



# ELASTICITY OF TAXABLE INCOME RESEARCH FOR NEW ZEALAND

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# Motivation

**Question:** How does taxable income respond to tax reforms?

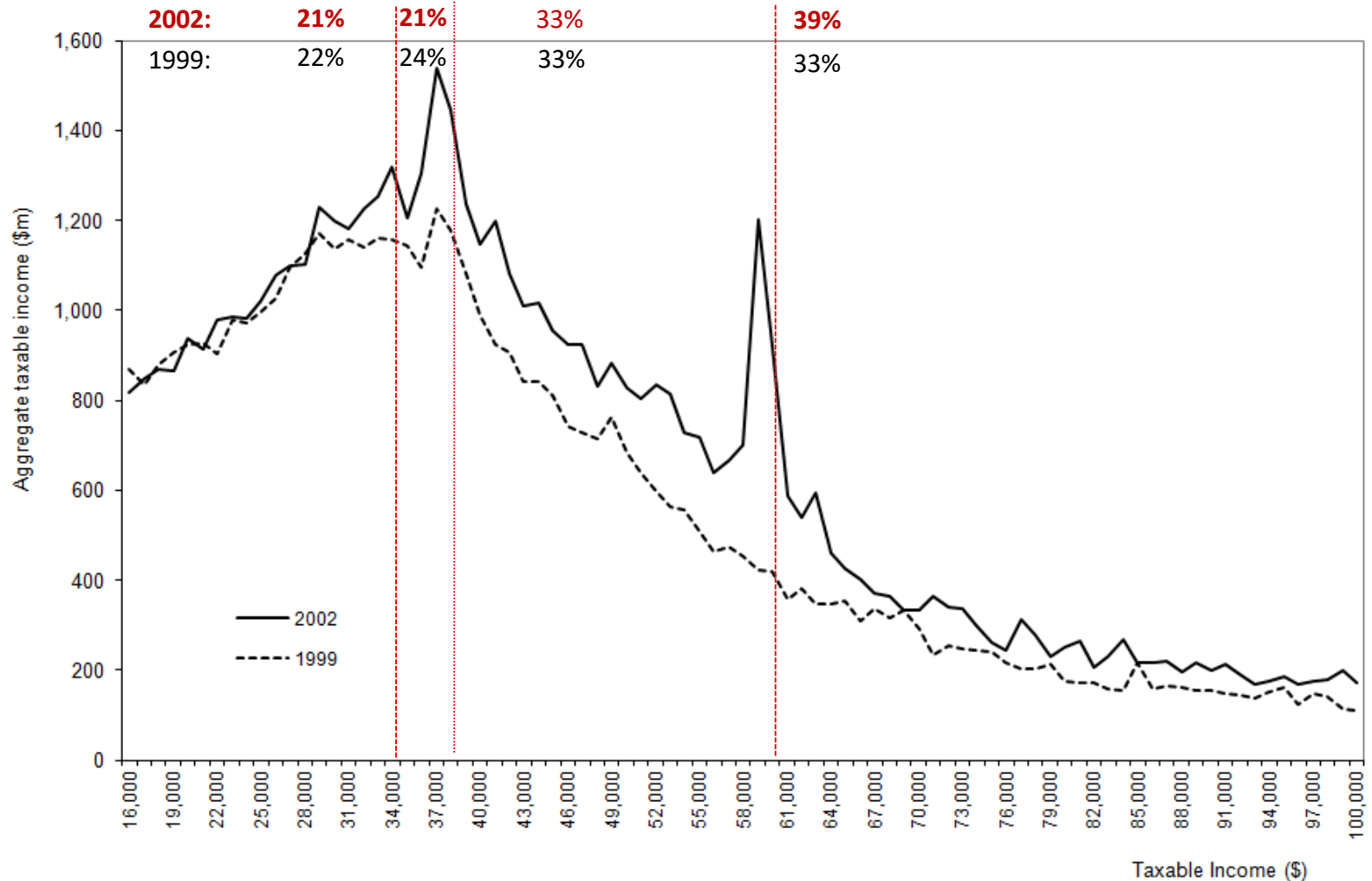
- Captures combined effect of variety of responses (incl. labour supply, tax avoidance, evasion) and directly relevant to projections of revenue outcomes
- Elasticity of taxable income, ETI (Feldstein, 1995):

ETI = responsiveness of taxable income to a 1% change  
in the ‘net-of-tax’ rate  $(1 - \tau)$

- Many empirical estimates using variety of methodologies, mainly for US, Europe  $\Rightarrow$  Saez et al (2012) ‘consensus’: ETI  $\sim$  0.1 to 0.4; Weber (2014): 0.8
- *Our Questions:*
  - How did NZ taxpayers react to major changes in 2001? (Econ. Rec. 2015)
  - Are income effects important?; should we use IV or OLS methods? (NZEP 2017)
  - What about 2010 tax reforms? (work-in-progress: MBIE project)
- In all cases we use regression approach but could adopt other methods: e.g. ‘bunching estimator’ – bunching (excess mass) at kinks in tax schedule ...

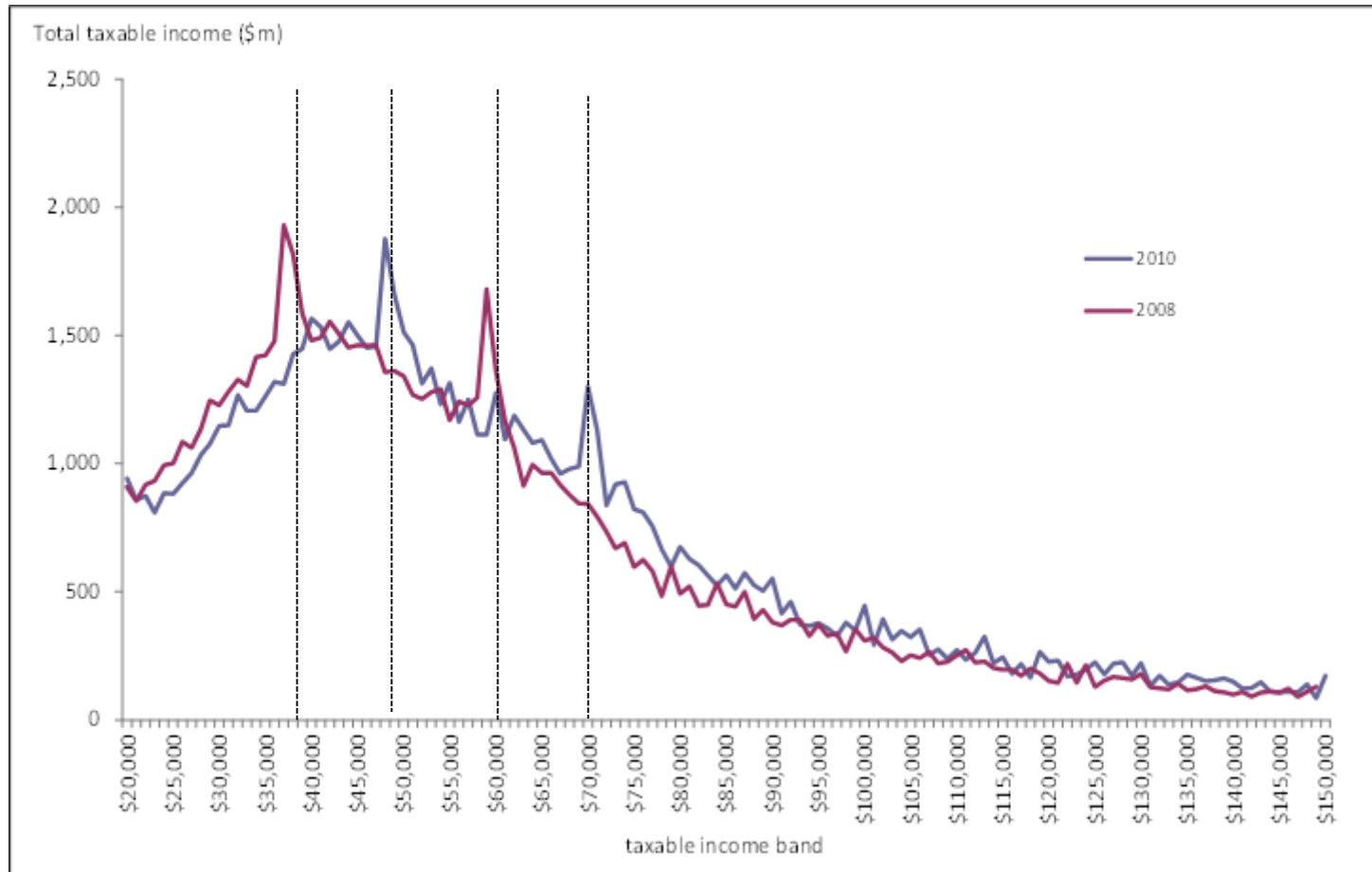
# The Kinks ...

... The 'raw data' suggestive of substantial taxable income reactions via 'excess mass' spikes around kinks in tax schedule.



# The KINKS

... The 'raw data' suggestive of substantial taxable income reactions via 'excess mass' around kinks.



# Regression approaches: issues

- Well-known OLS bias in presence of multi-rate income taxes:
  - ... incomes respond to the MTR, but MTR depends on income
- Use IV with ‘standard instrument’: post-reform tax rate *with unchanged income* to predict ‘correct’ MTR after reform (Gruber-Saez, 2002)

But:

- Annual income subject to temporary shocks and regression towards the mean.  $\Rightarrow$  standard instrument may not solve inconsistency of OLS under plausible assumptions about income generating process (Weber)
  - Most attempts to deal with this involve adding lagged income terms to regressions
- So-called ‘treated’ and ‘untreated’ may not only differ in tax reform exposure? (e.g. non-random selection for treatment).
- **Weak** instrument with volatile income dynamics (exogenous). Largely ignored but important in NZ data.
  - Income in post-reform years likely very different from pre-reform *even with no tax reform*
  - Can we find a way to proxy for post-reform incomes in ‘*no tax reform counterfactual*’

# ETI regressions

- Typical ETI regression:

$$\Delta \ln y_{i,t} = \alpha + \eta * \Delta \ln(1 - \tau_{i,t}) + \beta * N_{i,t} + u_{i,t}$$

$\Delta \ln y_{i,t}$  = change in log income

$\Delta \ln(1 - \tau_{i,t})$  = change in log net-of-tax rate

$\eta$  = ETI estimate

$N$  = other variables e.g. population, age

$i$  = individual taxpayer

$\Delta$  = change before/after reform years

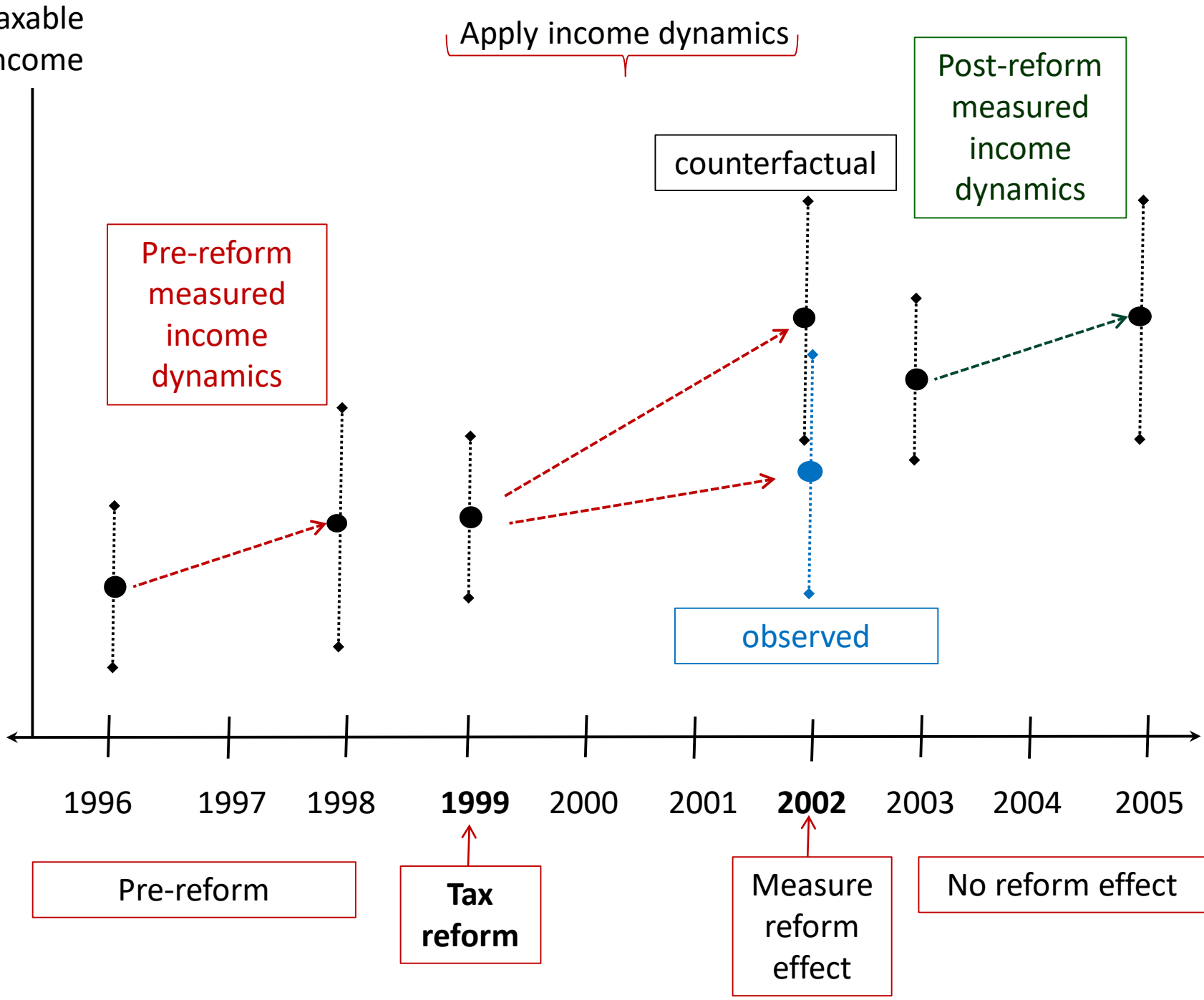
- Need instrument,  $z_{i,t}$ , for  $(1 - \tau_{i,t})$  that is truly exogenous and captures counterfactual post-reform year incomes
- We estimate income dynamics for years when no tax reform and use estimates parameters ‘cast forward’ from pre-reform year incomes
- Specify dynamics to incorporate both *regression towards the mean* and *serial correlation* in relative income changes:

$$\ln y_{i,t} - \mu_t = \alpha_1 (\ln y_{i,t-1} - \mu_{t-1}) + \alpha_2 (\ln y_{i,t-2} - \mu_{t-2}) + u_i$$

- Parameters  $a_1$  and  $a_2$  used to project counterfactual incomes after reform year



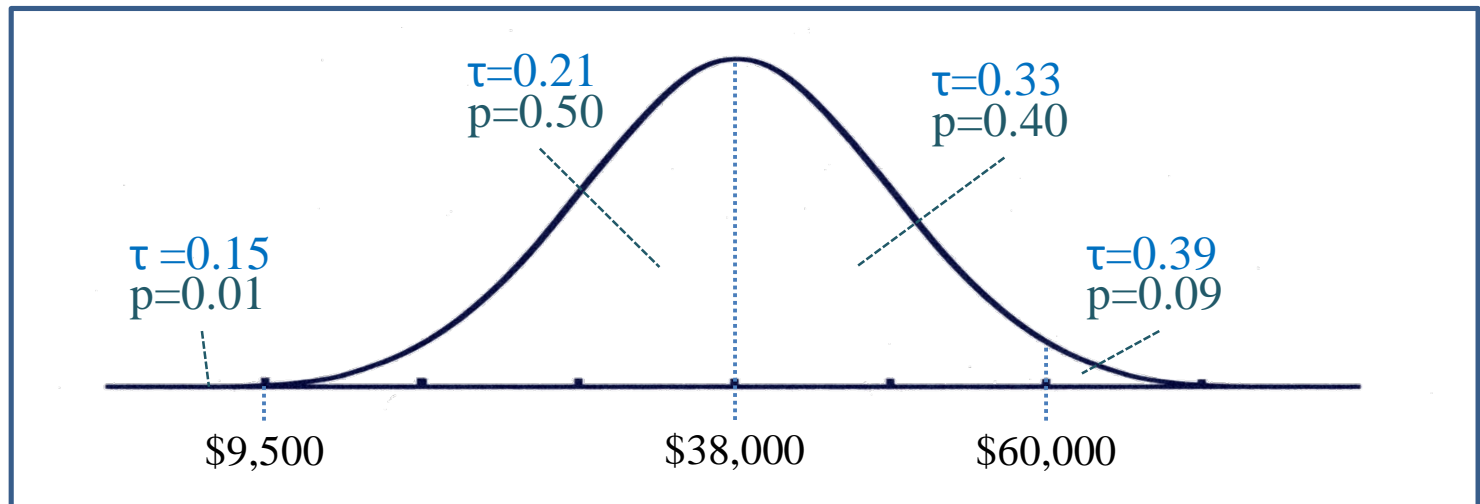
Taxable income



# Instruments



- Two new counterfactual instruments:
  - Tax rate applicable to ‘expected (mean) income’ for post-reform year:  $\tau @ E(y)$
  - ‘Expected tax rate’,  $E(\tau)$ , based on weighted average from full distribution of possible incomes for post-reform year
- Example:



$$E(\tau) = 0.15 \times 0.01 + 0.21 \times 0.50 + 0.33 \times 0.40 + 0.39 \times 0.09 = 0.27$$



# ETI Results

	Standard Instrument	Expected Income Instrument	Expected Tax Rate Instrument
ETI coefficient	<b>-175.027</b>	<b>0.575</b>	<b>0.676</b>
t-statistic	<b>-0.11</b>	<b>1.99</b>	<b>5.39</b>
Significant?	<b>no</b>	yes (95%)	yes (99%)
'Other income' t-statistic	<b>-0.11</b>	5.71	6.52

$N = 38,744$  taxpayers (original random sample = 138,464 in 1999): weighted  $\approx 804,000$ )

$\Delta \ln \tau \approx +18\%$  (33%  $\rightarrow$  39%) implies:  $\Delta \ln(1 - \tau) \approx -9\%$  (67%  $\rightarrow$  61%)

ETI = 0.67 implies:  $\Delta y$  response  $\approx -6.0\%$

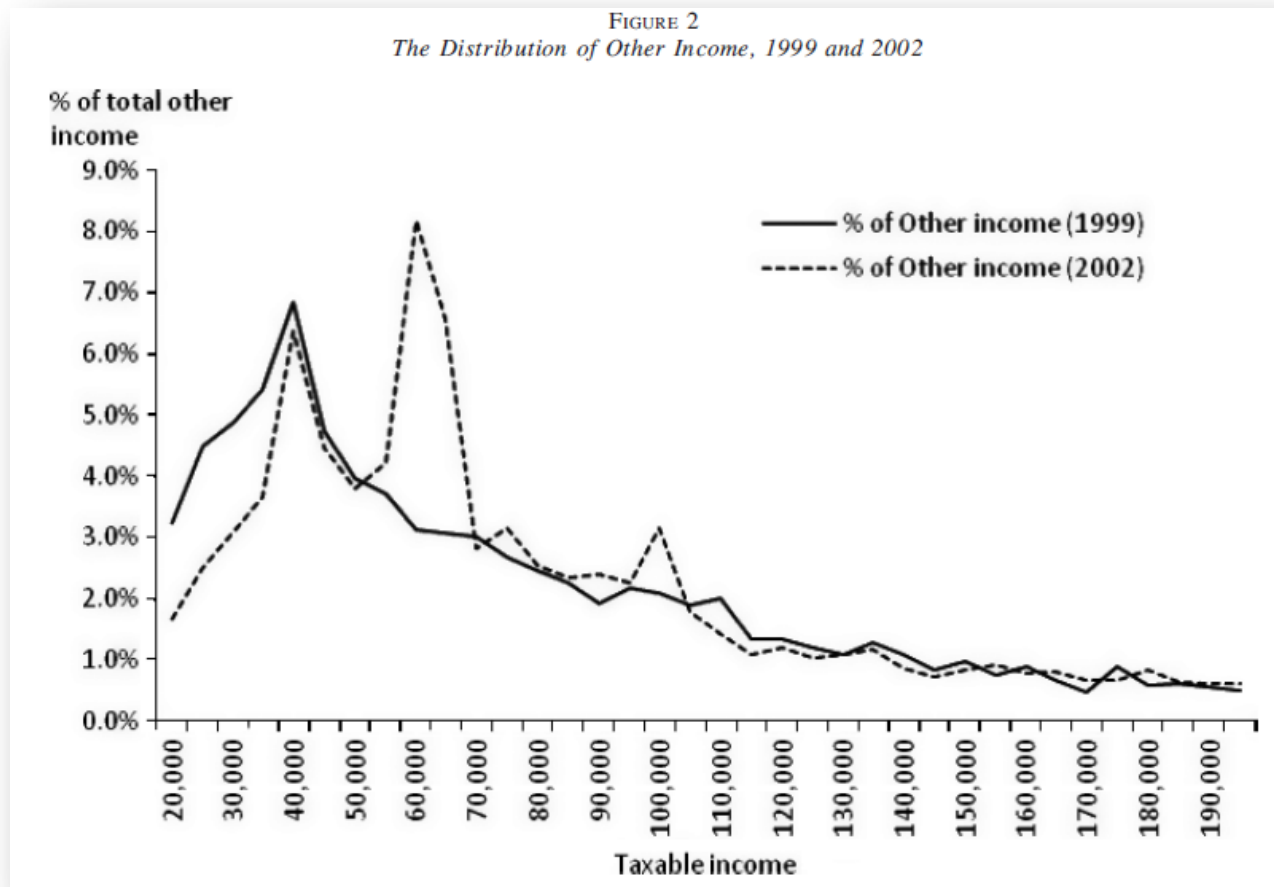
ETI = 0.58 implies:  $\Delta y$  response  $\approx -5.2\%$

# ETI coefficients by income & taxpayer type

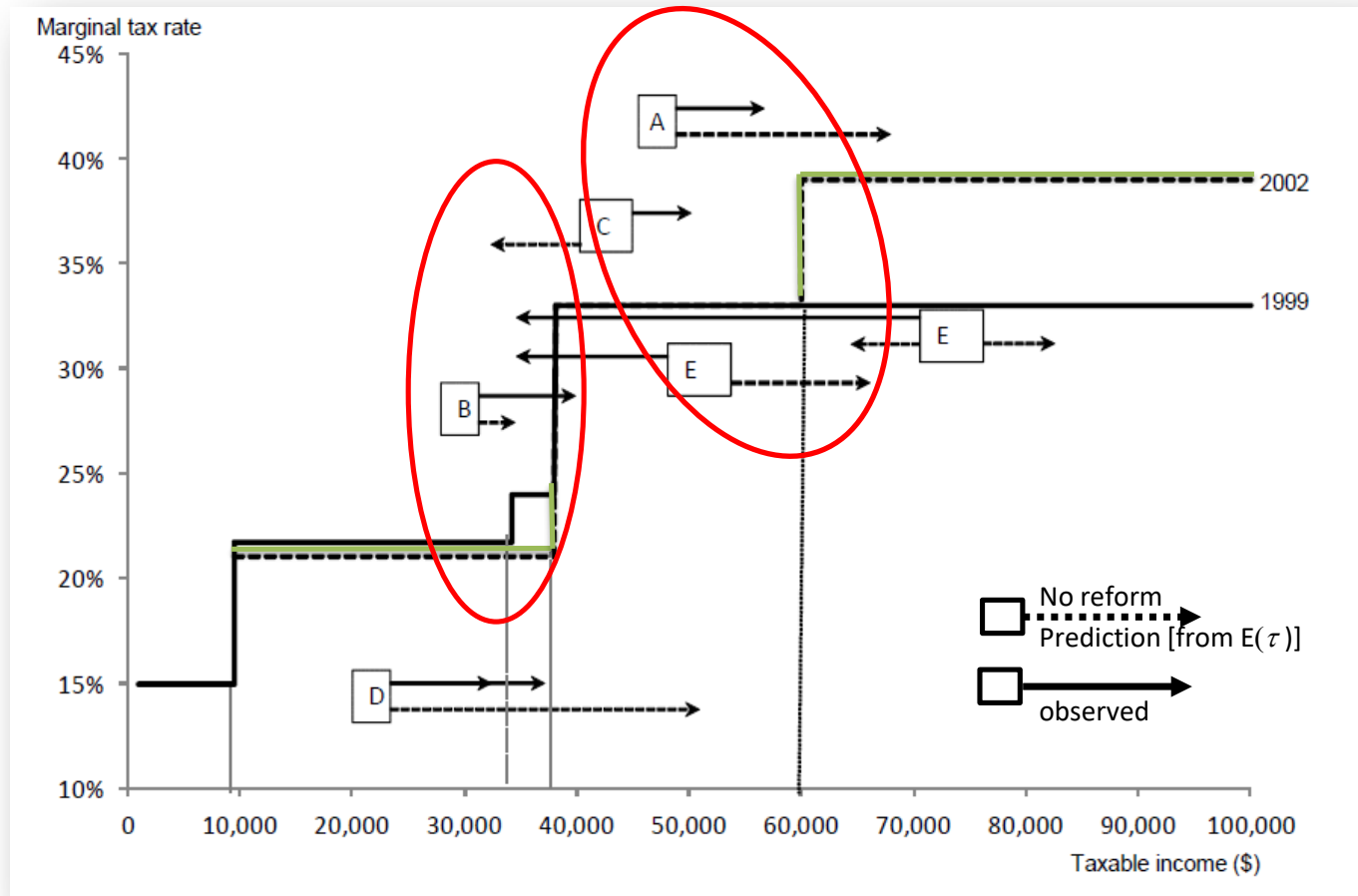
		Coefficient	t-statistic
By income type	wage/salary income	<b>0.414</b>	<b>2.39</b>
	other income (additional)	<b>0.495</b>	<b>2.13</b>
By taxpayer type	with other income	<b>0.514</b>	<b>3.65</b>
	without other income	<b>0.190</b>	<b>0.88</b>
Taxpayers <i>with other income</i> 1999 & 2000	all income	<b>0.220</b>	<b>1.53</b>
	other income	<b>2.484</b>	<b>7.28</b>

# ‘Other income’ responses –

Is this suggestive evidence of couples’ behaviour?



# Observed income responses: five groups



Reform-induced movements ... did they involve *family* income sharing?

# NZEP 2017 ...

Deals with two issues: income effects and ‘OLS versus IV’

- Should we allow for income effects – and how?
  - Higher top tax rates lead to lower after-tax incomes (a ‘virtual income’ or ‘average tax rate’ effect) and less incentive to declare incomes via marginal rate effect.
  - Do taxpayers respond to the lower after-tax incomes by earning *more* taxable income (separate from *reduced* taxable income from MTR effect)?
- Does our counterfactual tax rate variables deal with endogeneity?
  - If so, is OLS with ‘proxy variable’ better than (less efficient) IV?
  - What about measurement error in the counterfactual variables? ... projected forward, *with random error component*, from income dynamics regression.
  - Lead to downward biased ETI estimate?
- NZEP (2017) find little support for income effects:
- But find:
  - OLS expected tax rate proxy: ETI = **0.375** ( $t = 5.75$ )
  - OLS expected tax rate proxy (incl. income effects): ETI = **0.520** ( $t = 5.79$ )  
[previously ETI = 0.676]
  - OLS ‘standard instrument’ used as proxy: ETI = **0.312** ( $t = 2.63$ )

# Analysing 2010 tax reform?

*Question:* Can we apply previous methods to estimate ETIs from 2010 reforms?

- *Various complications:*
  - All income tax rates change similarly except top rate (no diff-in-diff? but – capture responses across whole income distribution)
  - GST raised (do we expect ETI response to GST rate?)
  - Corporate tax rate reduced & other changes to corp./property tax regime
  - Concurrent GFC effects, 2009-11
- *‘Optimising frictions’:*
  - 2001: Likely frictional costs assoc. with diverting income to avoid new 39% PIT rate (trusts, incorporation). For many, these worth incurring in 2001.
  - 2010: No similar costs to ‘switching back’ for top rate payers, but why switch?  
Will ‘new’ taxpayers moving over \$70k threshold no longer incur these costs; therefore fewer divert income from PIT? (⇒ will it take time to observe?)  
Will existing taxpayers over \$70k now declare more PIT?
- *IV versus OLS:* Even if our new instruments deal with all ‘transitory v permanent’ income concerns, do we still need IV to deal with measurement error biases? (ER versus NZEP)
- *Couples’ income sharing:* could not address with 2001 reform and IR data, but IDI could provide household-level information



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Questions / Comments