# Labour Supply Responses to Income Taxation among Older Couples: Evidence from a Canadian Reform*

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- Reform: the introduction of pension income splitting, in 2007.
- IV widely used in studies on behavioural responses to taxation to address the well-known problem of *reverse-causality bias*.
- Will also briefly discuss an empirical density ("bunching") estimator, which is useful for visual inspection of sorting activity.

# Motivation

- Workforce aging poses challenges for economic growth, national saving, and the solvency of public pension systems (OECD '11).
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- Governments have been raising retirement ages and strengthening work incentives to boost employment among older workers (OECD '12).
  - Pension receipt and retirement respond to pension incentives (Baker & Benjamin '99; Baker et al. '03; Feldstein & Liebman '02).
- Understanding how policy levers affect the labour supply of the elderly is becoming increasingly important.

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  - Large literature on this topic (Keane '11; Saez '12).
  - However, older workers are typically excluded from analysis.
- A better understanding of whether older workers respond to income taxes has implications for public policy.
  - Banks and Diamond ('10, Mirrlees Review) advocate age-dependent taxation.
  - Welfare gains up to 2.4 percent of consumption (Weinzierl '11; Fahri and Werning '13; Stantcheva '17; Heathcote et al. '20).

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    - Important if couples' employment decisions are co-dependent (Gustman & Steinmeier '04, '09; Banks et al. '10).

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3. What are the implications for age-dependent taxation?

# Data & Sample

- Data: Longitudinal Administrative Databank (LAD)
  - 20% longitudinal sample of T1 tax records from Canada Revenue Agency.
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  - Rich source of information for demographics, labour earnings, income, taxes, transfers, and pensions for tax filers and their families.
- Sample selection:
  - Restrict to tax filers aged 53 to 69 years old in 2006.

Table: Summary Statistics

| | Mean (1) | Median (2) |
|---|---|---|
| Demographics | | |
| Age | 60.1 | 60.0 |
| Female | 51.5 | |
| Married | 72.8 | |
| Has Income | | |
| Labor | 59.9 | |
| Labor in Household | 69.3 | |
| Private Pension | 25.4 | |
| Private Pension in Household | 37.0 | |
| Labor and Private Pension in Household | 20.0 | |
| Conditional Income | | |
| Labor | 44,200 | 31,250 |
| Private Pension | 20,650 | 17,200 |
| After-Tax | 40,700 | 29,700 |
| Personal Income Tax | | |
| Marginal Tax Rate | 24.9 | 28.9 |

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- Since 2007, couples can split private pension income with their spouses.
- Private pension recipients can transfer eligible income to their spouses to reduce their joint tax liabilities.
- Several margins of variation in eligibility to exploit empirically:
  - If less than 65 years old: eligible pension income only includes payments from employer-sponsored pension plans.
  - If 65 years old or more: all pension income is eligible.

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  1. Calculate the optimal amount of pension income for couples to split in 2007 after the tax reform is enacted.
  2. Simulate tax rates and liabilities in 2007 assuming couples split pension income optimally but all other demographic and earnings characteristics are held fixed *at their 2006 values*.

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- Actual and simulated tax rates are correlated, but the *only* change in simulated tax rate is the reform $\Rightarrow$ NO REVERSE CAUSALITY.
- Therefore, we can estimate the *causal* effect of interest:

Simulated Tax Rate $\rightarrow$ Labour Supply.

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  - Data manipulation.
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  - Simulation of tax rates (Canadian Tax and Credit Simulator).
  - Series of multiple linear regressions carried out using analytical software that adjusts standard errors for correct inference.
- Why instrumental variables?
  - Convention in the literature.
  - Designed to address measurement and reverse causality biases.

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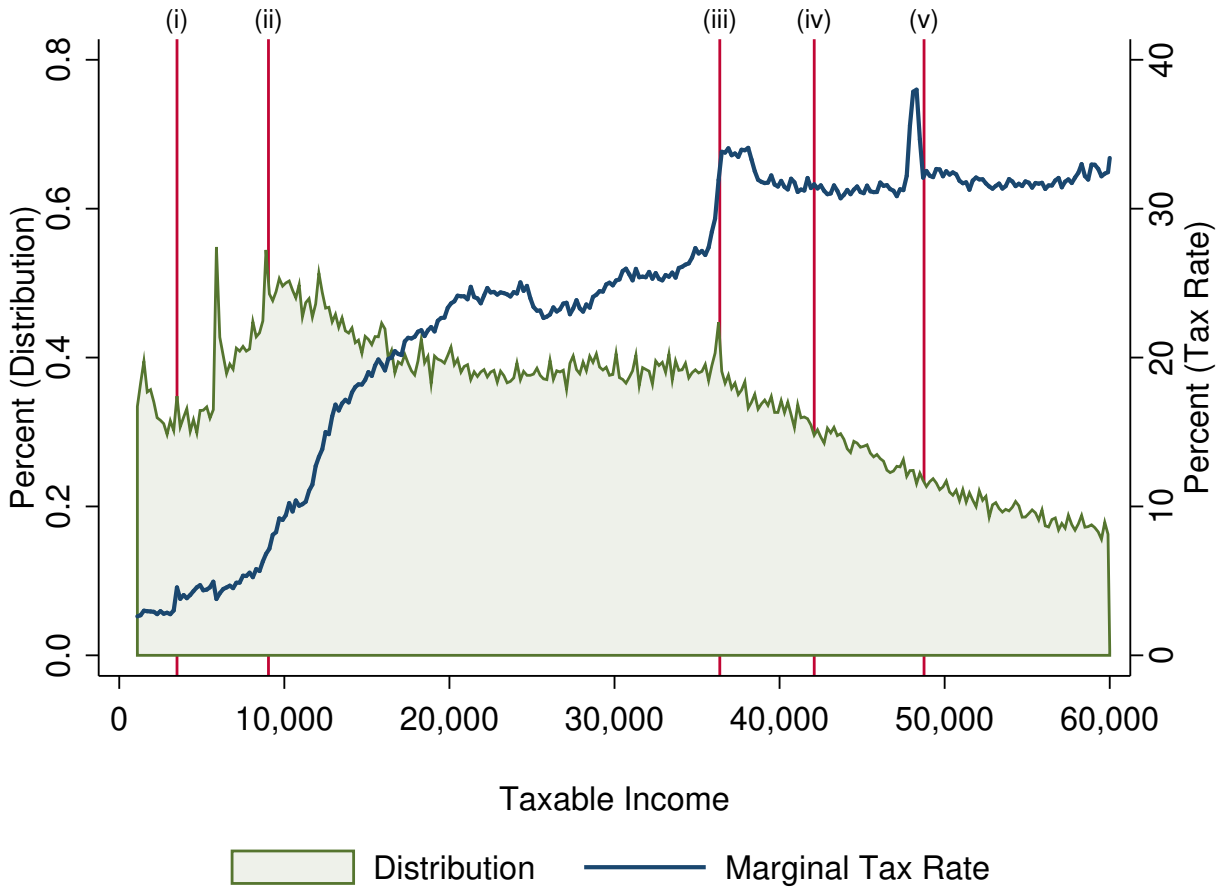
- If pension income splitting has low take-up, then it does not really make sense to study how resultant tax variation affects labour supply.
- This turns out not to be a problem.




*Notes:* Vertical lines correspond to: (i) Canada Pension Plan contributions begin; (ii) federal basic exemption limit; (iii) second federal tax bracket; (iv) Canada Pension Plan contributions stop; (v) Employment Insurance clawback.

Figure: Bunching in Taxable Income, 2001-2006

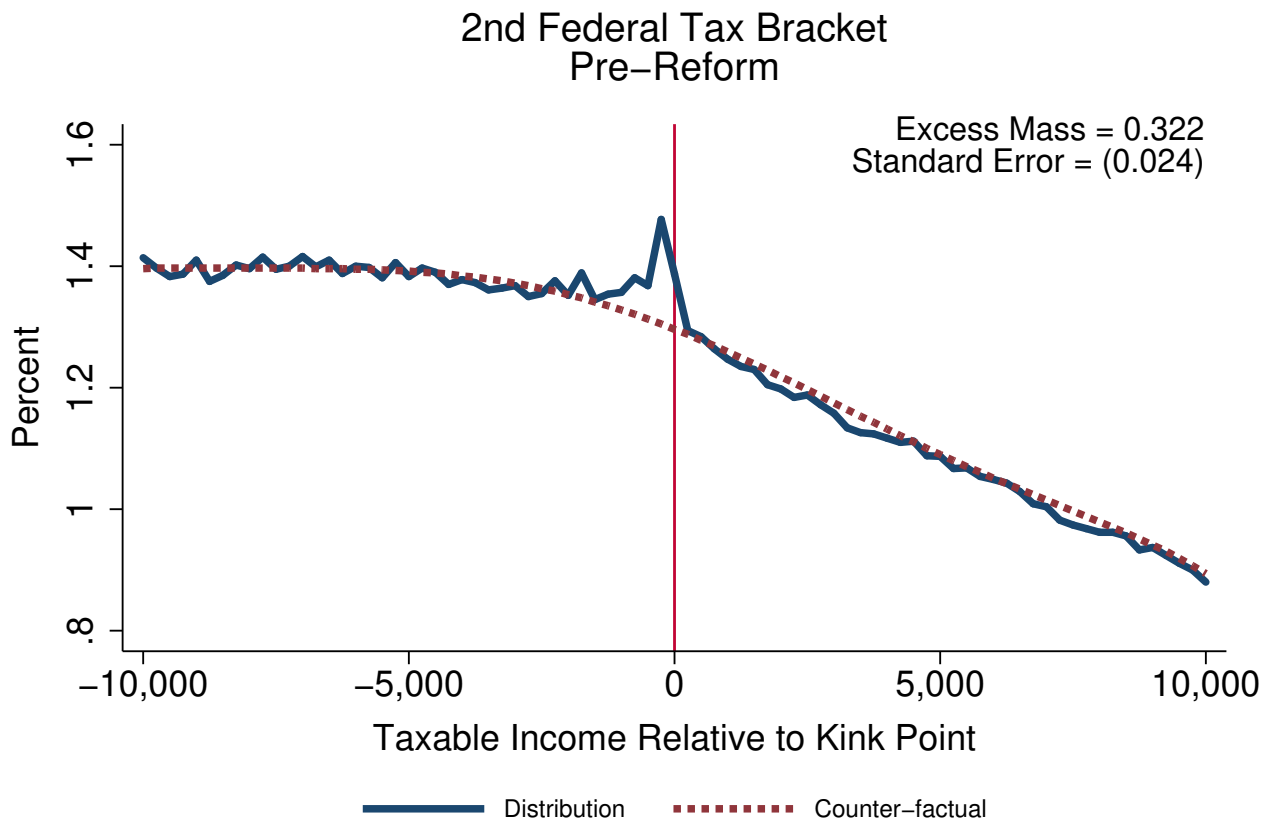
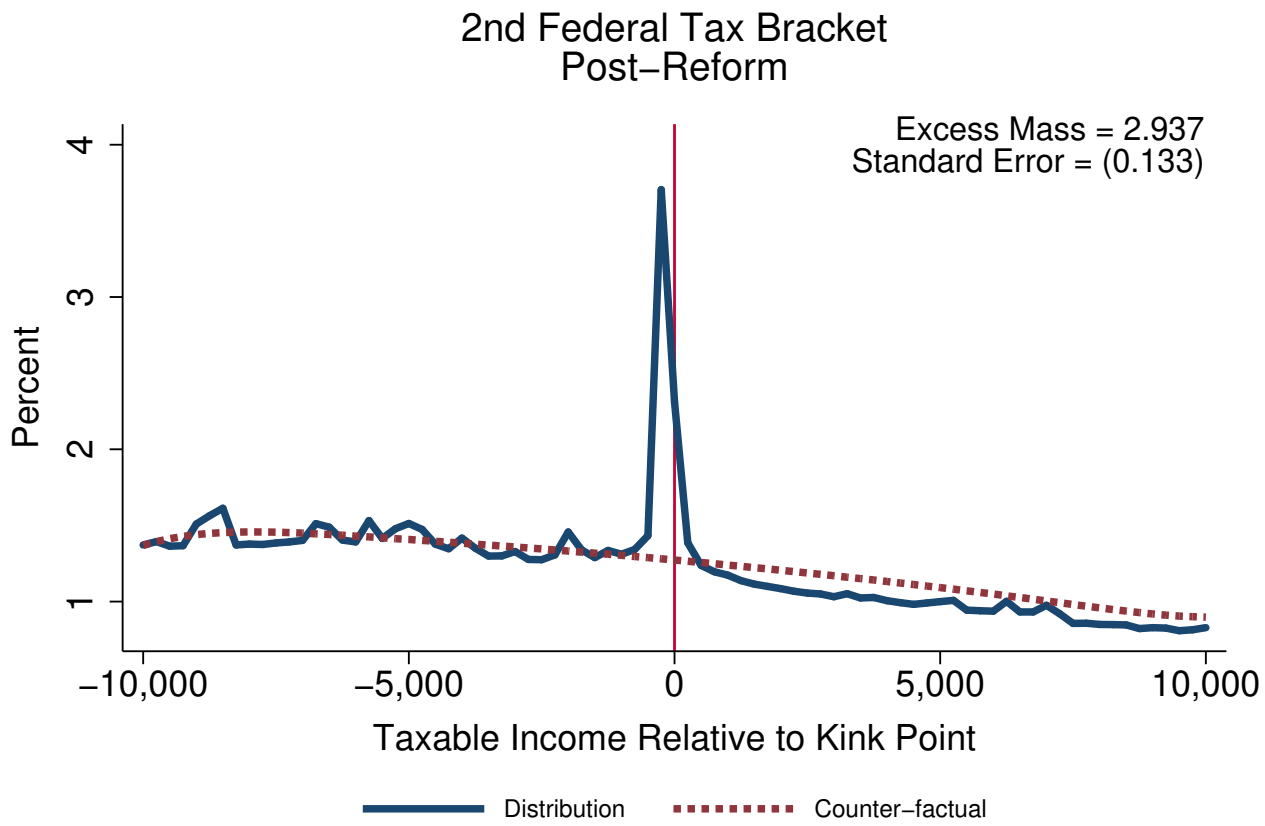


Figure: Bunching in Taxable Income, 2007-2012



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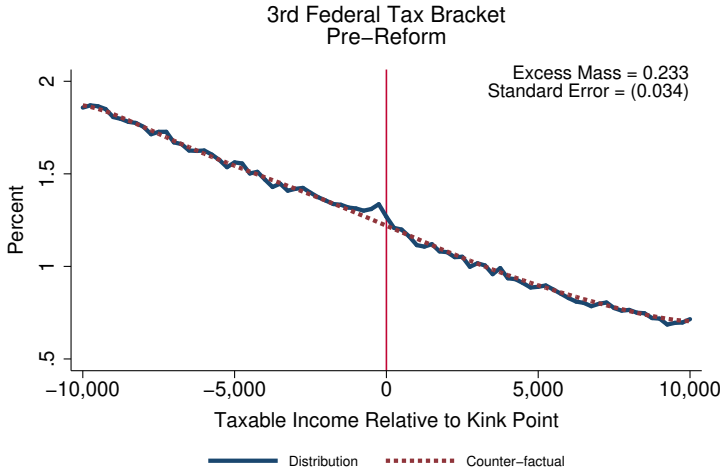


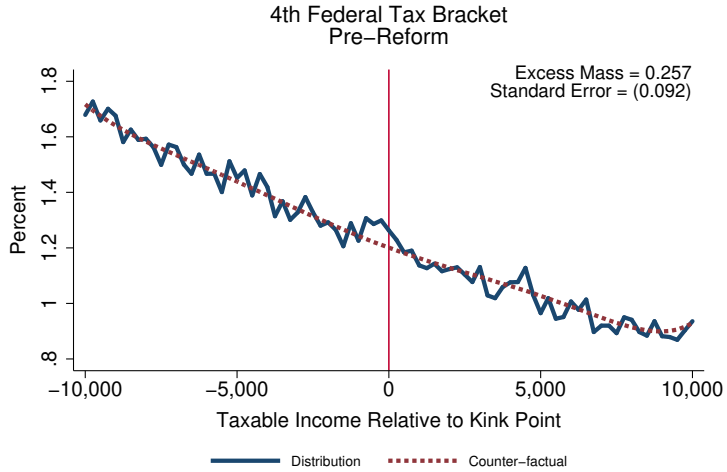


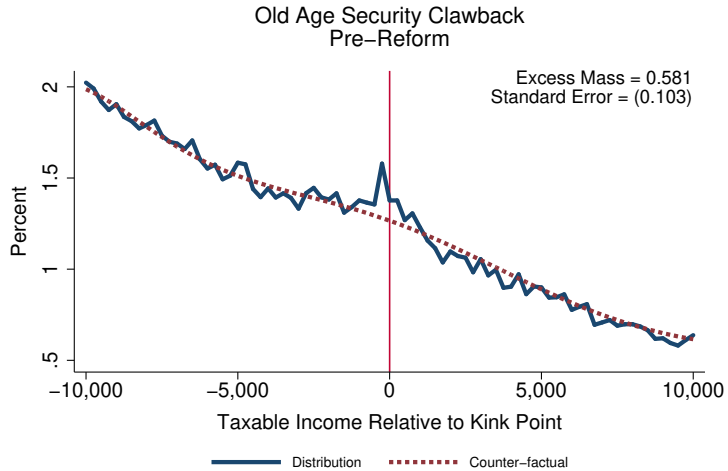

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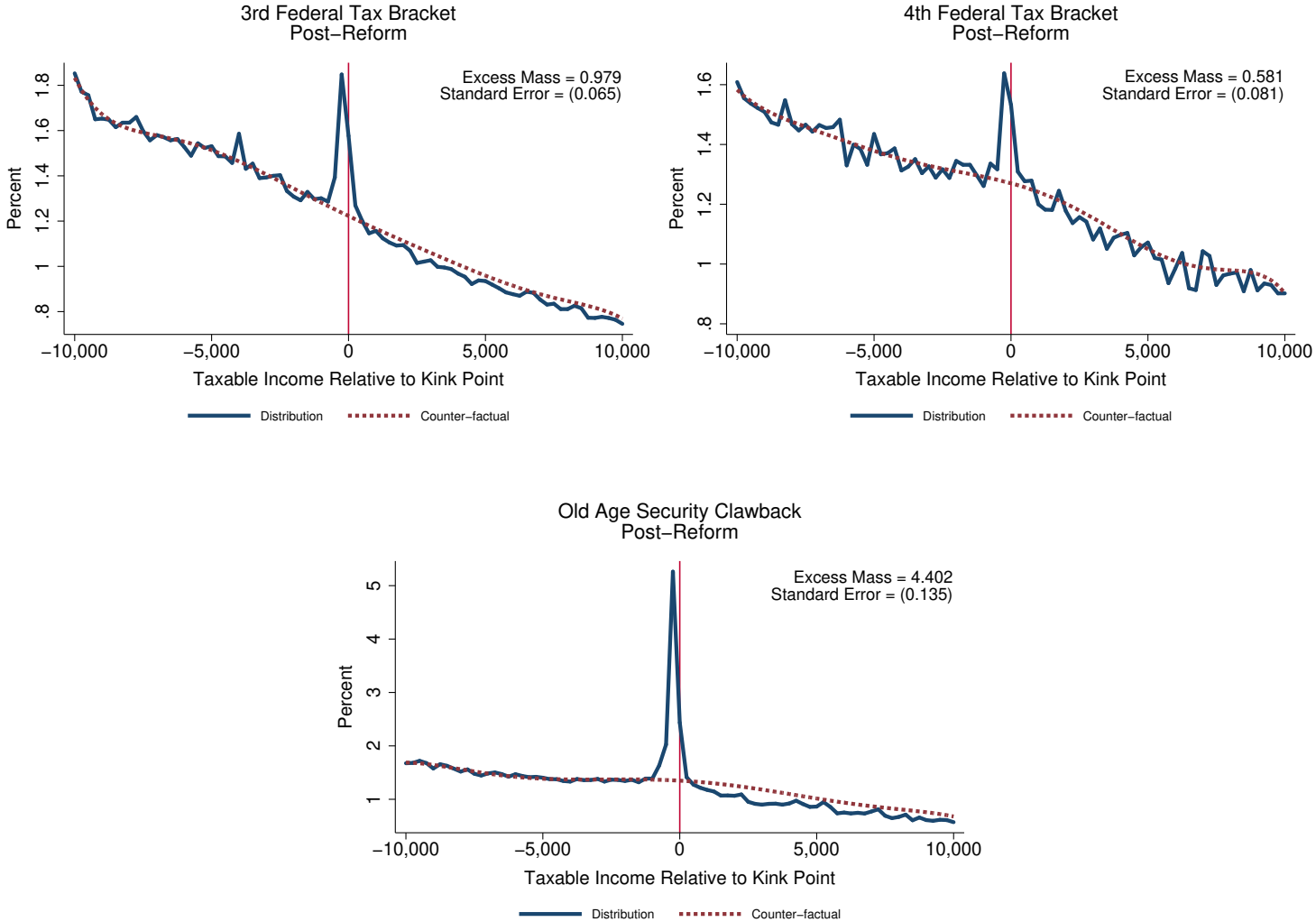

Table: Excess Mass at the Marginal Tax Rate Discontinuities by Marital Status and Private Pension Receipt, 2007 to 2012 (Post-Reform)—Bunching Estimator

| | Single | | Married | | | |
|---|---|---|---|---|---|---|
| | No Private Pension Income | Has Private Pension Income | No Private Pension Income | Has Private Pension Income | | |
| | | | | Individual | Spouse | Either |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 2nd Federal | 0.072 | 0.007 | 0.311*** | 7.342*** | 8.146*** | 7.072*** |
| | (0.051) | (0.068) | (0.039) | (0.541) | (0.525) | (0.454) |
| 3rd Federal | 0.001 | 0.255 | 0.154*** | 3.925*** | 3.960*** | 3.465*** |
| | (0.089 | (0.170) | (0.052) | (0.294) | (0.306) | (0.231) |
| 4th Federal | 0.223 | 0.101 | 0.010 | 2.357*** | 2.771*** | 2.315*** |
| | (0.201) | (0.473) | (0.097) | (0.215) | (0.240) | (0.190) |
| Public Pension | 0.848*** | 0.331 | 1.086*** | 7.195*** | 8.661*** | 7.056*** |
| | (0.254) | (0.206) | (0.180) | (0.271) | (0.402) | (0.268) |

*Notes:* Standard errors are in parentheses. *** and ** denote significance at the 1% and 5% levels, respectively.

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- Hence, the tax reform was salient and take-up was high.
- Excellent setting for studying labour supply responses.

# Labour Supply Analysis

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# Labour Supply Analysis

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- Consider both "extensive-margin" (whether to work at all) and "intensive-margin" (how much to work, if employed) responses.
- Test if couples respond equally to their own and their spouses' taxes.

Table: Labor Supply Responses to Changes in the Marginal Net-of-Tax Rate and After-Tax Income, 2006 to 2007

| | | Instrumental Variables | |
|---|---|---|---|
| | Ordinary Least Squares (1) | Reduced-Form (2) | Two-Stage Least Squares (3) |
| *Panel B: Intensive Margin* | | | |
| After-Tax Income of Individual | 0.478*** | −0.113*** | −0.220*** |
| | (0.012) | (0.027) | (0.064) |
| After-Tax Income of Spouse | −0.065*** | −0.140*** | −0.212*** |
| | (0.005) | (0.026) | (0.057) |
| Marginal Net-of-Tax Rate of Individual | −1.773*** | −0.005 | −0.164 |
| | (0.032) | (0.079) | (0.183) |
| Marginal Net-of-Tax Rate of Spouse | 0.217*** | 0.095 | 0.149 |
| | (0.020) | (0.093) | (0.196) |
| R-squared | 0.302 | 0.099 | |
| Unitary Model Test | [0.000] | [0.397] | [0.910] |

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| | Ordinary Least Squares (1) | Reduced-Form (2) | Two-Stage Least Squares (3) |
| *Panel B: Intensive Margin* | | | |
| After-Tax Income of Individual | 0.478*** | −0.113*** | −0.220*** |
| | (0.012) | (0.027) | (0.064) |
| After-Tax Income of Spouse | −0.065*** | −0.140*** | −0.212*** |
| | (0.005) | (0.026) | (0.057) |
| Marginal Net-of-Tax Rate of Individual | −1.773*** | −0.005 | −0.164 |
| | (0.032) | (0.079) | (0.183) |
| Marginal Net-of-Tax Rate of Spouse | 0.217*** | 0.095 | 0.149 |
| | (0.020) | (0.093) | (0.196) |
| R-squared | 0.302 | 0.099 | |
| Unitary Model Test | [0.000] | [0.397] | [0.910] |

*Notes:* Standard errors are in parentheses, clustered by individual. The p-values for the tests of the unitary model are in square brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

First-Stage Results

Table: Labor Supply Responses to Changes in the Marginal Net-of-Tax Rate and After-Tax Income, 2006 to 2007

| | Ordinary Least Squares (1) | Instrumental Variables: Reduced-Form (2) | Instrumental Variables: Two-Stage Least Squares (3) |
|---|---|---|---|
| *Panel B: Intensive Margin* | | | |
| After-Tax Income of Individual | 0.478*** | −0.113*** | −0.220*** |
| | (0.012) | (0.027) | (0.064) |
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First-Stage Results

Table: Labor Supply Responses to Changes in After-Tax Income, 2006 to 2007

| | | Instrumental Variables | |
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| | Ordinary Least Squares (1) | Reduced-Form (2) | Two-Stage Least Squares (3) |
| *Panel A: Extensive Margin* | | | |
| After-Tax Income of Individual | 0.044*** | −0.018*** | −0.038*** |
| | (0.001) | (0.001) | (0.003) |
| After-Tax Income of Spouse | −0.002*** | −0.006*** | −0.009*** |
| | (0.001) | (0.002) | (0.002) |
| R-squared | 0.158 | 0.144 | |
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Include Tax Rates

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*Notes:* Standard errors are in parentheses, clustered by individual. The p-values for the tests of the unitary model are in square brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Include Tax Rates

# Discussion

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- Workers decrease labour supply as their own and their spouses' tax bills decline.
- However, workers do not respond to *incremental* changes in tax rates.
- Results are similar based on personal characteristics, including level of household income or presence of a child in the family. Extensive Margin Intensive Margin

# Conclusion

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# Conclusion

- I assess how labour supply responds to changes in taxation among older workers.
- Using administrative data and exploiting a unique reform that offered tax relief for couples with a pensioner, I show couples coordinated effectively to reduce their joint tax liabilities.
- Labour supply is very responsive to changes in total tax bills. Hence, tax relief for seniors has spill-over effects in the labour market and may conflict with competing incentives to keep people working longer.
- However, low responsiveness to *incremental* tax rate changes suggests effects of small-scale work incentives (e.g., career extension tax credit) are likely small.

**Thank You!**

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Table: Excess Mass at the Marginal Tax Rate Discontinuities by Year, 2003 to 2010—Bunching Estimator

| | 2nd Federal (1) | 2nd Provincial (2) | 3rd Federal (3) | 3rd Provincial (4) | 4th Federal (5) | Public Pension (6) | Unemployment Insurance (7) |
|---|---|---|---|---|---|---|---|
| 2003 | 0.349*** | 0.238*** | 0.072 | 0.096 | 0.216 | 0.442** | 0.237 |
| | (0.051) | (0.052) | (0.101) | (0.083) | (0.253) | (0.188) | (0.273) |
| 2004 | 0.157*** | −0.005 | 0.410*** | −0.045 | −0.087 | 0.818*** | 0.477** |
| | (0.051) | (0.052) | (0.101) | (0.098) | (0.243) | (0.219) | (0.241) |
| 2005 | 0.421*** | 0.008 | 0.306*** | −0.164* | 0.319 | 0.740*** | 0.147 |
| | (0.059) | (0.056) | (0.097) | (0.093) | (0.231) | (0.190) | (0.205) |
| 2006 | 0.246*** | 0.073 | 0.183** | −0.140* | 0.458* | 0.729*** | 0.274 |
| | (0.054) | (0.049) | (0.078) | (0.080) | (0.244) | (0.205) | (0.242) |
| 2007 | 1.519*** | 0.647*** | 0.341*** | 0.314** | 0.828*** | 3.624*** | 0.583*** |
| | (0.150) | (0.225) | (0.115) | (0.127) | (0.228) | (0.200) | (0.216) |
| 2008 | 2.189*** | 1.988*** | 0.960*** | 1.040*** | 0.437** | 5.028*** | 0.750*** |
| | (0.337) | (0.248) | (0.249) | (0.172) | (0.174) | (0.363) | (0.225) |
| 2009 | 3.198*** | 1.071*** | 1.008*** | −0.006 | 0.602** | 4.506*** | 0.949*** |
| | (0.329) | (0.398) | (0.200) | (0.239) | (0.237) | (0.318) | (0.191) |
| 2010 | 3.606*** | 0.287 | 1.382*** | 0.362 | 0.363* | 4.219*** | 1.285*** |
| | (0.422) | (0.438) | (0.183) | (0.256) | (0.195) | (0.250) | (0.286) |

*Notes:* Standard errors are in parentheses, clustered by individual. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

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Table: Excess Mass at the Marginal Tax Rate Discontinuities by Marital Status and Observed Characteristics, 2007 to 2012 (Post-Reform)—Bunching Estimator

| | Single, or Married with No Private Pension Income in the Household | | | Married with Private Pension Income from Either Spouse | | |
|---|---|---|---|---|---|---|
| | 2nd Federal | 3rd Federal | 4th Federal | 2nd Federal | 3rd Federal | 4th Federal |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: By Self-Employment Status* | | | | | | |
| Self-Employed | 1.016*** | 0.289** | 0.587** | 6.166*** | 3.301*** | 2.913*** |
| | (0.117) | (0.136) | (0.262) | (0.361) | (0.296) | (0.660) |
| Not Self-Employed | 0.140*** | 0.114** | −0.020 | 7.122*** | 3.482*** | 2.230*** |
| | (0.028) | (0.053) | (0.084) | (0.452) | (0.238) | (0.205) |
| *Panel B: By Industry* | | | | | | |
| Agricultural, Blue Collar | 0.256*** | 0.207*** | 0.125 | 7.236*** | 3.570*** | 2.030*** |
| | (0.033) | (0.072) | (0.135) | (0.555) | (0.326) | (0.265) |
| White Collar | 0.152*** | 0.063 | −0.028 | 6.549*** | 3.374*** | 2.582*** |
| | (0.037) | (0.057) | (0.116) | (0.267) | (0.197) | (0.261) |

*Notes:* Self-employment status is based on earning $2,000 or more in self-employment income. Agriculture and 'blue collar' industries refers to North American Industrial Classification System (NAICS) codes 11-49, and 'white collar' refers to NAICS codes 51-91. The sample sizes across the two industry groups are approximately equal. Standard errors are in parentheses. See the notes in **??** for more information. *** and ** denote significance at the 1% and 5% levels, respectively.

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Table: Excess Mass at Benefit Clawback Thresholds by Eligibility, 2007 to 2012 (Post-Reform)—Bunching Estimator

| | Unmarried | | Married | |
|---|---|---|---|---|
| | No Private Pension Income | Has Private Pension Income | No Private Pension Income | Has Private Pension Income |
| | (1) | (2) | (3) | (4) |
| *Panel A: Public Pension* | | | | |
| 63 Years Old | 0.189 | −0.076 | 0.051 | 0.476 |
| | (0.421) | (0.324) | (0.253) | (0.321) |
| 64 Years Old | 0.095 | −0.117 | −0.260 | 0.488 |
| | (0.419) | (0.417) | (0.284) | (0.356) |
| 65 Years Old | −0.525 | 0.684 | 1.138*** | 5.456*** |
| | (0.393) | (0.460) | (0.317) | (0.293) |
| 66 Years Old | 0.709 | −0.099 | 1.048*** | 6.916*** |
| | (0.513) | (0.370) | (0.303) | (0.375) |
| *Panel B: Unemployment Insurance* | | | | |
| No Receipt | 0.024 | 0.036 | −0.103** | −0.010 |
| | (0.065) | (0.077) | (0.044) | (0.222) |
| Receipt | 0.530*** | 0.745 | −0.014 | 3.018*** |
| | (0.188) | (0.371) | (0.126) | (0.292) |

*Notes:* Private pension income receipt is based on whether at least one spouse is a pensioner. The analysis is restricted to the post-reform period. Standard errors are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

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## Table: First-Stage Effects, 2006 to 2007

| | Marginal Net-of-Tax Rate of Individual (1) | Marginal Net-of-Tax Rate of Individual (2) | After-Tax Income of Individual (3) | After-Tax Income of Spouse (4) |
|---|---|---|---|---|
| *Panel A: Extensive Margin* | | | | |
| Predicted After-Tax Income of Individual | | | 0.475*** | 0.011*** |
| | | | (0.009) | (0.003) |
| Predicted After-Tax Income of Spouse | | | −0.017*** | 0.694*** |
| | | | (0.004) | (0.008) |
| R-squared | | | 0.201 | 0.229 |
| *Panel B: Intensive Margin* | | | | |
| Predicted Marginal Net-of-Tax Rate of Individual | 0.496*** | 0.007 | −0.230*** | −0.117*** |
| | (0.012) | (0.008) | (0.053) | (0.031) |
| Predicted Marginal Net-of-Tax Rate of Spouse | −0.012 | 0.508*** | 0.006 | −0.091** |
| | (0.010) | (0.010) | (0.036) | (0.045) |
| Predicted After-Tax Income of Individual | −0.049*** | −0.020*** | 0.496*** | 0.040*** |
| | (0.004) | (0.002) | (0.028) | (0.009) |
| Predicted After-Tax Income of Spouse | −0.004 | −0.068*** | −0.009 | 0.628*** |
| | (0.003) | (0.003) | (0.011) | (0.020) |
| R-squared | 0.127 | 0.275 | 0.113 | 0.255 |

*Notes:* Standard errors are in parentheses, clustered by individual. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table: Robustness Checks of Extensive Margin Labor Supply Responses to Changes in the Marginal Net-of-Tax Rate and After-Tax Income, 2006 to 2007—Instrumental Variables

| | | Instrumental Variables | |
|---|---|---|---|
| | Ordinary Least Squares (1) | Reduced-Form (2) | Two-Stage Least Squares (3) |
| Marginal Net-of-Tax Rate of Individual | −0.829*** | 0.020* | 0.005 |
| | (0.005) | (0.010) | (0.021) |
| Marginal Net-of-Tax Rate of Spouse | −0.015*** | −0.018* | −0.021 |
| | (0.004) | (0.011) | (0.022) |
| After-Tax Income of Individual | 0.012*** | −0.017*** | −0.038*** |
| | (0.001) | (0.001) | (0.003) |
| After-Tax Income of Spouse | −0.001 | −0.007*** | −0.011*** |
| | (0.001) | (0.002) | (0.003) |
| Employment of Spouse | 0.096*** | 0.120*** | 0.124*** |
| | (0.002) | (0.002) | (0.004) |
| R-squared | 0.264 | 0.144 | |
| Unitary Model Test | [0.000] | [0.000] | [0.000] |

*Notes:* ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

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Table: Labor Supply Responses to Changes in the Marginal Net-of-Tax Rate and After-Tax Income by Family and Worker Characteristics, 2006 to 2007

| | By Total Income of Couple | | Presence of Child | |
|---|---|---|---|---|
| | Low | High | No Child | Has Child |
| | (1) | (2) | (3) | (4) |
| *Panel A: Extensive Margin* | | | | |
| After-Tax Income of Individual | −0.043*** | −0.039*** | −0.038*** | −0.037*** |
| | (0.005) | (0.004) | (0.003) | (0.005) |
| After-Tax Income of Spouse | 0.004 | −0.010*** | −0.006* | −0.019*** |
| | (0.004) | (0.004) | (0.003) | (0.005) |
| Unitary Model Test | [0.000] | [0.000] | [0.000] | [0.004] |

*Notes:* Standard errors are in parentheses, clustered by individual. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

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| | Low | High | No Child | Has Child |
| | (1) | (2) | (3) | (4) |
| *Panel B: Intensive Margin* | | | | |
| Marginal Net-of-Tax Rate of Individual | 0.345 | −0.274 | −0.043 | −0.488 |
| | (0.331) | (0.223) | (0.222) | (0.316) |
| Marginal Net-of-Tax Rate of Spouse | 0.166 | 0.122 | −0.014 | 0.494 |
| | (0.373) | (0.239) | (0.247) | (0.323) |
| After-Tax Income of Individual | −0.178 | −0.193** | −0.166** | −0.404*** |
| | (0.116) | (0.083) | (0.077) | (0.110) |
| After-Tax Income of Spouse | −0.162 | −0.190*** | −0.219*** | −0.214** |
| | (0.103) | (0.072) | (0.069) | (0.104) |
| Unitary Model Test | [0.904] | [0.977] | [0.578] | [0.174] |

*Notes:* Standard errors are in parentheses, clustered by individual. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

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