



Estimating Firm-Level Effective Marginal Tax Rates and the User Cost of Capital in New Zealand

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Introduction

Question: To what extent do taxes distort the cost of capital for NZ firms?

Sub-Questions:

1. Does the effect differ across firms? (If so, how?)
2. Are there differences between domestic & foreign firms?
3. How did tax reforms since 2000 affect capital costs?



Motivation

Why are we interested?

1. Domestic capital taxes can distort the international competitiveness of NZ firms
2. Differences in tax effects across firms and industries can distort investment and financing choices – e.g. *where* to invest; debt versus equity funding
3. If user cost differences affect investment, UCCs may provide convenient instrument in “exporting \leftrightarrow investment” debates
4. How does the N.Z. imputation system affect outcomes?



How do taxes affect capital costs?

Two main measures:

- User cost of capital (UCC)
- Effective (average & marginal) tax rates

User cost:

- *Forward-looking* measure for hypothetical marginal investment
- What rate of return does an investment have to earn *before tax*, to yield a given, required, rate of return *after tax*?
- *required after-tax* rate of return = return available on alternative investment, r^* .

EMTR:

- Percentage difference between pre-tax and post-tax marginal rates of return



How do taxes affect capital costs?

Tax affects the UCC via:

- *Statutory* tax rate
- *Depreciation* allowances
- *Losses* tax treatment [affects *when* depreciation is claimed]
- *Inflation* [& whether depreciation nominal or real]
- *Financing*: tax treatment of debt versus equity
- *Marginal investor's* tax rate (shareholder-level versus corporate-level taxation)

User Cost of Capital

'Net' user cost:

$$C_{net} = \frac{\overbrace{\{1 - \tau(Z + k)\}}^{\text{Tax component}} \overbrace{(r^* + \delta)}^{\text{Gross return}}}{\underbrace{1 - \tau}_{\text{Gross UCC}}} - \delta$$

where:

τ = statutory corporate tax rate

Z = present value of depreciation allowances

k = rate of investment allowance (NZ: 'depreciation loading')

r^* = real cost of funds (= required after-tax rate of return)

δ = rate of economic depreciation

Various studies work with 'gross' user cost: $C = \frac{\{1 - \tau(Z + k)\}(r^* + \delta)}{1 - \tau}$

Depreciation

Net user cost:

$$C_{net} = \frac{\{1 - \tau(Z + k)\}(r^* + \delta)}{1 - \tau} - \delta$$

Z = present value of depreciation allowances (discounted at the *nominal* interest rate, i)

$$Z = \frac{\delta^*}{1+i} \left(1 + \frac{1-\delta^*}{1+i} + \left(\frac{1-\delta^*}{1+i} \right)^2 + \dots \right) = \frac{\delta^*}{i + \delta^*}$$

δ^* = **fiscal** depreciation rate

- Normally **real** depreciation only (not nominal)
- Fiscal (& economic) depreciation rates vary by asset: land, buildings, vehicles, computers etc

⇒ UCC differs by firms' asset structures / technology

Required Rate of Return, r^*

Net user cost:
$$C_{net} = \frac{\{1 - \tau(Z + k)\}(r^* + \delta)}{1 - \tau} - \delta$$

r^* = real cost of funds = required after-tax real rate of return

δ = economic depreciation rate

- Nominal returns taxed, therefore r^* depends on inflation rate, π .
- Foreign-source equity finance: $r^* = r_E = r_{\text{World}}$
- Foreign-sourced debt finance is tax deductible: $r^* = \left[r(1 - \tau) - \frac{\tau\pi}{1 + \pi} \right]$
- Domestic-sourced: both equity and debt are taxed at marginal rate
- What is that marginal rate?:
- Full imputation = personal MTR $\Rightarrow r^* = \left[r(1 - m) - \frac{m\pi}{1 + \pi} \right]$

where m = top MTR?

EMTRs

Net user cost: $C_{net} = \frac{\{1 - \tau(Z + k)\}(r^* + \delta)}{1 - \tau} - \delta$

Effective marginal tax rate: $EMTR = \frac{r - r^*}{r} = \frac{(C_{net} - r^*)}{C_{net}}$

Gross-of-tax return \swarrow \nwarrow Net-of-tax return



Applying the Analysis to LBD Data ...

Sample: Approx. 185,000 firms across 16 industry groups

Firm characteristics:

- Ownership: foreign defined as >50% foreign equity or self-declared as 'foreign-owned' (1.5% of firms; 25% of assets)
- Very different asset composition across industries
- Finance source: foreign firms on average have higher debt/asset ratios

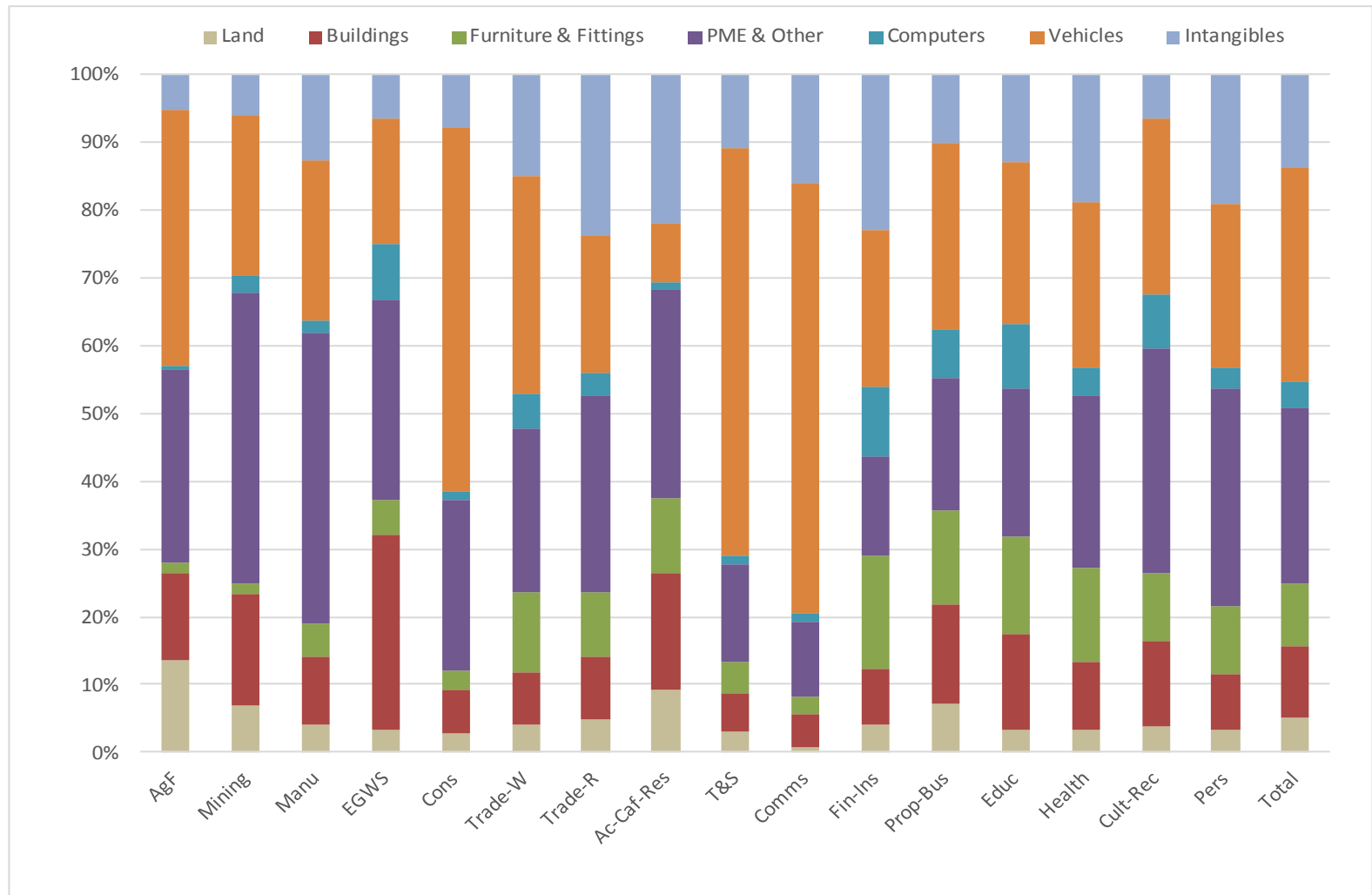
Tax changes:

- Corporate tax rates: decreasing over time
- Marginal personal tax rates: decreasing over time
- Asset-specific fiscal depreciation allowances; change over time

Assumed values, constant over time:

- Inflation (2%)
- World real interest rate (5%)

Asset Structure by Industry, 2010



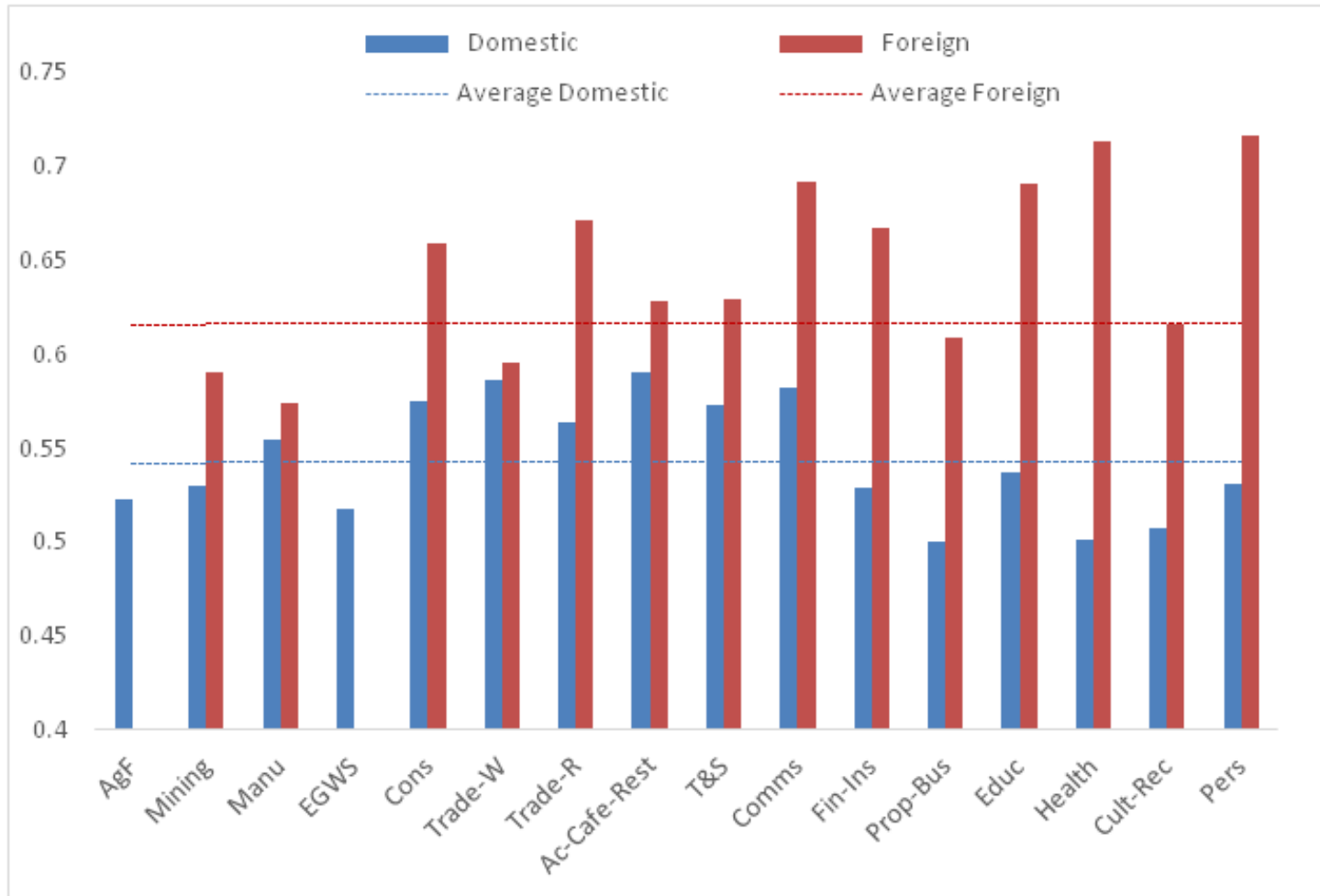
*Key message: asset structures very **different** across industries*

Weighted Depreciation by Industry, 2010

| | Buildings | Furniture | PME | Computers | Vehicles | Intangibles | Total |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Fiscal depreciation rates (excluding loading) | | | | | | | |
| | 0.03 | 0.16 | 0.25 | 0.50 | 0.25 | 0.20 | - |
| Asset-weighted depreciation rates | | | | | | | |
| AgF | 0.004 | 0.003 | 0.071 | 0.003 | 0.094 | 0.011 | 0.185 |
| Min | 0.005 | 0.003 | 0.107 | 0.013 | 0.059 | 0.012 | 0.199 |
| Manu | 0.003 | 0.008 | 0.108 | 0.010 | 0.059 | 0.026 | 0.212 |
| EGWS | 0.009 | 0.008 | 0.074 | 0.042 | 0.046 | 0.013 | 0.191 |
| Con | 0.002 | 0.004 | 0.063 | 0.007 | 0.134 | 0.016 | 0.226 |
| Trade-W | 0.002 | 0.019 | 0.061 | 0.026 | 0.080 | 0.030 | 0.218 |
| Trade-R | 0.003 | 0.015 | 0.073 | 0.016 | 0.051 | 0.048 | 0.205 |
| A-C-R | 0.005 | 0.018 | 0.077 | 0.005 | 0.022 | 0.044 | 0.171 |
| T&S | 0.002 | 0.008 | 0.036 | 0.007 | 0.150 | 0.022 | 0.224 |
| Comm | 0.001 | 0.004 | 0.028 | 0.006 | 0.159 | 0.032 | 0.230 |
| Fin-Ins | 0.002 | 0.027 | 0.037 | 0.052 | 0.057 | 0.046 | 0.221 |
| Prop | 0.004 | 0.022 | 0.049 | 0.036 | 0.069 | 0.020 | 0.200 |
| Edu | 0.004 | 0.023 | 0.054 | 0.048 | 0.060 | 0.026 | 0.215 |
| Health | 0.003 | 0.022 | 0.064 | 0.020 | 0.061 | 0.038 | 0.208 |
| Cult | 0.004 | 0.016 | 0.083 | 0.040 | 0.065 | 0.013 | 0.220 |
| Pers | 0.002 | 0.016 | 0.080 | 0.016 | 0.060 | 0.038 | 0.213 |
| Total: | 0.003 | 0.015 | 0.065 | 0.020 | 0.079 | 0.027 | 0.208 |

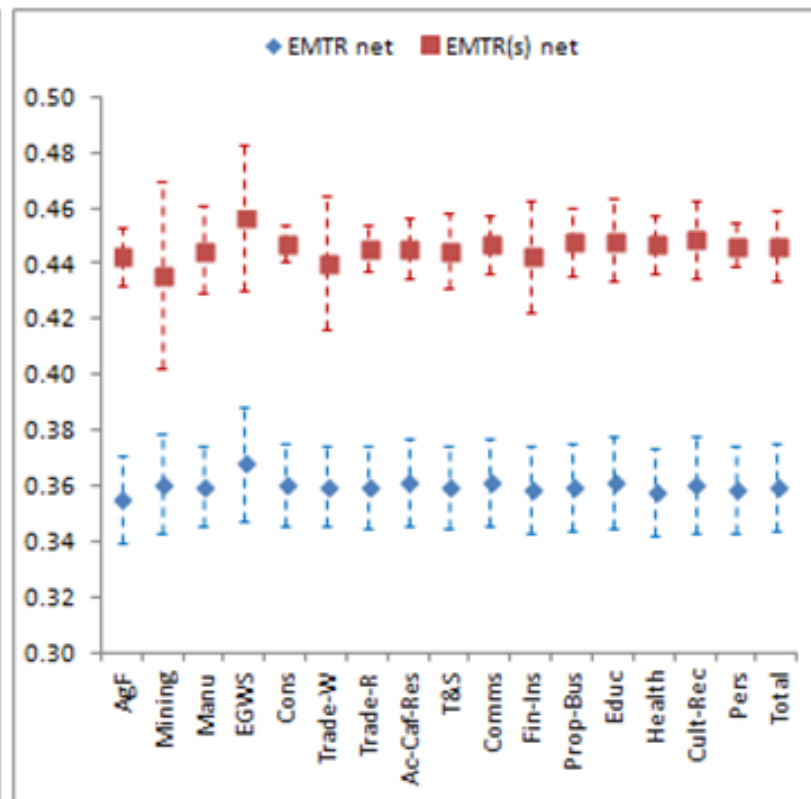
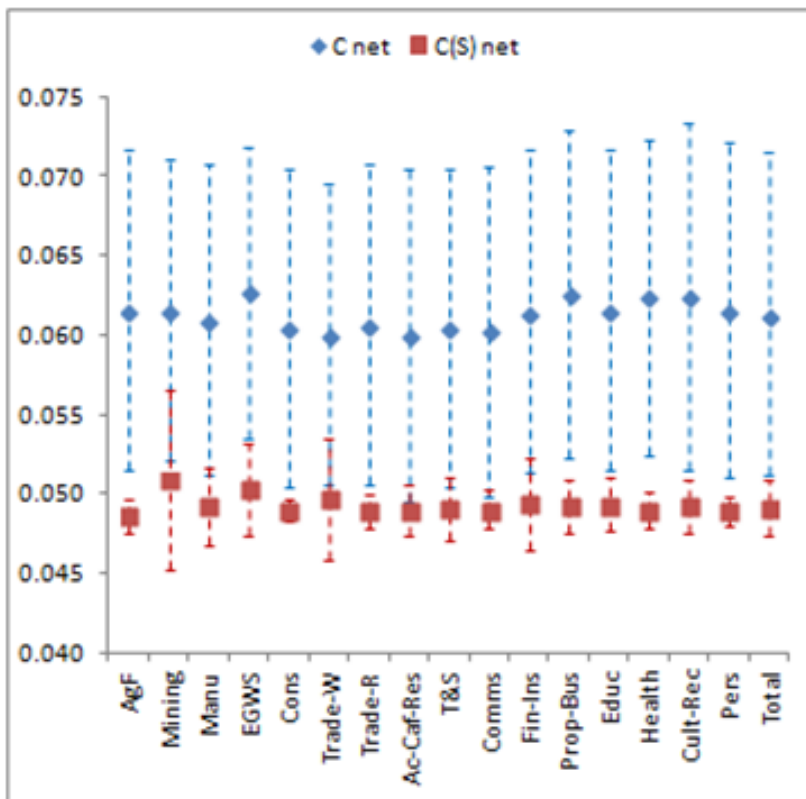
*Key message: Weighted depreciation rates very **similar** across industries*

Debt-Asset Ratios by Industry/Ownership, 2010



*Key message: **foreign firms'** debt-asset ratios significantly **higher** on average*

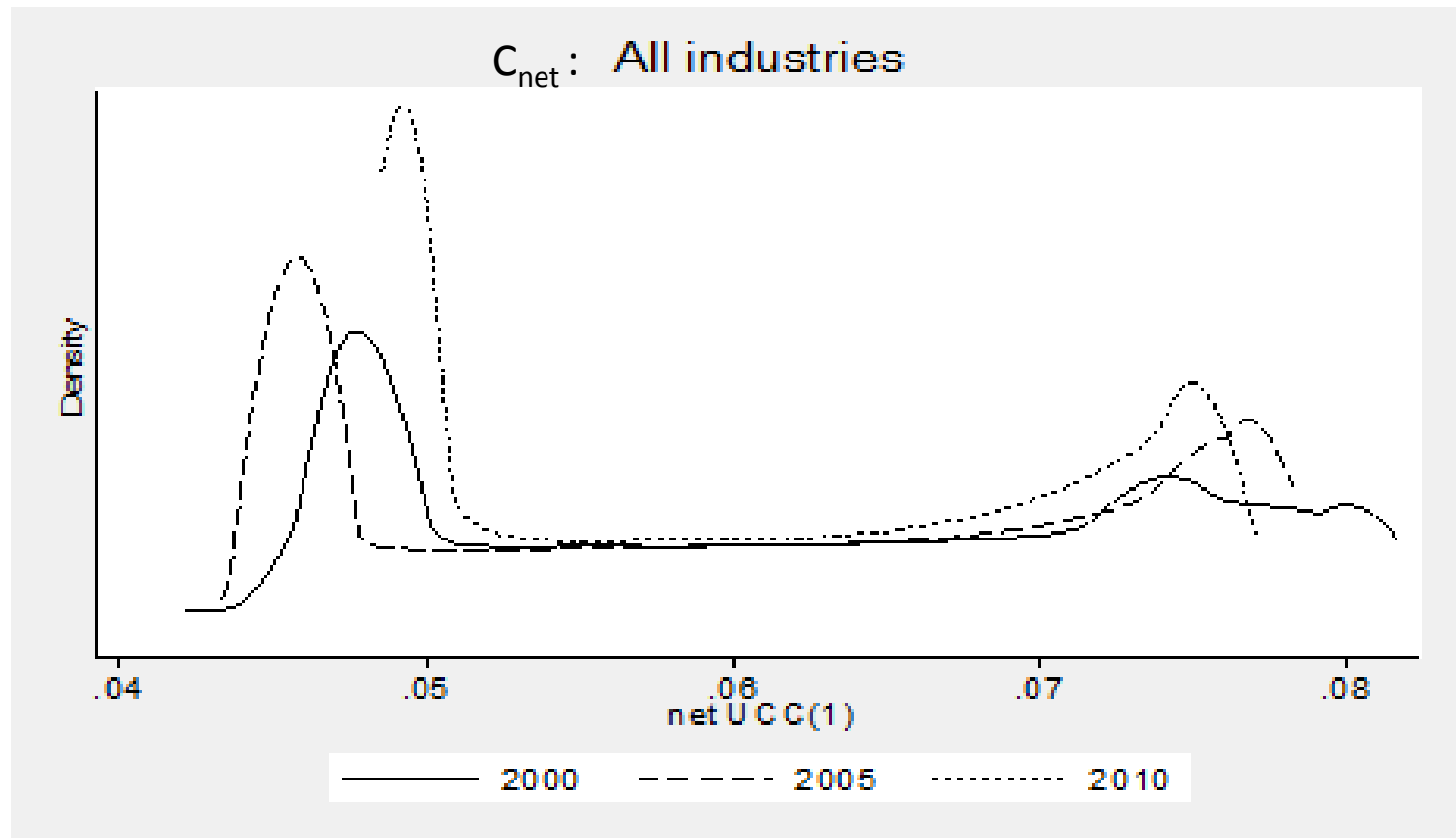
UCC and EMTR across/within Industries, 2010



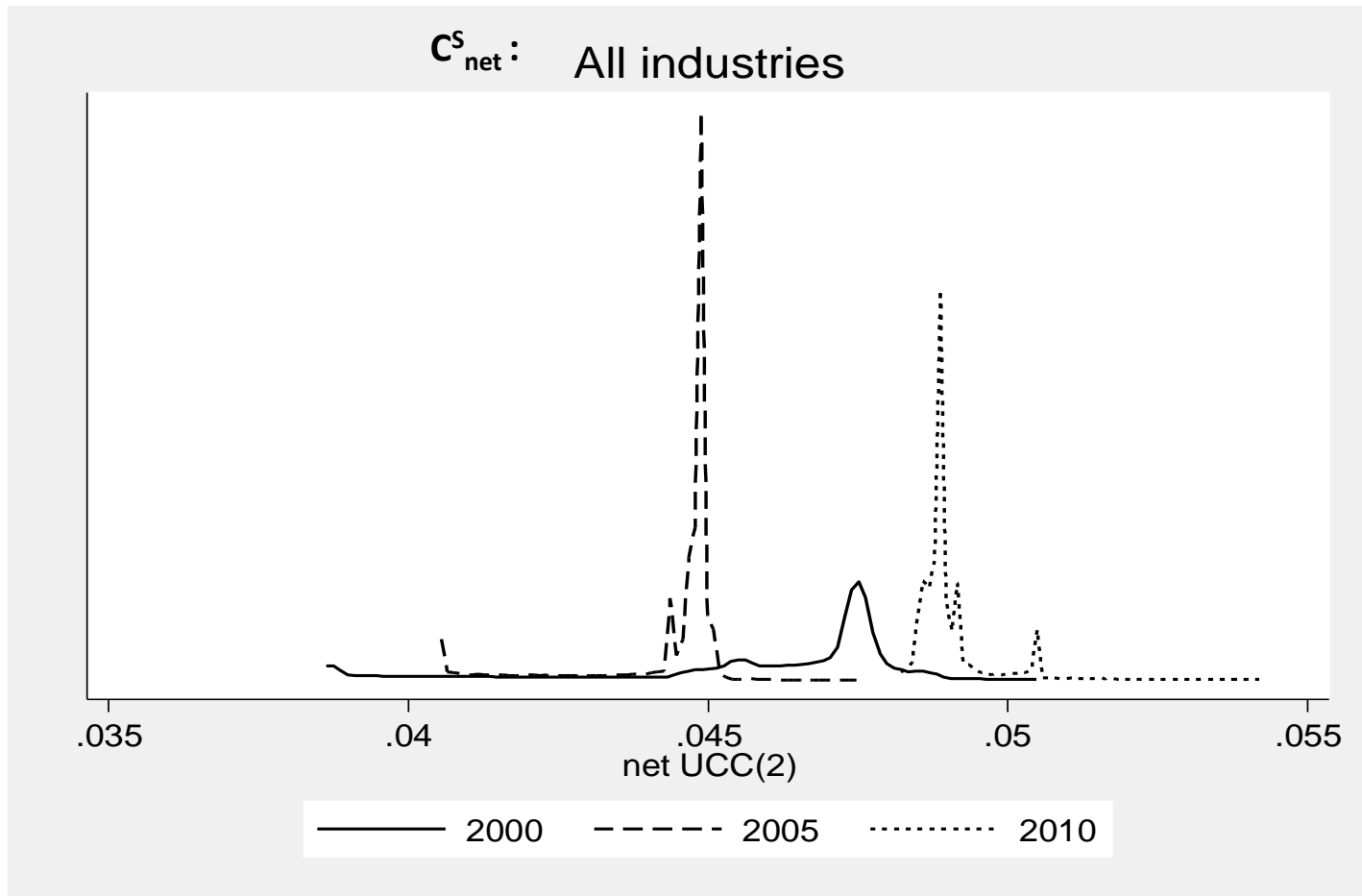
Foreign debt: $r^* = 2.9\%$
 Foreign equity: $r^* = 5.0\%$
 Domestic s'holder: $r^* = 2.7\%$

$$EMTR = \frac{r - r^*}{r} = \frac{(C_{net} - r^*)}{C_{net}}$$

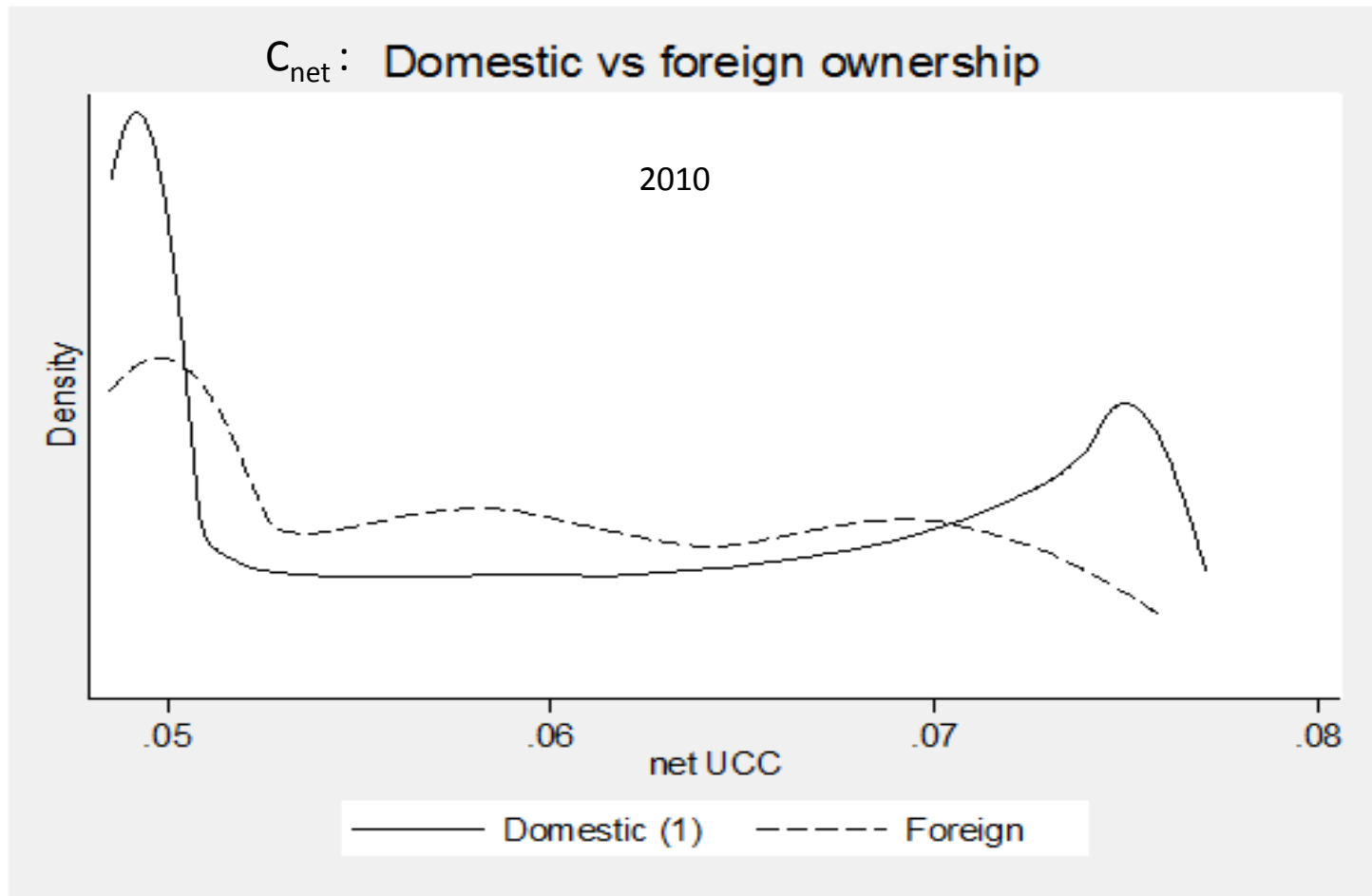
Kernel Density Functions for User Costs



Kernel Density Functions for User Costs



Kernel Density Functions for User Costs





N.Z. Tax Reforms: 2005-11

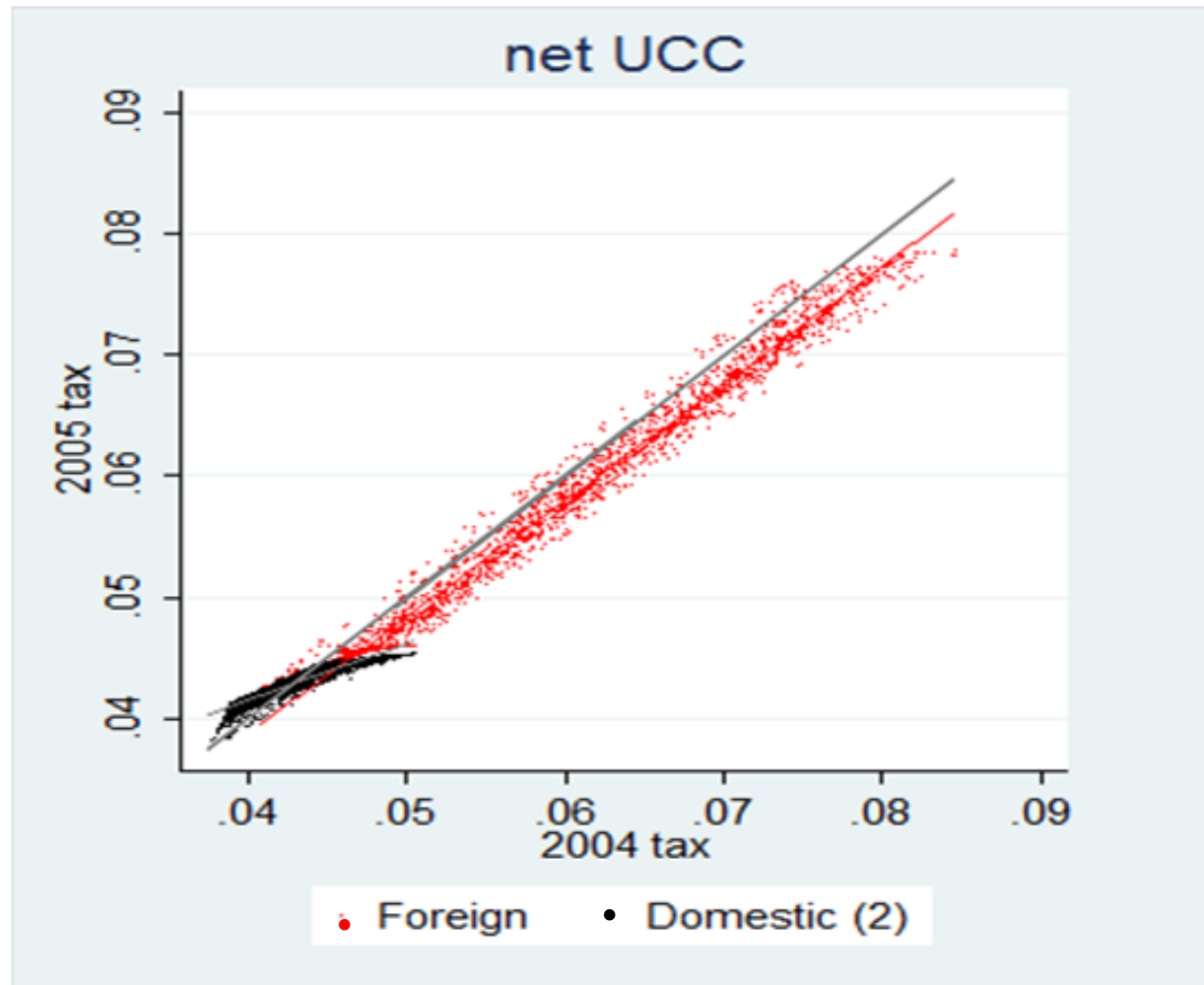
How did N.Z. tax reforms affect user cost of capital?

Reforms:

| | |
|------|--|
| 2005 | <ul style="list-style-type: none">• Fiscal depreciation rates <i>increased</i> for most assets• Buildings depreciation rate <i>reduced</i>: 4% to 3% |
| 2008 | <ul style="list-style-type: none">• Company tax rate <i>reduced</i> from 33% to 30% |
| 2009 | <ul style="list-style-type: none">• Top personal tax rate <i>reduced</i> from 39% to 38% |
| 2010 | <ul style="list-style-type: none">• Top personal tax rate <i>reduced</i> from 38% to 33%. |
| 2011 | <ul style="list-style-type: none">• Company tax rate <i>reduced</i> from 30% to 28%;• Building depreciation rate <i>reduced</i> from 3% to 0%.• 20% depreciation loadings <i>removed</i> from all assets |

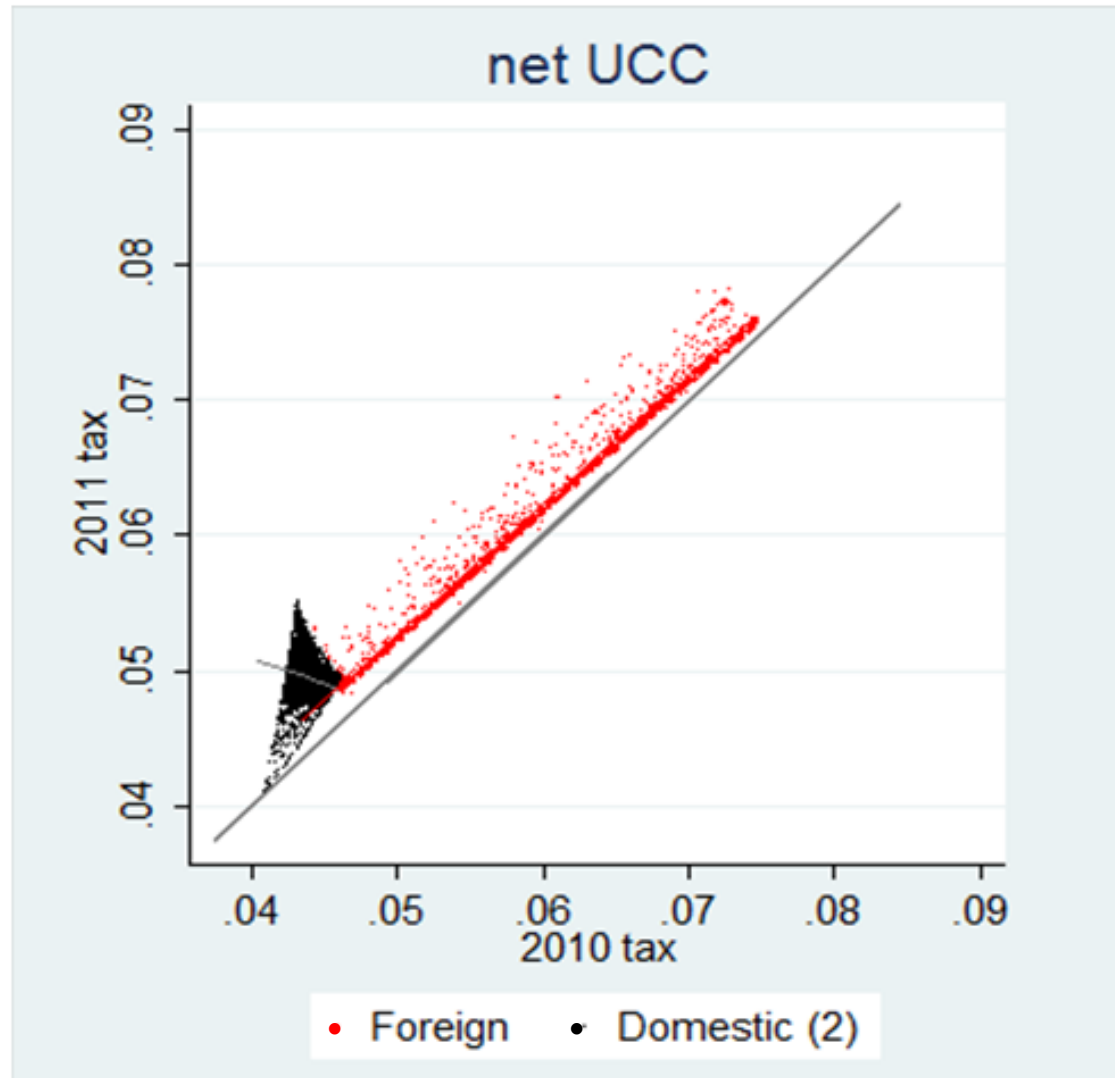
Impact of Depreciation Reform: 2004-05

2004-05 Depreciation Reforms: C_{net}^S

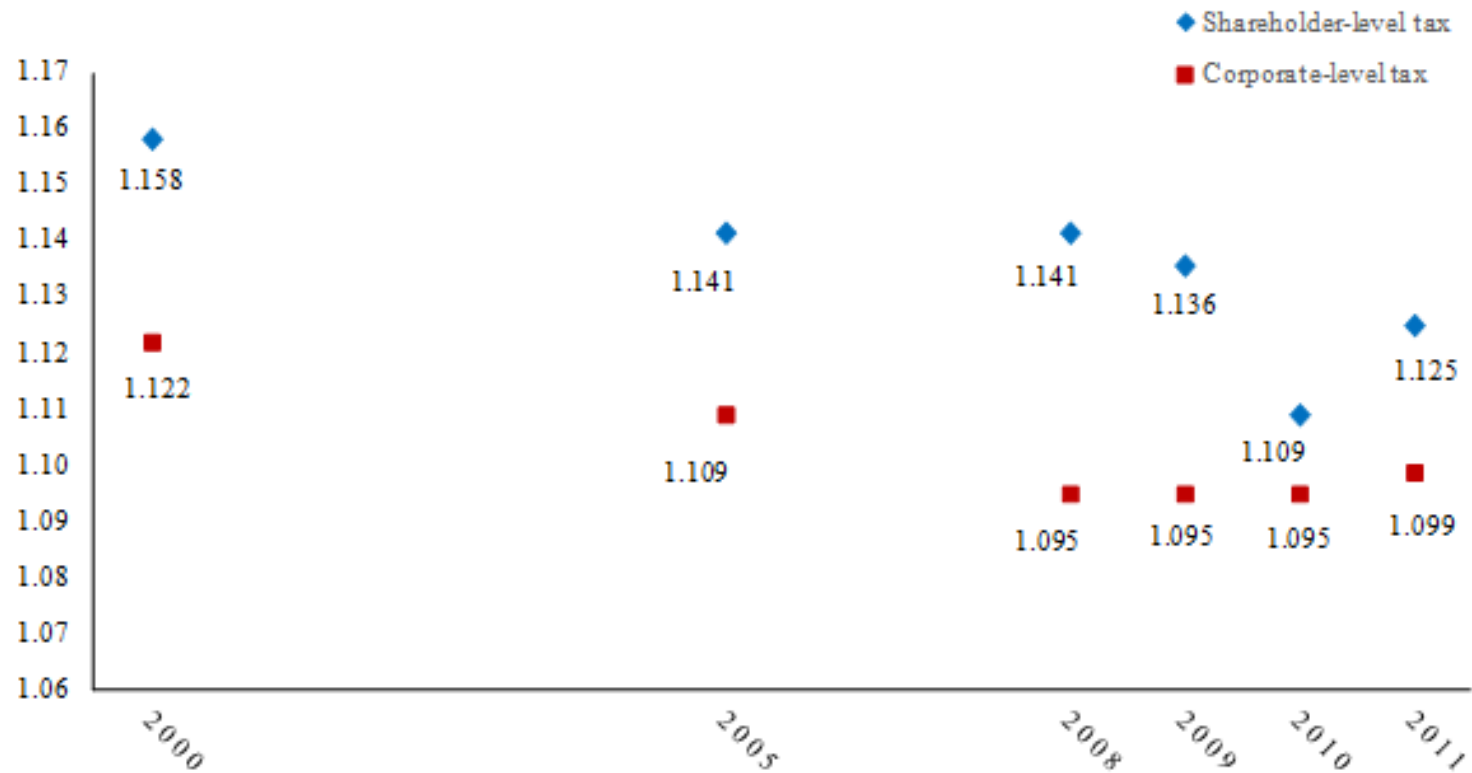


Impact of Tax Reform: 2010-11

2010-11 Tax Reforms: C_{net}^S



Reform & the UCC Tax Component: 2000-11



Conclusions

UCCs & EMTRs useful measures of 'tax impost' on firms' capital costs

LBD data for 185,000+ NZ firms suggests:

- Shareholder-level taxation makes a noticeable difference to UCC estimates - much more concentrated distribution
- Systematic differences between foreign & domestic firms.
- Assumed investment financing type (debt v equity) matters; asset composition relatively unimportant.
- Overall, NZ corporate/personal tax system has modest impact on rates of return \Rightarrow EMTRs *modestly* higher than statutory rates.
- UCC 'tax component' and EMTRs fall 2000-10, but rise in 2011.

\Rightarrow *which, if any, UCC measure does investment respond to?*