

Inefficient At Any Level: A comparative efficiency argument for eliminating narrow-based state taxes

Presentation to the Institute of Policy Studies of Sri Lanka, 21st December 2022

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Insight from Harberger (2008)

Tax policy analysis in a CGE framework

“...The alternative sensible way to go is to try to construct a computable general equilibrium model that takes into account the precise conditions, economic structure and tax laws prevailing in a particular country at a given moment in time.

One can then simulate the results of an increase or decrease in the corporate tax rate, given all the bells and whistles that characterize that country’s tax system...

...To my knowledge, nobody has yet tried to do this, but it is an inviting topic for new research...”

- Arnold Harberger, A. C. (2008) *The Incidence of Corporation Income Tax revisited.*

Agenda

Main focus:

Can we do better than ranking taxes according to their economic cost per unit revenue (excess burden) at their current tax rate?

Nassios, J., and J. A. Giesecke. *Inefficient at any level: A comparative efficiency argument for complete elimination of property transfer duties and insurance taxes*. CoPS Working paper G-337.

Will also mention:

The CoPS team has estimated marginal excess burdens for a wide range of Australian taxes. These are worth reviewing for broader context.

Perhaps a small mention:

CGE models carry rich detail when assessing tax reforms.

Is all this information reflected in excess burdens? Can we do more?

See:

Nassios, J., and J. A. Giesecke. *Studying the impact of property tax reform on housing prices and efficiency*. CoPS Working paper G-330.

Calculating Marginal Excess Burdens in VURMTAX

Deviation in **real gross national income** from baseline forecast in year t .

Deviation in the real **value of household leisure** in year t .

Deflator: Divisia index of the private, public and investment (domestic share only) price indices. Present-day and future consumption prices thus impact economic welfare.

Do not value additional leisure consumed by the unemployed.

$$MEB(t) = - \frac{d_{RGNI}(t) - d_{v_leisure}(t)}{d_{LST}(t)}$$


Real value of **lump sum transfers** to households, required to balance government operating budgets.

*Public consumption: tied to private consumption.
The lump sum tax (LST) is impacted by changes in the income- and expenditure-sides of the government budget.*

MEB estimates using VURMTAX (state & local taxes)

State and local taxes	Revenue / GDP	MEB
Taxes on Gambling	0.33	46
→ Taxes on insurance	0.30	38
<i>Taxes on General Insurance</i>	<i>0.20</i>	<i>36</i>
<i>Taxes on Fire Service Levy</i>	<i>0.04</i>	<i>42</i>
<i>Taxes on Health Insurance</i>	<i>0.01</i>	<i>31</i>
<i>Taxes on Life Insurance</i>	<i>0.01</i>	<i>27</i>
Taxes on use of motor vehicles	0.57	40
<i>Taxes on private motor vehicle use</i>	<i>0.38</i>	<i>25</i>
<i>Used car transfer duties/levies</i>	<i>0.08</i>	<i>24</i>
<i>Taxes on new investment in motor vehicles</i>	<i>0.12</i>	<i>97</i>
→ Property transfer duties	1.14	76
<i>Property transfer duties, residential</i>	<i>0.88</i>	<i>112</i>
<i>Property transfer duties, business</i>	<i>0.26</i>	<i>40</i>
Payroll tax	1.28	22
State land tax	0.48	-15
Council rates	0.97	-11
Other state & local taxes	1.38	not estimated
State & local tax revenue : GDP. Weighted average	6.45	29

MEB estimates using VURMTAX (federal taxes)

Federal Taxes	Revenue / GDP	MEB
→ GST	3.4	24
Fuel excises	1.0	2
→ Personal income taxes	11.2	24
Corporate income taxes	4.6	-26
Other federal taxes	2.1	not estimated
Federal tax revenue : GDP. Weighted average MEB	22.28	12

Australian fiscal federal system characterized by heavy vertical fiscal imbalance: Federal government has only 55% of expenditure responsibilities, but raises 78% of tax revenue. State & local government have 45% of expenditure responsibility, and raise 22% of all tax revenue.

Federal government has constitutional rights over most of the broad-based taxes. States mainly left with narrow-based taxes.

Weighted-average Australian MEBs:

$MEB_{Direct} = 9 \text{ c / dollar of revenue}$

$MEB_{Indirect} = 33 \text{ c / dollar of revenue}$

Australian & Sri Lankan taxation statistics compared

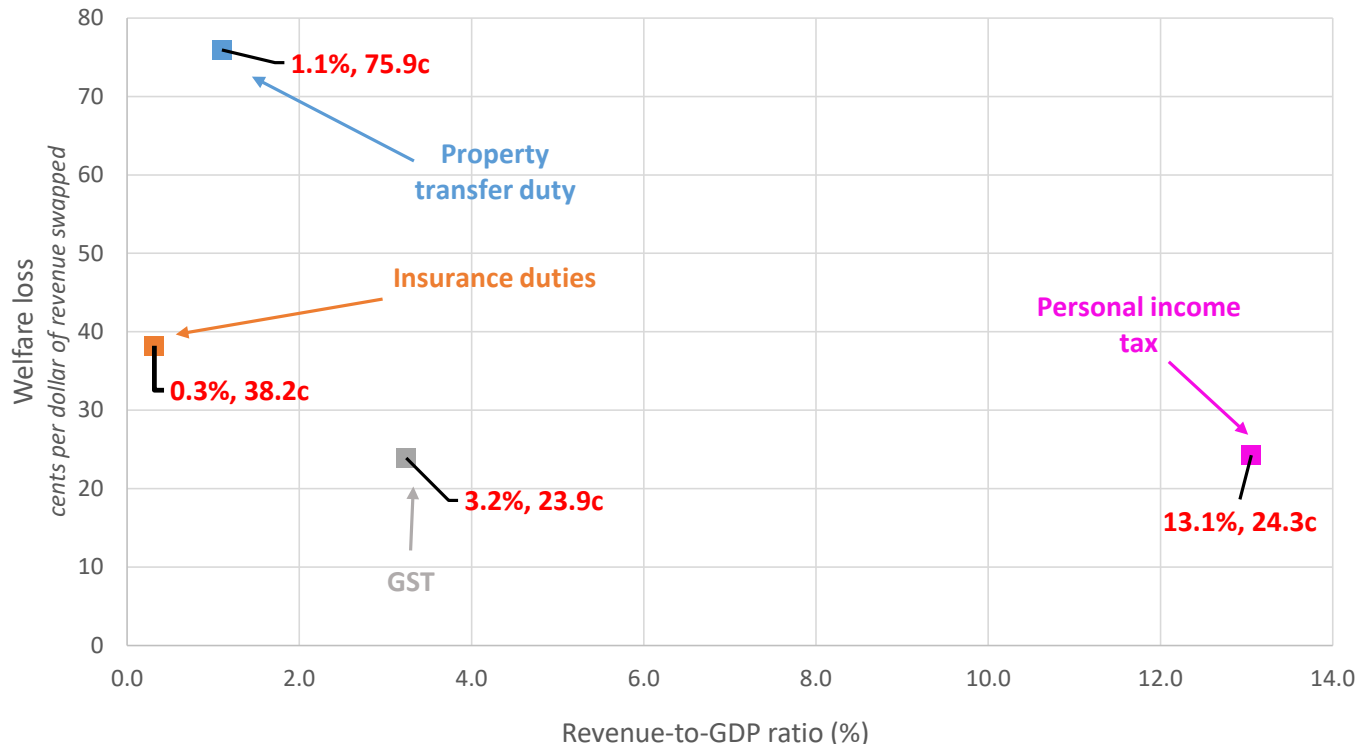
- **Tax collections as a share of GDP:**
 - Sri Lanka: 11% (2019, via MoF & central bank stats)
 - Australia: 29% (2017/18, via ABS)
- **Direct taxes as a share of total revenue:**
 - Sri Lanka: 25% (2019, via MoF & central bank stats)
 - Australia: 64% (2017/18, via ABS)
- **Indirect taxes as a share of total revenue:**
 - Sri Lanka: 75% (2019, via MoF & central bank stats)
 - Australia: 36% (2017/18, via ABS)
- **GST/VAT as a share of total tax revenue:**
 - Sri Lanka: 43% (2019, via SL Inland Revenue)
 - Australia: 12% (2017/18, via ABS)

What do we know?

The state of play in the welfare impacts of taxation in Australia

- Studies of Australia's tax system using CGE models report long-run comparative static rankings of economic costs per unit of revenue for many taxes, i.e., the **marginal excess burden (MEB)**.

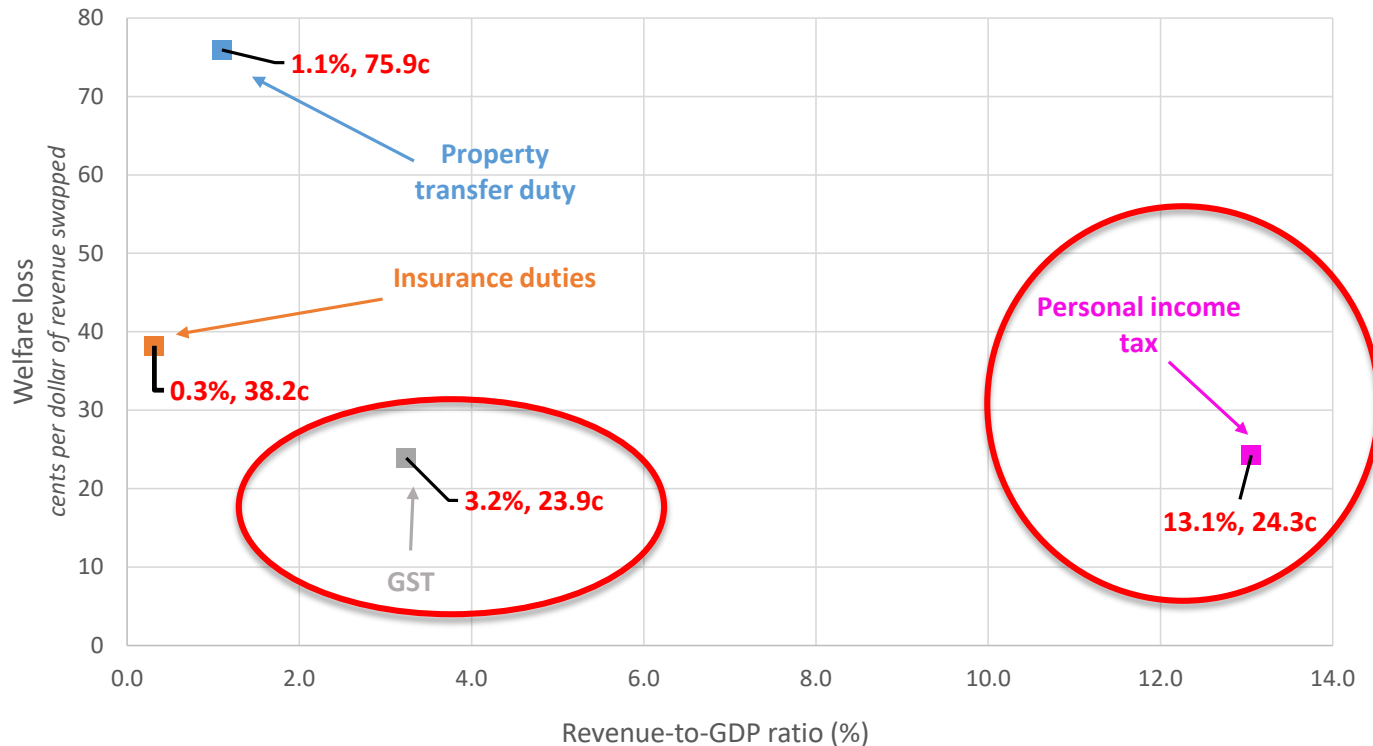
$$MEB(2040) = -100 \cdot \frac{d_welfare(2040)}{d_revenue(2040)}$$



Q&A on the state of play

Question 1

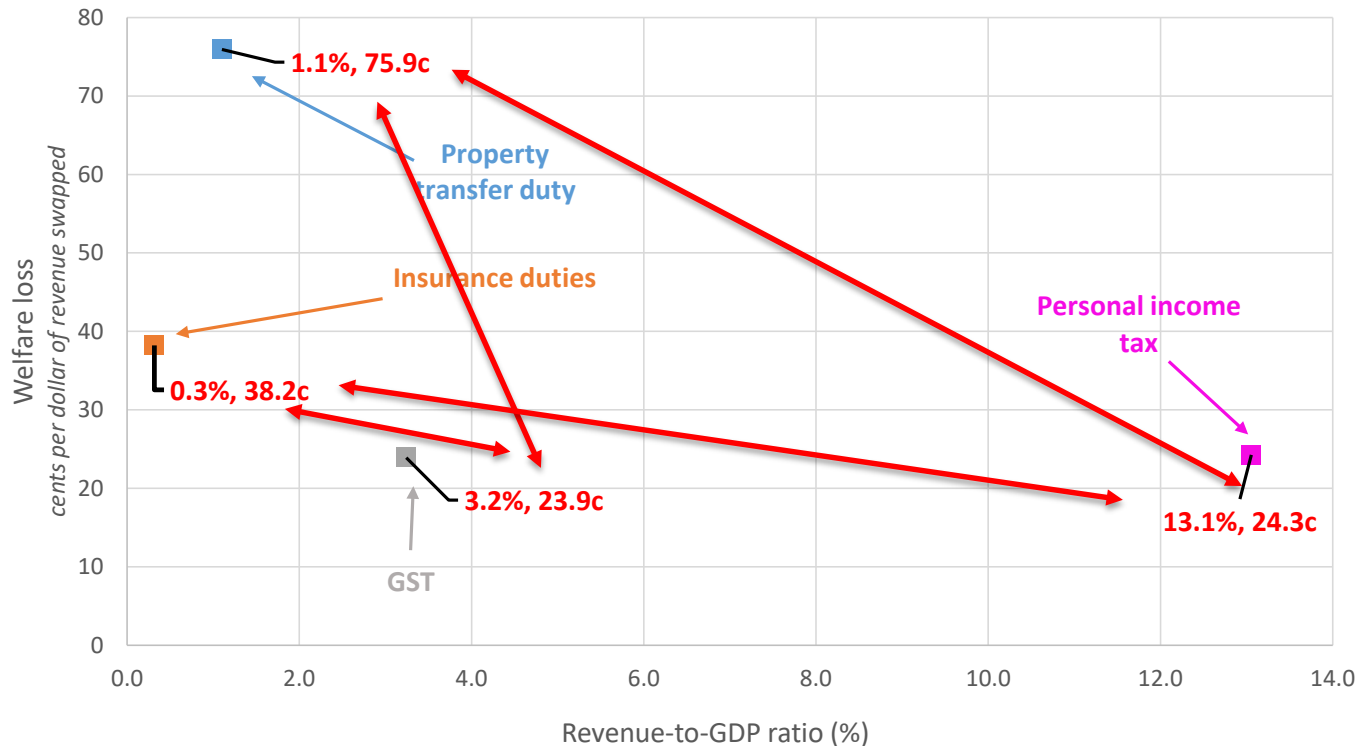
- **Q:** The OECD say Australia relies too much on personal income tax, and should move towards consumption taxes. Discuss.
 - **A:** MEBs are similar. The mix between GST and PIT looks about right.
 - **Policy analyst:** Oh, that is great. Can I try a few more?



Q&A on the state of play

Question 2

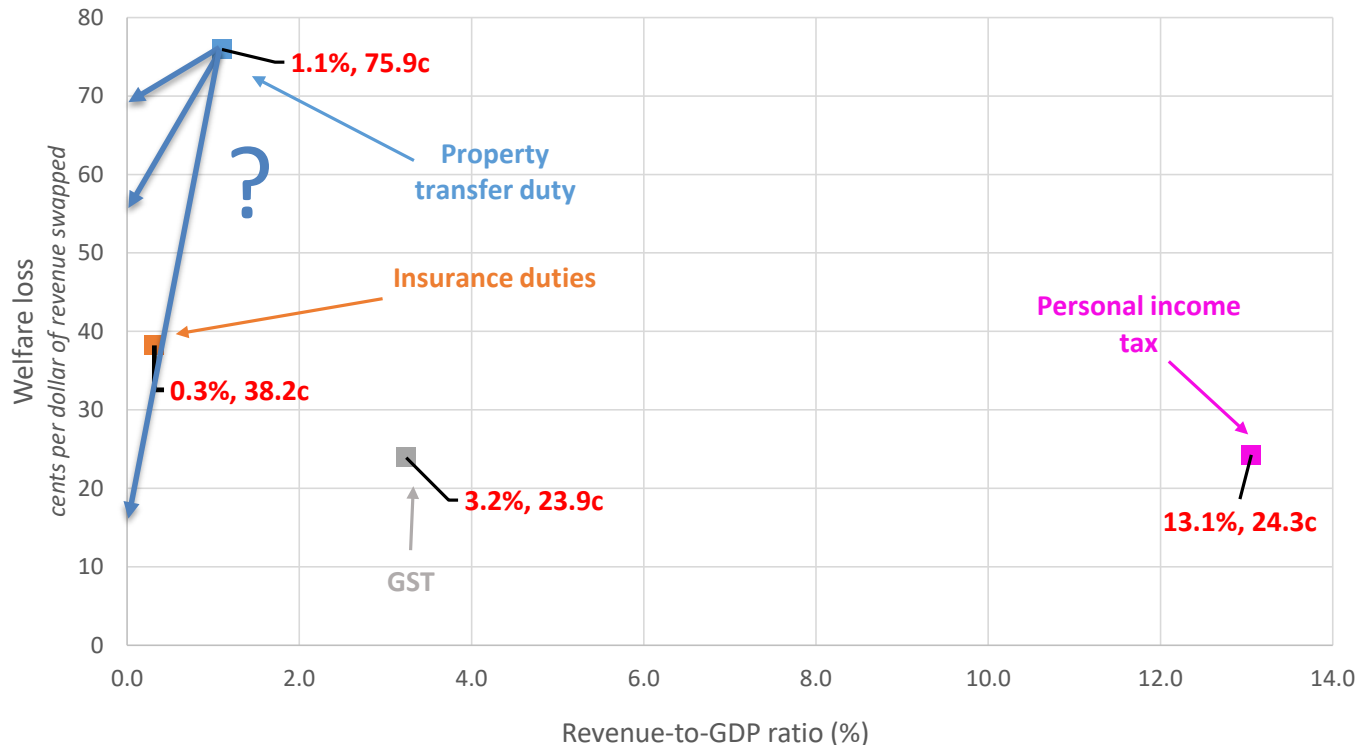
- **Q:** Should Property transfer duty be reduced, or removed? What about insurance duty?
 - **A Part 1:** Reduced certainly, excess burdens very high compared to broad-based federal taxes.



Q&A on the state of play

Question 2 cont.

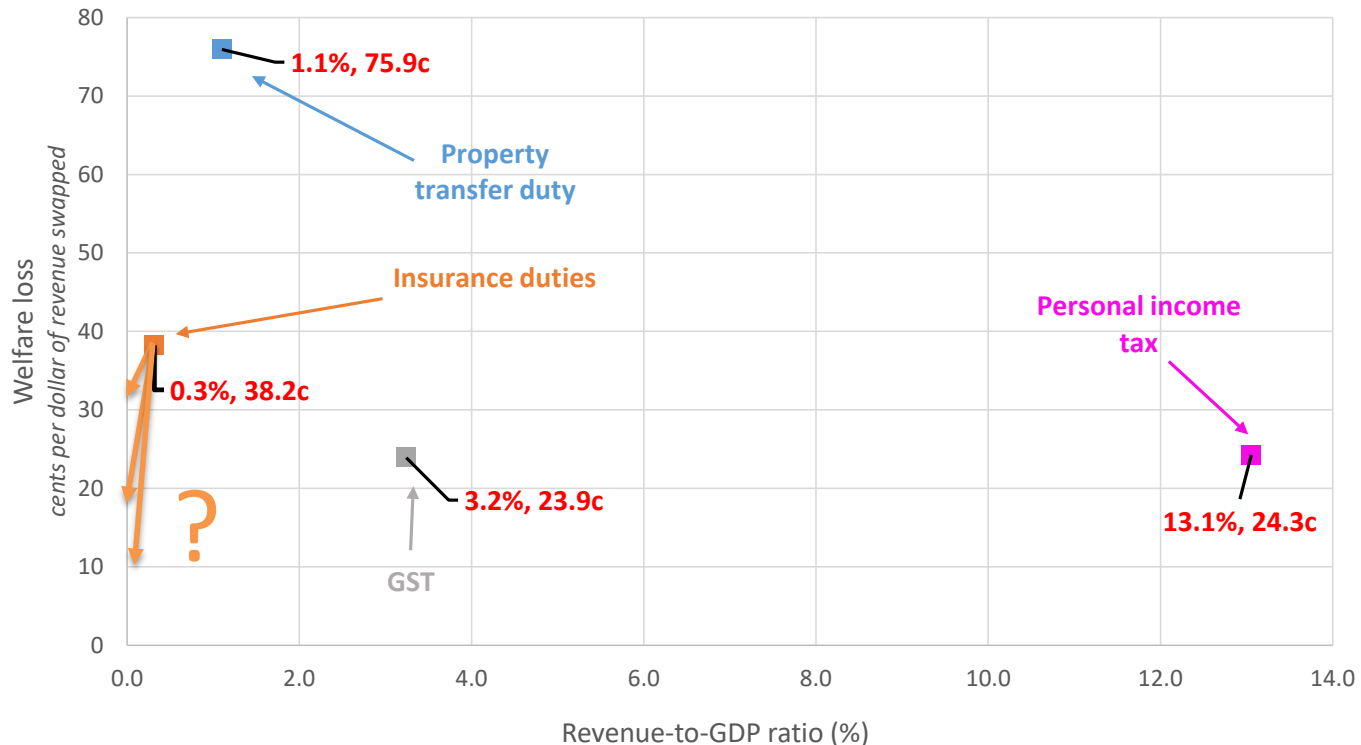
- **Q:** Should Property transfer duty be reduced, or removed? What about insurance duty?
 - **A Part 2:** Removed? Not sure. How sensitive are MEBs (y-axis) to decreases in revenue-to-GDP (x-axis)?



Q&A on the state of play

Question 2 cont.

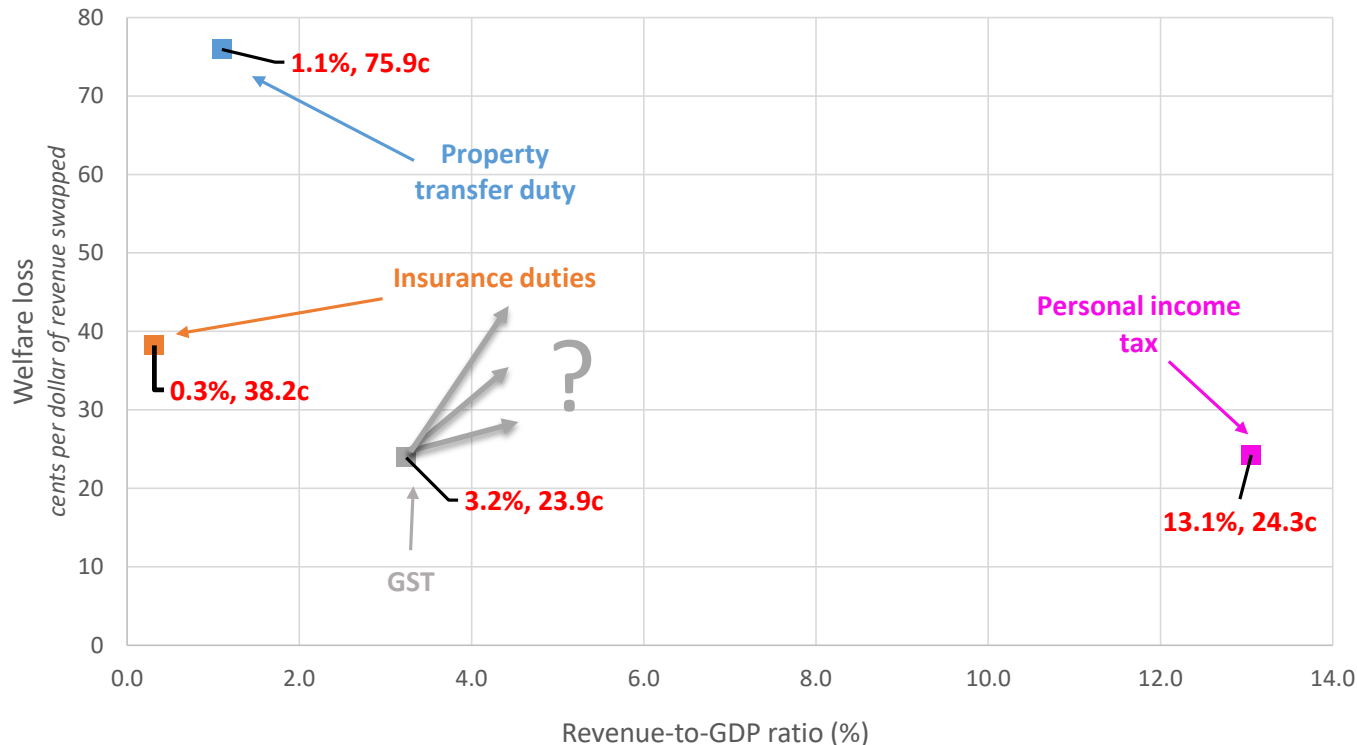
- **Q:** Should Property transfer duty be reduced, or removed? What about insurance duty?
 - **A Part 2:** Removed? Not sure. How sensitive are MEBs (y-axis) to decreases in revenue-to-GDP (x-axis)?
 - **Policy analyst:** Oh...I suppose you helped a little there.



Q&A on the state of play

Question 3

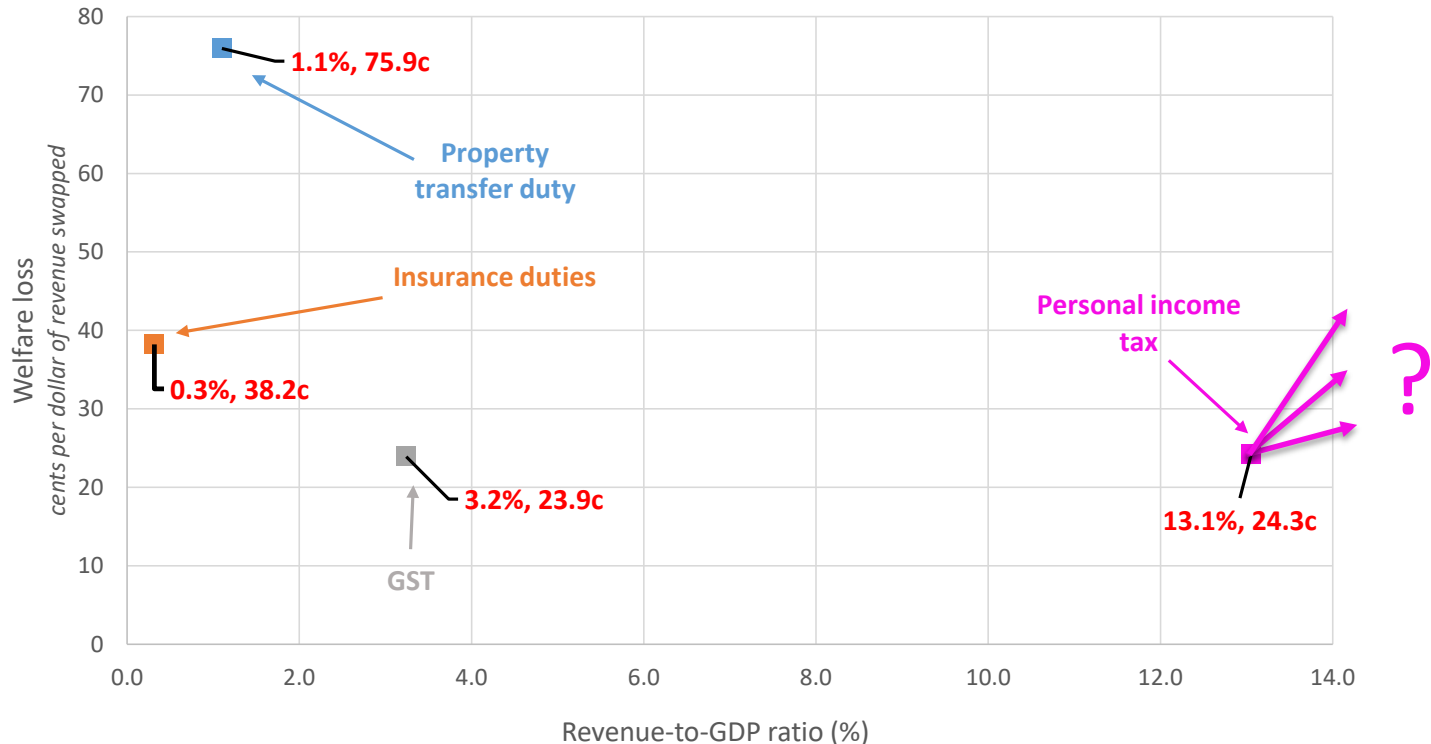
- **Q:** If we are talking about federally-assisted replacement of state taxes: should we raise the GST rate, or PIT rates?
 - **A:** Good question...not sure. Would need to know how sensitive MEBs (y-axis) are to increases in revenue-to-GDP (x-axis).



Q&A on the state of play

Question 3 cont.

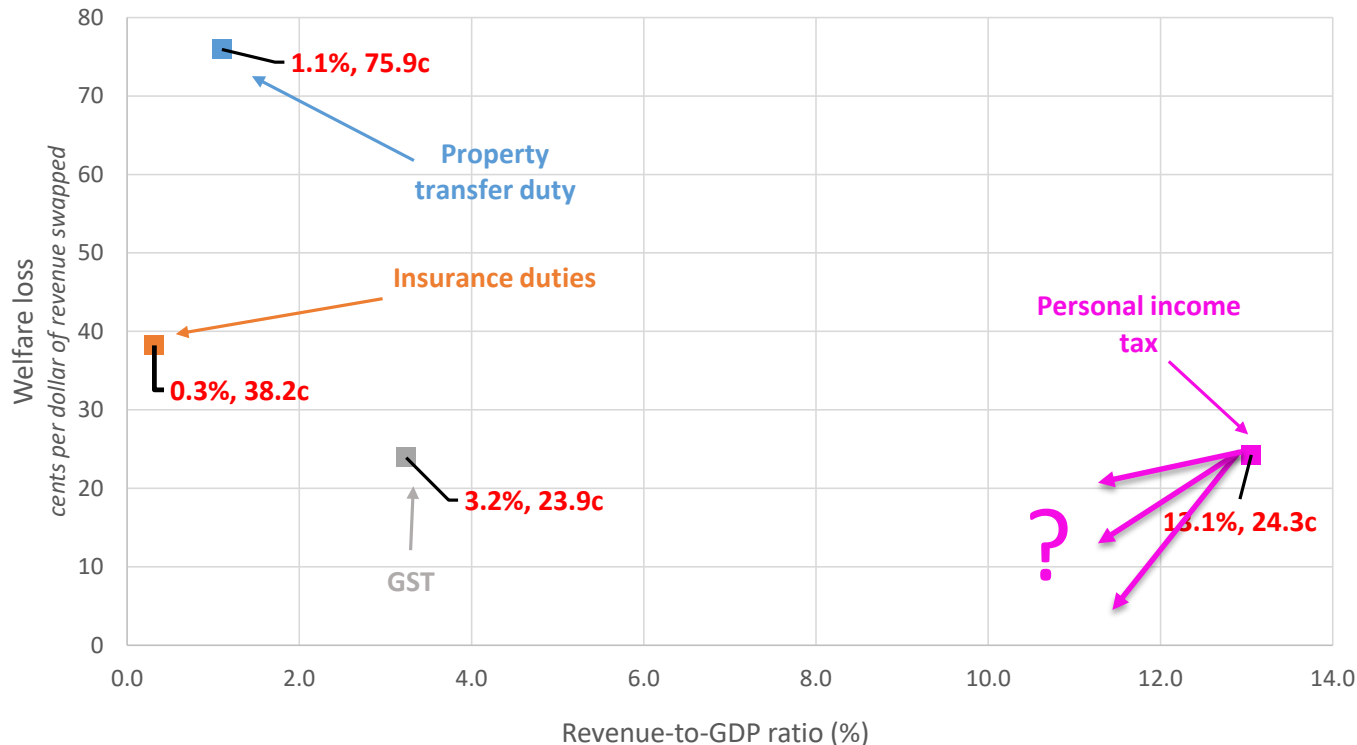
- **Q:** If we are talking about federally-assisted replacement of state taxes: should we raise the GST rate, or PIT rates?
 - **A:** Good question...not sure. Would need to know how sensitive MEBs (y-axis) are to increases in revenue-to-GDP (x-axis).
 - **Policy analyst:** Oh...again



Q&A on the state of play

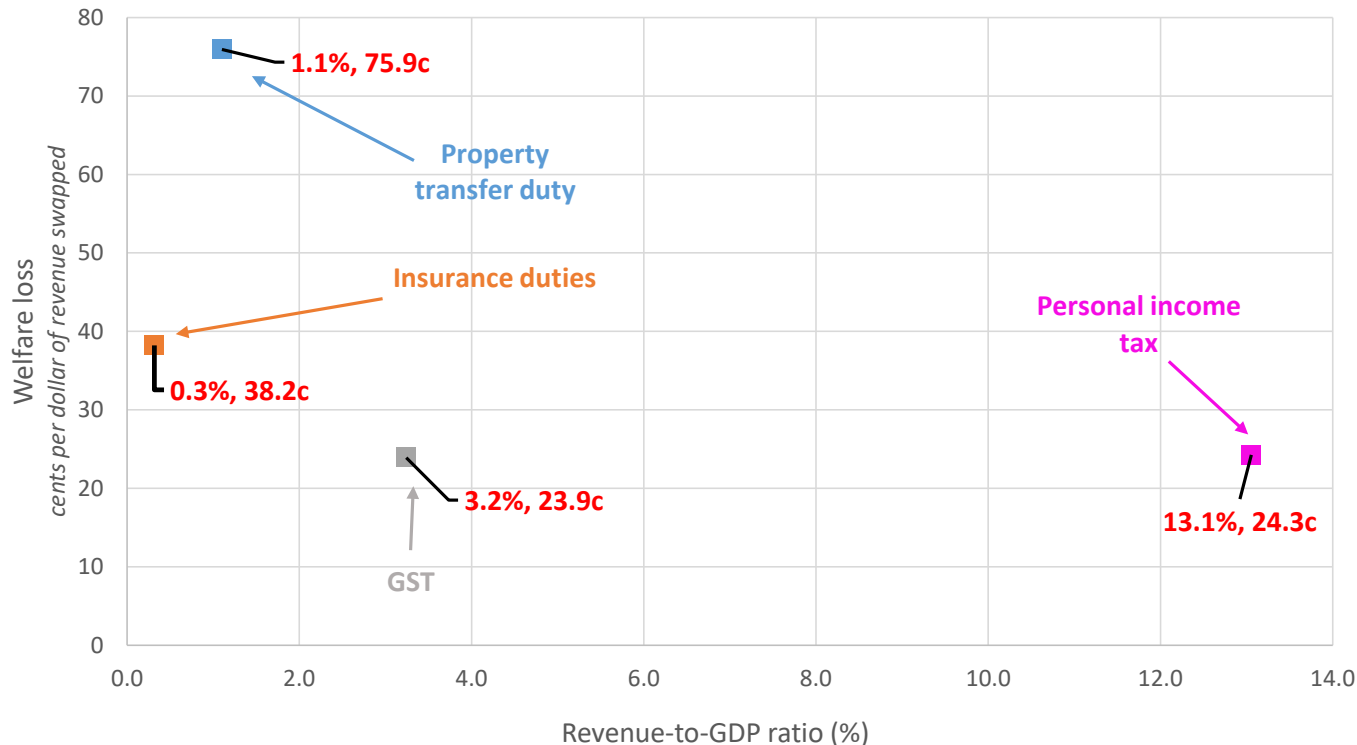
Question 4

- **Q:** Are personal income tax cuts a priority?
 - **A:** Good question...doesn't look like it. Big gains may materialize if MEB is very sensitive to falls in tax rates, but this chart can't help there.
 - **Policy analyst:** Oh...maybe we try again after some more work.



What we have vs what we need

- Work to date is useful, but incomplete.
- To inform debate, we need to understand how MEBs change as tax rates change.
- This is the focus today.
- Look only at the four taxes introduced thus far (calculating the MEB schedules is a big job!).



Sketch of the approach

VURMTAX

- Our tool for building MEB distribution functions is VURMTAX (Victoria University regional model with taxation detail).
 - **Dynamic:** Annual time paths for all variables are traced. BAU baseline, and policy counterfactual. Results reported as counterfactual deviations from BAU.
 - **Bottom-up multi-regional:** Economic activity is modelled within each state. Modelling of the taxing, spending and transfer activities of two levels of gov (a regional government in each state, and federal gov operating Australia-wide).
 - **High-levels of tax and subsidy detail:** Approximately thirty tax lines tracked distinctly, along with subsidies like fuel tax credits. Legislated detail of taxes modelled (e.g. the GST).
 - **Multi-production:** 86 industries, producing 96 commodities.
 - Housing distinguished by density (hi,lo) and tenure type (own, rent);
 - Industry-specific capital. Endogenous foreign equity ownership. Foreign debt adjusts to finance the current account deficit.

Sketch of the approach

VURMTAX (cont.)

- Model structure follows familiar neoclassical lines:
 - **Constrained optimising behaviour:** Firms choose inputs of intermediate inputs and primary factors subject to CRS production functions in a cost-minimising fashion. Representative households (one per region) are utility maximisers.
 - **Market clearing:** In general, markets are assumed to clear and to be competitive. Short-run wage stickiness can generate short-run unemployment.
 - **Investment:** Expected rates of return guide investment allocation across regional industries. Investment and capital are specific to each regional industry. New units of capital are constructed in a cost-minimising way.
 - **Open economy:** Imperfect substitutability between imported and domestic sources of supply. Foreign currency import prices are given. Downward-sloping export schedules with different export demand elasticities (highly elastic for most resource exports, small amount of market power in other commodities).

Sketch of the approach

VURMTAX (cont.)

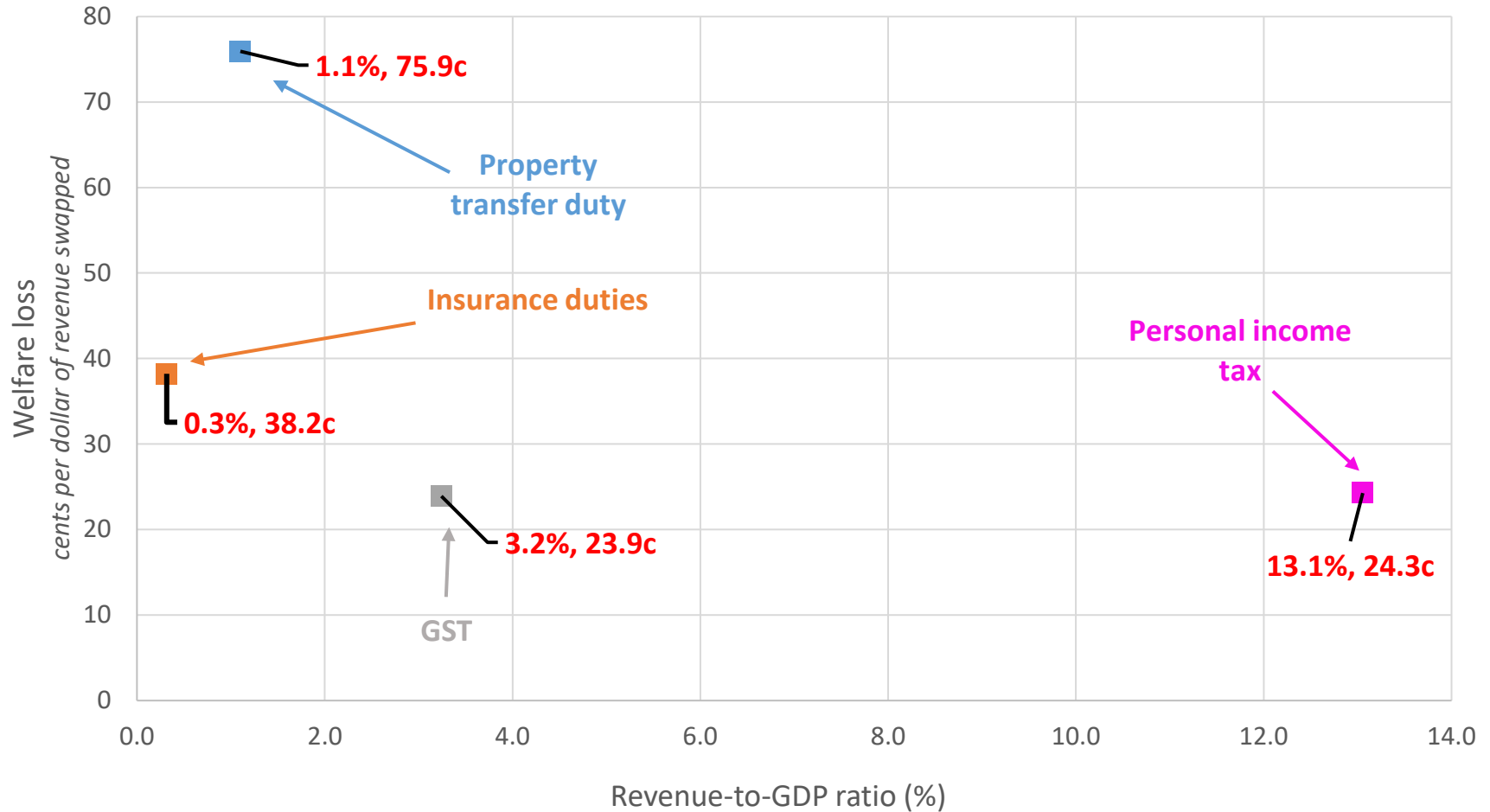
- Model structure follows familiar neoclassical lines:
 - **Margins and taxes:** Purchaser's prices differ from basic prices by the value of indirect taxes and margins. Taxes and margins differ across commodities, users, region of source and region of destination.
 - **Inter-regional migration:** Inter-regional migration rates are sticky in the short-run, but gradually adjust to restore regional per capita real disposable income relativities across regions.
 - **Regional linkages:** Regional economic linkages arise from inter-regional trade, factor mobility, and the taxing and spending activities of the federal government.
 - **Model solution:** via CoPS' GEMPACK software.

Aim: Derive tax-specific schedules showing MEB values at different levels of revenue-raising effort

- For each of the **GST**, Personal income tax (**PIT**), Property transfer duty (**TD**), and Insurance duty (**ID**):
 - Run a series of counterfactual simulations for $k \in [\text{PIT}, \text{GST}, \text{TD}, \text{ID}]$;
 - For each k , incrementally adjustment the tax rate in the counterfactual $T_k^{\text{Pol}} \in [0.01 T_k^{\text{Base}}, T_k^{\text{Base}}, 1.99 T_k^{\text{Base}}]$;
 - Measure changes in welfare and aggregate revenue relative to baseline;
 - Compare these deviations across the counterfactuals. This yields the MEB at one point along the MEB distribution for tax k ;
 - Allows us to build up a set of discrete points along the MEB distribution for each k .

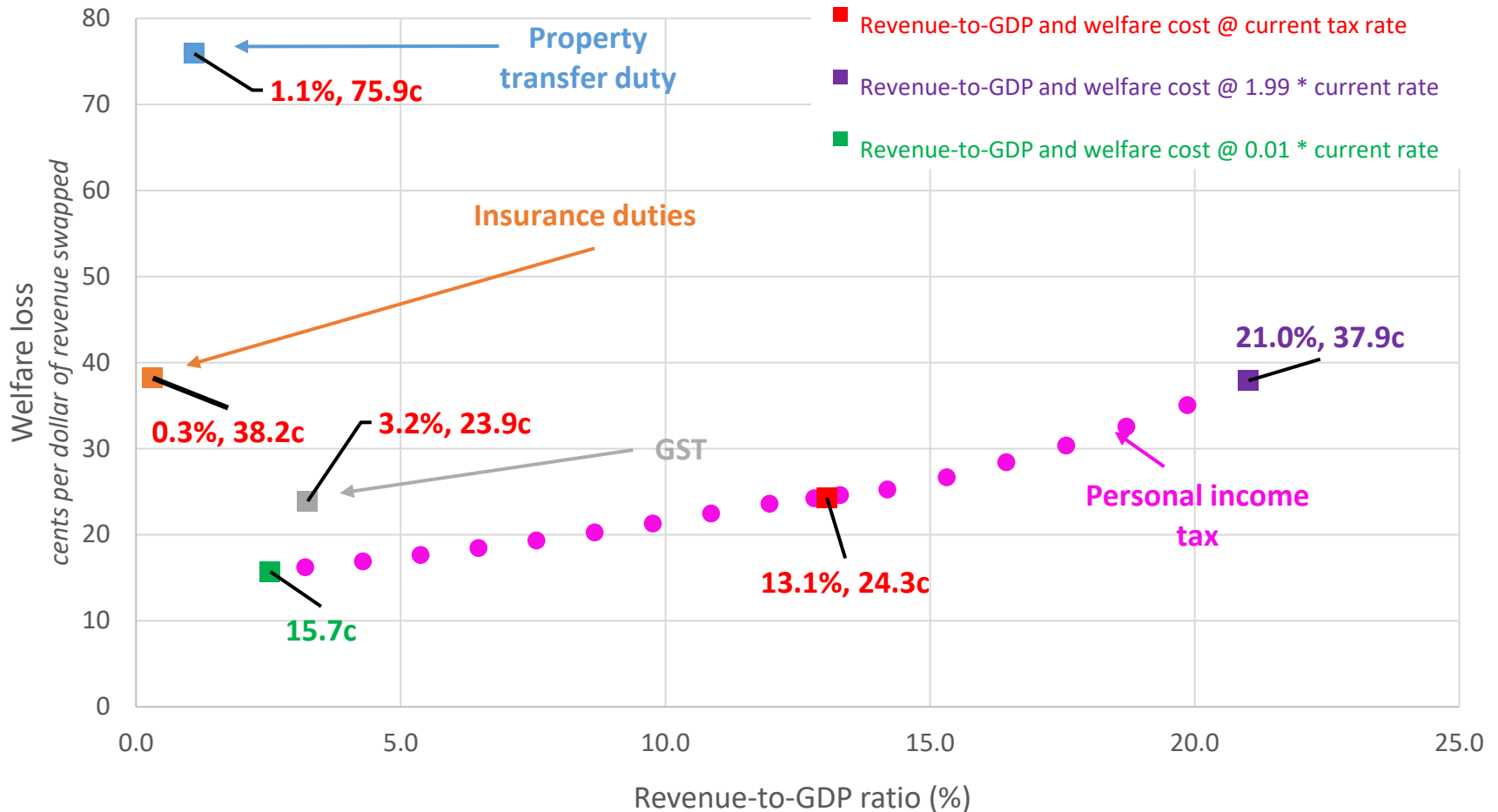
Discrete MEB distribution functions

Go from this...



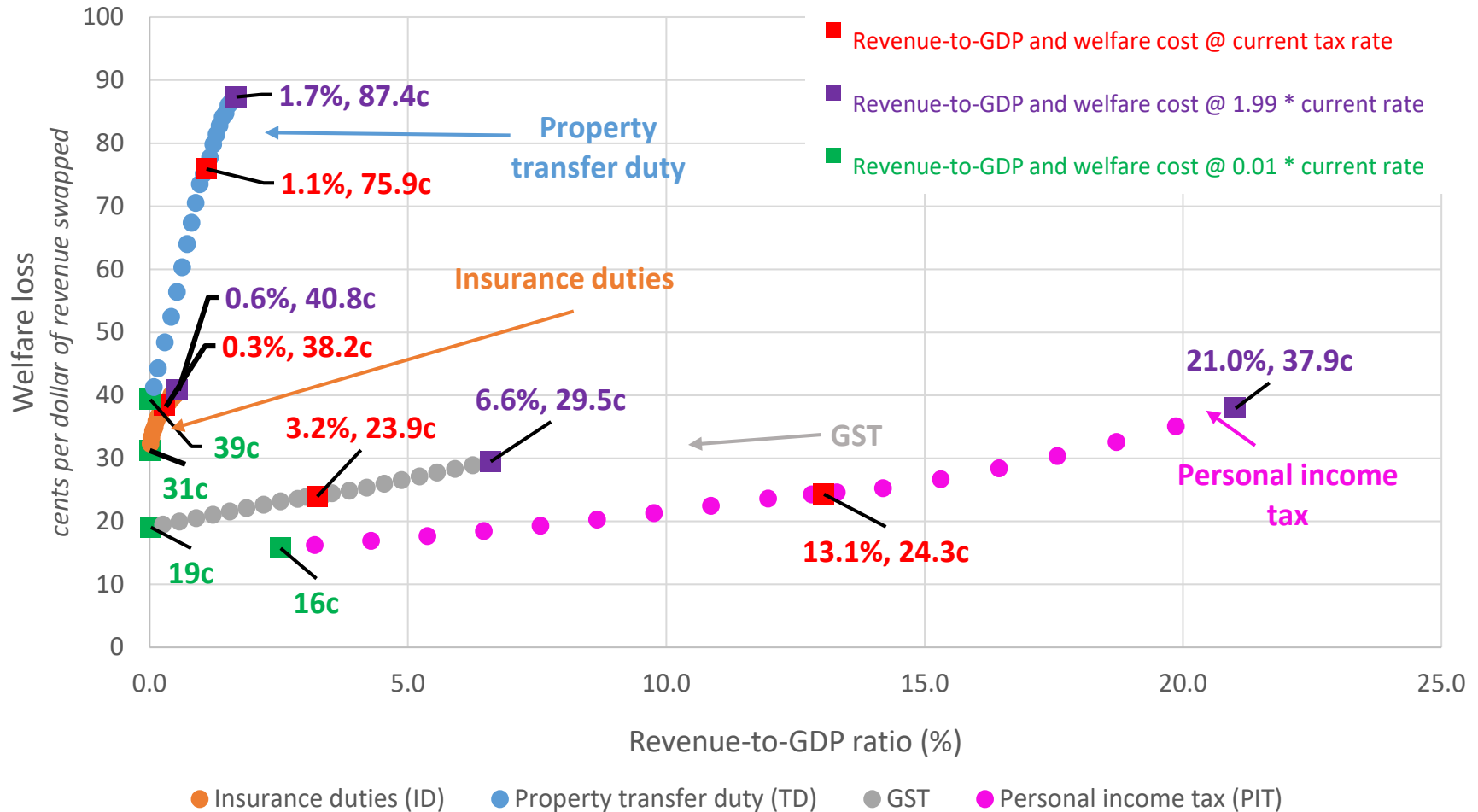
Discrete MEB distribution functions

...to this...



Discrete MEB distribution functions

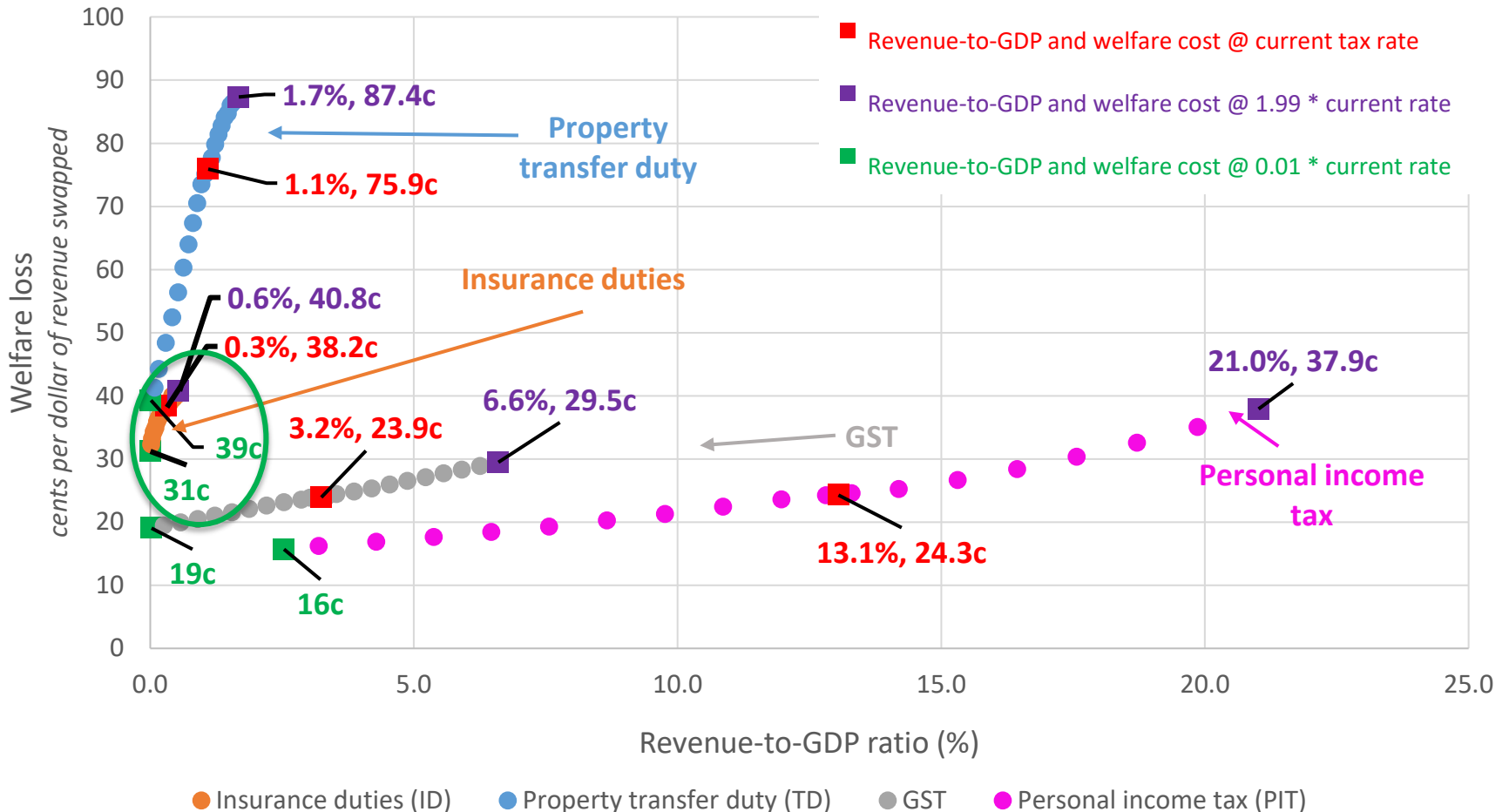
...then this in 100 simulations



Discrete MEB distribution functions

Revisiting Question 2

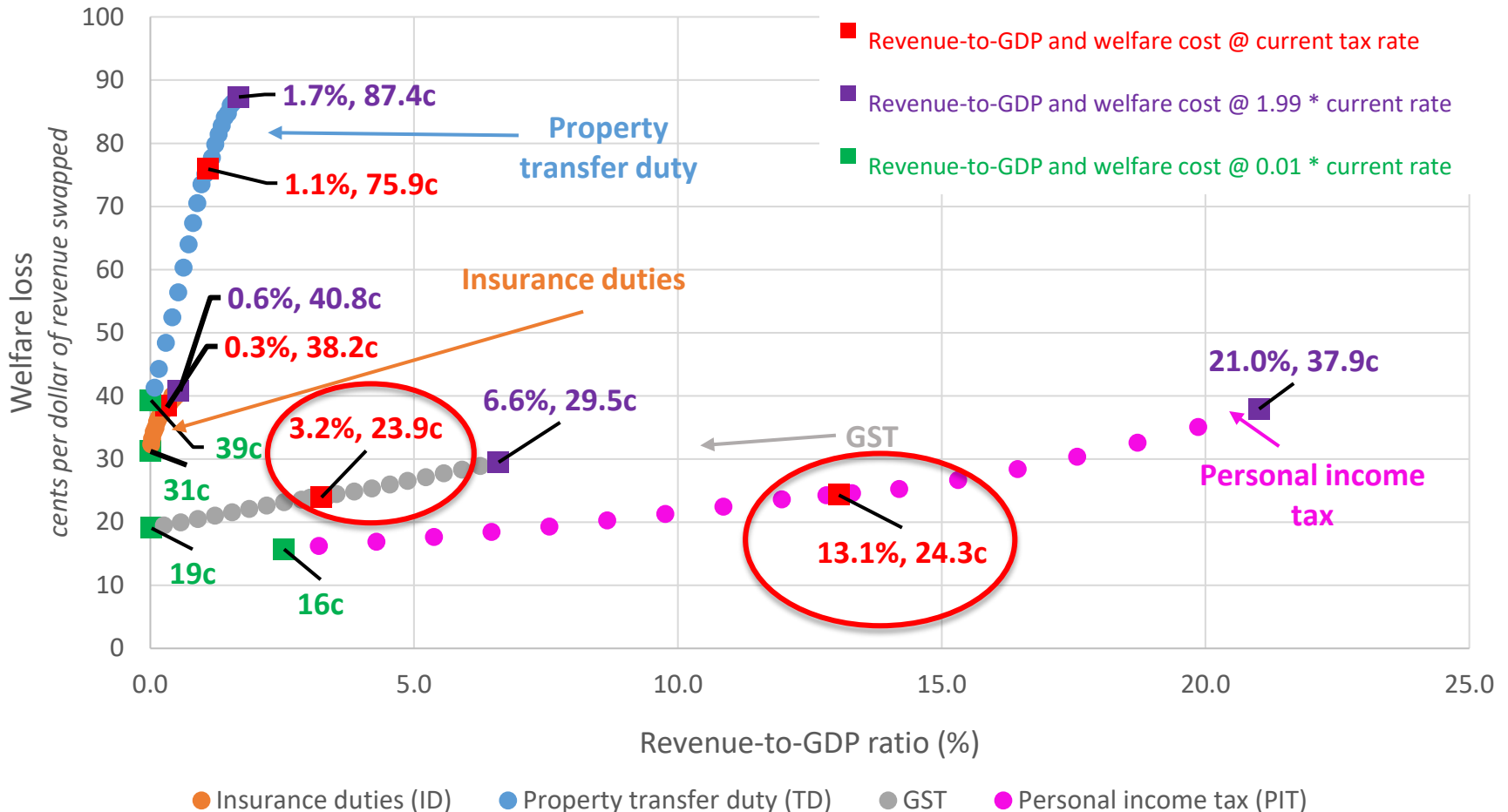
- Q: Should property and insurance duties be removed?
 - A: Removed, certainly. MEBs remain high (39c and 31c) even at low rates.



Discrete MEB distribution functions

Revisiting Question 3

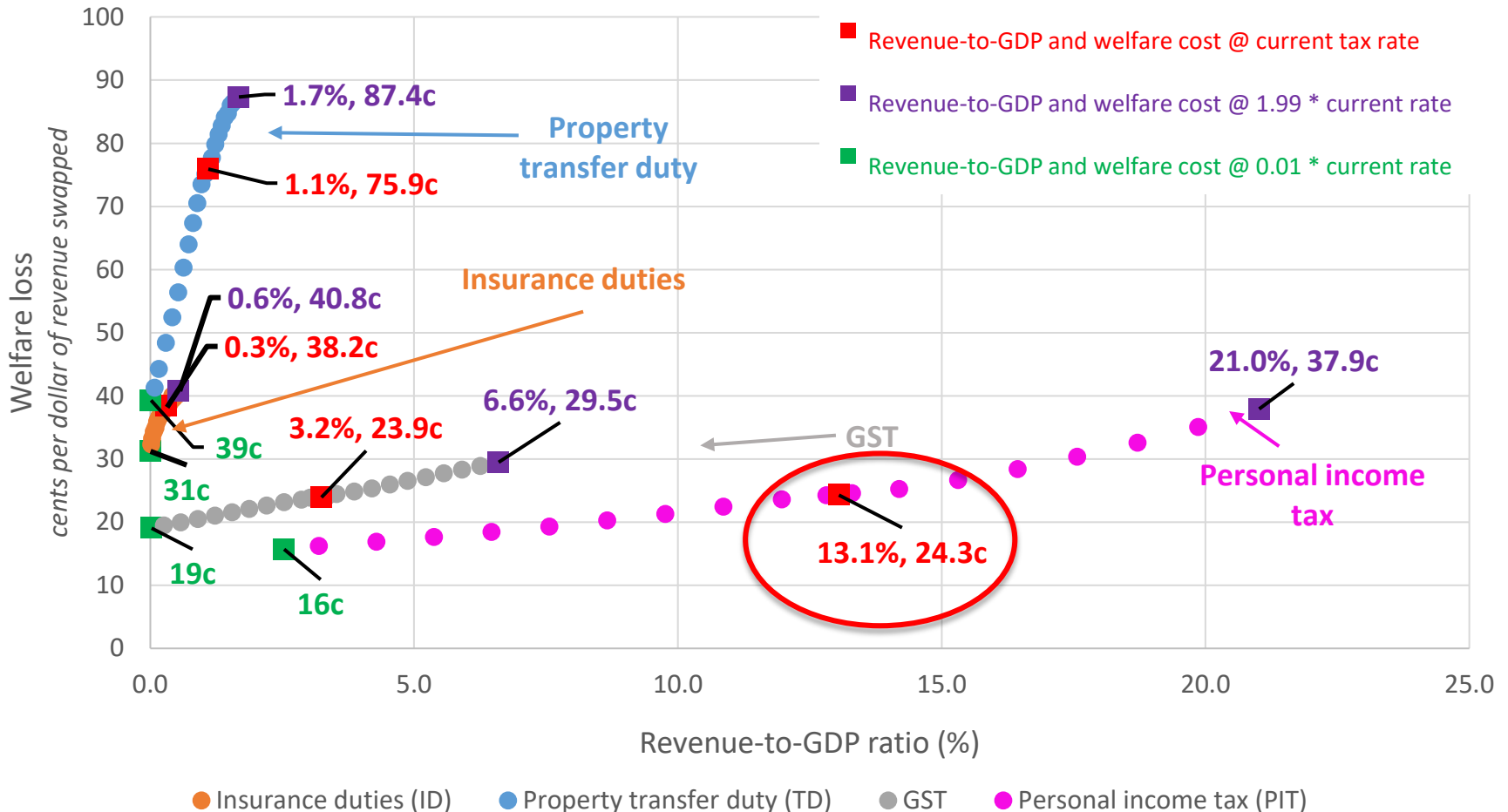
- Q: If federal assistance was forthcoming, do they fund it with GST or PIT rate rises?
 - A: A mix, certainly. Perhaps slight overweight to PIT.



Discrete MEB distribution functions

Revisiting Question 4

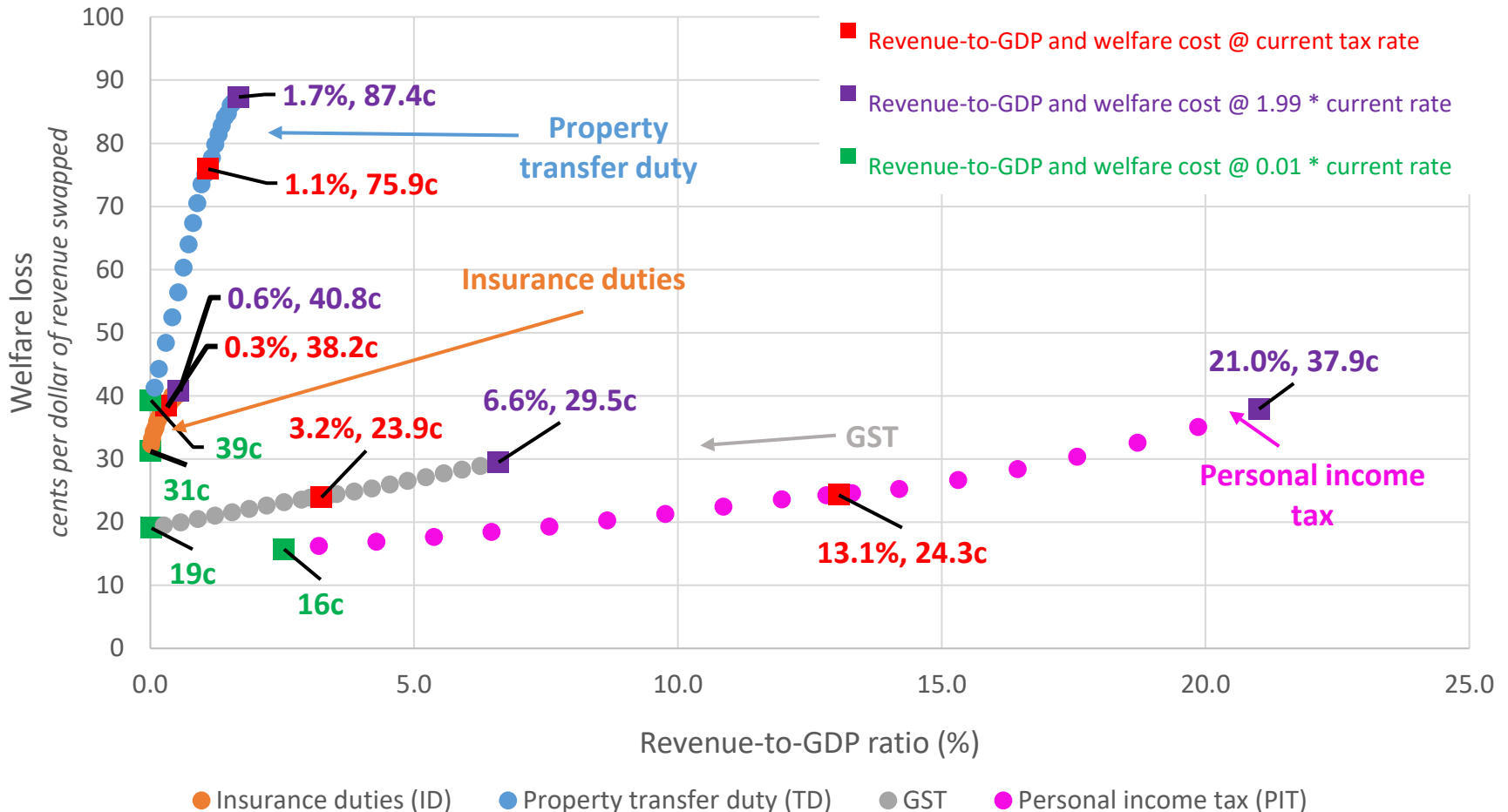
- Q: Are PIT cuts a priority?
 - A: No. MEB distribution looks relatively linear at the current revenue ratio.



Discrete MEB distribution functions

Go from this...

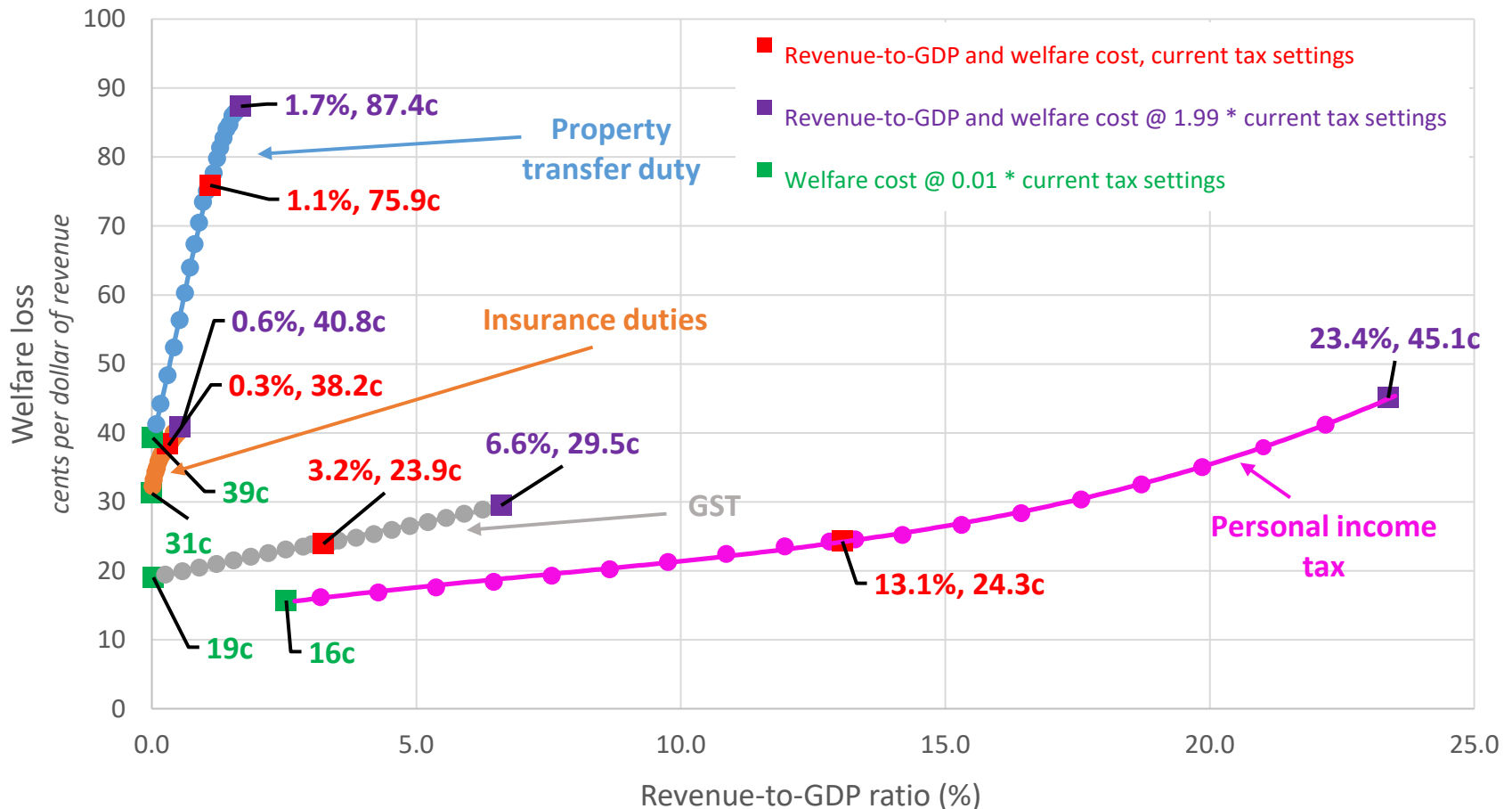
- Q: Discrete MEBs look nice on a graph, but are hard to use. Can we address this?
 - A: Yes!



Continuous MEB distribution functions

...to this!

- Using a curve-fitting algorithm, continuous functions can be derived!
- Solve these with a pen and paper to study tax mix changes, welfare gains etc.
- Agreement with data is excellent.



Continuous MEB distribution functions

Polynomials: easy to understand and solve

- Paper covers two functional forms. Focus on one in the presentation.
- Form differ w.r.t the independent variable choice.
 - If using revenue-to-GDP (R2GDP, equation 7 in paper) equations are:

Intercept is the MEB estimate when revenue effort is approaching 0

> PIT and GST MEBs at current rates (24.3c & 23.9c respectively)

$$MEB_{GST}^{2040}(R2GDP) = 19.1^{***} + 1.55^{***} R2GDP, \quad (1a)$$

$$MEB_{PIT}^{2040}(R2GDP) = 12.6^{***} + 1.30^{***} R2GDP - 0.076^{***} R2GDP^2 + 0.0034^{***} R2GDP^3, \quad (1b)$$

$$MEB_{ID}^{2040}(R2GDP) = 31.5^{***} + 43.6^{***} R2GDP - 91.7^{***} R2GDP^2 + 78.6^{***} R2GDP^3, \quad (1c)$$

$$MEB_{TD}^{2040}(R2GDP) = 38.7^{***} + 29.6^{***} R2GDP + 13.1^{***} R2GDP^2 - 8.05^{***} R2GDP^3. \quad (1d)$$

- Aim of fitting equations to the MEB estimates is to produce a tool that facilitates:
 - Calculation of MEB-equalizing revenue raising efforts across the tax system.
 - Via integration, calculating the value of welfare impacts of tax mix change.

Continuous MEB distribution functions

Application: Revisit Q3 to derive optimal GST/PIT replacement mix

Should federal assistance to remove TD and ID be funded by GST, PIT or both?

We must replace revenue equal to 1.4% of GDP (= current TD and ID revenue).

What if we raised the full 1.4 percentage points from a higher rate of **GST**?

This would raise the GST's R2GDP level to $3.2\% + 1.4\% = 4.6\%$.

Hence, the new level of the GST MEB would be:

$MEB_{GST}(4.6) = 19.1 + 1.55 * 4.6 = 26.2$ cents per dollar of GST revenue.

A GST MEB of 26.2 cents is lower than the ID and TD MEBs at very low ID and TD rates (31.5c and 38.7 c respectively).

Hence, replacement of ID and TD with a higher GST alone would raise welfare.

Continuous MEB distribution functions

Application: Revisit Q3 to derive optimal GST/PIT replacement mix

Should federal assistance to remove TD and ID be funded by GST, PIT or both?

We must replace revenue equal to 1.4% of GDP (= current TD and ID revenue).

What if we raised the full 1.4 percentage points from a higher rate of **PIT**?

This would raise the PIT's R2GDP level to 13.1% + 1.4% = 14.5%.

Hence, the new level of the PIT's MEB would be:

$$MEB_{PIT}(14.5) = 12.6 + 1.30*14.5 - 0.076*14.5^2 + 0.0034*14.5^3 = 25.7 \text{ c .}$$

A PIT MEB of 25.7 cents is lower than the ID and TD MEBs at very low ID and TD rates (31.5c and 38.7c respectively).

Hence, replacement of ID and TD with a higher PIT alone would raise welfare.

Continuous MEB distribution functions

Application: Revisit Q3 to derive optimal GST/PIT replacement mix

- Should federal assistance to remove TD and ID be funded by GST, PIT or both?
 - **A:** Almost 50/50 split across GST and PIT, it turns out!
 - We must replace 1.4% R2GDP (i.e. = current TD and ID revenue).
 - GST and PIT initially raise 3.2% and 13.1% R2GDP.
 - Let A be the amount of extra R2GDP load on the GST.
 - Hence, GST target revenue = 3.2 + A;
 - Hence, PIT target revenue = 13.1 + (1.4 – A) = 14.5 – A. Yields:

$$MEB_{GST}^{2040}(3.2 + A) = 19.1 + 1.55 \cdot (3.2 + A),$$

$$MEB_{PIT}^{2040}(14.5 - A) = 12.6 + 1.30 \cdot (14.5 - A) - 0.076 \cdot (14.5 - A)^2 + 0.0034 \cdot (14.5 - A)^3.$$

- We have 2 equations, 3 unknowns (A, MEB_{PIT} , MEB_{GST});
- Seek a solution for A where the $MEB_{PIT} = MEB_{GST}$;
- We find $A = 0.65$, or about 48% ($=0.65/1.4$) of total replacement revenue should come from higher GST, the remainder from higher PIT.

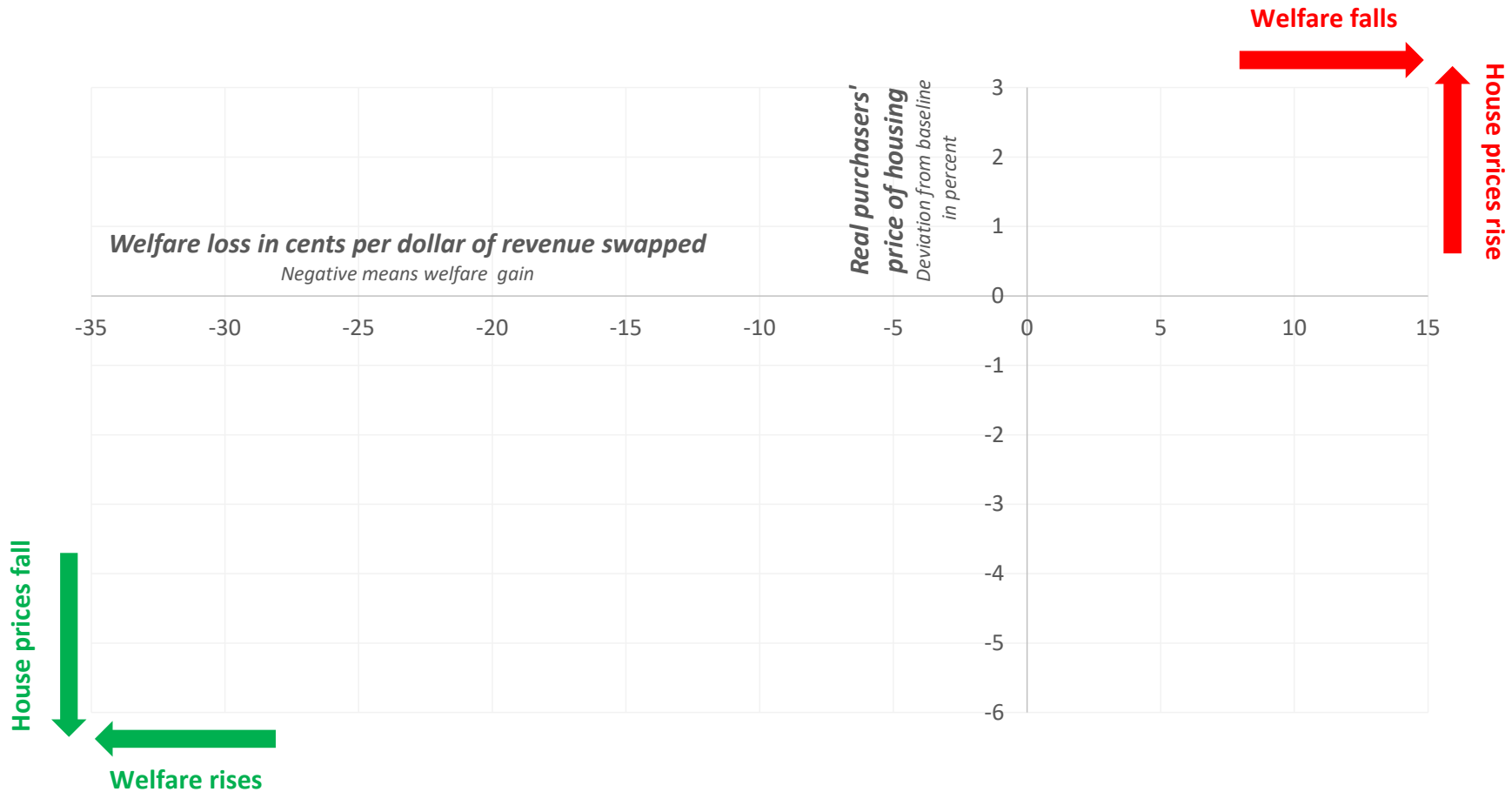
Summary and future work

- The tax system is complicated! But...
- ...focusing on measures like the MEB at the current tax rate oversimplifies matters.
- **One metric does not rule them all!**

- **Are state taxes inefficient?**
 - Yes, at their current rates they are. But...
 - We need to understand how MEBs change as rates change to discuss Australia's future tax system;
 - Lots more work to do. More than 100 distinct taxes in Australia! CoPS has MEB point estimates for about 30 taxes, & full MEB schedules for 4 taxes.

- **Is there more to the tax debate than MEBs? Absolutely!**
 - Impacts on employment, GDP, relative winners and losers across states, industries, occupations, income distribution etc.
 - E.G.: What does property tax reform do to housing prices?

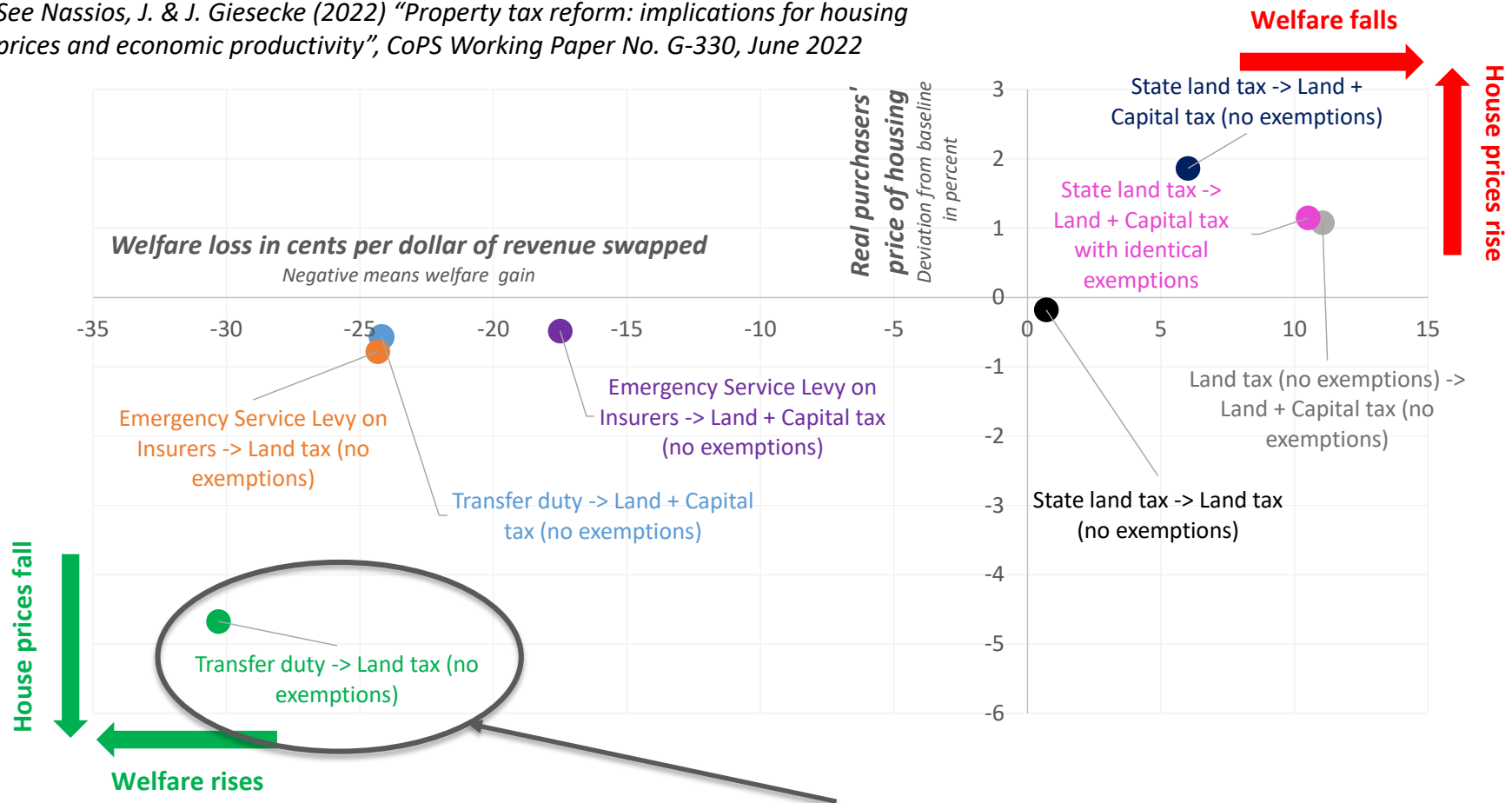
Thinking multi-dimensionally...



Australia has high house prices. Is there a trade-off between tax reform and housing affordability?

...can enrich policy advice!

See Nassios, J. & J. Giesecke (2022) "Property tax reform: implications for housing prices and economic productivity", CoPS Working Paper No. G-330, June 2022



Prices fall on average, but compositional change is evident. In the paper we show why low-density prices fall, yet high-density prices rise.

Thank you