



POLICY AND REGULATORY STEWARDSHIP

Tax policy report: GST distributional analysis

Date:	29 July 2022	Priority:	Medium
Security level:	In Confidence	Report number:	IR2022/327

Action sought

	Action sought	Deadline
Minister of Revenue	Note the contents of this report Refer to the Minister of Finance for information	NA

Contact for telephone discussion (if required)

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29 July 2022

Minister of Revenue

GST distributional analysis

Executive Summary

1. This paper assesses the distributional impacts of GST at the household income and expenditure levels.
2. There is debate in the literature as to whether the distributional impacts of consumption taxes, such as GST, should be assessed relative to expenditure or income. This is because the GST to income ratio is significantly affected by savings and borrowings, such that results for an individual based on a single year's income differ significantly to results over a longer period. Some argue that an expenditure base better smooths out these lifecycle effects. There are however conceptual challenges with both an income and an expenditure base.
3. Similar to the approach taken in recent literature (e.g., Fiscal Studies vol. 43.1 *Reassessing the Regressivity of the VAT* in OECD countries) we assess households' GST burden relative to both an annual expenditure and income base, across income deciles. We use a similar method to that in the Fiscal Studies paper, although our analysis is based on the average income and expenditures per decile, rather than household unit record data as in that paper. This will reduce the accuracy of our results. We provide results for New Zealand based on Household Economic Survey data for the 2015/16 and 2018/19 years.
4. Our findings are similar to those in international literature. The GST to income ratio declines as income increases (i.e., GST is regressive with respect to households' annual disposable income). This is consistent with higher deciles having higher savings rates.
5. Our results also show that the GST to expenditure ratio is broadly proportional or slightly regressive for households in New Zealand, depending on how the expenditure base is defined. The results are particularly sensitive to whether interest payments and contributions to savings (included in HES) are excluded from the expenditure base. The GST to expenditure ratio is broadly proportional when interest payments and contributions to savings are not included in the expenditure base, whereas it is slightly regressive when they are included.
6. We extrapolate our results to the high-wealth individuals (HWI) research population based on the mean and median family (taxable) income in this population. Adding in the high-wealth individuals results in an extrapolation of the above trends; for the GST to income ratio a declining trend continues. This result is based on modelling the expenditure of the high-wealth individuals based on the relationship between income and expenditure. We expect to be able to improve these estimates once we have survey data of the population's expenditure (currently being sought in the HWI research project).

Purpose

7. This paper provides analysis of the distributional impacts of GST at the household level.

Analysis

Assessing the distributional impacts of GST

8. **In the literature, there is debate as to whether the distributional impacts of consumption taxes should be assessed relative to annual income or expenditure.** The results depend on which base is chosen. When considered as a portion of annual income, GST will appear regressive as higher income households tend to have higher savings rates and therefore lower consumption relative to income. However, when considered as a portion of expenditure, the outcome will depend on the distributional effects of exemptions from the tax. Both an income and an expenditure-based approach can be useful in providing a perspective on the distributional impacts of GST.
9. **Measuring the GST burden relative to annual income allows a combined analysis with direct taxes** – allowing an assessment of the distributional impacts of the whole tax system. Proponents of using an annual income measure also argue that an annual income measure is useful as the timing of taxes can be important, especially for credit constrained borrowers. For the high-wealth individuals research project, the GST burden of the cohort will be calculated to get a fuller picture of the total burden of tax paid by this cohort.
10. **However, the GST to income ratio is significantly impacted by savings and borrowings, meaning that for an individual an annual measure will be significantly different to a measure over a longer period.** For example:
 - As individuals who are currently higher income tend to save a greater proportion of their income, they typically have a low burden of GST relative to income. However, if they eventually spend that saved income it will be subject to a consumption tax at that point of time - and they may then have a high burden of GST relative to income. Therefore, using an annual income base for savers will make their single year's GST to income burden appear lower than it will be across their lifetimes.
 - Further, for dis-savers, expenditure may be a better measure of an individual's wellbeing than income. For example, someone who has retired but has savings, or someone who has inherited wealth, may have low income but high expenditure. These individuals will appear to be paying a high share of GST relative to income. However, their current income level does not give an accurate picture of their welfare level.
11. **Analysing the GST burden relative to expenditure can smooth lifecycle effects.** However, the argument in favour of an expenditure base is subject to limitations. For example, wealthy individuals are more likely to pass on significant wealth as inheritance and therefore they will not pay GST on their full

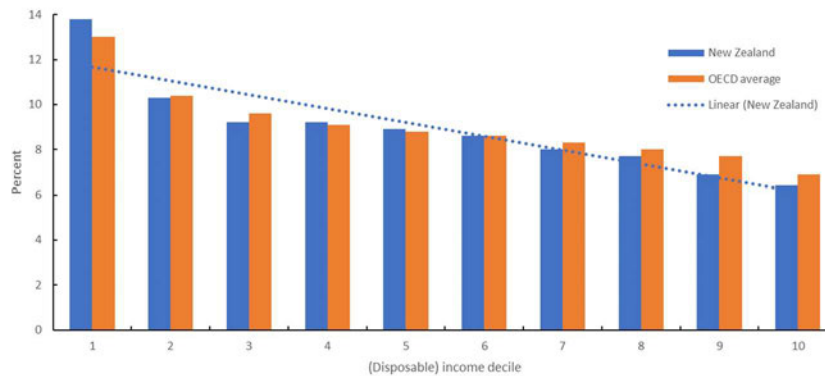
lifetime income.¹ Further, as discussed later there are competing arguments as to what to include in an expenditure base, meaning there is no perfect base.

12. **Given these competing arguments our analysis considers the GST burden both relative to annual income and expenditure.** This is consistent with previous work such as Fiscal Studies vol. 43 paper, *Reassessing the Regressivity of the VAT*, Alastair Thomas, 2022 (referred to below as Thomas). However, an important point is that the distributional impacts of GST should be considered as part of the distributional impact of the tax and transfer system in totality. In particular, New Zealand’s tax and transfer system relies on tools other than GST to achieve progressivity and redistribution.

Previous studies

13. **Thomas (2022) assessed the distributional impacts of value added taxes (VAT) relative to annual income and expenditure for 27 OECD countries.** The results are plotted below for the 10 income deciles (based on data collected in the Household Economic Survey (HES) 2016 for New Zealand).
14. **The GST to income ratio for New Zealand follows a similar declining trend to that of other OECD countries.** For the OECD average, the VAT to income ratio declines from around 10.4% in decile 2 to 6.9% in decile 10.²

Figure 1: VAT-income ratio (%) by income deciles according to Thomas (2022)



Source: Thomas (2022; Table 2, p32).

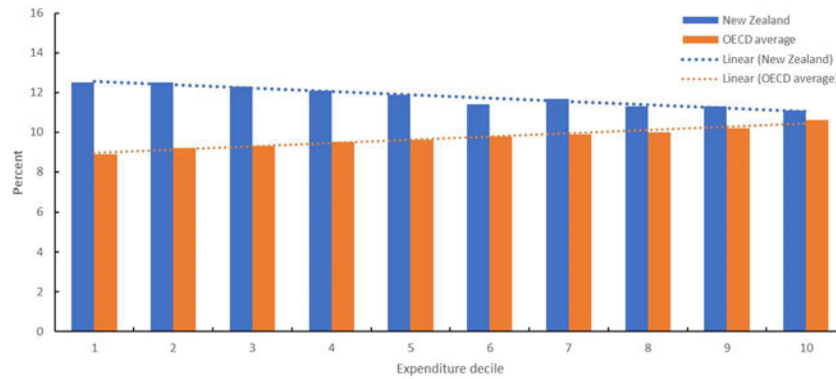
15. **For the VAT to expenditure ratio, Thomas finds that most consumption taxes appear proportional or slightly progressive.** Progressivity will occur for this ratio when exemptions from the VAT provide proportionally more benefit to low spending or income households (although the exemption may still provide a greater absolute benefit to higher income households). However, in the case of New Zealand when assessed relative to expenditure, Thomas found a small degree of regressivity. Our results suggest that whether GST to expenditure is

¹ Black, Devereux, Landaud and Salvanes (2022), “The (un)Importance of Inheritance”, Working Paper 29693, NBER” show for Norway that wealthy individuals on average leave significant inheritance while lower wealth deciles do not. Available at: [The \(Un\)Importance of Inheritance \(nber.org\)](https://www.nber.org/papers/w29693)

² Decile 1 can be difficult to interpret as incomes in this decile may not be representative of the resources of the individual (e.g., if there is an annual loss), hence we compare decile 2 and 10.

regressive in New Zealand depends on how the expenditure base is defined (in particular, whether interest payments and contributions to savings that are included in HES expenditure are included).

Figure 2: VAT-expenditure ratio (%) by expenditure decile according to Thomas (2022)



Source: Thomas (2022; Table 3, p33).

Methodology - Inland Revenue calculations

16. **We have replicated the approach taken by Thomas to estimate both the GST to income and GST to expenditure ratio for New Zealand** (for the HES 2015/2016 and 2018/2019 years). We have extrapolated the results to also estimate the GST burden for the median and mean individual in the HWI project cohort. Our results for both ratios are presented by income deciles.
17. **We used Thomas’ findings as a benchmark for our results.** We replicate Thomas based on HES 2015/2016 to benchmark our results. We also recalculated our model using HES 2018/2019. There are some differences in our approaches - Thomas used a microsimulation model to do calculations at an individual household level. We use decile averages of household income and expenditures. Our modelling choice simplified computations but is likely to be slightly less accurate. Use of decile averages also limits our ability to order individuals or control for the size of the household. Nevertheless, our baseline results are similar to those of Thomas, giving us confidence in our approach.

Elements of the calculation

18. The ratios calculated are, for the median household in each income decile:

GST/annual income	GST/annual expenditure
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19. To estimate the **GST burden**, relative to **expenditure** and **income**, we need to estimate the following for the median household in each decile:
 - The expenditure base.
 - The income base.

- Consumption subject to GST (to estimate the GST burden).

Defining the Expenditure Base for the GST to expenditure ratio

20. **To determine the expenditure base for the GST to expenditure ratio**, we start with HES data (2015/2016 and 2018/2019) on median household expenditure by decile (both aggregate expenditure and by subclass). We then remove certain expenditures from the expenditure base. There are arguments to remove expenditures from the base, for example when they do not allow an unbiased comparison of different deciles, they are infrequent and volatile so a single year may be misleading (such as for large durable goods), or they are not considered expenditures on final consumption³ (such as interest payments).
21. Given there is a degree of subjectivity as to what expenditures to remove from the base we undertook our analysis with different definitions of the base.
- **Following Thomas, we exclude rents from the base.** This helps treat renters and owner-occupiers equivalently in our estimations. If we were to include the rent category, this could bias our expenditure base by inflating the annual expenditure of renters vis-à-vis owner-occupiers, because the HES does not include imputed rents on owner-occupied housing. This drawback could also be resolved by including data on imputed rents for owner-occupiers. This data may be available later in 2022, or 2023, when the Treasury envisages completing a research project in this area.
 - **We also tested excluding all expenditures related to purchases of motor vehicles and the housing capital stock.** This is on the basis that these items are significant and purchased infrequently, and for housing it has special treatment in the National Accounts. These exclusions from the expenditure base did not materially affect our findings (so we do not present them separately in our results for the GST to expenditure ratio).
 - **Finally, we excluded all expenditure on loan servicing and contributions to savings** (which are included in HES expenditure). This excludes interest payments, contributions to savings, fines and money gifts. The argument to exclude these items is that they are not part of final consumption expenditure. As you will see in the results below, our estimates of the GST to expenditure ratio are sensitive to these exclusions.

Definition of income (GST to income ratio)

22. **To calculate the GST to income ratio we use median disposable income by decile.** Disposable income is used given that consumption is out of after-tax income. Disposable income also reflects the redistributive effects that income taxes have on low versus high incomes. We estimate disposable income based on household income (individualised) less tax (this may overestimate income).

³ As defined by the National Accounts methodology.

23. **Income is sourced from HES (except for top earners as discussed below).** HES income excludes certain gains that would be considered to form part of 'economic income'. For example, accrued and realised capital gains and retained earnings in companies and trusts are excluded. Given wealth is unevenly distributed (estimates suggest that the wealth share of the top net worth decile is around 60%)⁴ it is expected capital gains would be disproportionately earned by those in higher wealth deciles.

Estimating GST "paid"

24. **GST paid for the numerator of both ratios is estimated from HES data.** For both ratios, we take average expenditure per decile (less the expenditure excluded from the relevant expenditure bases, as per above) and remove items that are either exempt from GST or zero-rated. This amount is then multiplied by the rate of GST to work out GST paid per decile.⁵
25. **To select the GST exempt or zero-rated expenditures, we follow the tax law.** In estimating the tax burden, the following items were treated as GST exempt or zero-rated: international flights and overseas accommodation prepaid in New Zealand⁶; life insurance and fees for financial services. Further, interest payments, contributions to savings (like KiwiSaver contributions), money gifts, and fines are treated as GST exempt when included in the calculation.

Extending the HES Data Sample for Top Earners

26. **We have extended the approach to include the mean and median family from the HWI research project population ("top earners").** We do this based on information on the mean and median (family)⁷ taxable income of the HWI families in the database created for the HWI project.⁸ This allows us to model the GST burden for the high-wealth population as a proxy of high-income earners. Both the median (\$355,000) and mean (\$896,000) high-wealth family, based on taxable income, are in income decile 10.
27. **Data on the top earners are limited and we do not know much about their consumption patterns.** The HES is designed to sample overall population living standards and does not properly sample the top earners. Domestic and

⁴ Official Information Act Response 20210012 - Request for Documents on Monetary Policy - Received 18 Jan 2021 - Published 22 Apr 2021 - The Treasury.

⁵ The GST rate is 13% on gross expenditure (15% of net expenditure).

⁶ This category should also include expenditures on international flights and accommodation paid outside of New Zealand, but HES doesn't provide reliable data at the decile level, so it is omitted.

⁷ For the HWI project the 'family' is the identified HWI and their partner, and dependent children.

'Household' is a broader concept and includes all individuals living in a household. We do not have data on income of HWI households, but the demographic characteristics of our data sample suggest that both household income and family income may be very close definitions. An average HWI family consists of 2 people, 66 years old.

⁸ We consider that a cash-based measure of income is appropriate to base expenditure estimates off, given individuals will not consume all capital gains as earned and because we model the relationship between cash income and expenditure. The cash-based income is also more easily comparable with income in HES.

international literature on this topic is also scarce. Given this, our approach is to model the level and composition of expenditure of the top earners, based on income. Modelled results are subject to assumptions and therefore increase the uncertainty about the ratios for this cohort. The HWI research project will collect survey data on the expenditure of the high-wealth families. We expect that this data (although not as detailed as HES) will be more robust than the modelled results. We will update the model when we have this data.

28. **We estimate HWI expenditure by modelling the relationship between income and expenditure and extrapolating this relationship.** We first estimated the amount each HES expenditure subclass (such as food, clothing, housing, health or transportation) increases as income increases across the income deciles (the consumption income elasticity). We then use the elasticities to project what the expenditures on these items would be at the mean and median income of top earners, and the total expenditure for the mean and median family. The estimates are statistically uncertain but are in line with evidence from other studies. For example, Henry (2014)⁹ documents that higher-income individuals in the United States tend to spend more as a proportion of income on goods and services that can be considered discretionary and less on necessities (such as food, healthcare, or utilities) than individuals with lower income. We observe similar patterns across the HES data.
29. **We have verified our results against international literature on high-wealth consumption patterns.** Our estimated average propensity to consume (APC), that is estimated expenditure as a proportion of income, is consistent with international literature on the APC of high-wealth individuals. For the high-income families, we estimate the APC to be around 51 percent for \$355,000 median income (and around 44 percent for \$896,000 mean income). For comparison, the median income decile 10 APC estimated by the Treasury is around 61 percent. In the US, the APC for high-income households is estimated to be around 44 to 48 percent¹⁰. New Zealand and US empirical literature documents that the APC falls with income and wealth¹¹ - richer people save more of their income than lower-income households¹². Based on this comparison our results for the level of expenditure seem reasonable.

⁹ Henry LaVaughn H. (2014) "Income Inequality and Income-Class Consumption Patterns," Federal Reserve Bank of Cleveland, Economic Commentary, no. 2014-18.

¹⁰ Fisher Jonathan, David Johnson, Timothy Smeeding, and Jeffrey Thompson (2019), "Estimating the Marginal Propensity to Consume Using the Distributions of Income, Consumption and Wealth," Federal Reserve Bank of Boston Working Paper Series, no. 19-4; available on-line at <https://www.bostonfed.org/-/media/Documents/Workingpapers/PDF/2019/wp1904.pdf>. Estimated in 1999/2013 NZ dollar purchasing power parity terms for individual incomes above \$290,000 (being the median of the top quintile).

¹¹ Ching Ben (2022), "Average Propensity to Consume," Treasury Technical Note, mimeo. Fisher Jonathan, David Johnson, Jonathan P. Latner, Timothy Smeeding, Jeffrey Thompson (2016), "Inequality and Mobility Using Income, Consumption, and Wealth for the Same Individuals," The Russell Sage Foundation Journal of the Social Sciences, vol. 2 (6), pp 44-58; available on-line at <https://doi.org/10.7758/RSF.2016.2.6.03>

¹² Dynan, Karen E., Jonathan Skinner, and Stephen P. Zeldes (2004), "Do the Rich Save More?," Journal of Political Economy, vol. 112 (2), pp. 391-406.

30. **Finally, we multiplied the extrapolated expenditures by the GST rate to calculate the GST burden for the top earners.** This approach is comparable to Thomas. We applied the same expenditure base and GST exclusions as for the HES data sample discussed above to calculate both ratios.
31. **One caveat is that there is a difference between the definition of income used by Thomas, the HES, and the IRD HWI database.** Thomas and the HES use self-reported total gross household income. Self-reported income is typically under-reported¹³. Taxable income used for the HWI cohort is the average family income of the HWI families between 2016 and 2020. We believe that the differences between self-reported and administrative data, and the differences between the definitions of family and household for HWI, have minimal material effect on our baseline results. Like HES income, taxable income excludes certain gains that are considered economic income, such as non-taxable capital gains.

Results

32. **The GST to expenditure ratio across income deciles in New Zealand is proportional or slightly regressive depending on the expenditure base chosen.** The results are particularly sensitive to the inclusion of interest costs and contributions to savings in the expenditure base. When interest costs and savings contributions are excluded from the expenditure base a broadly proportional trend is seen (yellow line figure 3). However, when they are included in the expenditure base a slightly regressive trend is observed (blue line figure 3). This is because interest costs and contributions to savings are a higher proportion of expenditure of high-income households. There are competing conceptual arguments as to whether interest costs should be included in the expenditure base, complicating the analysis of a GST to expenditure ratio.
33. **Other expenditure areas modelled as not subject to GST make little difference to the GST to expenditure ratio.** Outside of rents, savings contributions, interest payments and financial services, items not subject to GST in New Zealand are relatively small in relation to expenditure over the income deciles. Overseas travel, credit services and life insurance have minimal impact on the GST to expenditure ratio. We also find it makes minimal difference to the ratio if purchases of cars and housing are excluded from the expenditure base.
34. **Consistent with international literature, the ratio of GST to annual income decreases as income increases.** The GST to income burden for decile 2 is roughly twice as high as for decile 10. As noted, the measures of income used in this analysis do not include certain sources of income such as capital gains. Given wealth is concentrated in higher deciles in New Zealand, including capital gains would be expected to reduce the ratio for higher deciles more than lower deciles. Note however, these results provide a point in time estimate and

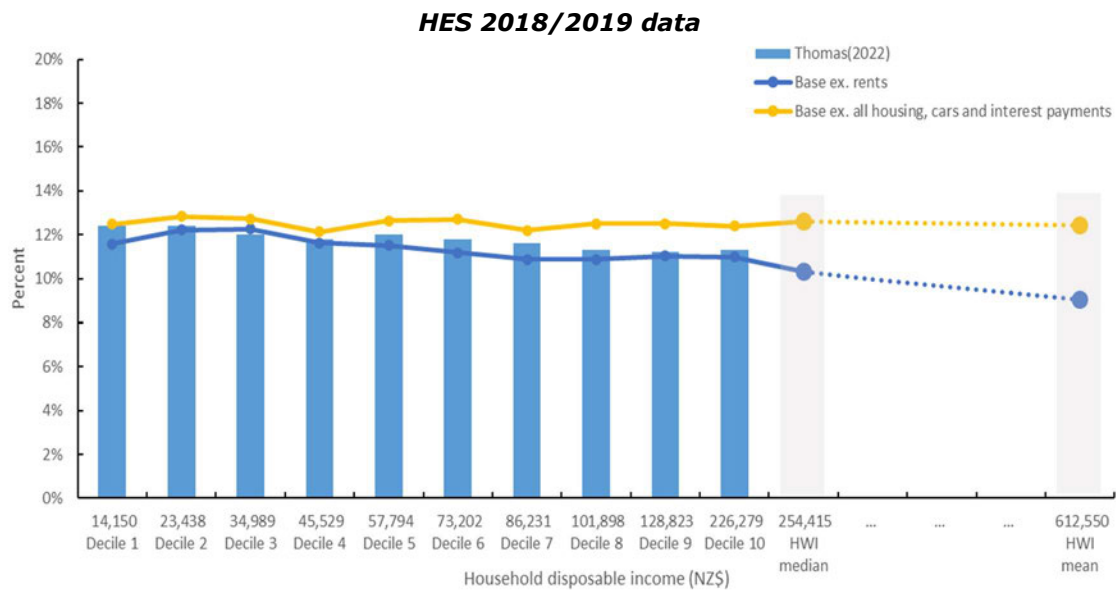
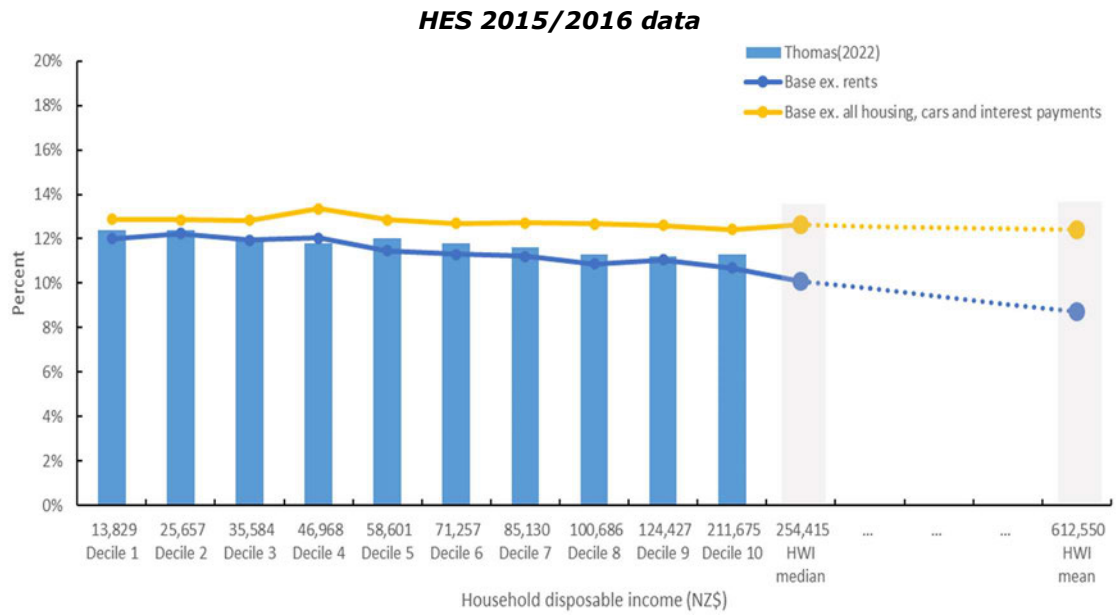
¹³ Decoster A. Loughrey, J. O'Donoghue, and D. Verwerft (2010), "How Regressive Are Indirect Taxes?," *Journal of Policy Analysis and Management*, vol. 29, pp. 326-50.

are impacted by individuals' saving and borrowing behaviour. If an individual spends all their income over their lifetime the GST burden will be broadly proportional to their income (however as noted earlier there is evidence from other countries that wealthy individuals are more likely to leave inheritance and therefore not spend all their lifetime income).¹⁴

- 35. The trends continue when we extrapolate to the HWI population.** For both of the ratios, when we extrapolate to the mean and median HWI family the trend continues (the large dots in Figure 3 and 4). For example, the ratio of GST to taxable income is lower for the mean HWI family (disposable income \$612,550) than the median decile 10 family (4.4% for the HWI mean versus 4.6% decile 10, for 2018/19 excluding housing and cars).
- 36. This modelling is subject to several limitations.** It is based on households, so cannot be used to identify individual circumstances. It uses aggregate data and assumptions which means the results are approximations. Any policy implications should be considered in light of how the overall tax and transfer system meets the Governments objectives, including objectives for efficiency and compliance and administrative costs.

¹⁴ Results for this ratio are presented to be consistent with the GST to expenditure ratio; where an item has been excluded from the comparable expenditure base (e.g., rents) any GST relating to that item is not included in the GST to income ratio.

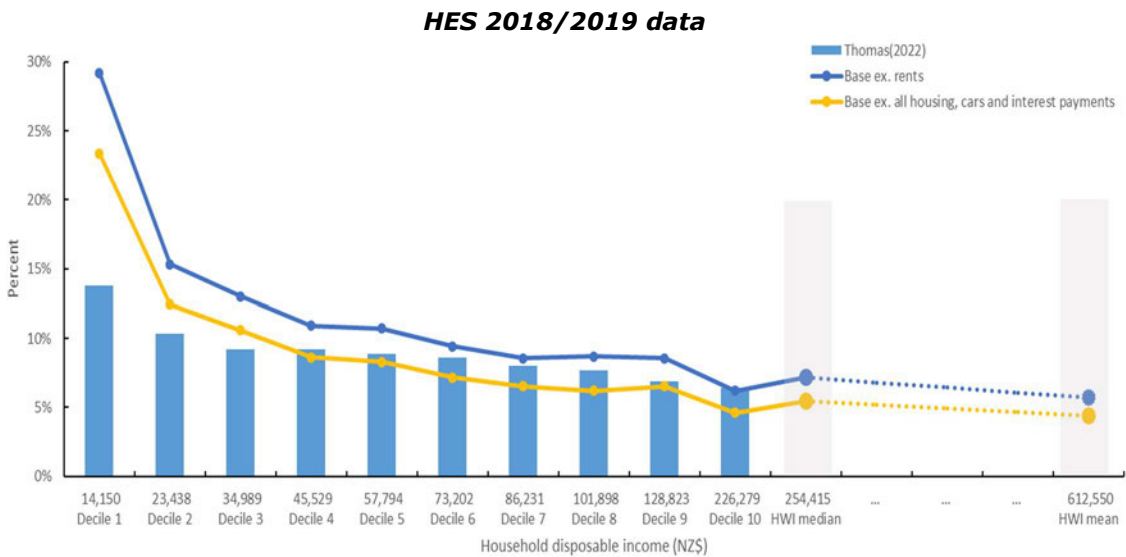
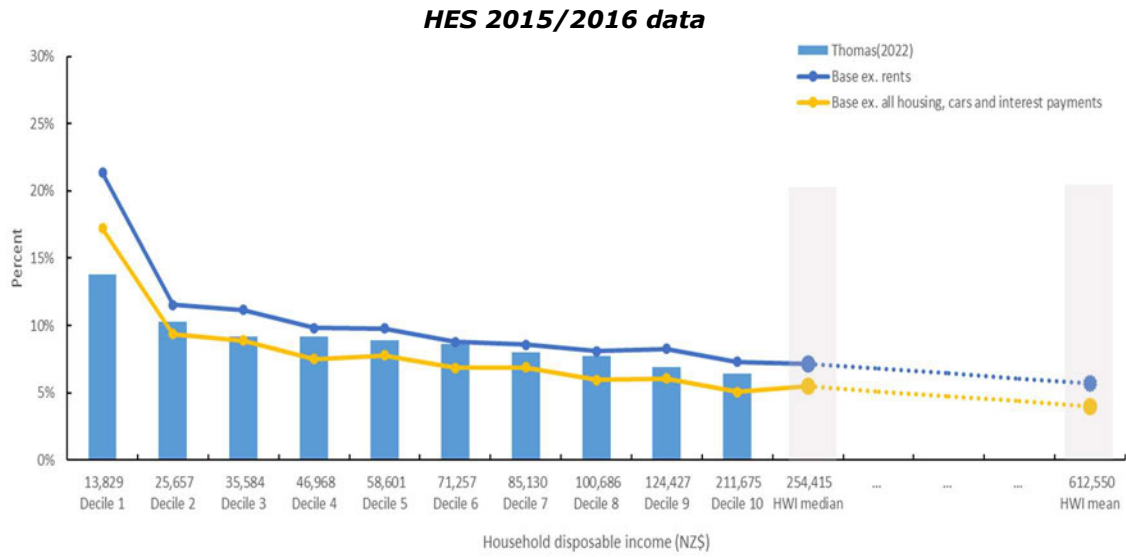
Figure 3: GST – expenditure ratio



Source: Staff calculations.

Note: Calculations are based on the HES 2015/2016 and 2018/2019 data. Comparison for Thomas is from HES 2015/2016. Annual disposable income is the total annual household income less estimated payable taxes. The income of \$254,415 is the median and \$612,550 is the mean of net taxable income of the HWI population from IRD database (highlighted in grey). For the yellow line all 'other expenditure' is excluded – that is interest payments, contributions to savings and fines.

Figure 4: GST – income ratio



Source: Staff calculations.

Note: Comparison to Thomas is from HES 2015/2016. The GST-income ratio excluding all housing and cars is the same as the ratio excluding all housing, cars and interest payments/contributions to savings. This is because the interest payments/contributions to savings do not enter the numerator (as they are either treated as not subject to GST or excluded from the expenditure base).

Next Steps

37. The Financial Collection will provide survey data on the level and (high-level) composition of expenditure of the high-wealth population. We can then update our modelling of the HWI population based on the survey data. While survey data may underreport expenditure, we expect survey data will provide more accurate information on the level and high-level composition of expenditure of the HWI cohort than the modelled results. A further refinement of the methodology in this paper is to break down savings and interest expenses to understand their relative contribution to the GST to expenditure ratio.
38. We intend to include GST in the measures we analyse in the public report on the effective tax rates of high-wealth individuals. This is because GST represents part of the tax burden of high-wealth individuals. The Treasury will also model GST as one of the taxes they consider in their work on effective tax rates relative to economic income and expenditure across income deciles 1 through 10.

Consultation

39. The Treasury has been consulted on this report.

Recommended action

We recommend that you:

40. **Note** the contents of this report.
41. **Refer** a copy of this report to the Minister of Finance for their information.

Referred/Not referred

9(2)(a)



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Policy Lead, Economics
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Hon David Parker
Minister of Revenue
/ /2022