Fiscal incidence:
The effects of taxes and benefits on household income

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Introduction and previous studies

Fiscal incidence studies

Typically household income surveys and microsimulation modelling focus on disposable income (= market income + government transfers – income tax)

Fiscal incidence studies go beyond this to estimate the "final" income received by households, by including further (additive and subtractive) gov. contributions:

- indirect (consumption) taxes

- in-kind benefits

(usually limited to social in-kind spending (health, education) rather than e.g., defence, infrastructure etc)

Cash values of in-kind benefits are estimated in a cost-of-provision approach

- households are attributed a share of the cost to the government of the service, according to some estimate of their use

O. Aziz *et al.*, Policy Quarterly 8 (1), pp. 29-38 (2012)
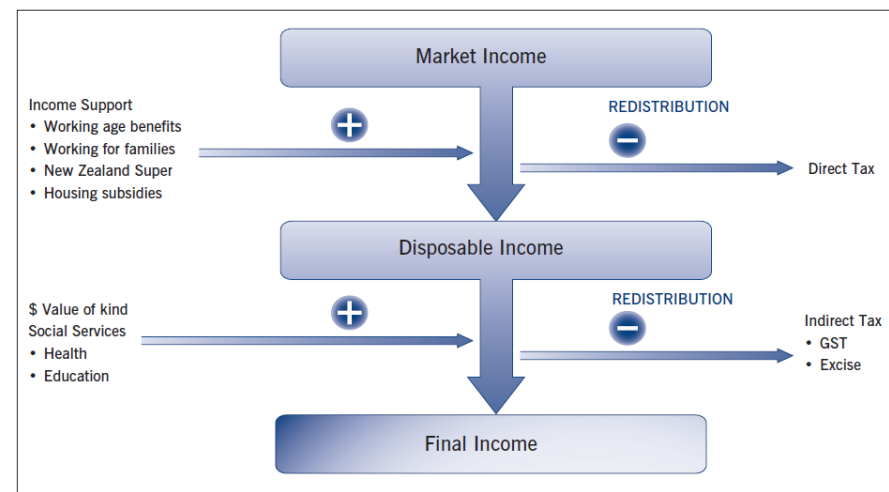
Previous FI studies at treasury

Crawford and Johnston – TSY Working Paper (2004)

Estimated final incomes in 97/98, using the TAXMOD model, and reanalysed data from a previous Dept. of Statistics study of 87/88

- Period of extensive policy reforms affecting household incomes

Included indirect tax, social housing, health and education spending
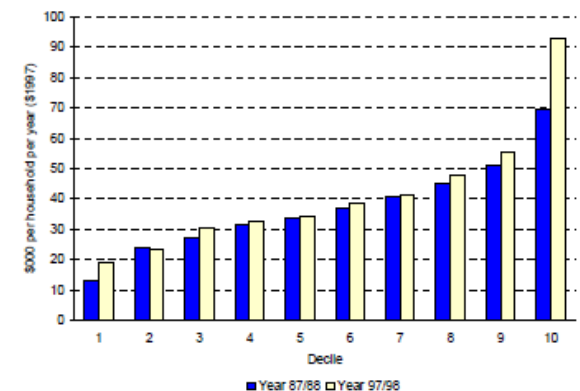
Found that although market and disposable incomes in the lower deciles were static/decreasing between 88 and 98, final incomes mostly increased

Increases in market and disposable income inequality (Gini index) significantly mitigated when in-kind benefits (and consumption tax) are considered

I. Average market income ($)
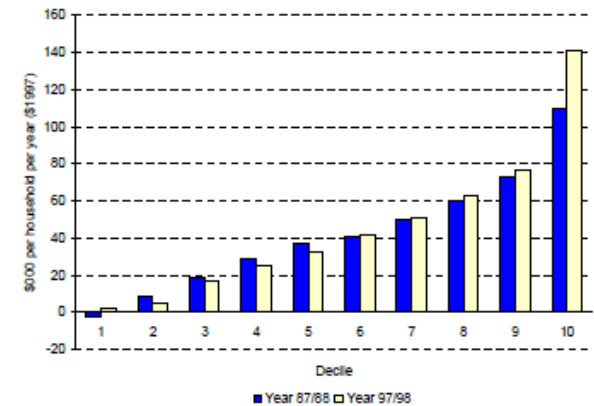
I. Average final income ($)

Previous FI studies at treasury

Aziz, Gibbons, Ball and Gorman – Policy Quarterly (2012)

Extended C&J's 2004 study with results for 2006/07 and 2009/10

Results based on HES survey in these years, modelled with Taxwell
(successor model to TAXMOD)

Plotted previous 88/98 results along the results of their new analysis

Figure 11 Net Fiscal Impact Average receipt of income support and social services less tax payments per household ($2010)

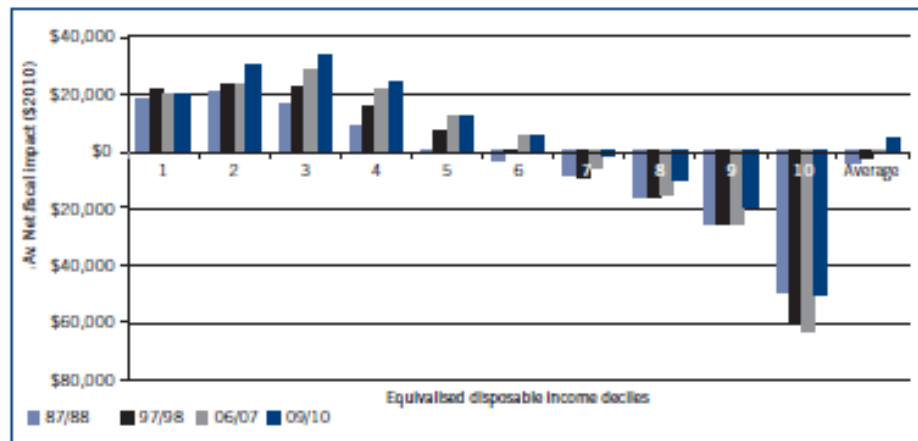Found further increases in market and disposable income inequality since 98, but these increases were again mitigated in final income by health and education spending

Table 3: Gini coefficient for different measures of household income	1988*	1998*	2007	2010
Market income	0.42	0.49	0.54	0.52
Disposable income	0.30	0.35	0.38	0.36
Final income	0.27	0.30	0.35	0.33

TAWA

Tax **A**nd **W**elfare **A**nalysis - Treasury's tax and transfer microsimulation model
- Successor (2017) to the Taxwell model

Models components of household disposable incomes under existing policy settings and hypothetical reforms

Input data is the Household Economic Survey (HES)
- Increasingly augmented with linked administrative data (taxes, benefits) within the IDI

Calculates transfer entitlements and direct tax liabilities for unit records in HES
- Facilitates distributional analysis for the whole (private household) population

Household incomes can be connected to HES survey data on household expenditure, wealth and material hardship
- HES sub-survey modules – e.g. Expenditure – run every third year (historically)

HES - Expenditure subsurvey

To calculate the incidence of indirect (consumption) tax on households, we run TAWA on the 2019 HES-expenditure sample

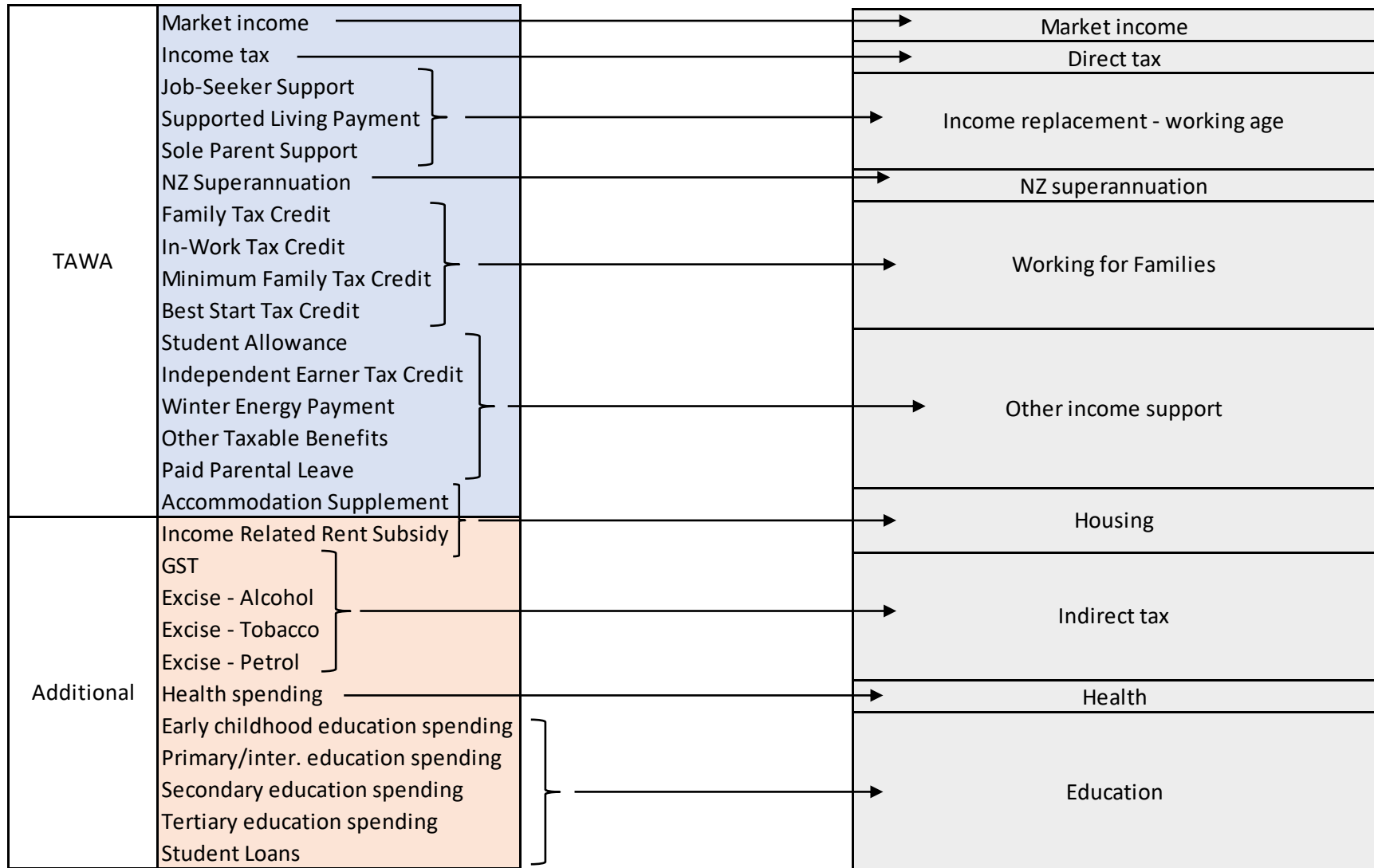HES – expenditure is a subsample of full (income) HES

	Individuals	Households
HES19 - Income	55,380	21,156
HES19 - Expenditure	9,987	3,933
Eligible population	4,834,000	1,748,000

Respondent households supply a diary of their expenditure over a 14 day period (samples are taken through the year) and are asked for their most recent payment for recurring expenses (e.g., utilities)

Annualised expenditure amounts are then used by Stats NZ to estimate, e.g., CPI

Fiscal incidence components

TAWA		
Market income	→	Market income
Income tax	→	Direct tax
Job-Seeker Support		
Supported Living Payment	→	Income replacement - working age
Sole Parent Support		
NZ Superannuation	→	NZ superannuation
Family Tax Credit		
In-Work Tax Credit	→	Working for Families
Minimum Family Tax Credit		
Best Start Tax Credit		
Student Allowance		
Independent Earner Tax Credit		
Winter Energy Payment	→	Other income support
Other Taxable Benefits		
Paid Parental Leave		
Accommodation Supplement	→	Housing

Additional		
Income Related Rent Subsidy		
GST		
Excise - Alcohol	→	Indirect tax
Excise - Tobacco		
Excise - Petrol		
Health spending	→	Health
Early childhood education spending		
Primary/inter. education spending		
Secondary education spending	→	Education
Tertiary education spending		
Student Loans		

Income-related rent subsidy

Kainga Ora households paying subsidised rent identified by HES survey response (landlord type): 60,000±11,000 (N=171)

- TAWA doesn't model subsidy (subsidised rents flow through to, e.g., after-housing-costs poverty measures)

Monthly snapshots of IRR receipt are available in the IDI – we use the March 2019 snapshot

We aggregate the average subsidy (= market rent – subsidised rent) by:
- Region (Accommodation Supplement regions 1-4)
- Household composition (Single, Sole-parent, Couple, Couple w/ children)
- Annual assessable income ($1000 bands)

and assign these averages to households in the survey

Scaled to match total IRR expense of $953MM (BEFU22 Table 5.2)

Indirect tax: GST and excises

GST

GST component of expenditure (15% rate) calculated for expenses in HES-expenditure sample (all households - 1.75MM records, N=3,933)

- Exclude non-GST-chargeable expenses, e.g., rent, financial intermediation, life insurance

Scale to 15% of GST-chargeable NZ resident consumption (Sys. of National Accounts)

- Final consumption and expenditure (FCE) minus rent, imputed rent, expenditure abroad …

Total value of $18,527MM in tax year 2019

(At present GST-chargeable consumption is estimated from published FCE assuming the historical (1987-2010) average deduction of 29%
- deduction has likely risen since then (rents))

Indirect tax: GST and excises

Excises

Total excise amounts for Alcohol, Tobacco, and Fuel are distributed over HES households reporting expenditure on each category, in proportion to their spend

Alcohol: 683,000±30,000 (N=1,470)

Tobacco: 199,000±20,000 (N=408)

Fuel: 949,000±30,000 (N=2037)

Excise totals taken from OECD revenue statistics DB for NZ, and household shares attributed based on splits derived from SNA Input-Output tables (2020)
- Household shares of 75% for alcohol and tobacco, and 31% for fuel

Total values

Alcohol: $536MM

Tobacco: $364MM

Fuel: $395MM

Health spending

All individuals in HES (4.8MM (N=9,997)) assigned an expected health cost, based on Ministry of Health's Person Based Funding (PBFF) model for the 2018/19 year

~ group risk-related insurance premium approach

PBFF model gives cost weights by:
- age (five-year bands)
- sex
- ethnicity (Māori, Pacific, Other)
- NZDep deprivation quintile of area where household is located
- used by MoH to estimate spending allocation to DHBs

PBFF cost weights (avg. over sex and NZDep quintile)
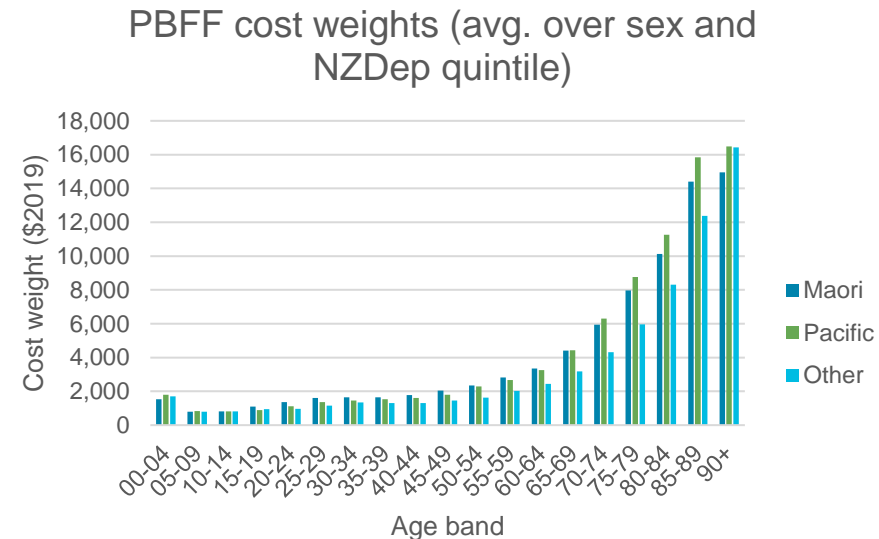
These values are then scaled to match the total health spend of $17,990MM (BEFU18/19, Table 5.3)

Education spending

Four components of education costs are attributed:

- Early childhood education funding

- Funding of placements for school-aged children

- Funding of tertiary students

- Cost of student loans

(In our approach student allowances are regarded as cash income support benefits or transfers,
rather than a component of in-kind education benefits)

Early childhood education

- Children aged under 5 with a survey response indicating ECE attendance – 173,000±13,000 (N=387)

- We assign the average subsidy spend per full-time equivalent place (1000 funded hours per year): $8,513 in tax year 2018/19 (Education Counts)

- Values scaled to match total ECE expenses of $1,883MM (BEFU22 Expenses Table 5.4)

Education spending

School-aged children

- All children aged 5-14, and children aged 15-17 with survey response indicating secondary enrolment (main institution) – 809,000±40,000 (N=1797)

- We assign the average operational and salaries funding per placement, by age

- Attributed values scaled to match total primary and secondary school expenses - $3,884MM and $2,817MM respectively
    - Primary and Secondary school totals taken from BEFU22 Table 5.5
    - Shares of other costs (e.g., school transport, special needs support and professional development) allocated in proportion to primary/secondary placement numbers (same source)

School type	Age	2019 cost ($)
Primary	5	8,699
Primary	6	6,276
Primary	7	6,269
Primary	8	5,324
Primary	9	5,325
Primary	10	5,321
Primary (Intermediate)	11	6,498
Primary (Intermediate)	12	6,655
Secondary	13	7,592
Secondary	14	7,585
Secondary	15	8,124
Secondary	16	9,524
Secondary	17	9,956

Education spending

Tertiary students

- Individuals aged over 15 reporting tertiary institution attendance in survey – 279,000±29,000 (N=519)

- We allocate to each the average tuition and other tertiary funding student per EFT - $14,370

- Values scaled to match total tertiary tuition and other tertiary funding - $3,161MM
(BEFU22 Table 5.6)

Student loans

- Fair-value write down on new borrowing of student loans – $571MM (Student Loan Scheme Annual Report) – distributed over all tertiary students

- Students receiving student allowance (in HES – from linked IRD data) are not attributed living costs (34% of total loan amount)
  - Living costs are distributed over the remainder and the other components (course fees and course-related costs) are distributed evenly over all students

- The student allowance itself is classified as cash income support – not education – in our analysis

Scaling of components

Income and tax totals from TAWA/HES sample - proportions of administrative totals
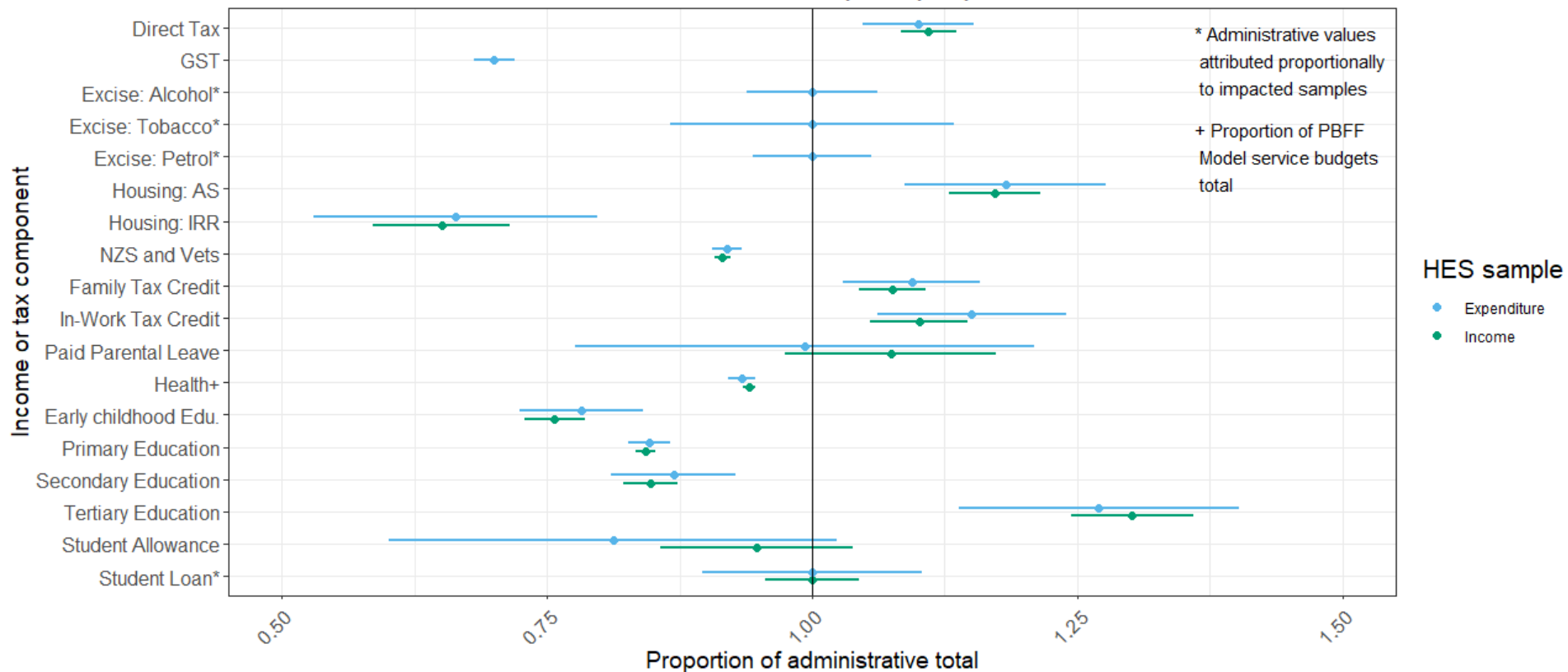
Cash benefits, tax credits, and direct taxes as calculated by TAWA are also scaled to match administrative totals

Totals account for 75% of core Crown tax revenue and 66% of core Crown expenses in TY2018/19

NB – These and all following results for 2019 are preliminary and subject to revision

Distributional results

Comparing to previous results

We compare our results (2019 tax year) to those found for the 2007 and 2010 tax years by Aziz *et al.*

- We primarily focus on the average incomes within deciles of household disposable income

For comparison with Aziz *et al.* deciles are defined using LIS(0.5) equivalised disposable income

- Household incomes are divided by the square root of the number of occupants

Deciles of household equivalised disposable income ($2019)
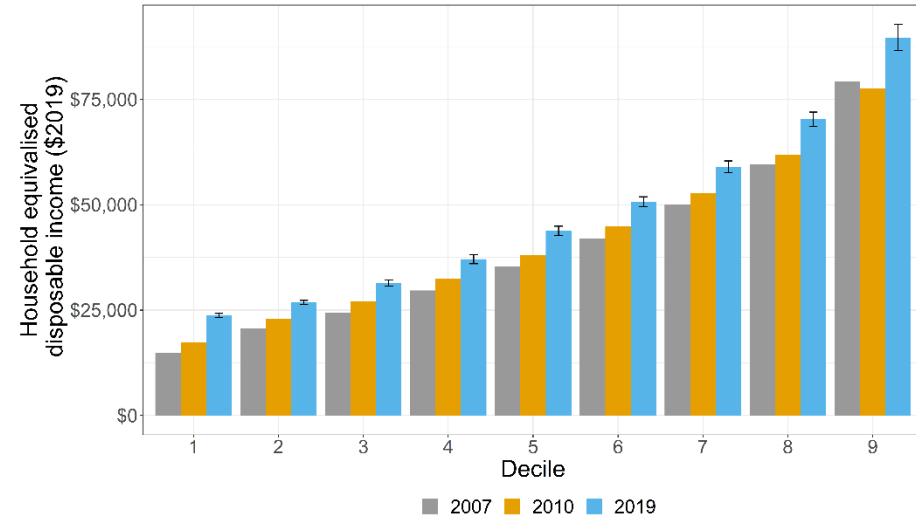
Table: Percentage of households in each household type

Household type	1988	1998	2007	2010	2019
Single	20.6%	21.9%	22.6%	22.6%	19.7%
Couple no children	24.4%	25.8%	25.8%	26.3%	26.4%
Couple with children	36.1%	31.4%	27.9%	28.4%	28.9%
Sole parents	7.8%	8.1%	9.5%	10.1%	8.5%
Other family types*	6%	8.4%	7.3%	6.1%	8.1%
Multi-family households **	5.2%	4.2%	6.9%	6.5%	8.5%

*Other family types include one-family households.
**Multi-family households (or All other households) include two- or three-family households and any other multi-person households (e.g. flatmates).

The deciles themselves have increased over time (in real terms) as incomes have inflated

Deciles are also affected by the demographic changes that have occurred over time

- For example, single-person households are less common in 2019 than in 2010

Market and disposable income

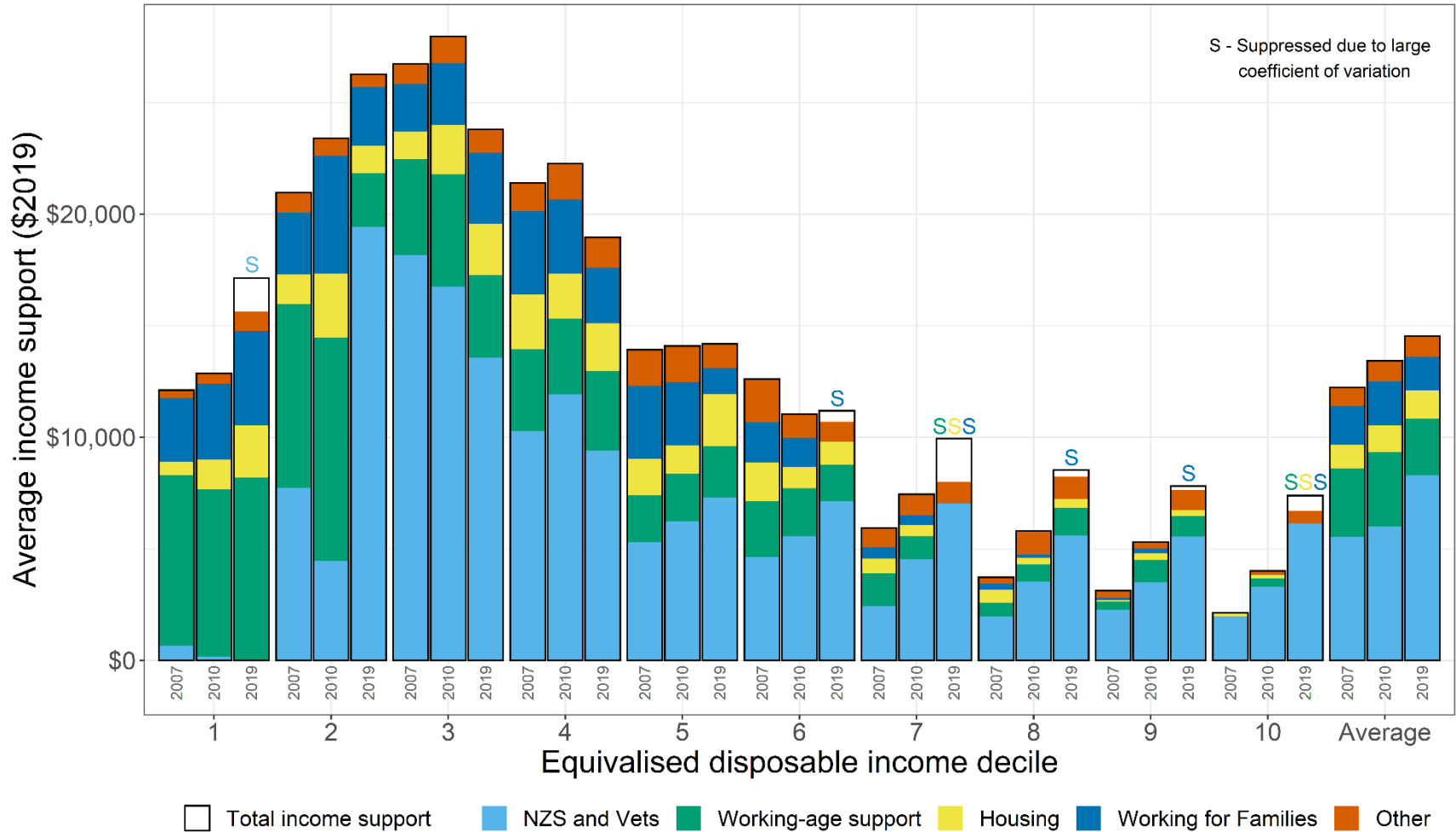Average household income by decile ($2019)
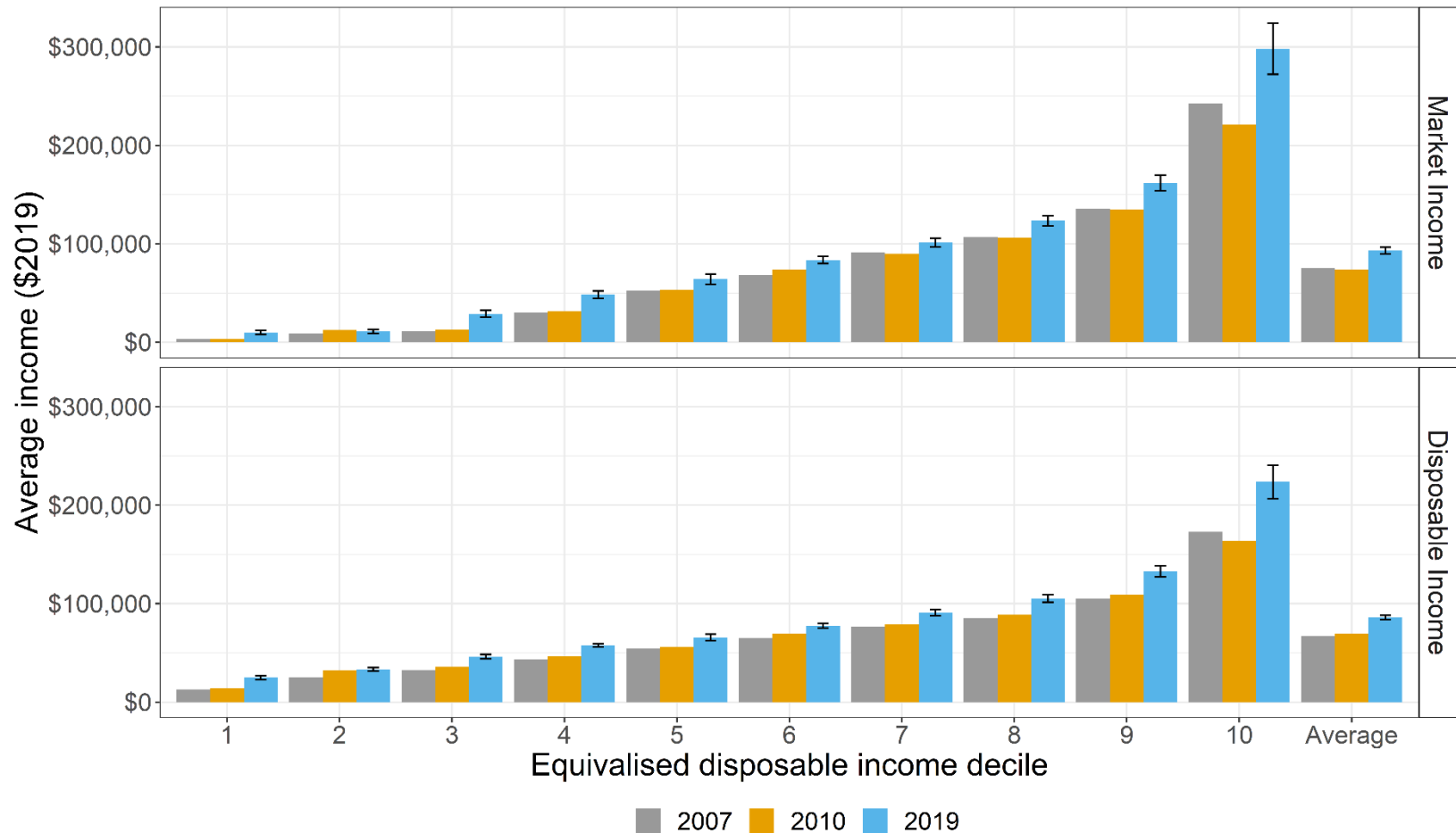
Total income support

Average cost of income support received by a household ($2019)
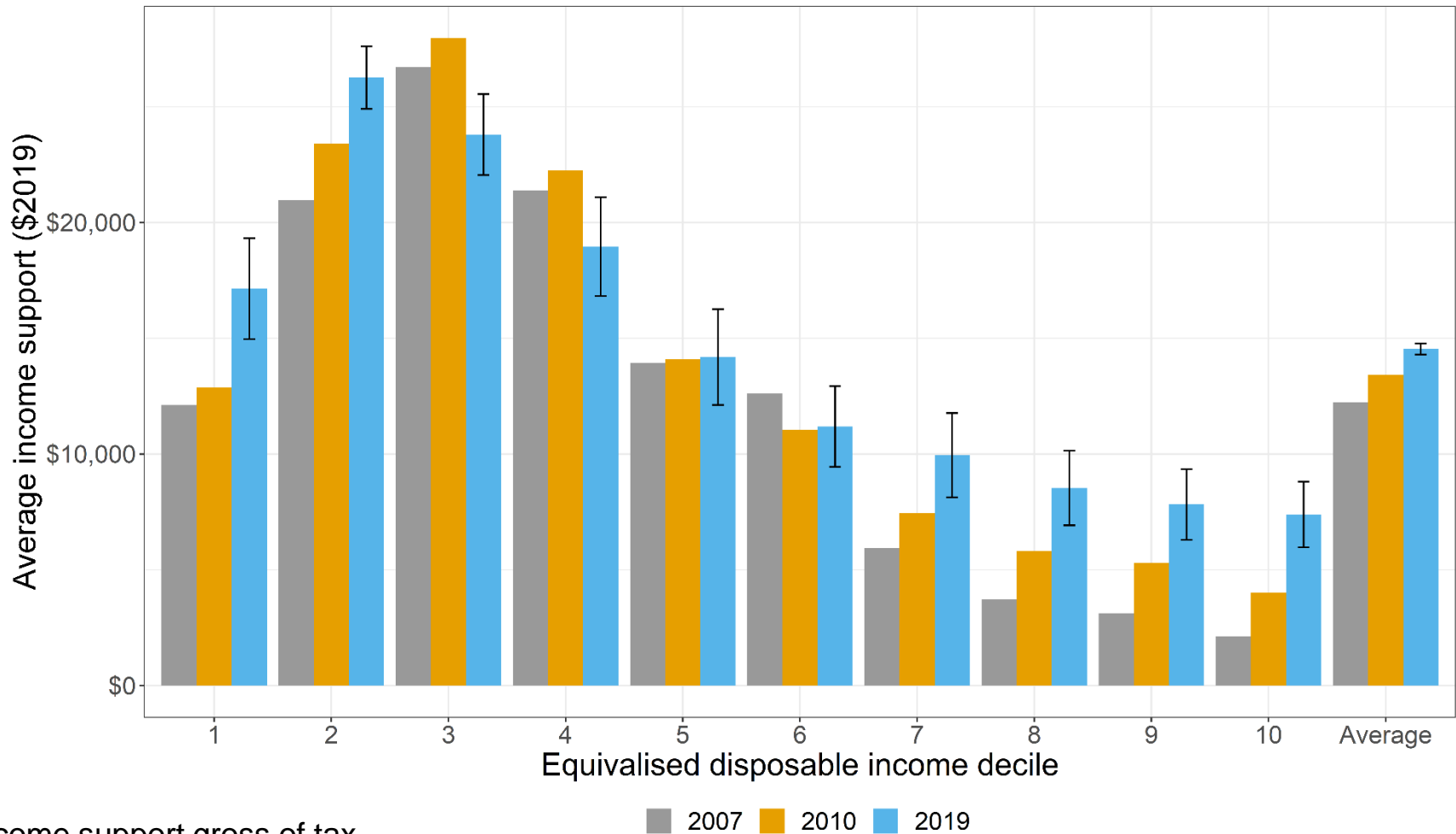
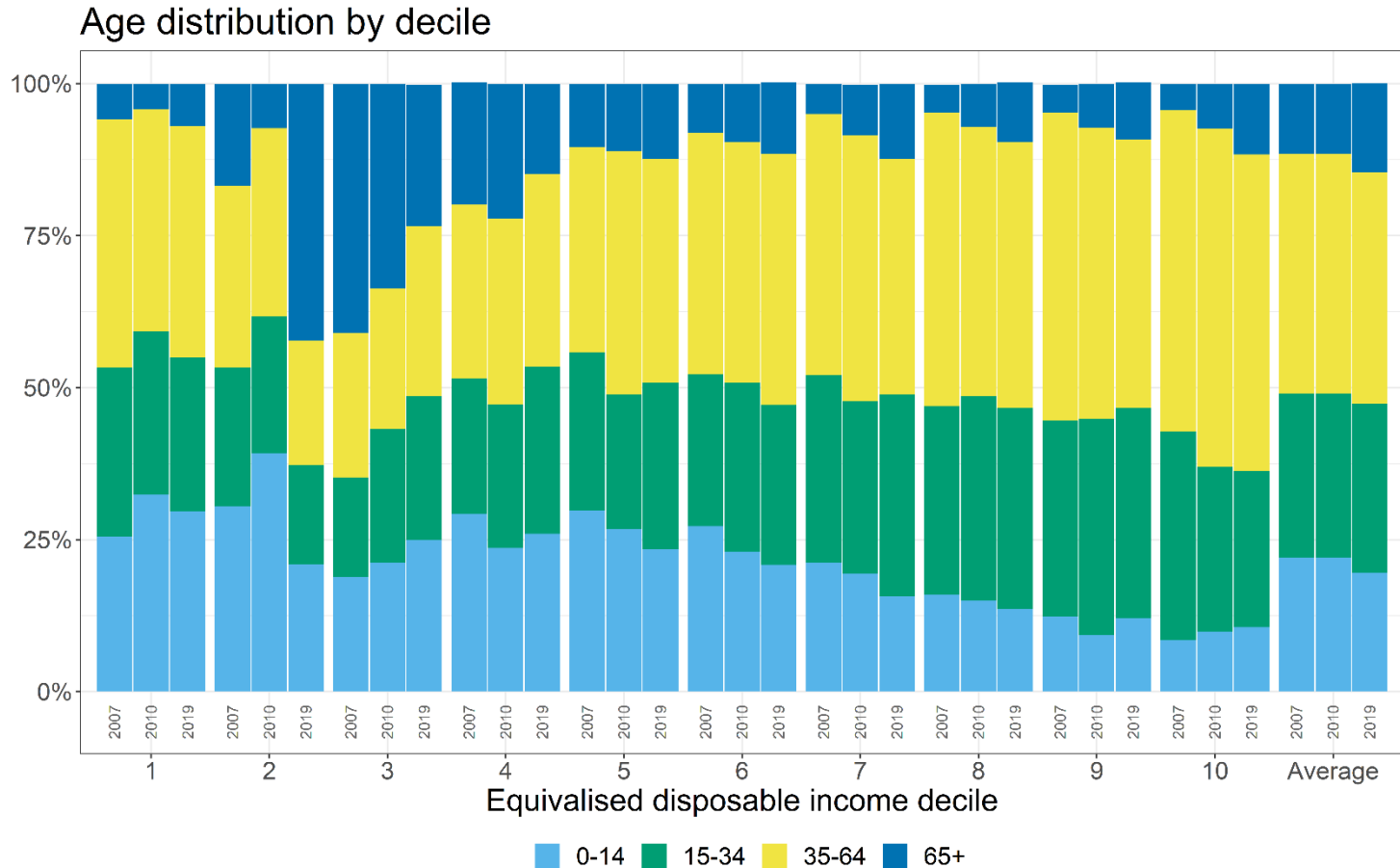Income support gross of tax
(where tax is applicable)

Income support components

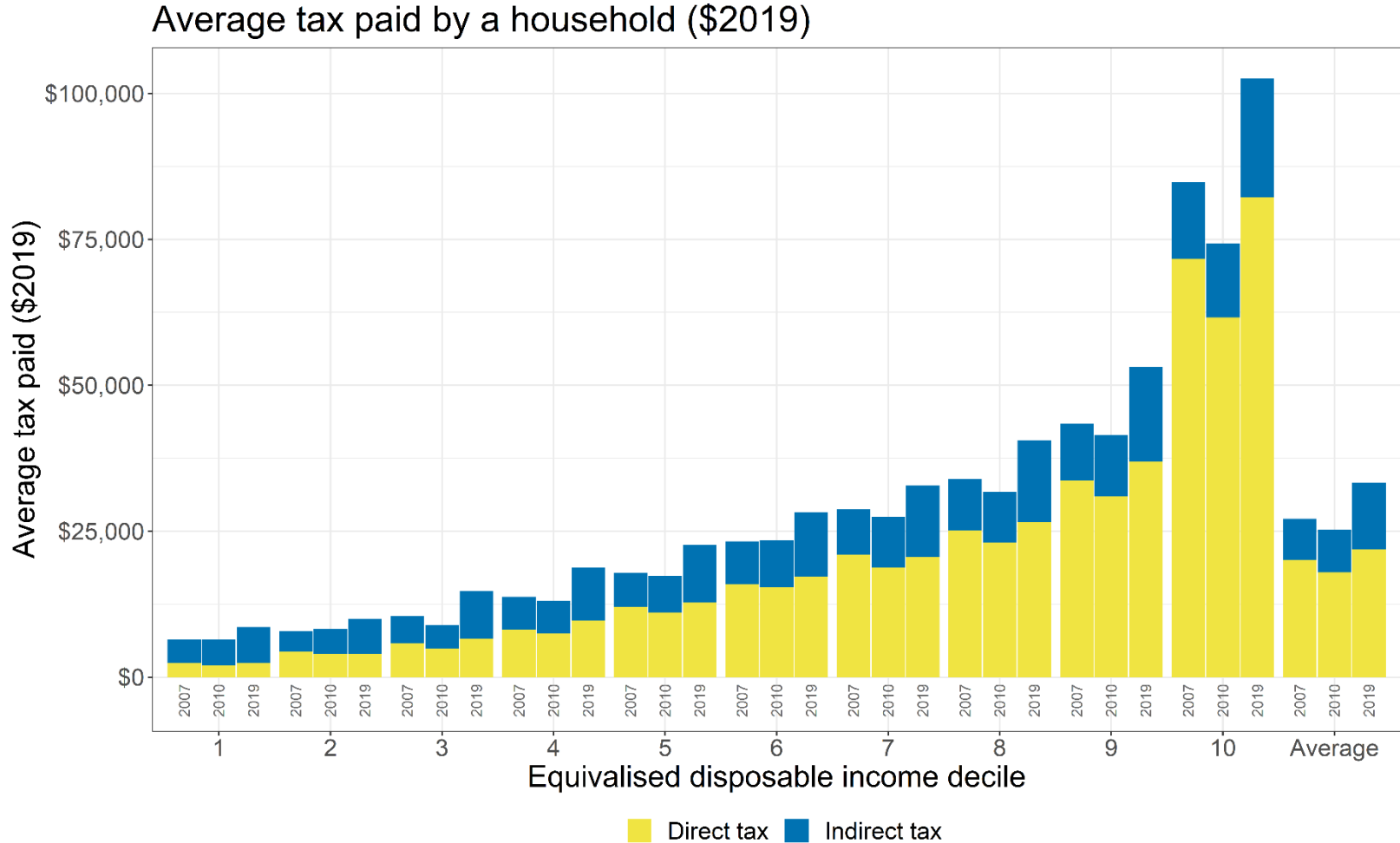

Average cost of different types of income support ($2019)

Age distributions in deciles

Age distribution by decile

The population aged 65+ has grown overall since 2010, and now is increasingly concentrated in decile 2
- NZS incomes have slipped relative to the decile definitions, on an equivalised basis

Direct and indirect tax

Average tax paid by a household ($2019)

Cost of health services

Average cost of health services received by a household ($2019)
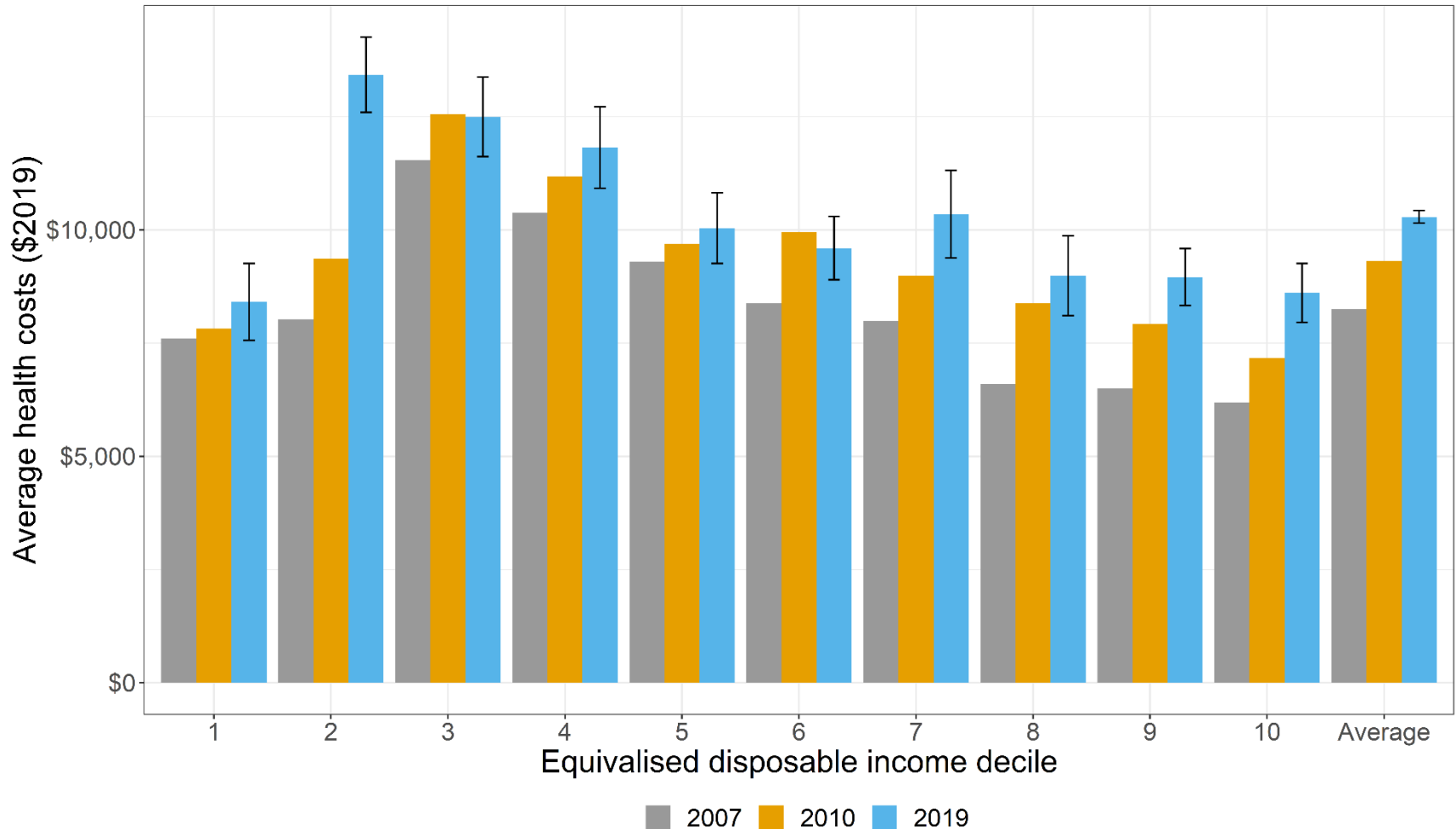
Cost of education services

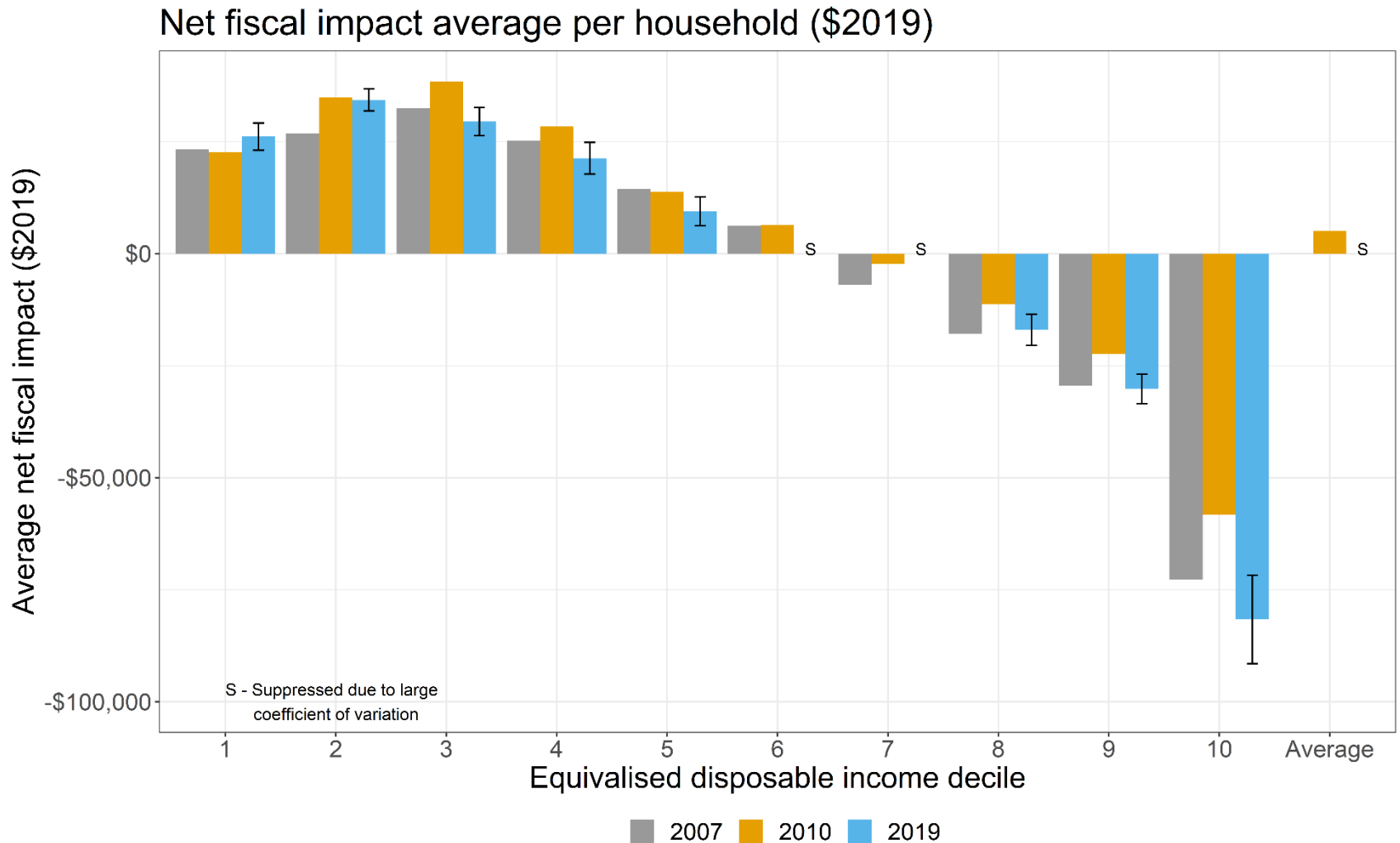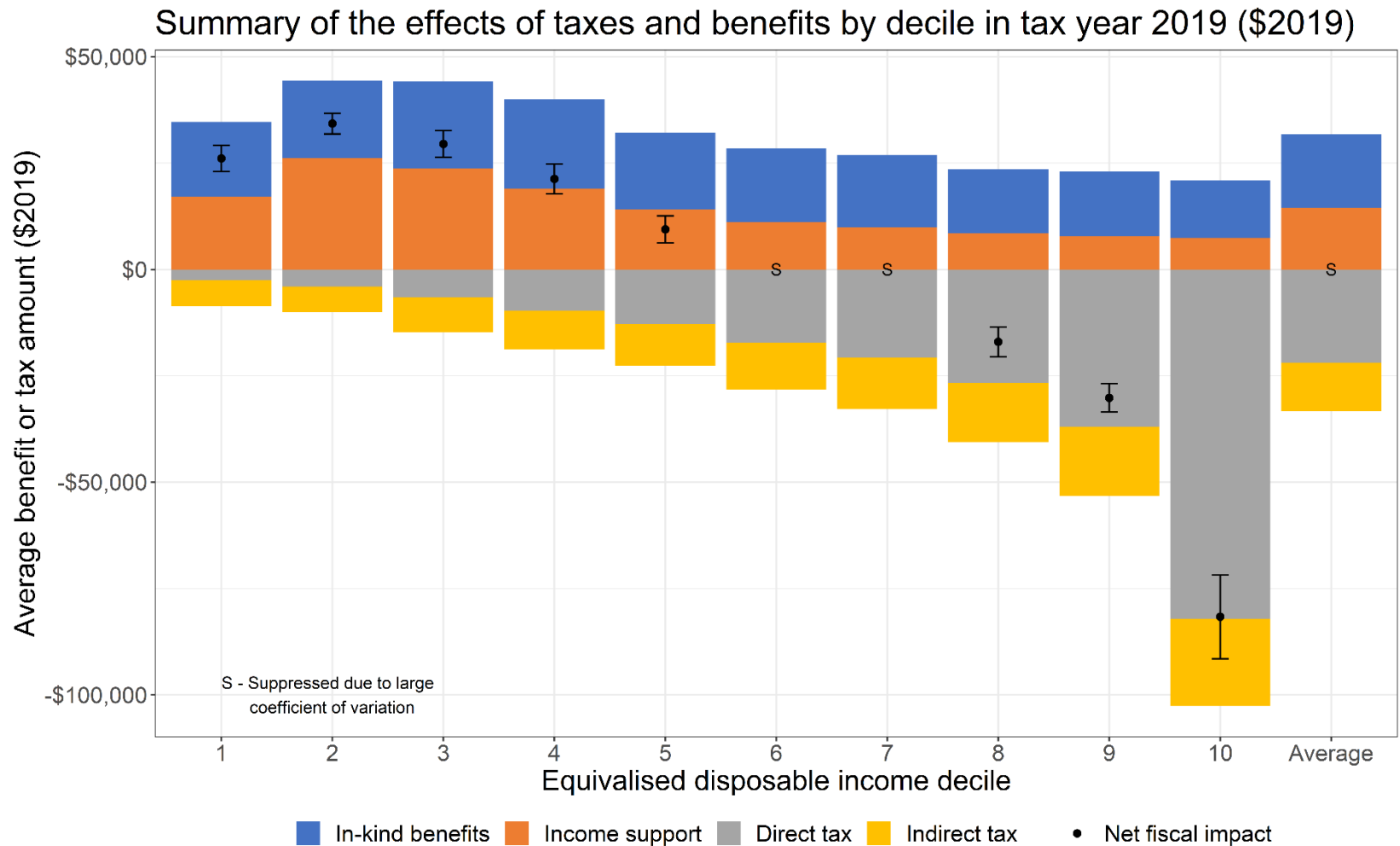Average cost of education services received by a household ($2019)
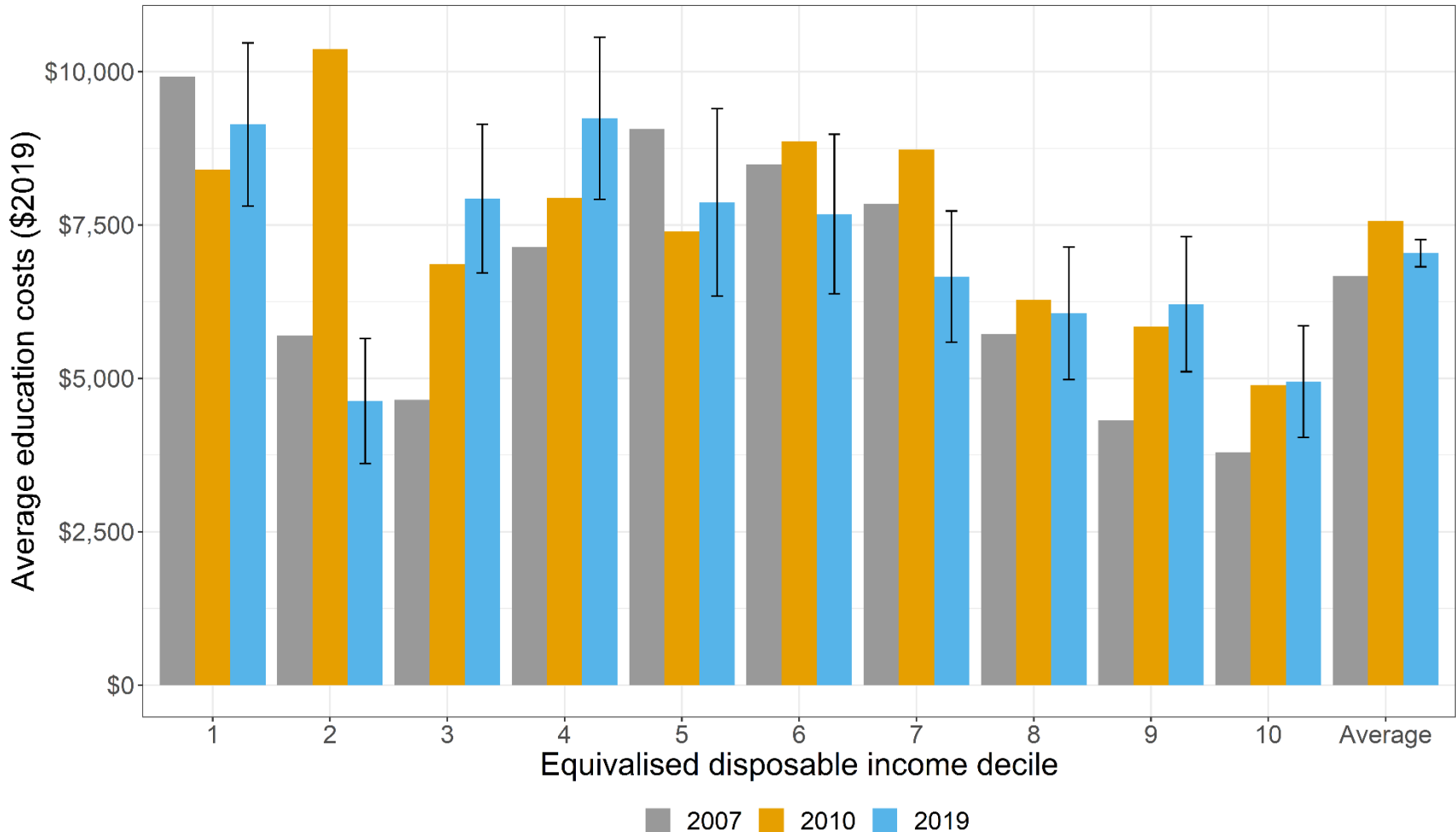
Final income

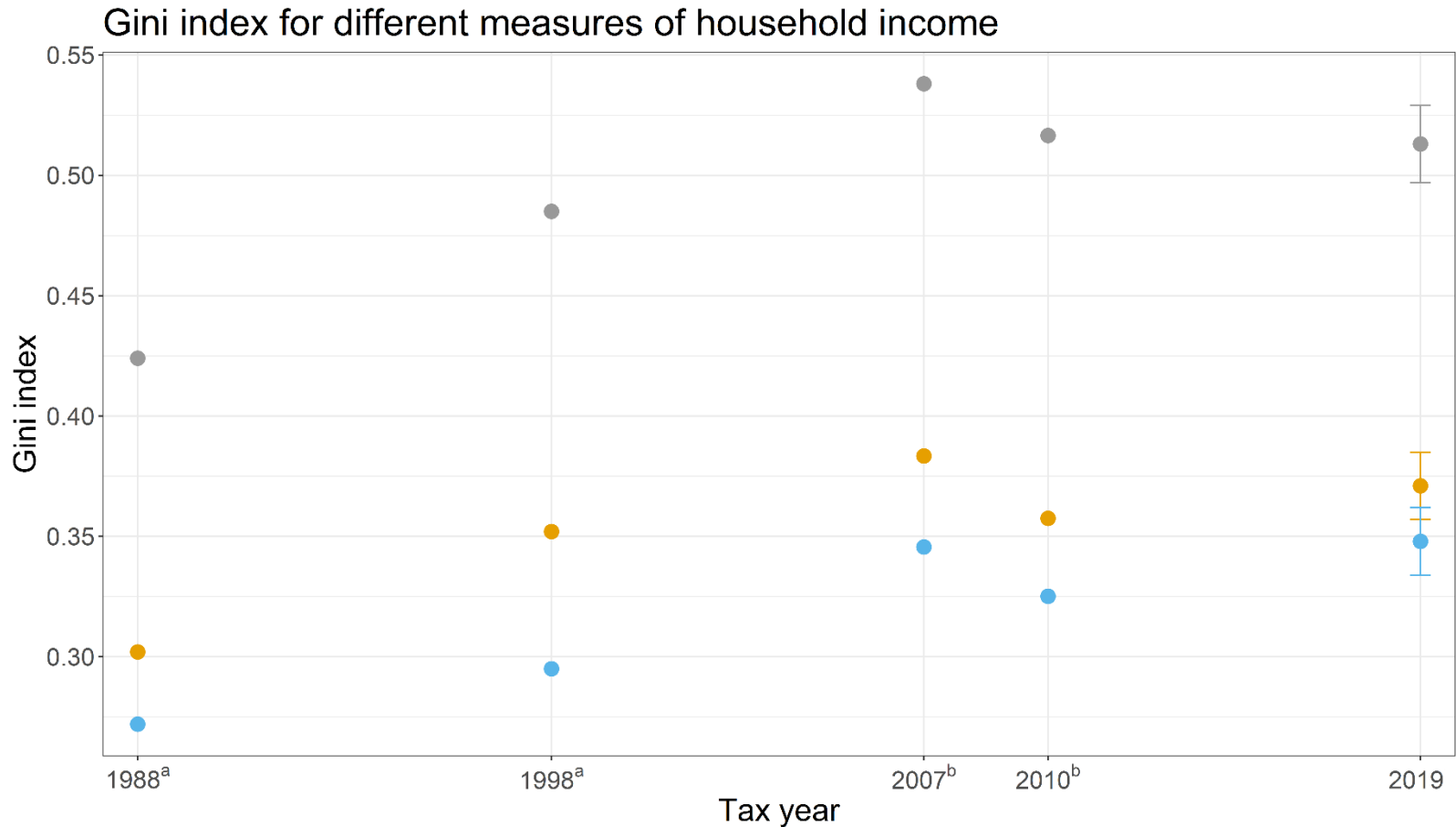Average household income by decile ($2019)

Net fiscal impact

Net fiscal impact average per household ($2019)
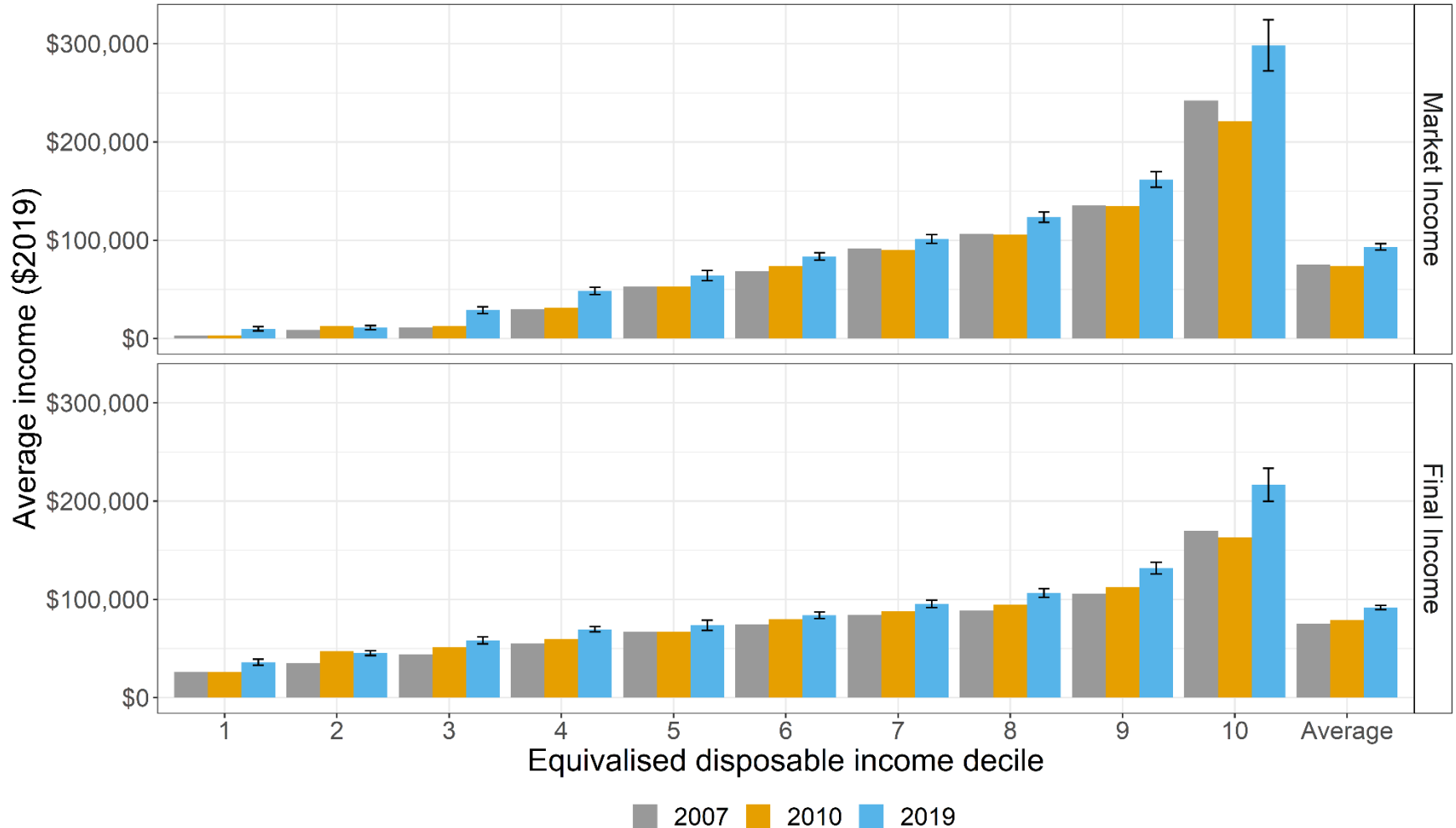
Components of net fiscal impact

Summary of the effects of taxes and benefits by decile in tax year 2019 ($2019)

Inequality and redistribution measures

Gini index – comparison to prev. results

Gini indices based on unequivalised (household) incomes (cf. Aziz *et al.*)

Gini index – Income definitions in 2019

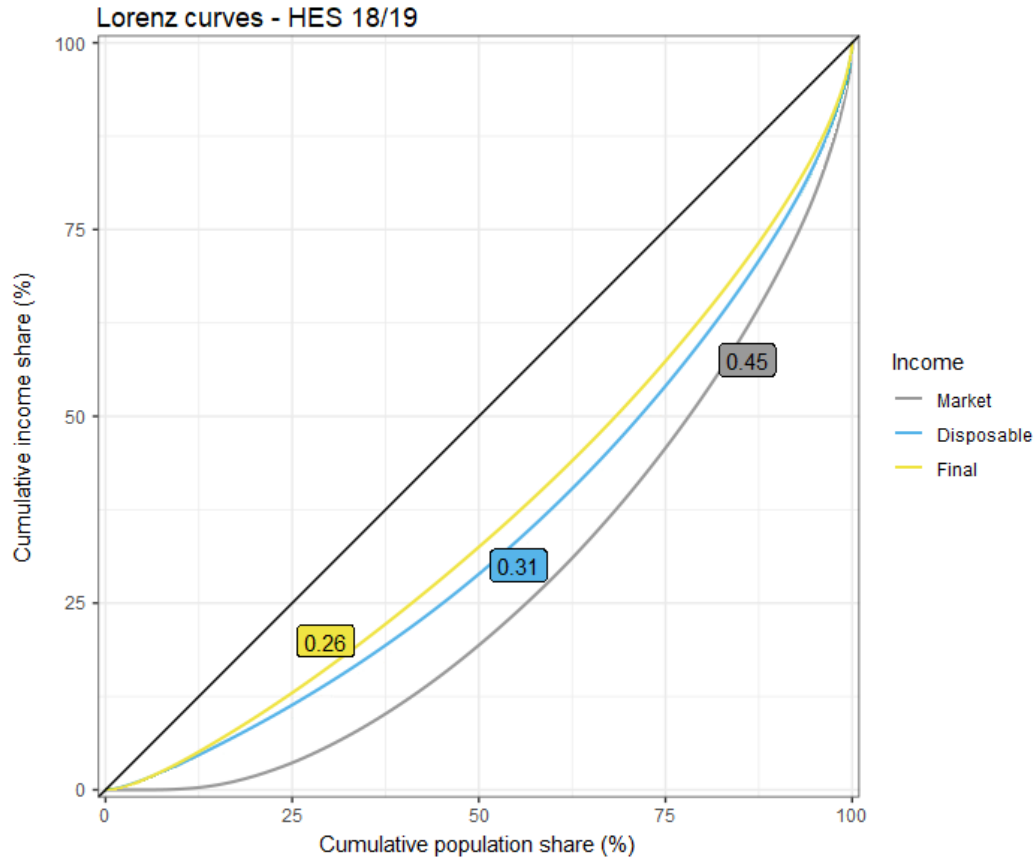Gini index for different measures of income of HES18/19
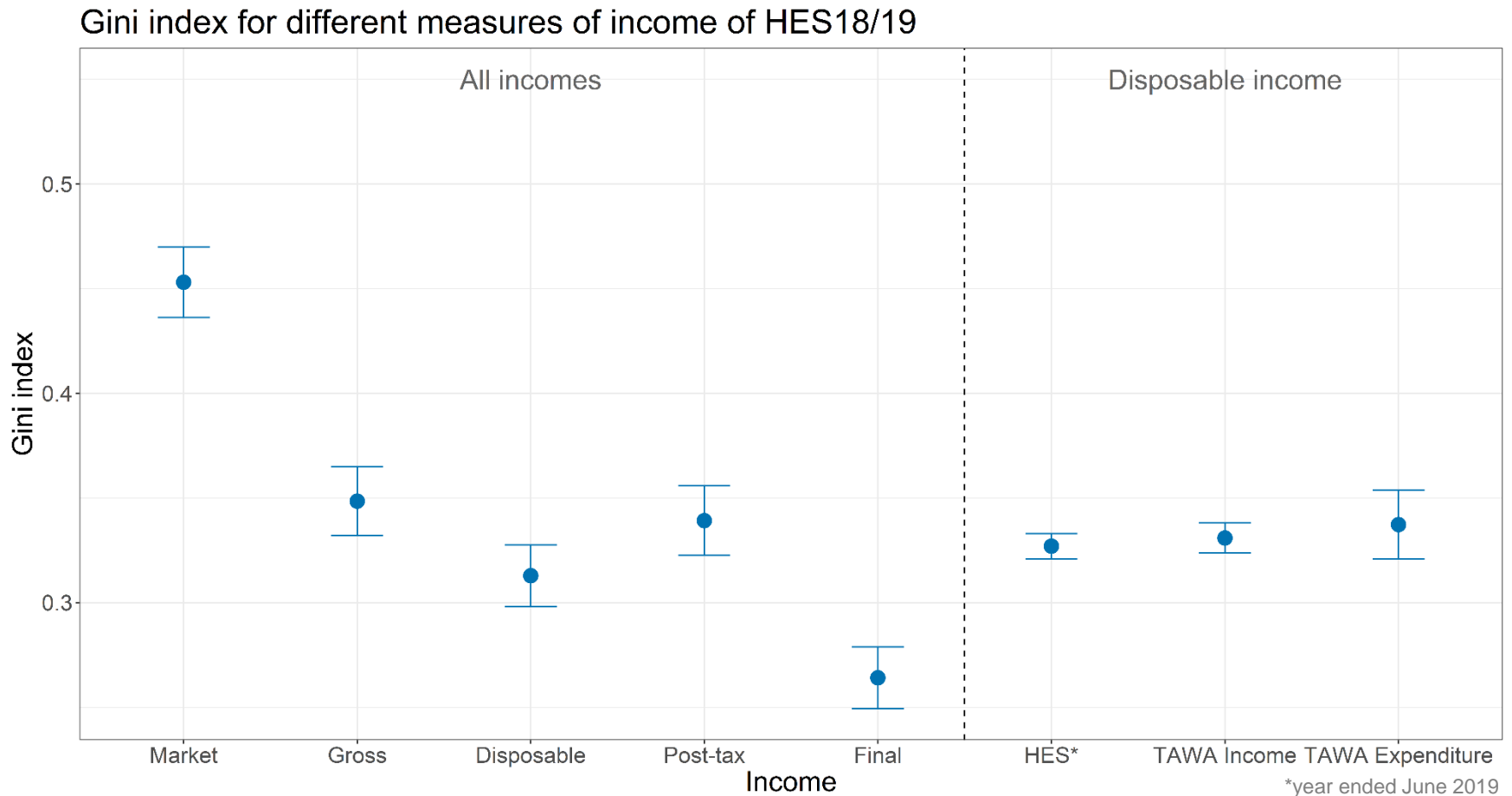
Gini indices based on mOECD equivalised (person-level) incomes

$$Eq_{mOECD} = 1 + 0.5 \times (N_{14+} - 1) + 0.3 \times N_{<14}$$

Lorenz curves

Lorenz curves - HES 18/19
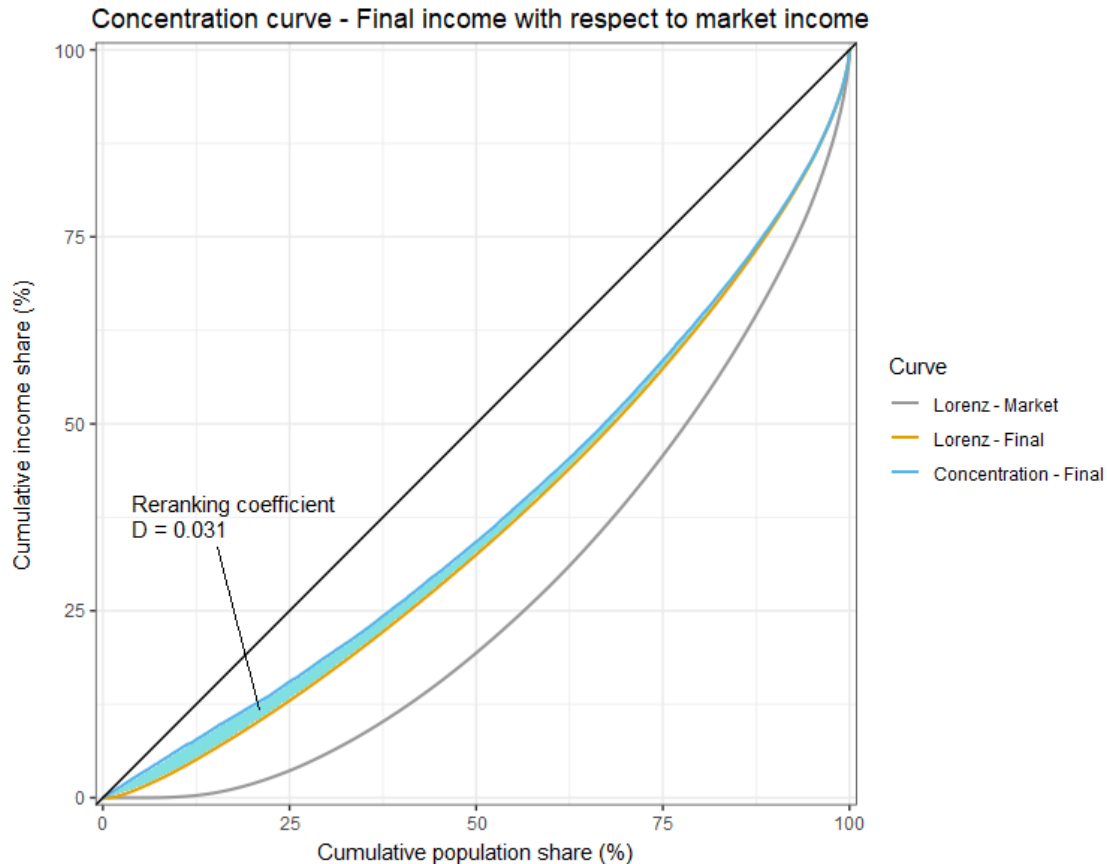
Lorenz curves characterise inequality across the whole income distribution

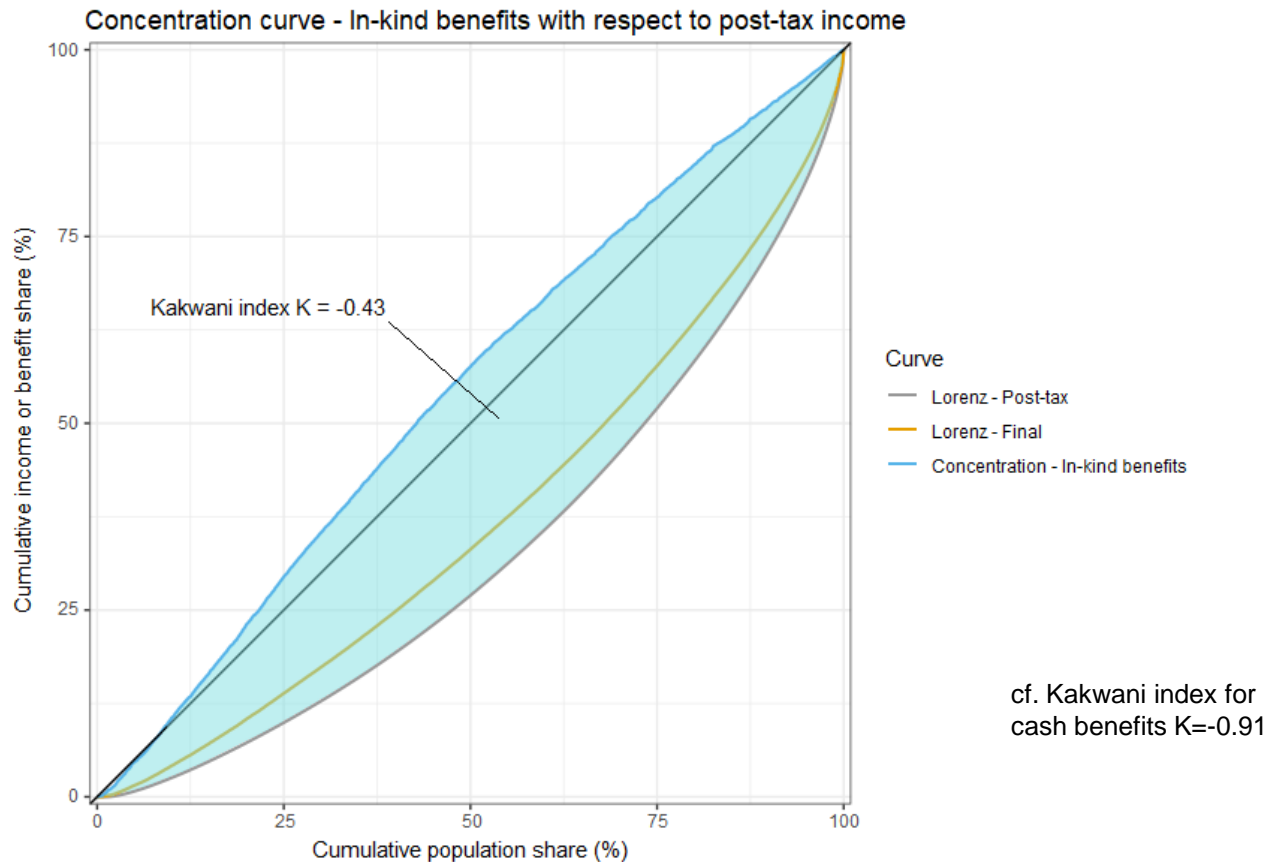Gini indices are a global summary of these curves

Re-ranking of household incomes

Concentration curves are as for Lorenz curves, but drawn with respect to *pre-policy* income ordering

Comparing to Lorenz curves allows us to estimate the contribution of reranking to redistribution
- Corresponds to *horizontal* inequity

Progressivity of in-kind benefits

Concentration curve - In-kind benefits with respect to post-tax income

Kakwani index K = -0.43

Curve
— Lorenz - Post-tax
— Lorenz - Final
— Concentration - In-kind benefits

cf. Kakwani index for
cash benefits K=-0.91

The concentration curve of in-kind benefits (i.e., final income minus post-tax income) illustrates the progressivity of in-kind benefits

Comparing it to the Lorenz curve of post-tax income allows us to estimate the *Kakwani index*
- A global summary of the progressivity of in-kind benefits

Future work

- Finalising results and writing Analytical Note (early 2023)

- Isolating life-cycle effects
  - e.g., estimate fiscal incidence for working-age households

- Other distributional cuts – e.g. regional

- Further investigation of redistributive measures

- Extending TAWA (linked admin data) approach to cover 2006/07, and intervening HES-Expenditure years

IDI microdata disclaimers

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.