Taxpayers' Behavioural Responses and the 'Laffer Effect'

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MOTU Public Policy Seminar, 19 April 2012

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Motivation

- Increasing micro evidence of various behavioural responses to tax rate changes
- Often summarised in 'taxable income' responses, including:
  - 'real' responses, e.g. labour supply (Chetty, 2011)
  - avoidance responses (Slemrod)
  - Institutional responses, e.g. wage bargaining (Piketty et al, 2011)
- Aggregate 'Laffer curve' well-known but little useful analytical content
- But 'Laffer curve effects' featuring in micro models of optimal tax structure/reform (Werning, 2007)

Outline of the presentation …

- For individuals, we ask: “How big do taxable income responses have to be for a tax rate increase to yield no additional revenue?” (the ‘Laffer maximum’)
- Given a distribution of individuals’ taxable income, how does this translate into aggregate revenue-maximising responses?
- For New Zealand’s income distribution and multi-step income tax structure, how likely are revenue-reducing responses?

Why do we care…?

- Welfare consequences (Pareto inefficiency) when on 'wrong side' of the Laffer curve (Werning, 2007).
  - Marginal excess burden becomes infinite above revenue-maximising tax rate (Saez et al, 2009)
- Needed for tax policy planning & forecasting – consideration of changes in tax structure …
- Needed as component of other models/analyses in which tax revenue changes are relevant

How do we do it …?

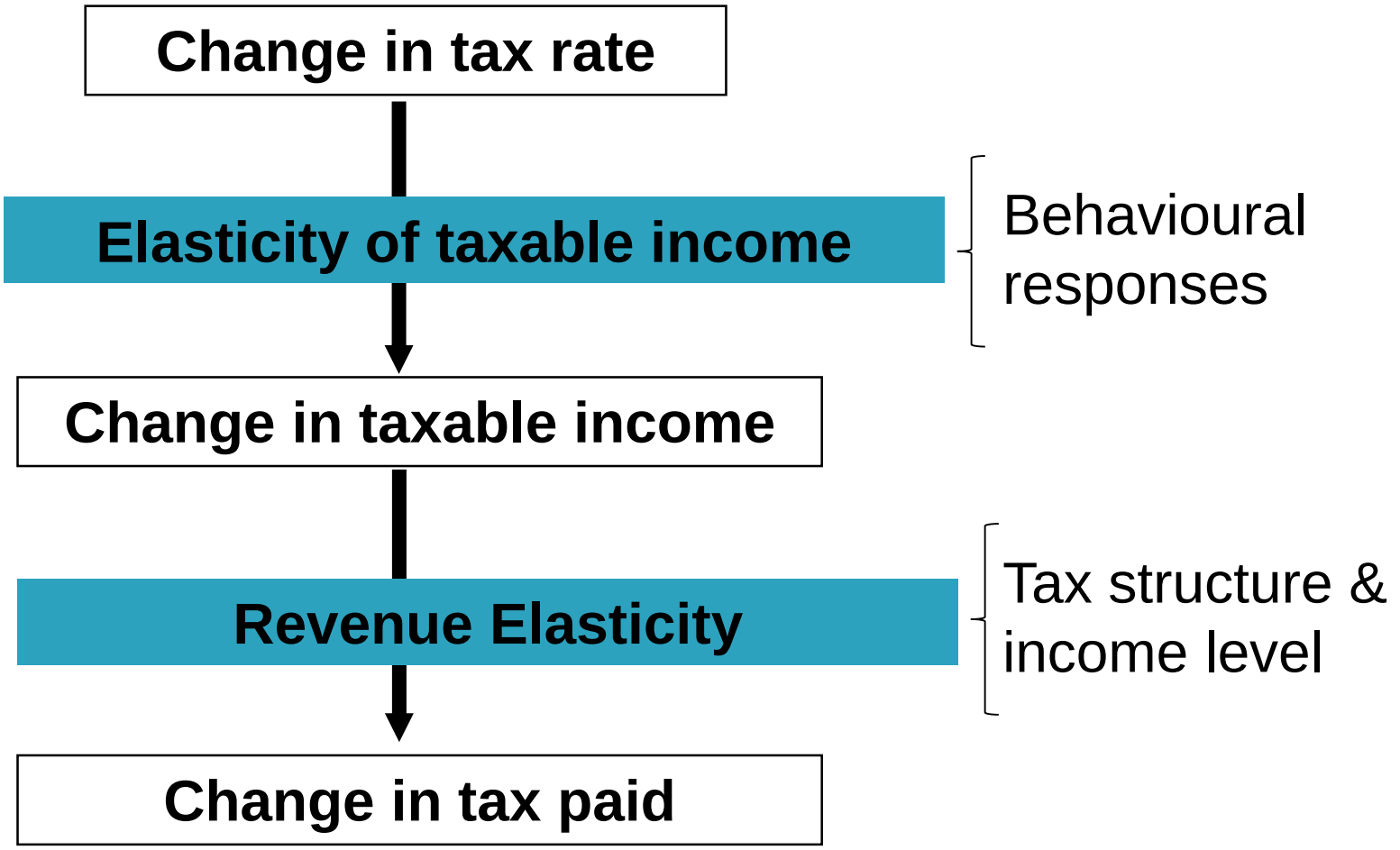
- Bring together two elements of the effect of tax change on tax revenue:
  1. Impact of tax rate change on tax base (income)
  2. Impact of income change on revenues
- No. 1 involves a range of types of adjustment: labour supply; income shifting; non-declaration of income, tax-favoured consumption

  Summarised by Feldstein's (1995) 'elasticity of taxable income':
  Response of taxable income to changes in the net-of-tax rate $(1-\tau)$
- No. 2 captured by the 'revenue elasticity' or 'fiscal drag'

ETI – illustration

Period	τ	$1-\tau$	Income (ETI=0.2)	(ETI=0.4)	(ETI=0.6)
1	0.25	0.75	100	100	100
2	0.20	0.80	101.3	102.7	104.0
% change	−20%	+6.7%	+1.3%	+2.7%	+4.0%

For an individual taxpayer …



Assume no movement into another tax bracket, so no further ‘feedback effects’

Previous literature

- Elasticity of taxable income (ETI) – wide range of estimates … narrowing to 0.2 – 0.6.

  (e.g. Saez, Slemrod, Giertz, *JEL*, 2012)

- Estimates unreliable (instrumental vars) and under-estimated if 'frictions' (Chetty, 2011)

- Revenue elasticity in ETI literature – ignored or treated 'as if' proportional tax (elasticity = 1). SSG examine revenue effect of top rate change.

- Revenue elasticity – examined extensively in fiscal drag literature for practical multi-step income taxes (Creedy & Gemmell…)

The Multi-step Tax Function

The multi-step tax function depends on a set of income threshold, $a_k, ..., a_K$, and a corresponding set of marginal tax rates $\tau_k, ..., \tau_K$. Let the tax paid by individual i with income of y_i be denoted $T(y_i) = T(y_i | \tau_1, ..., \tau_K, a_1, ..., a_K)$. Tax revenue can be written as:

$$\begin{array}{rcll} T(y_i) & = & \tau_1 (y_i - a_1) & a_1 < y_i \leq a_2 \\ & = & \tau_1 (a_2 - a_1) + \tau_2 (y_i - a_2) & a_2 < y_i \leq a_3 \end{array} \quad (1)$$

and so on. If y_i falls into the kth tax bracket, so that $a_k < y_i \leq a_{k+1}$, $T(y_i)$ can be expressed for $k \geq 2$ as:

$$T(y_i) = \tau_k (y_i - a_k) + \sum_{j=1}^{k-1} \tau_j (a_{j+1} - a_j) \quad (2)$$

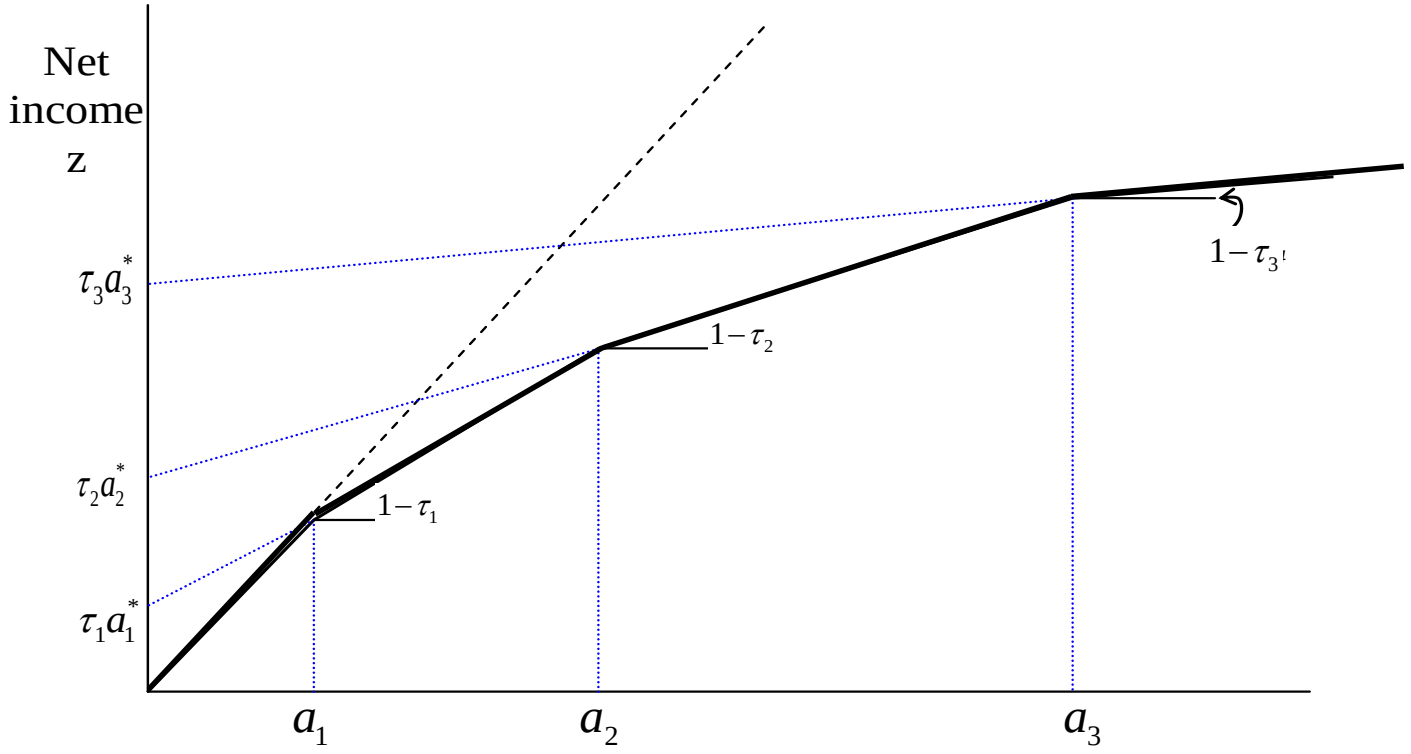
$$\boxed{T(y_i) = \tau_k (y_i - a_k^*)} \quad (3)$$

where:

$$a_k^* = \frac{1}{\tau_k} \sum_{j=1}^{k} a_j (\tau_j - \tau_{j-1}) \quad (4)$$

Net versus gross income

$$z_i = y_i - T(y_i) = \tau_k a_k^* + (1-\tau_k) y_i$$



Measuring elasticities: notation …

Elasticity of *a* with respect to *b* :

$$\eta_{b,a} = \frac{a}{b}\frac{db}{da}$$

A prime (′) indicates a partial elasticity of *a* with respect to *b*: $\eta'_{b,a}$

Elasticity of Revenue w.r.t. MTR (τ_k)

Differentiate (3): $T(y_i) = \tau_k (y_i - a_k^*)$, w.r.t. τ_k :

$$\eta_{T_i,\tau_k} = \eta'_{T_i,\tau_k} + \eta_{T_i,y_i}\eta_{y_i,\tau_k}$$

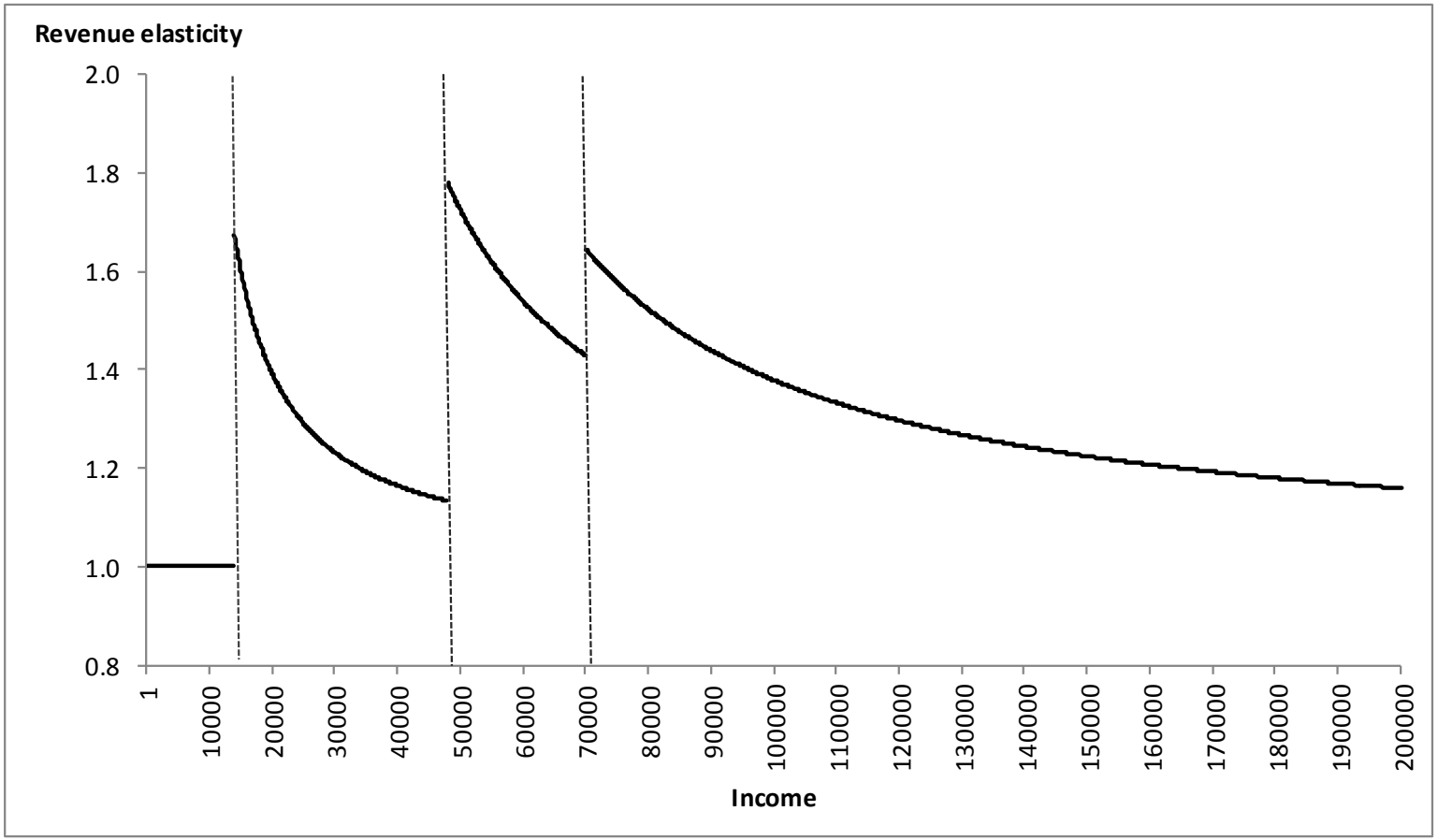
- Mechanical Elasticity
- Revenue Elasticity
- Elasticity of taxable income w.r.t. τ

Mechanical Effect: Elasticity of Taxable Income' (ETI)

$$\eta'_{T_i,\tau_k} = \frac{\tau_k (y_i - a_k)}{T(y_i)} = \frac{(y_i - a_k)}{(y_i - a_k^*)} = \frac{T_k(y_i)}{T(y_i)}$$

income w.r.t. $(1 - \tau)$

Revenue Elasticity Example
New Zealand, 2010



The Revenue Elasticity

$$\eta_{T_i,y_i} = \frac{y_i}{y_i - a_k^*} \geq 1$$

The Mechanical Elasticity

$$\eta'_{T_i,\tau_k} = \frac{\tau_k (y_i - a_k)}{T(y_i)} = \frac{(y_i - a_k)}{(y_i - a_k^*)} = \frac{T_k(y_i)}{T(y_i)}$$

The Elasticity of Revenue w.r.t. $(1-\tau)_k$

$$\eta_{T_i,\tau_k} = \eta'_{T_i,\tau_k} - \left(\frac{y_i}{y_i - a_k^*}\right)\left(\frac{\tau_k}{1-\tau_k}\right)\eta_{y_i,1-\tau_k}$$

Mechanical Effect

Behavioural Effect

The Revenue-maximising ('Laffer') ETI (ETI^L):

Set total elasticity: $\eta_{T_i,\tau_k} = 0$

$$\Rightarrow \quad \eta^L_{y_i,1-\tau_k} = \left(\frac{T_k(y_i)}{T(y_i)}\right)\left(\frac{y_i - a_k^*}{y_i}\right)\left(\frac{1-\tau_k}{\tau_k}\right)$$

> 0 $\quad$ < 1 $\quad$ > 1 or < 1

Mechanical Effect

Behavioural Effect

An ETI larger than ETI^L means REDUCED revenue from tax rate rise

Can identify the ETI assoc with any revenue target, *b*

(ETI^b): set $\eta_{T_i,\tau_k} = b$

$$\eta^b_{y_i,1-\tau_k} = (\eta'_{T_i,\tau_k} - b)\left(\frac{y_i - a^*_k}{y_i}\right)\left(\frac{1-\tau_k}{\tau_k}\right)$$

< 1 $\quad$ > 1 or < 1

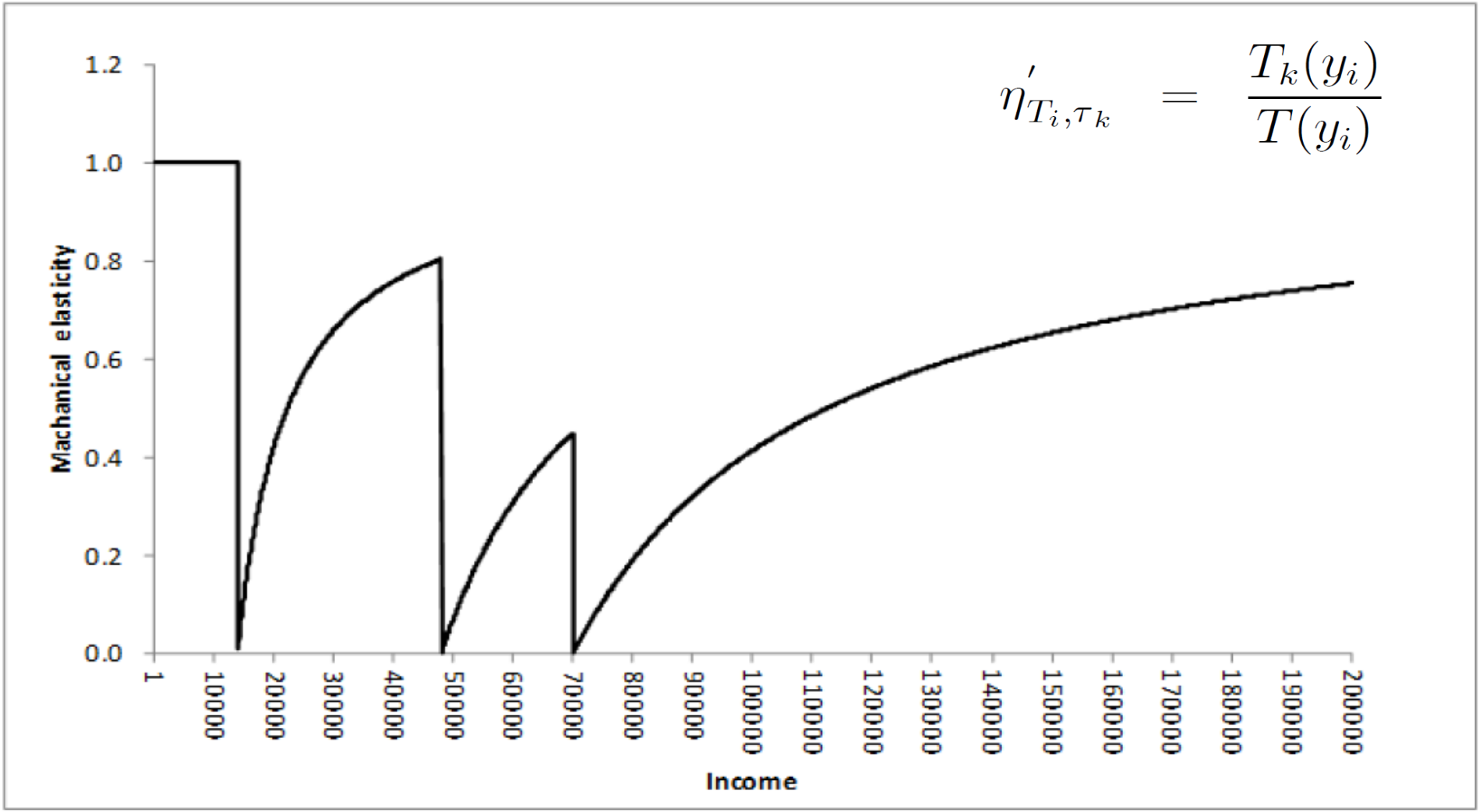
Need not be > 0

NZ revenue-maximising ETIs: single earner, no children

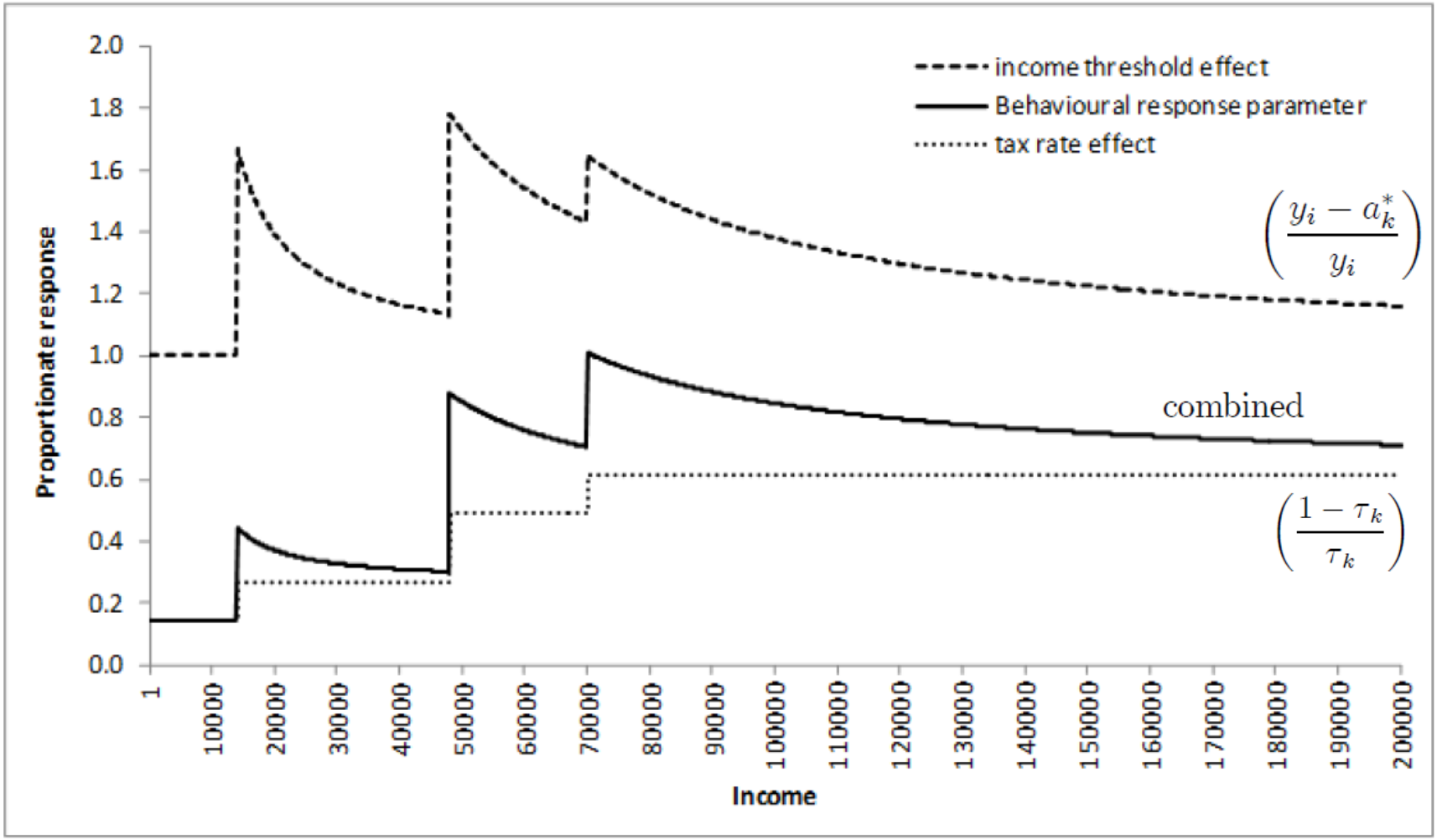
Tax Structure, 2010

	Income threshold	Tax rate	Effective threshold
k	a_k	τ_k	a_k^*
1	1	0.125	1.0
2	14,000	0.21	5667.3
3	48,000	0.33	21061.0
4	70,000	0.38	27500.3

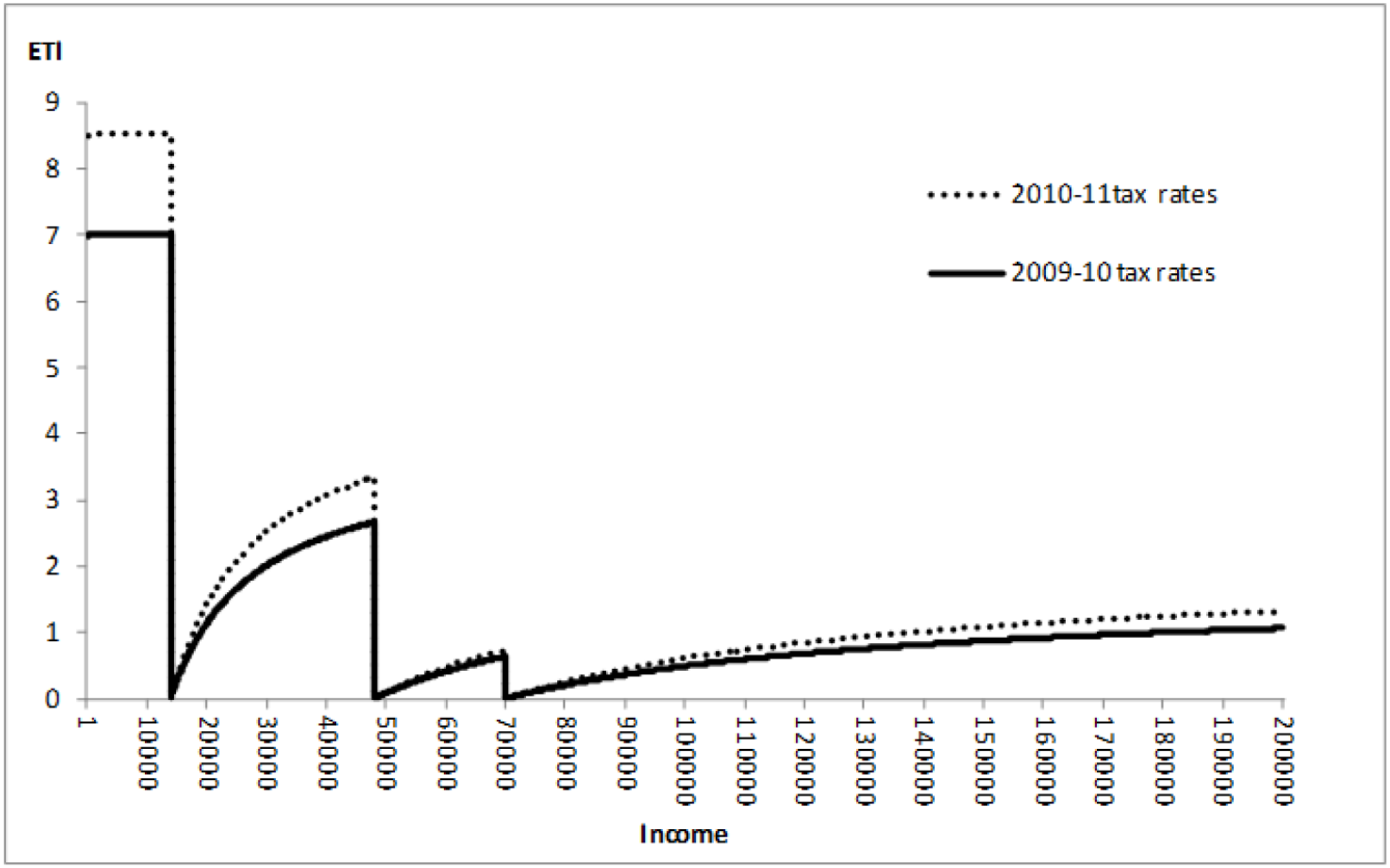
Mechanical elasticities: single earner, no children



Behavioural response components: single earner, no children



ETI^L: single earner, no children

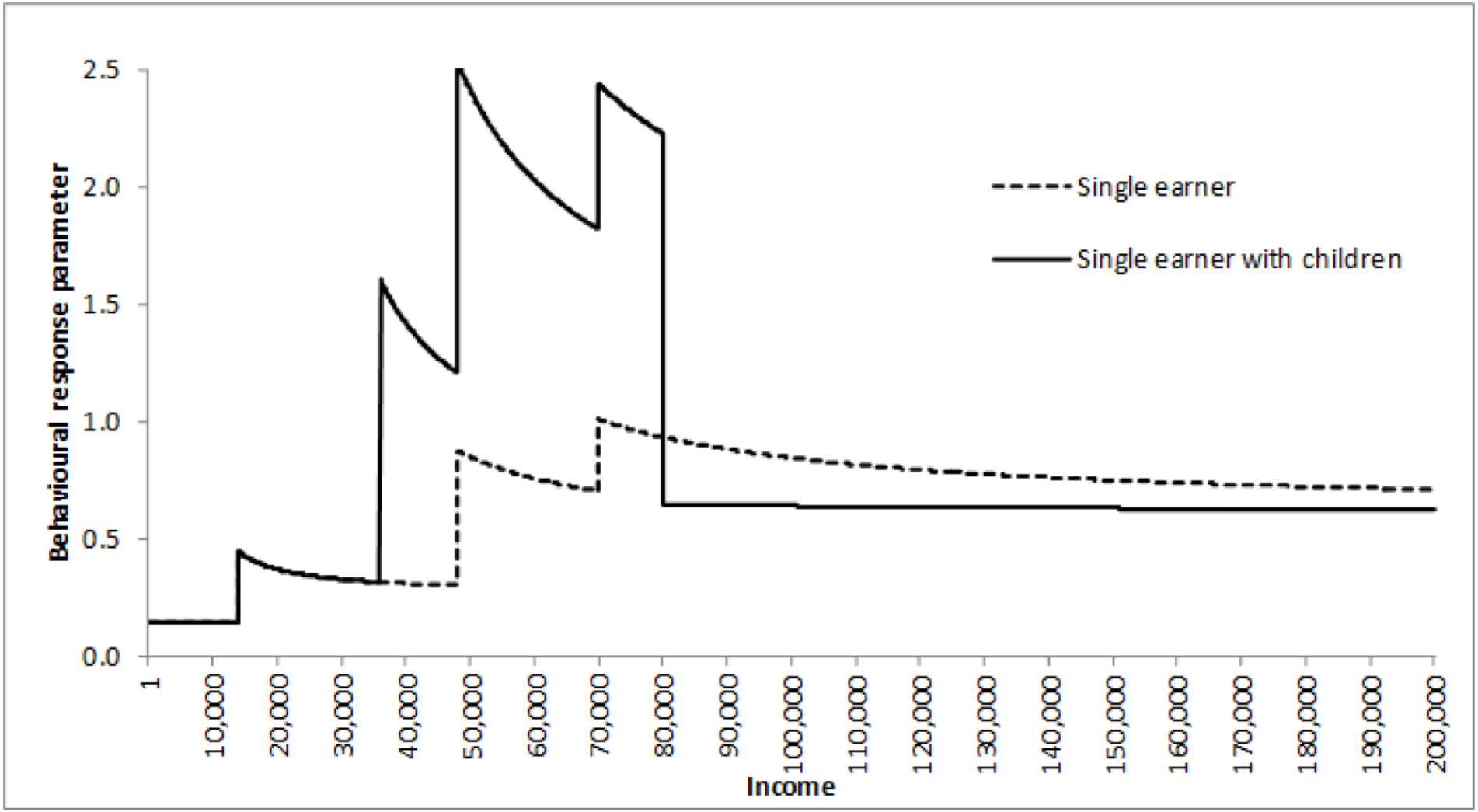


NZ revenue-max. ETIs: single earner with children (example)

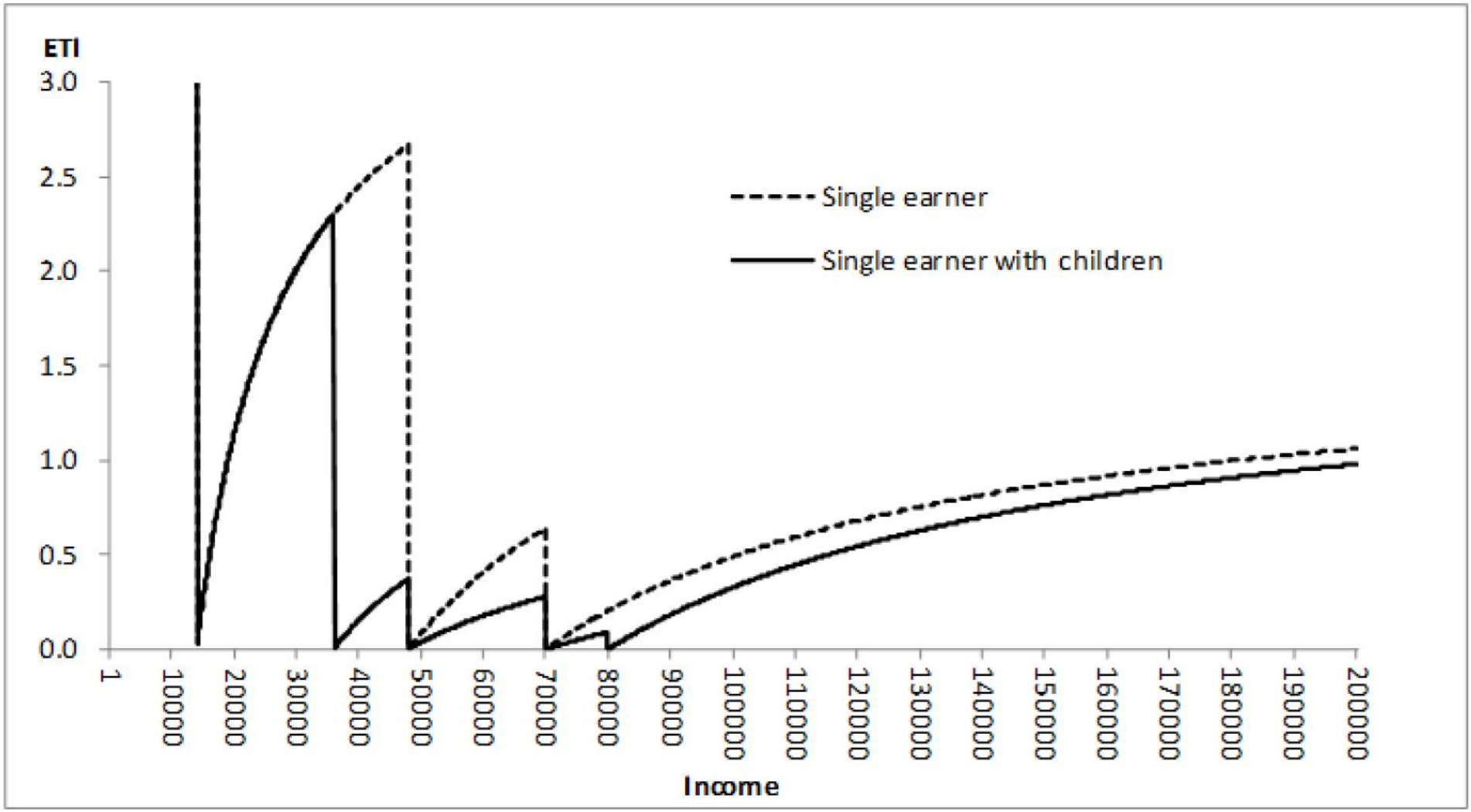
Tax Structure, 2010 (with abatement of WfF)

k	Income threshold a_k	Tax rate τ_k	Effective threshold a_k^*
1	1	0.125	1.0
2A	14,000	0.21	5667.3
2B	36,000	0.41	19488.1
3	48,000	0.53	25943.6
4A	70,000	0.58	29741.6
4B	80,000	0.38	3289.8

Behavioural response: single earner with children



ETI^L: single earner with children



Aggregate ETI^{L}s …

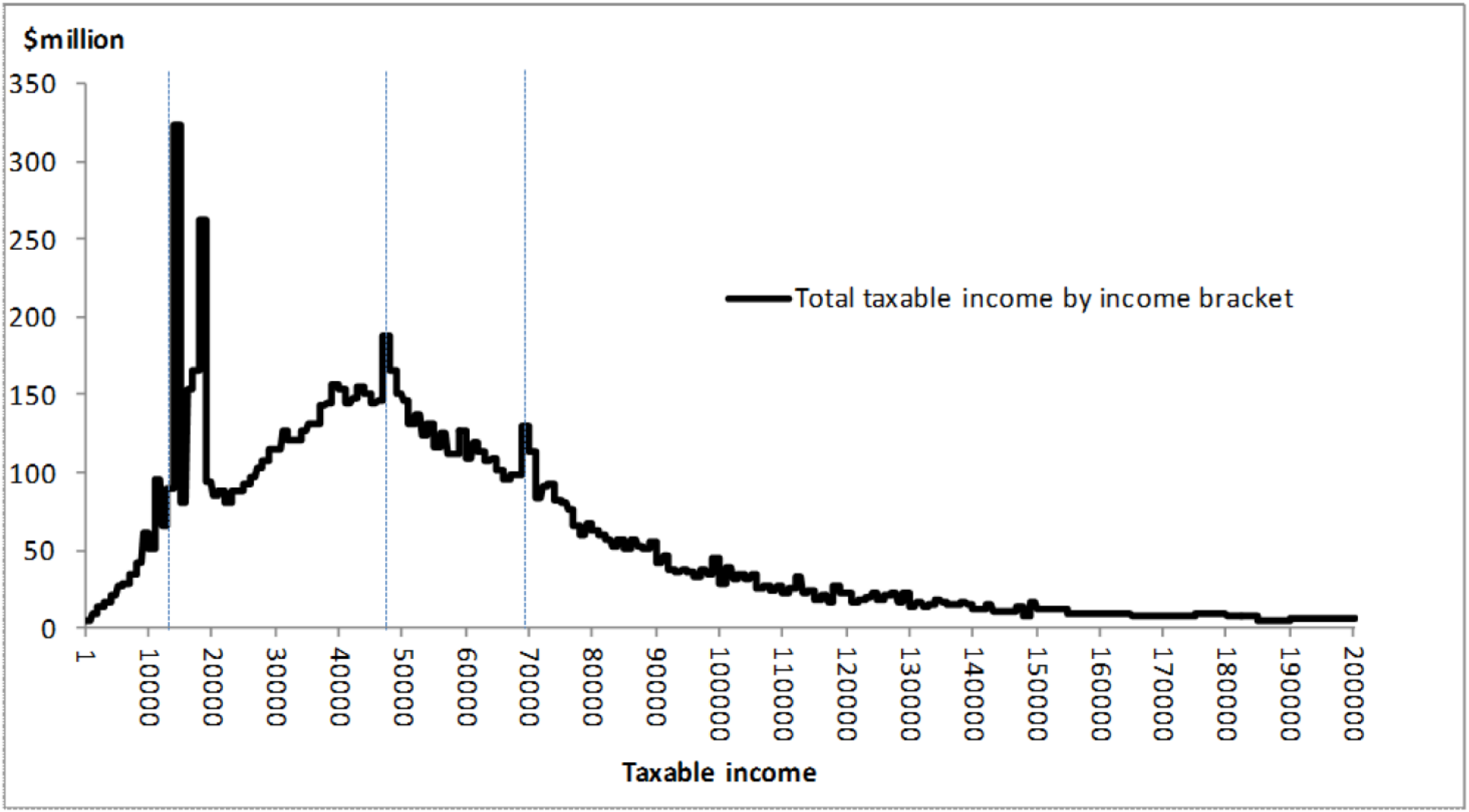
Aggregate ETI^{L}s are an income-weighted average of individuals' ETI^{L}s

$$\eta^{L}_{Y_k,1-\tau_k} = \sum_{i=1}^{N_k} \left(\frac{y_i}{Y_k} \right) \eta^{L}_{y_i,1-\tau_k}$$

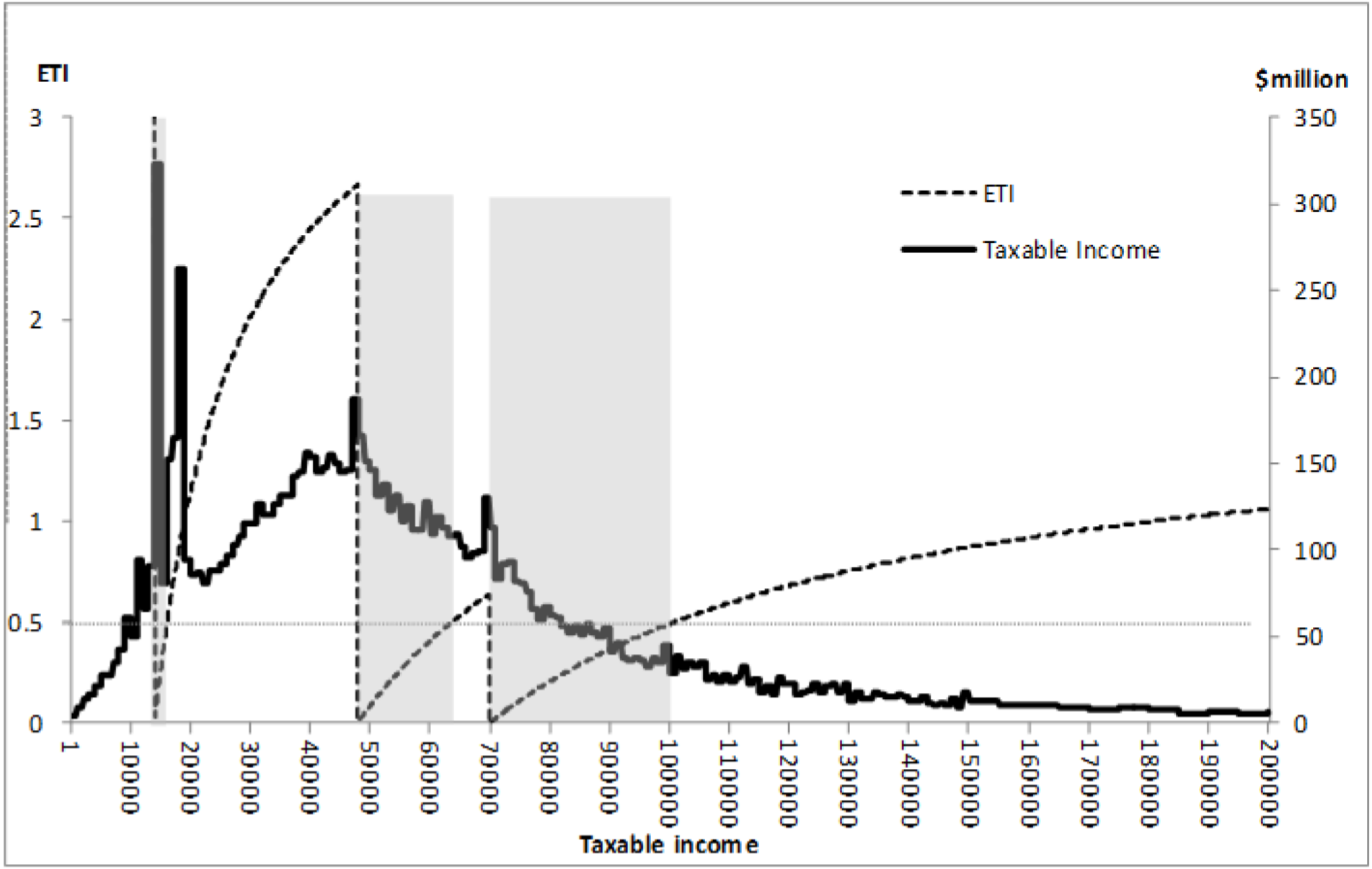
… hence need only information on distribution of taxable income across taxpayer types.

… IRD publishes this for NZ for <u>all</u> taxpayers combined, but not by taxpayer type.

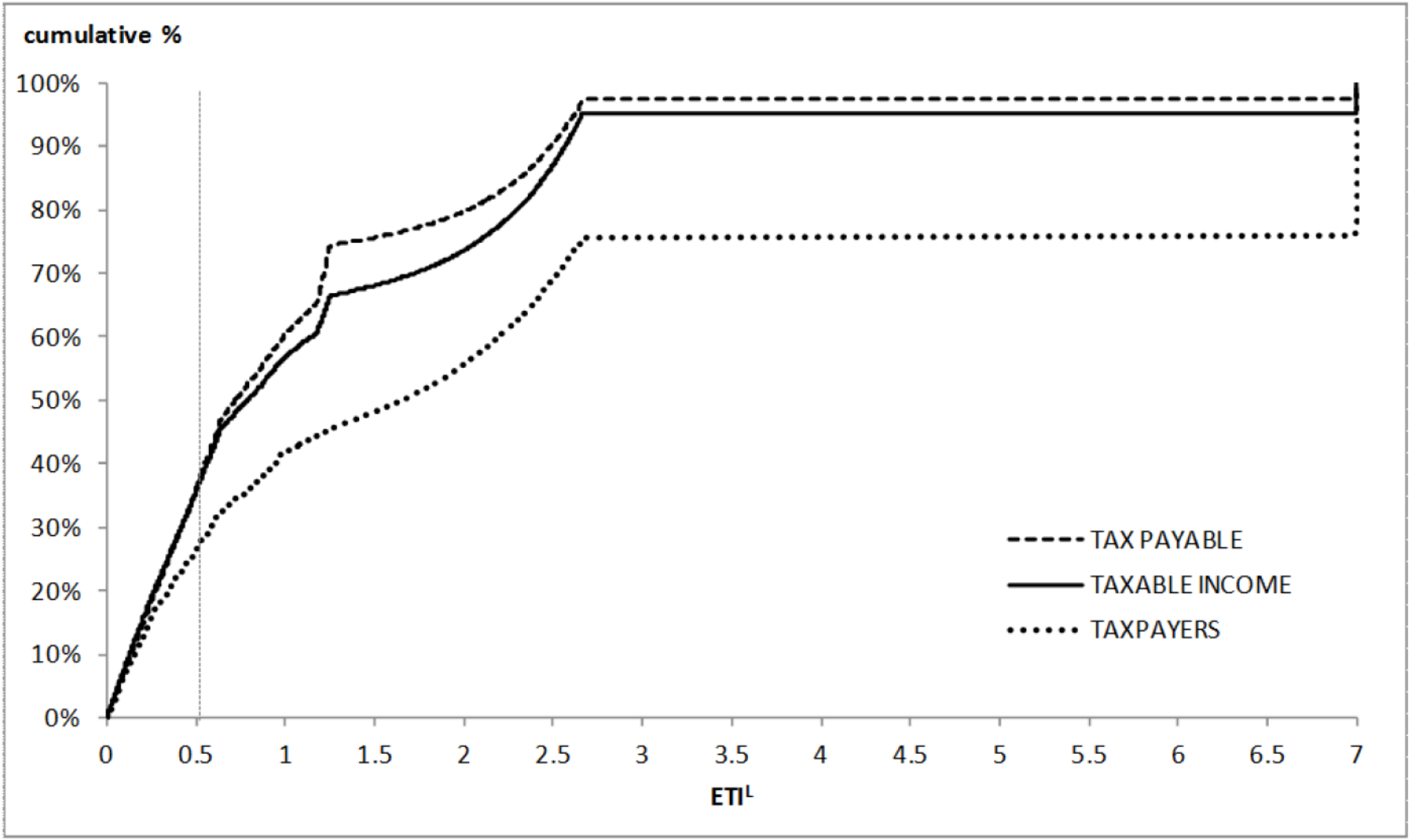
Distribution of taxable income, 2010



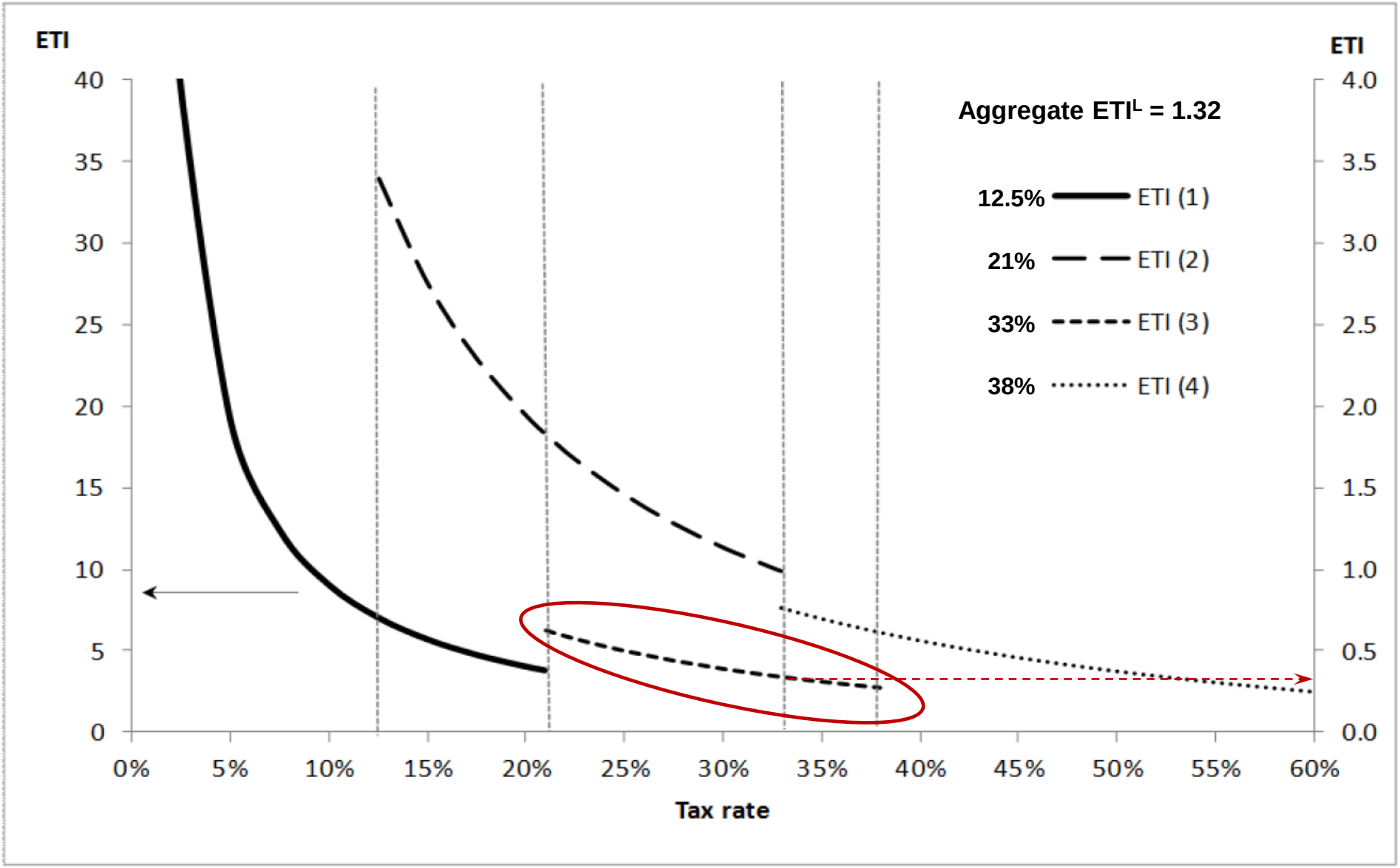
Taxable income distribution & ETI^{L}



Cumulative distribution of ETI^Ls



Simulating changes in MTRs on ETI^{L}s



Simulating changes in MTRs on Aggregate ETI (with/without children)

k	Income threshold a_k	ETI_k^L using τ_ks for: no children	2 children
1	1	7.0	7.0
2A	14,000	1.822	1.375
2B	36,000		0.213
3	48,000	0.338	0.148
4A	70,000	0.616	0.044
4B	80,000		0.621
ALL		1.323	0.892

ETI^L_k : $$\eta^L_{y_i,1-\tau_k} = \eta'_{T_i,\tau_k}\left(\frac{y_i - a^*_k}{y_i}\right)\left(\frac{1-\tau_k}{\tau_k}\right)$$

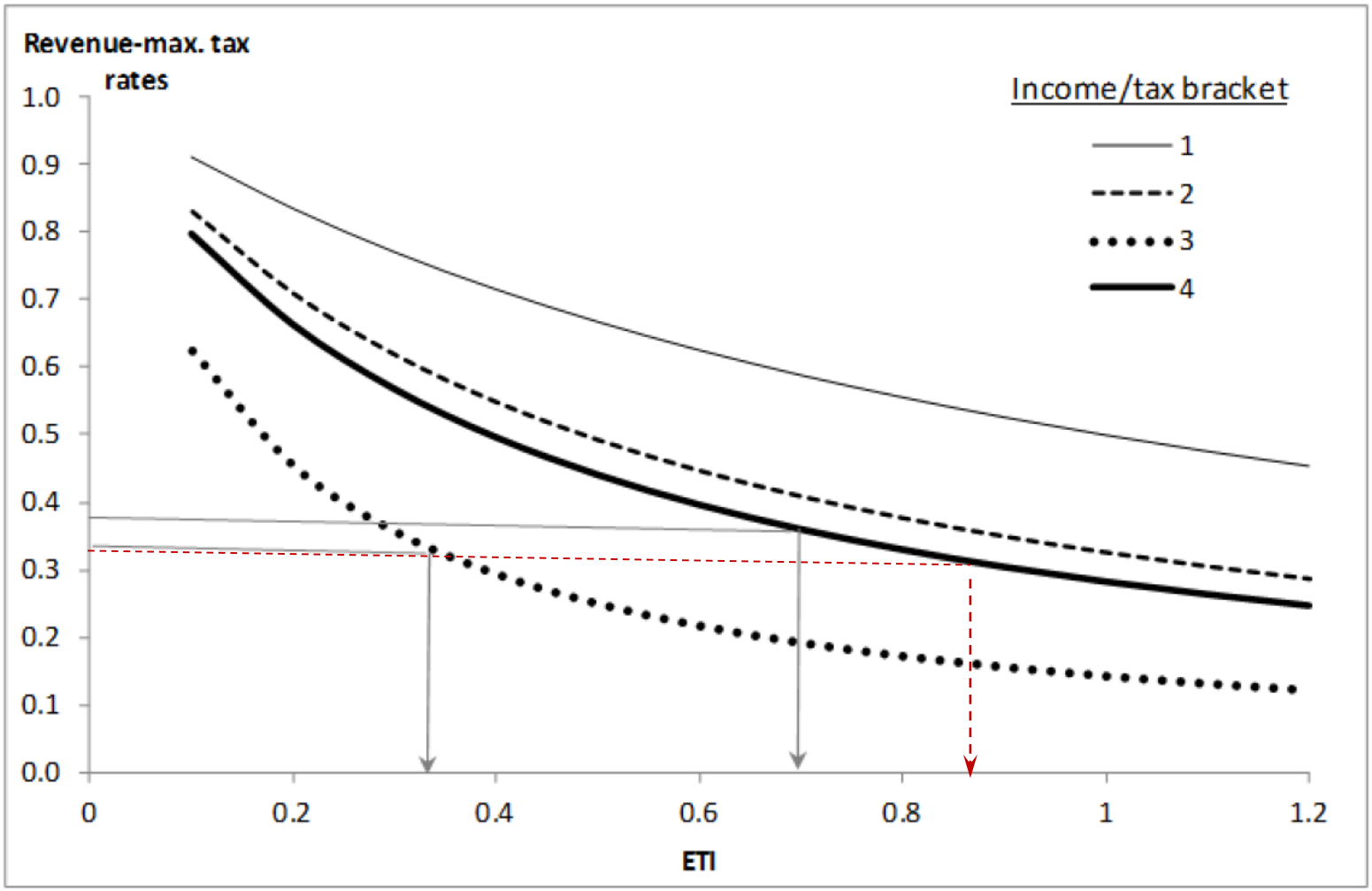
The revenue-maximising tax rate

- Can re-arrange the ETI^L expression to yield expression for the rev-max. tax rate:

$$\tau_k^L = \frac{(y_i - a_k)}{y_i(1 + \eta_{y_i, 1-\tau_k}) - a_k}$$

$$= \frac{1}{(1 + \eta_{y_i, 1-\tau_k})} \quad \text{(proportional tax)}$$

The revenue-maximising tax rate



Conclusions

- Identifying the 'right side' of the Laffer Curve more complex than usually recognised.
  - ETI^{L}s determined by (i) a mechanical effect; (ii) an income threshold effect; (iii) a tax rate effect. Each differs by taxpayer.
- Revenue-negative responses could be more prevalent than is generally supposed.
  - ETI^{L}s found in the estimated range of 'actual' ETIs for significant sub-sets of taxpayers.

Conclusions

- ETI^{L}s for high income taxpayers can be especially low (above but close to thresholds) **and** estimated ETIs generally larger for those taxpayers.
- ETI^{L}s are affected (intentionally or unintentionally) by tax structure changes and exogenous income growth.
- Pareto efficiency requires minimising these revenue-negative responses.