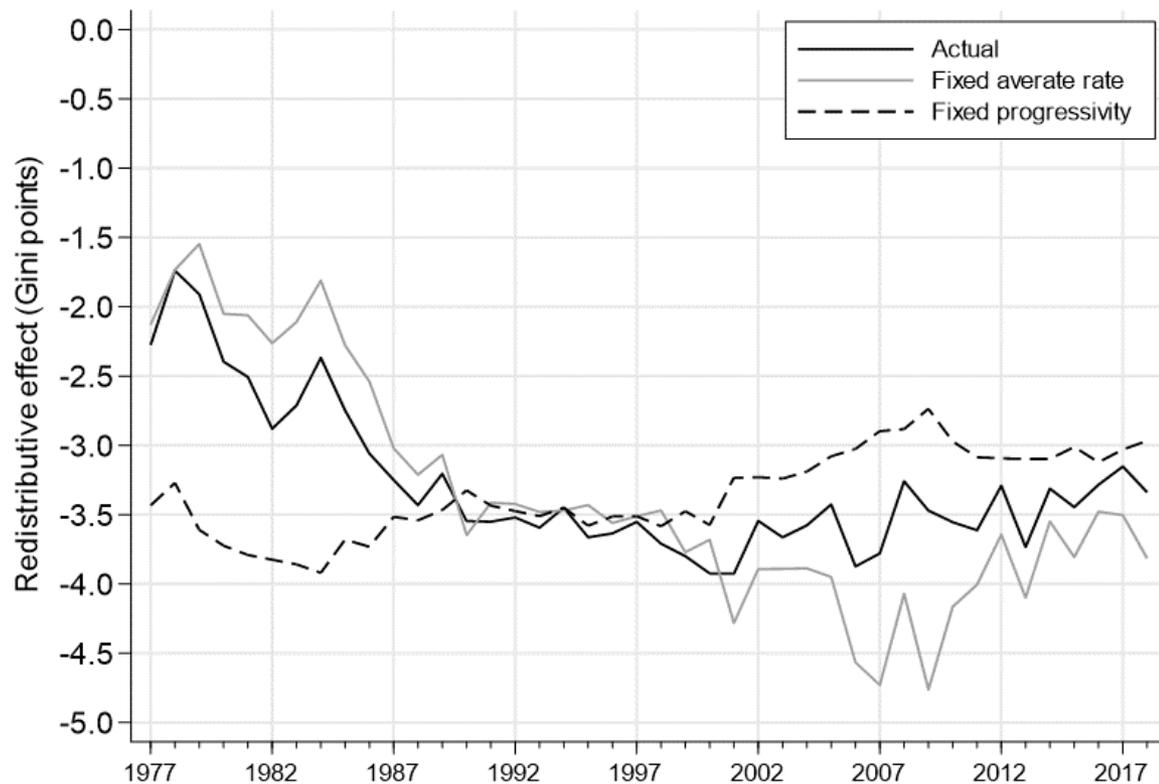
Figure 10. Counterfactual calculations of the redistributive effect of in-kind benefits

For in-kind income, the figure compares yearly observed redistributive effect (as in Figure 2) with two counterfactual calculations of redistributive effect: (a) R calculated by fixing the average rate (t) and reranking (D) at their 1977–2018 average values and setting K_T at the observed values ('fixed average rate'); and (b) R calculated by fixing progressivity (K_T) and reranking (D) at their 1977–2018 average values and setting the average rate (t) at the observed values ('fixed progressivity')

Which counterfactual series best tracks 'actual' depends on time period

Hence mixed results re what accounts for trends in redistributive effect of in-kind benefits