Intertemporal Labor Supply Substitution? Evidence from the Swiss Income Tax Holiday

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The Frisch Elasticity of Labor Supply

- How much more are people willing to work when their wage increases *temporarily*, e.g., due to a positive technology shock?
- Key parameter in macro models: it amplifies the effects of productivity shocks on labor supply and economic activity
- Many business cycle models require very large Frisch elasticities $(1.5 - 4)$ to match business cycle movements in employment
- Hard to identify well empirically, especially for a macro-wide change
- Longstanding divide in the micro and macro literature

Contribution: A Population-wide Natural Experiment to Estimate the Observed Frisch Elasticity (with Frictions)

- Tax holidays: income faces a tax rate $\tau = 0$ for one period
- Ideal natural experiment (Chetty et al., 2013):
  - exogenous variation in wage rates *unrelated* to labor supply or human capital accumulation decisions
  - substantial *temporary* change in net-of-tax wages
  - *entire* population
  - *annual* frequency (relevant time frame for business cycles)
  - quasi-pure *substitution* effect

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Our paper:

- Variation across time and *regions*
- Identification: Diff-in-Diff (DiD) and Event Studies (ES)

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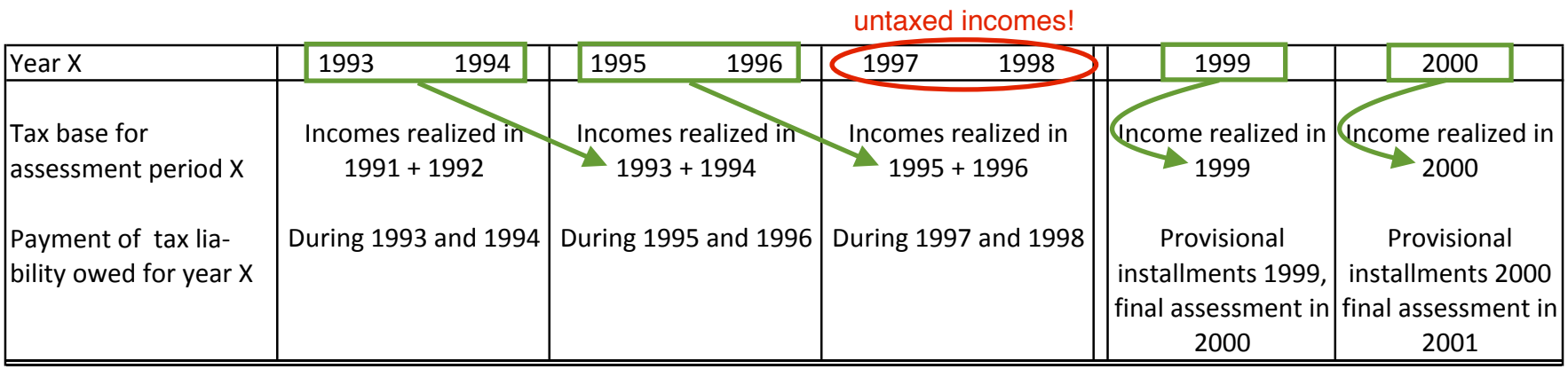
Most closely related papers:

- Bianchi et al. (2001), Stefanssón (2018), Sigurdsson (2018): Tax holiday in Iceland, 1987

1990s Income Tax Reform in Switzerland

Transition from retrospective taxation to annual pay-as-you-earn

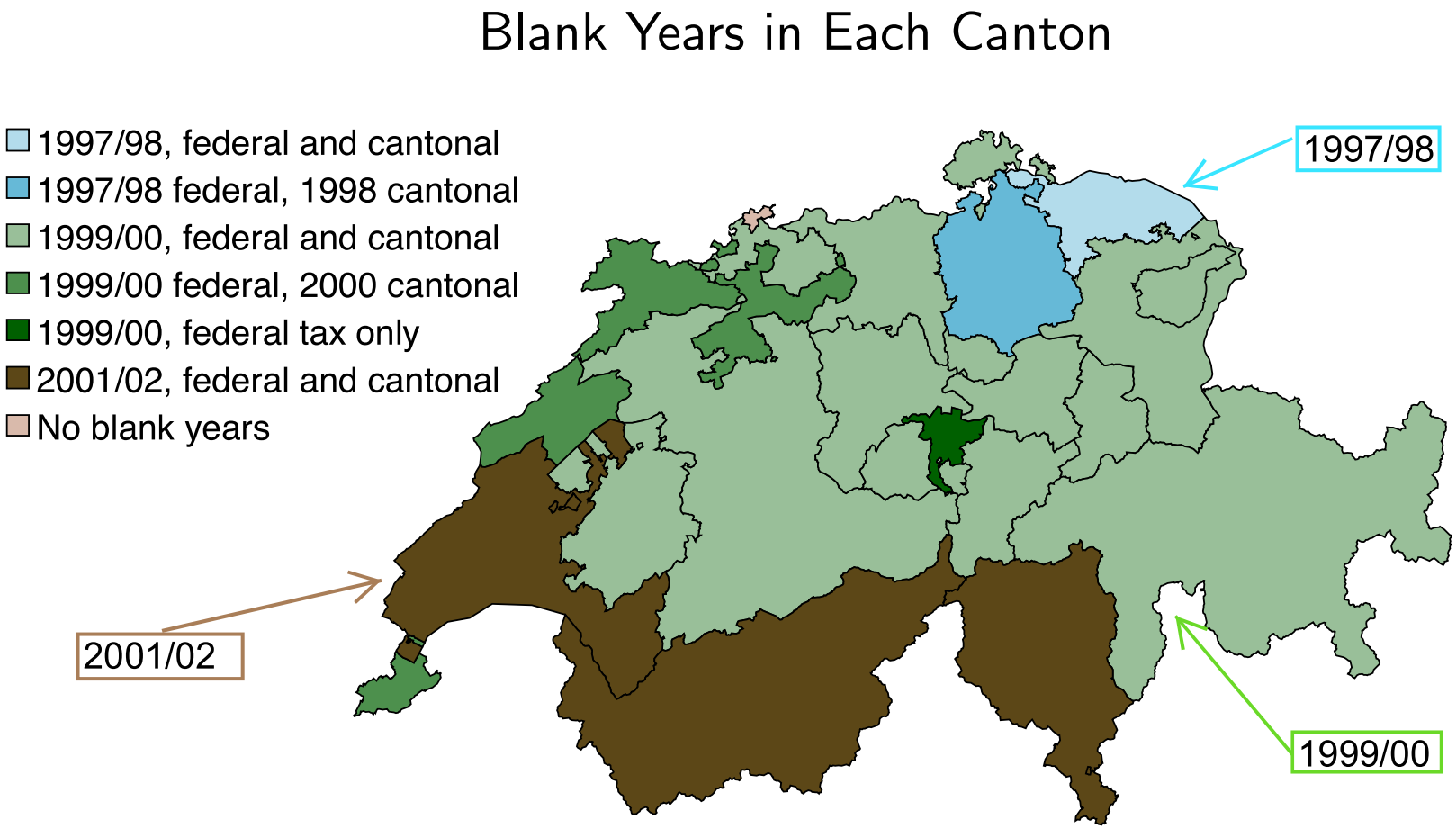
- Reasons: modernizing, simplifying and harmonizing
- Side effect: incomes earned during the two years prior to the change remained untaxed (blank years, tax holiday)



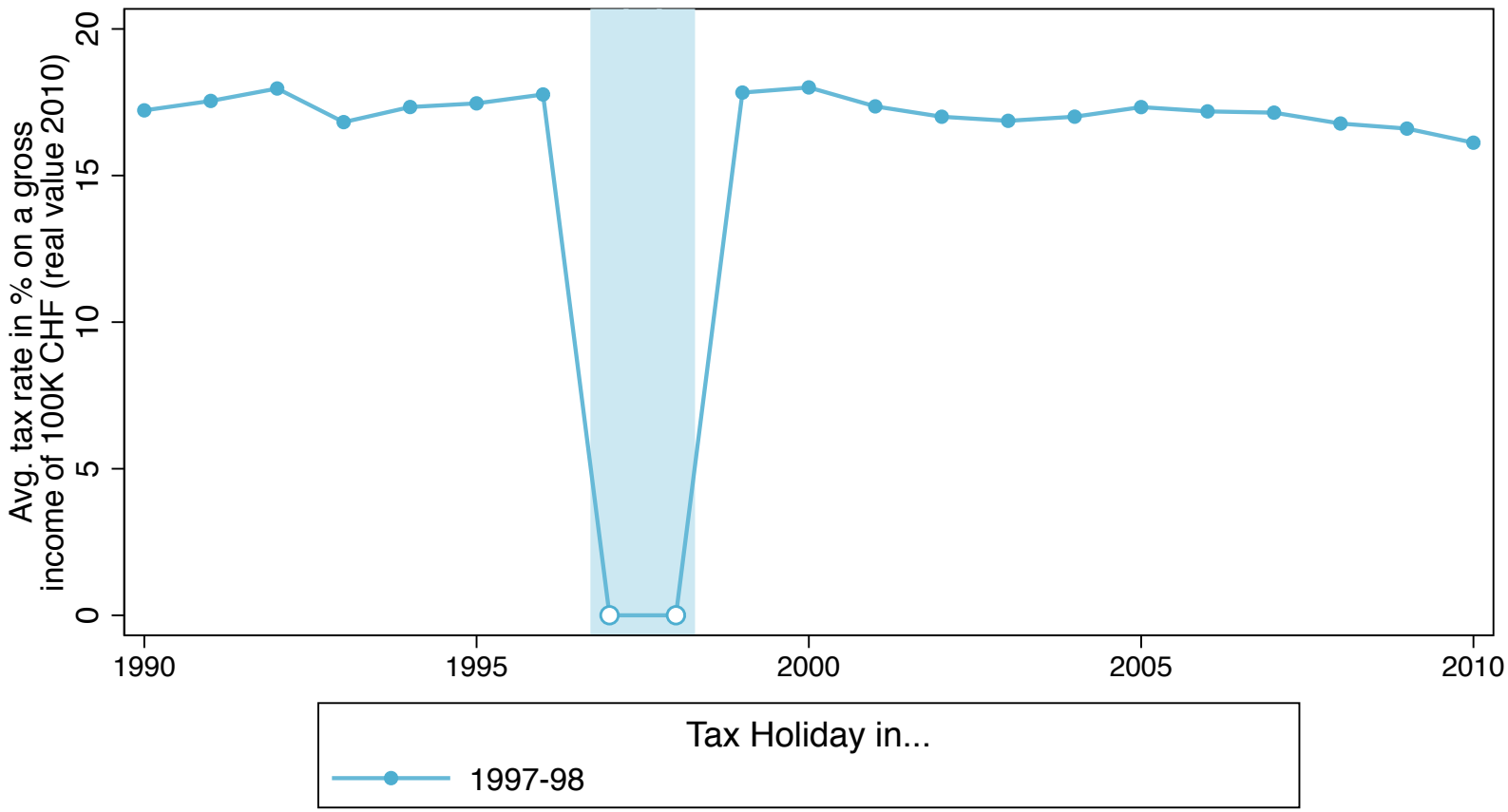
- Decided at Federal level in December 1990 (DBG and StHG)
- Cantons chose different years to change: 1999, 2001, and 2003

Outline

Identifying Variation: Timing Across Regions



First Stage: Substantial Change in Average Tax Rates



Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

1 CHF $\approx$ 1 USD

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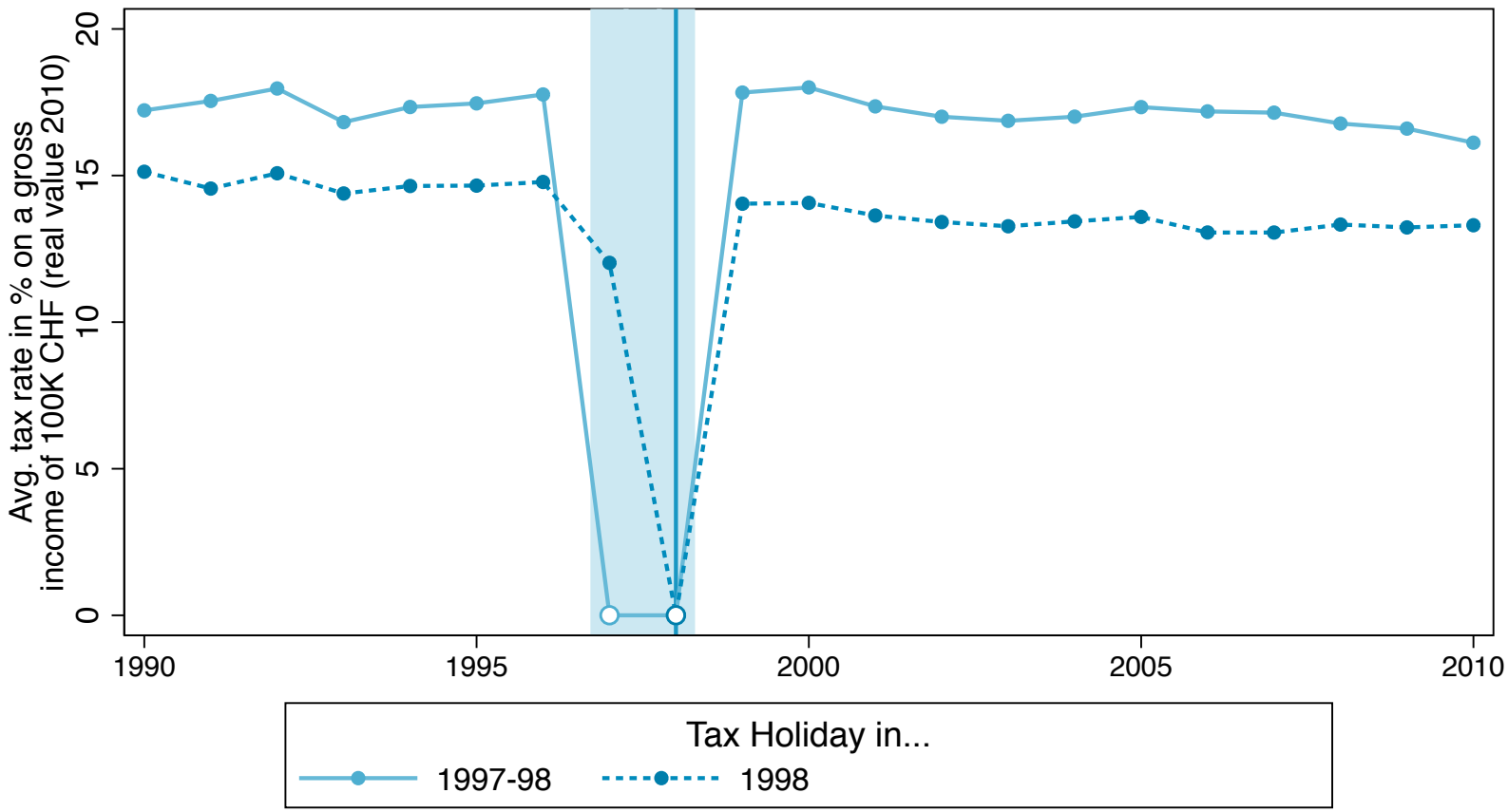

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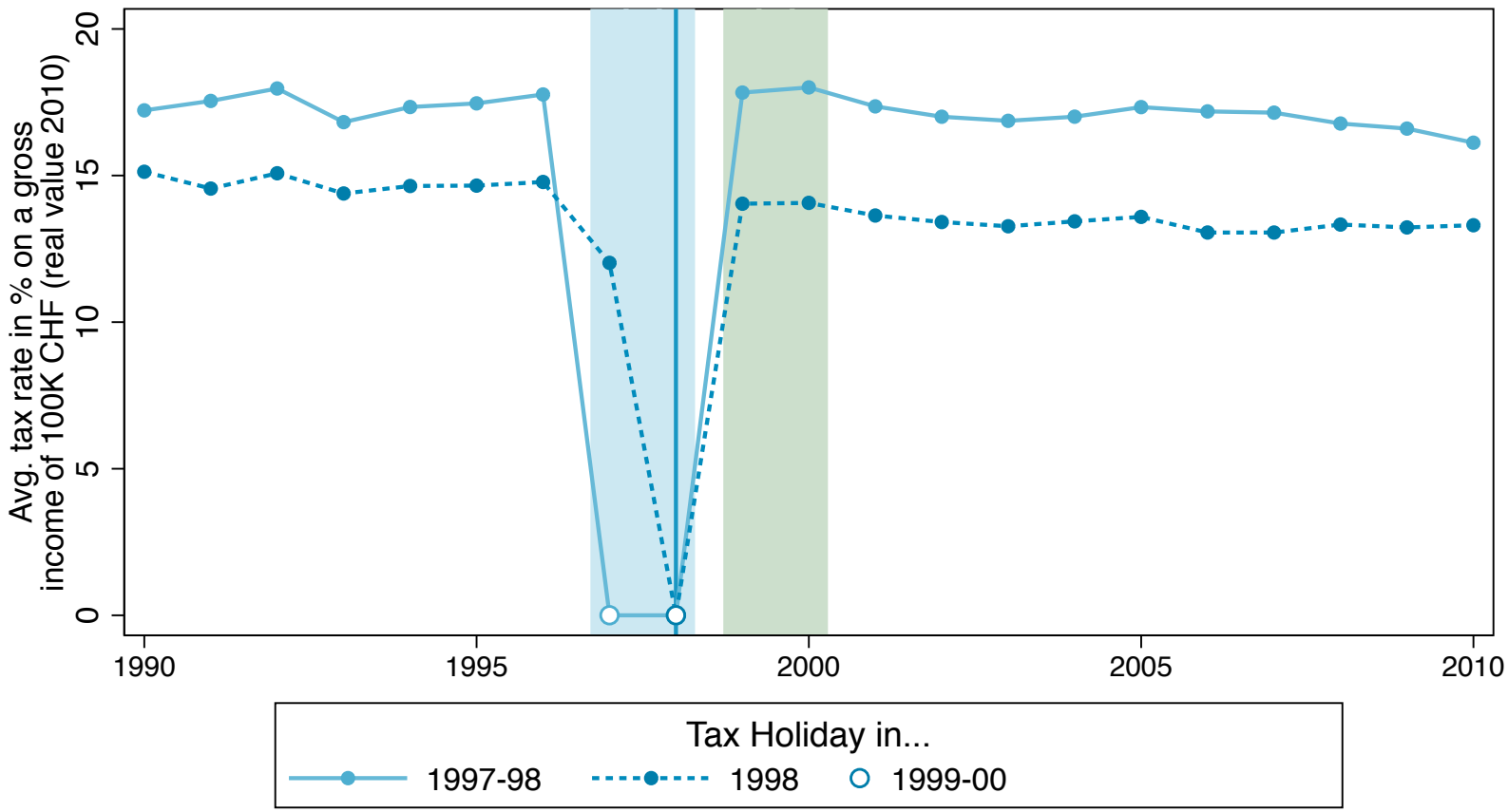

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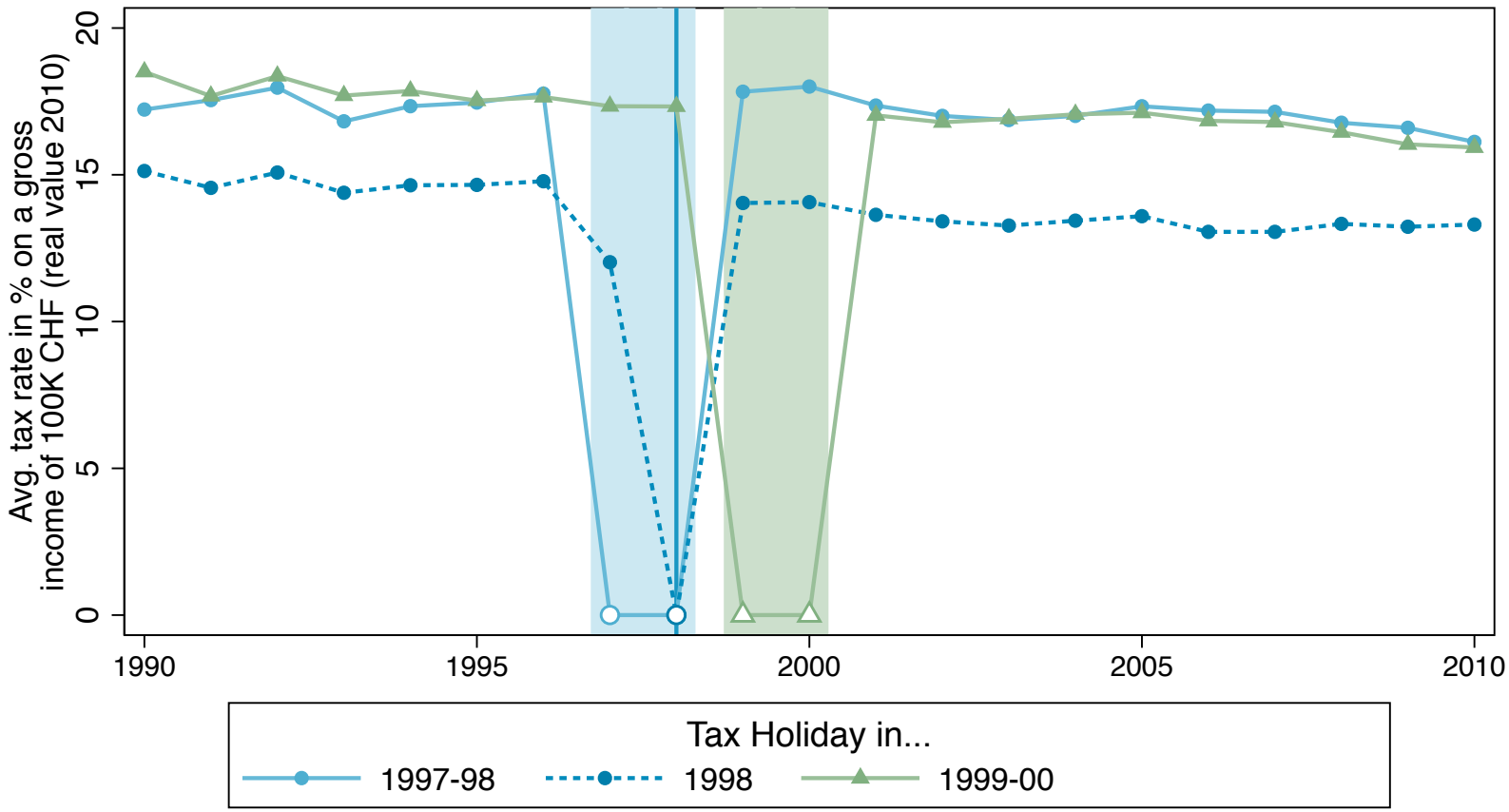

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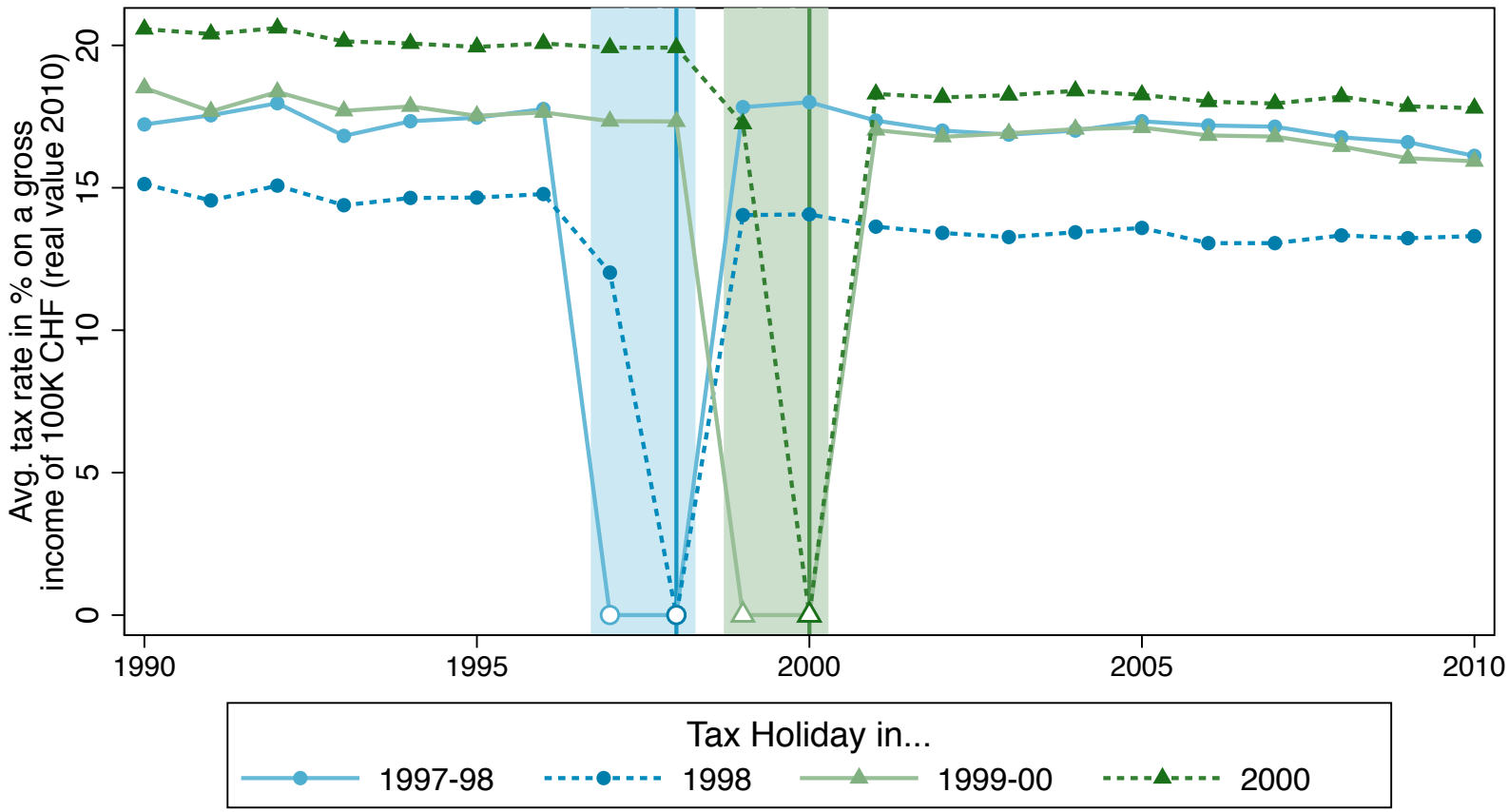

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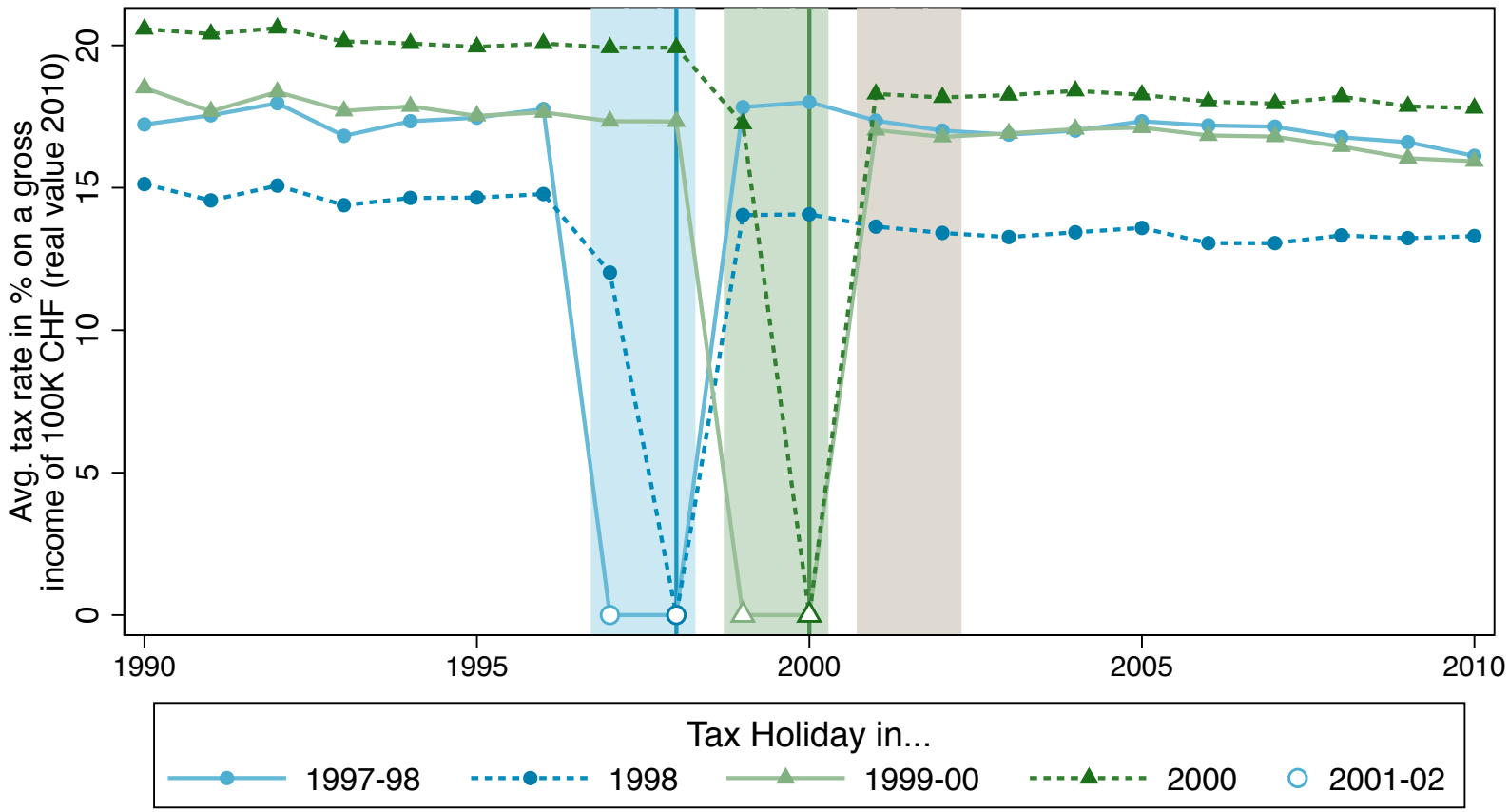

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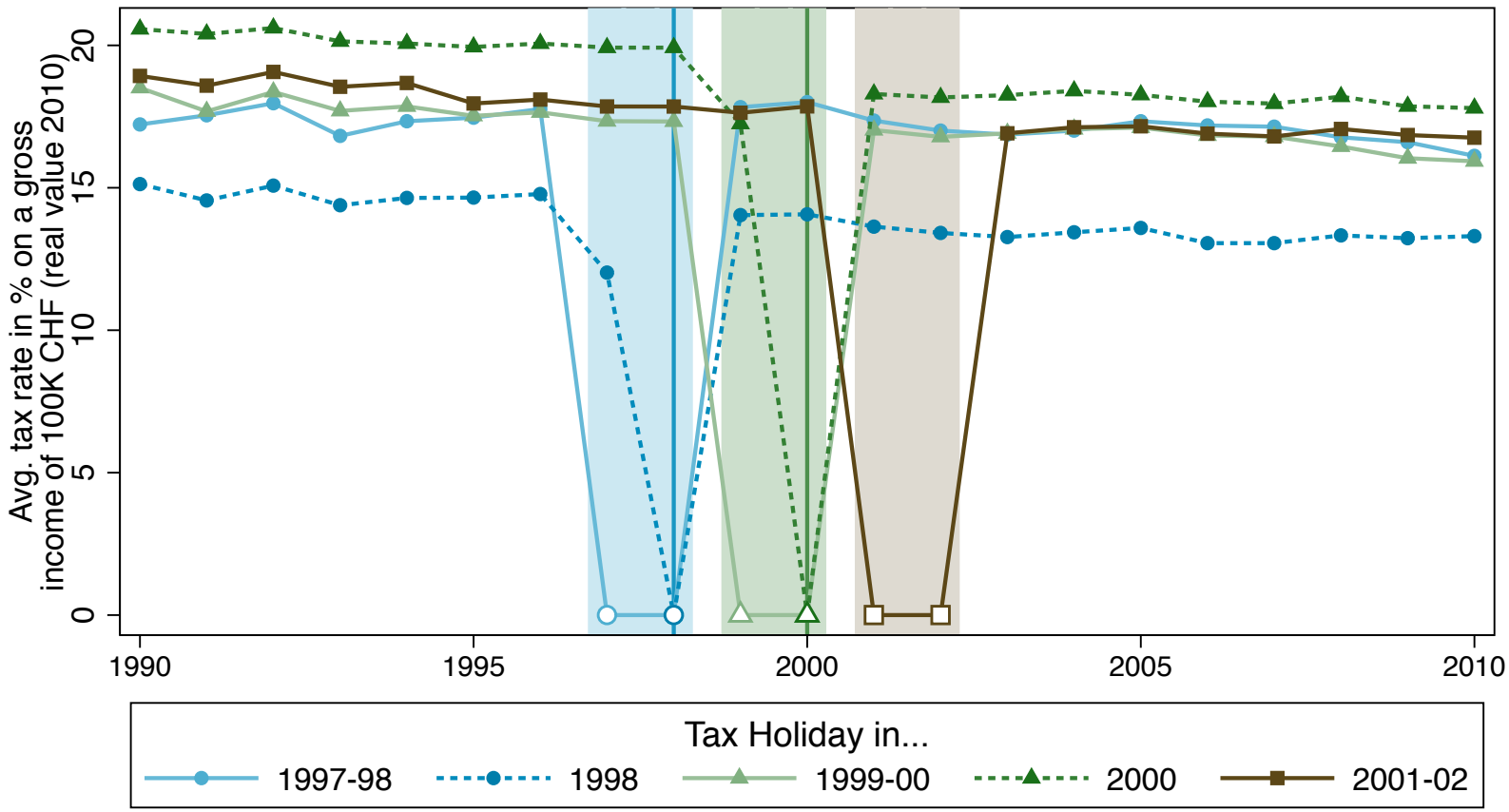
First Stage: Substantial Change in Average Tax Rates

Mean average tax rate in the economy: 11.1%



Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

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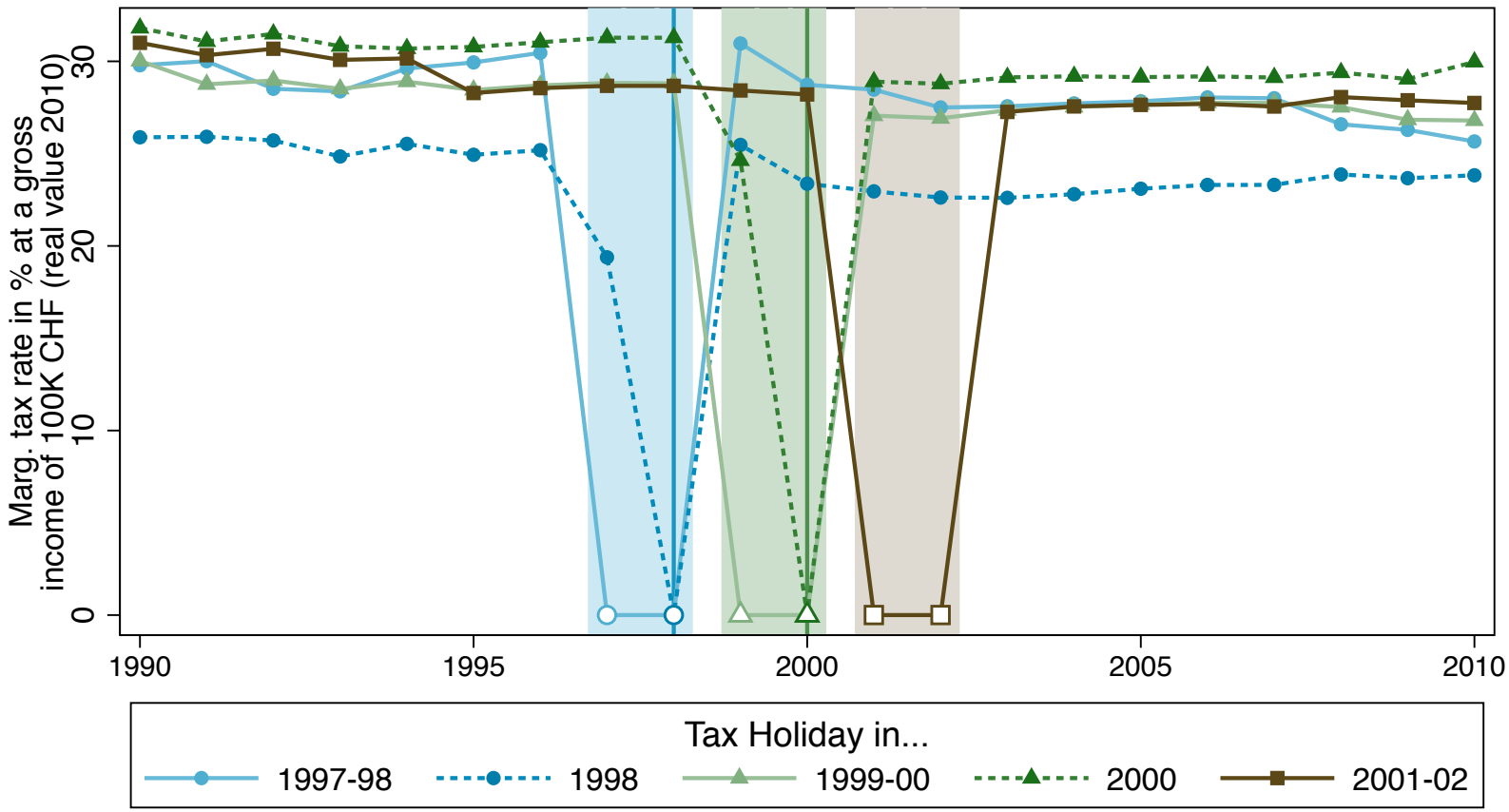
First Stage: Substantial Change in Marginal Tax Rates

Mean marginal tax rate in the economy: 24%



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Expected Behavioral Responses

- Extensive margin (average tax rate): more people work
- Intensive margin (marginal tax rate): people work more
- Tax avoidance margin: shift earnings into tax holiday years

- Expect larger responses for more elastic subgroups/subgroups with larger tax changes
  - Women
  - High income earners
  - Self-employed

Salience: Newspaper Coverage and Cantonal Votes

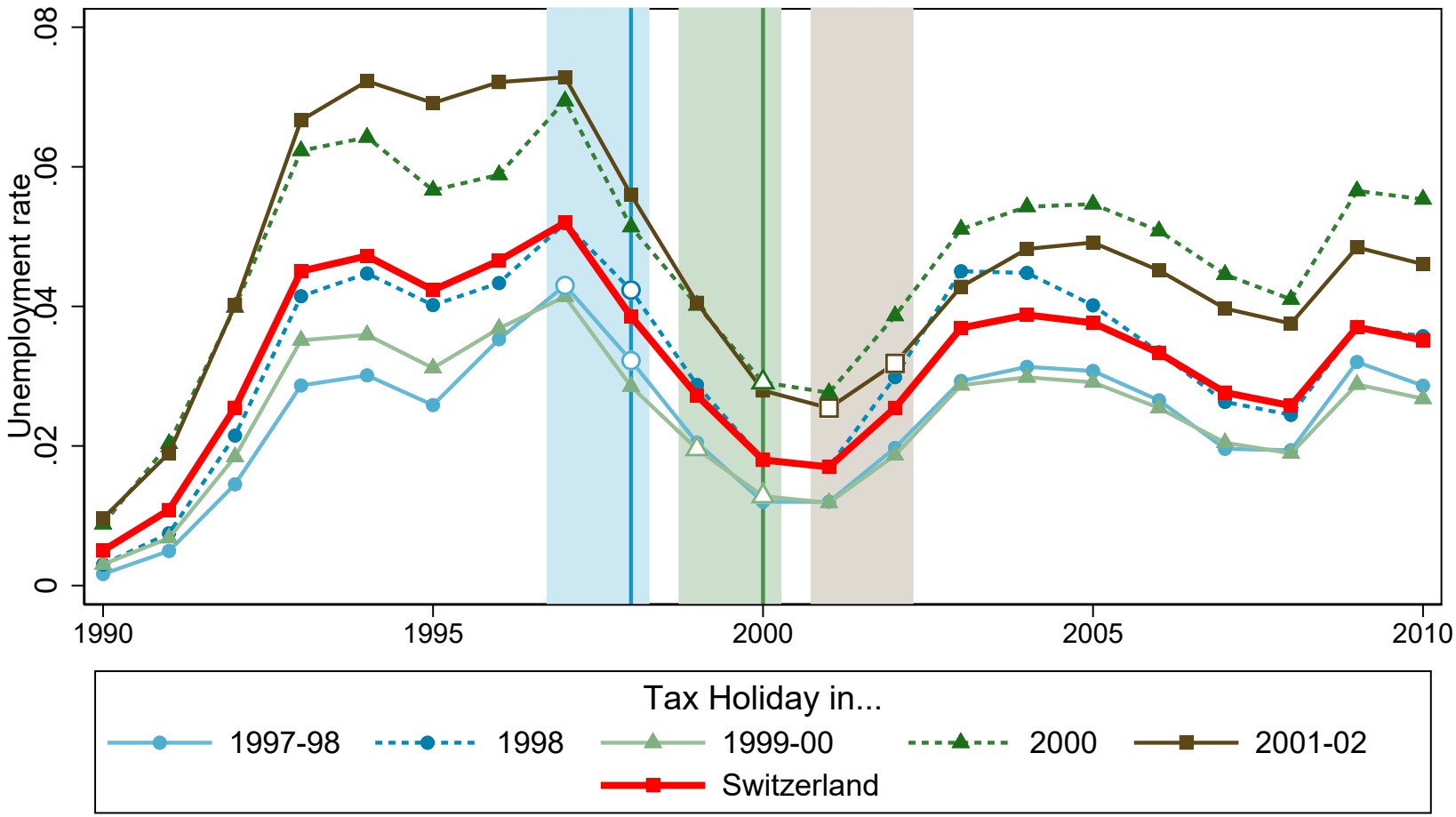
Newspaper Coverage

- Newspapers and magazines extensively covered the tax holidays, starting prior to the tax-free years, and with region-specific timing ▸ evidence
- Many articles specifically discuss the tax saving opportunities ▸ example

Cantonal Votes

- 14 out of 25 cantons held a referendum ▸ dates
- Voting material explains the tax holiday to a broad public ▸ voting material

Common Macro Trends: Unemployment Rates



▸ GDP ▸ to: ES regression

Main Data: Matched AHV-Census Data

Social security data (AHV) 1981-2010

- panel data covering the universe of the Swiss population
- entire individual labor market histories containing uncapped labor incomes (incl. bonuses and stock options)
- job spells and unemployment spells per month

\+ **Census 2000 and 2010**

- residential history
- marital status history
- household identifier (relevant for tax calculation)
- children
- education

Main Data: Matched AHV-Census Data

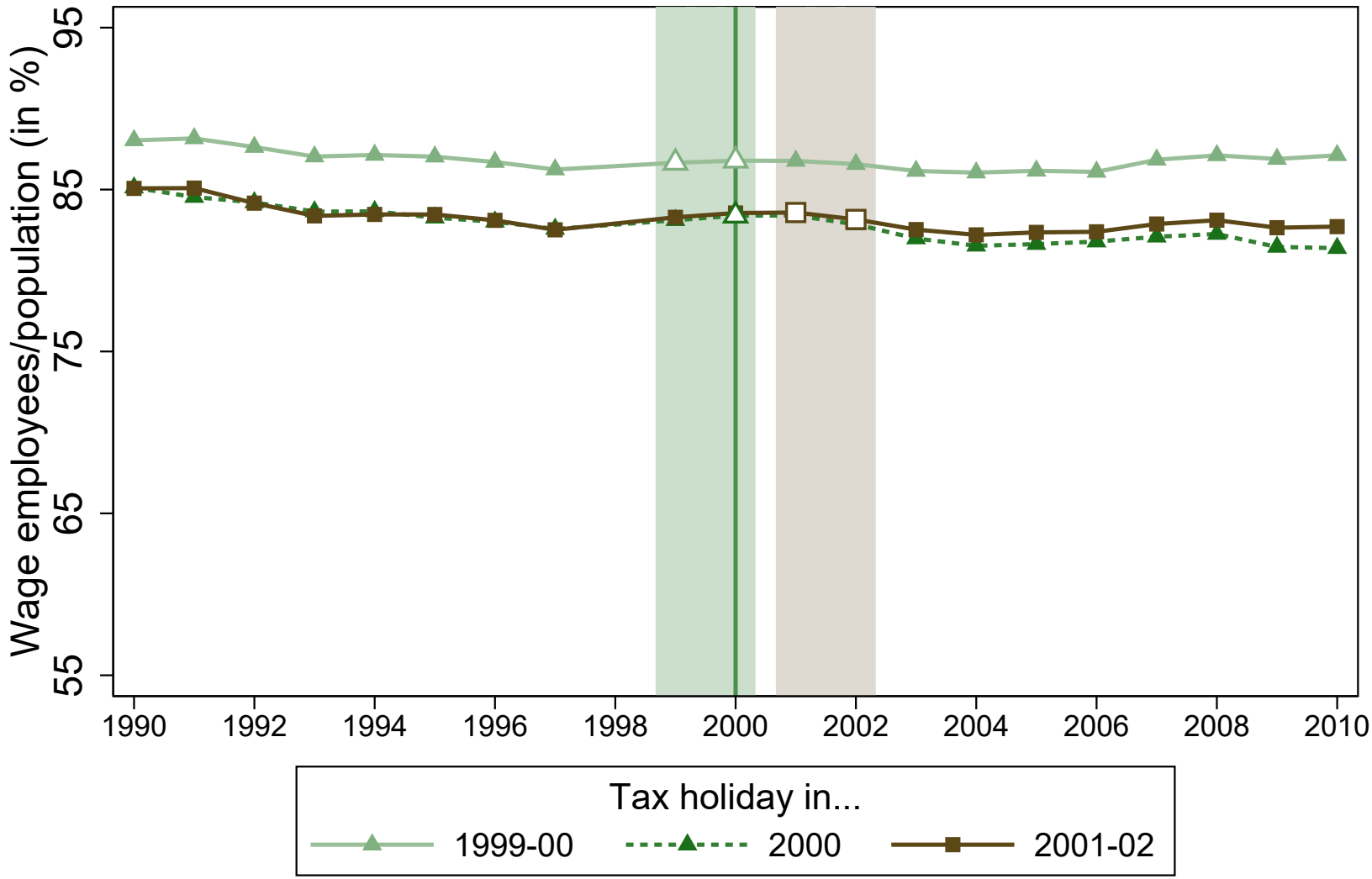
Disadvantages

- hours worked not known $\rightarrow$ focus on labor earnings
- non-random missing data in 1998 for employees
  $\rightarrow$ 1998 generally excluded from analysis
- self-employment incomes missing in 1999 & 2000

Outline

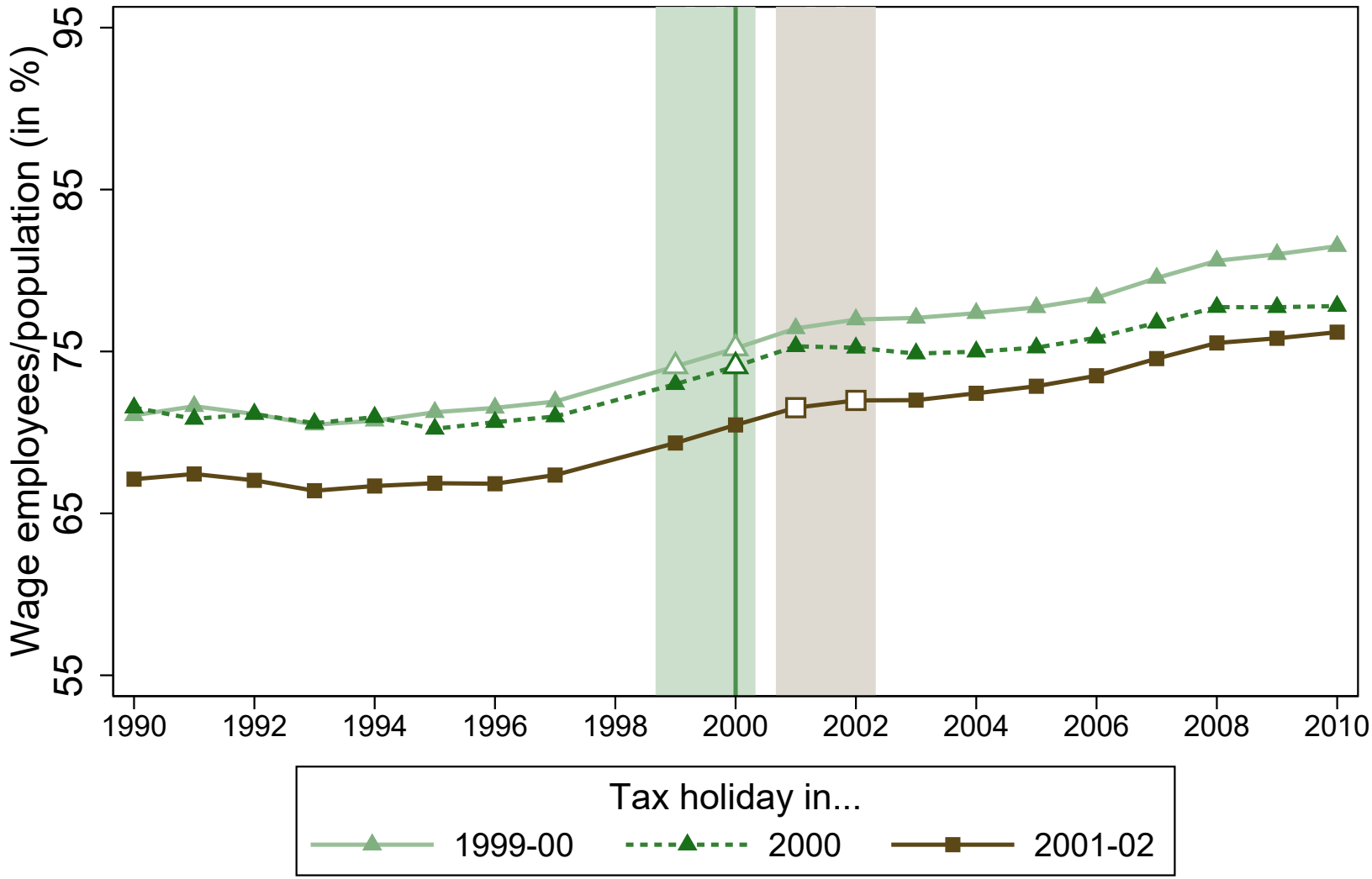
Outline

Wage Employment Rate: Men Aged 20-60



Data source: AHV-STATPOP

Wage Employment Rate: Women Aged 20-60



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Event Study - Regressions at Individual Level

$$Y_{it} = \alpha_i + \alpha_t + \sum_{k=-4}^{4} \delta_k TH_{ct}^k + X_{it} + \epsilon_{it}$$

- Y_{it}: outcome of individual i in period t
- α_i and α_t: person and year fixed effects
- $\sum_{k=-4}^{4} \delta_k TH_{ct}^k$: a sequence of event study dummies equal to 1 k periods away from the first year of the federal tax holiday in canton c (excluding $t-2$, which serves as reverence period)
- Controls X_{it}: age, age squared, age by gender; linear time trends by canton of residence; two dummies for $t \leq 5$ and $t \geq 5$

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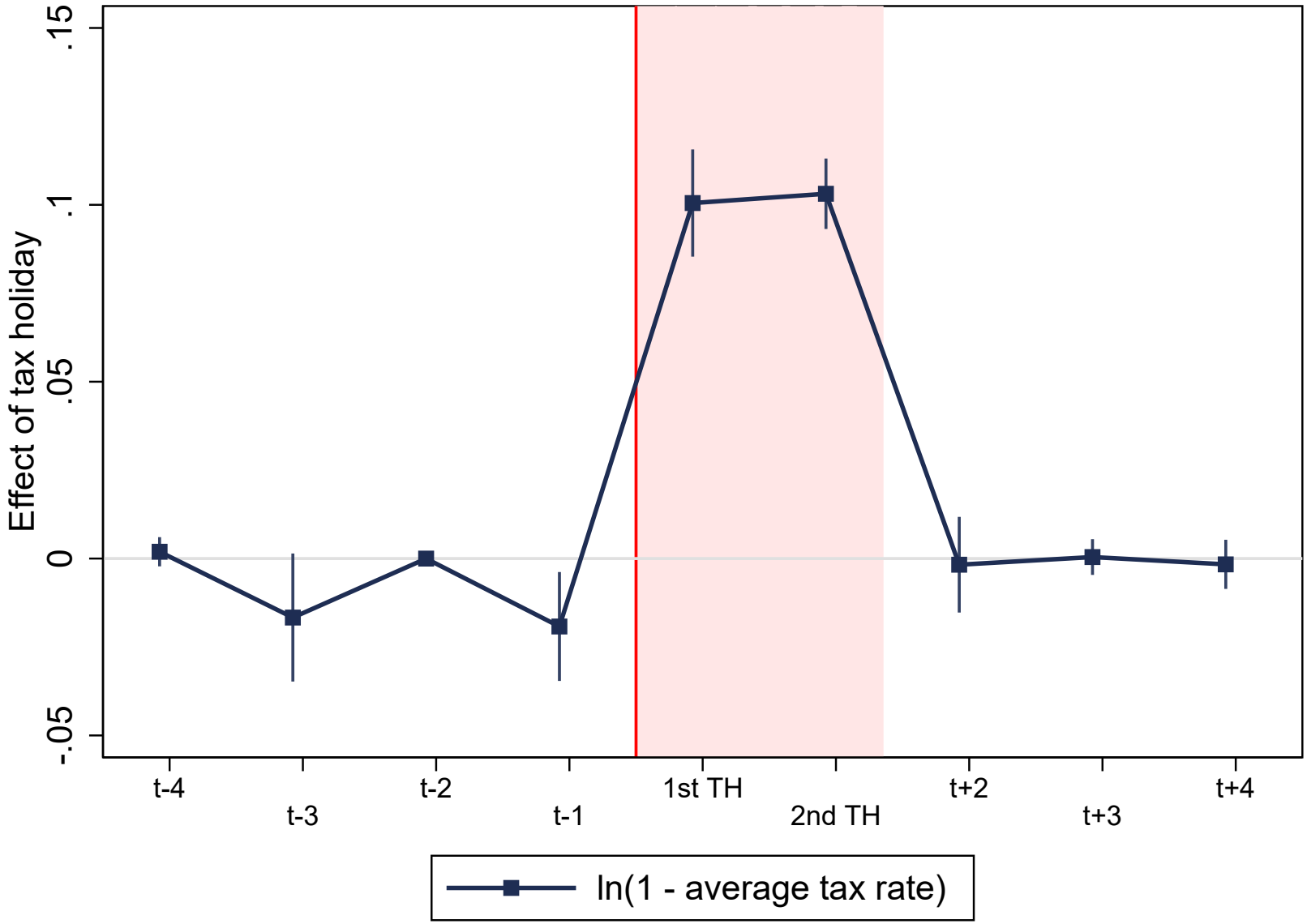
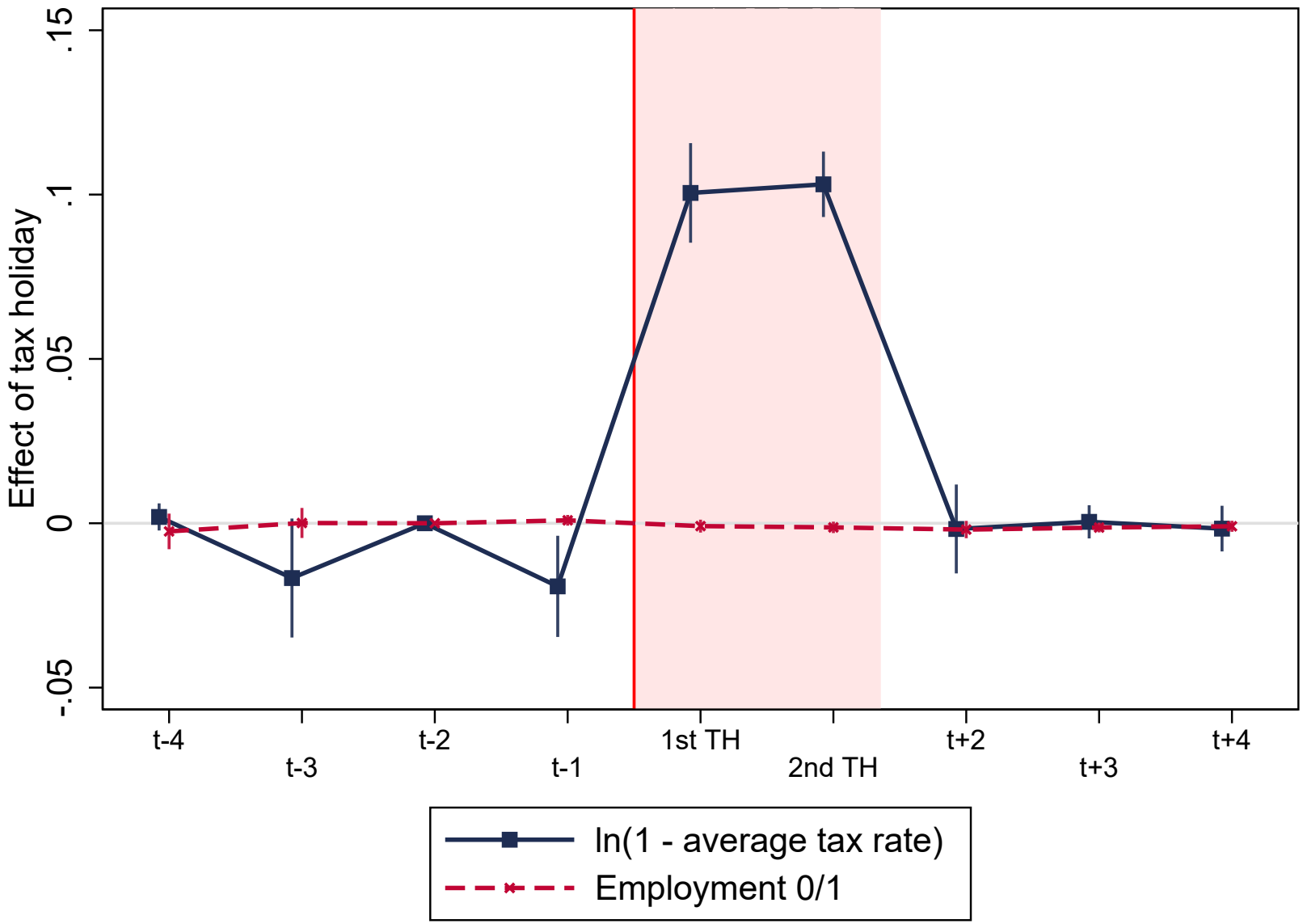
Identifying assumptions:

- Common trends in outcomes
  (e.g., employment and unemployment rates)
- Elastic labor demand ▸ evidence

Event Study: First Stage



Event Study: Extensive Margin (Wage Earners)



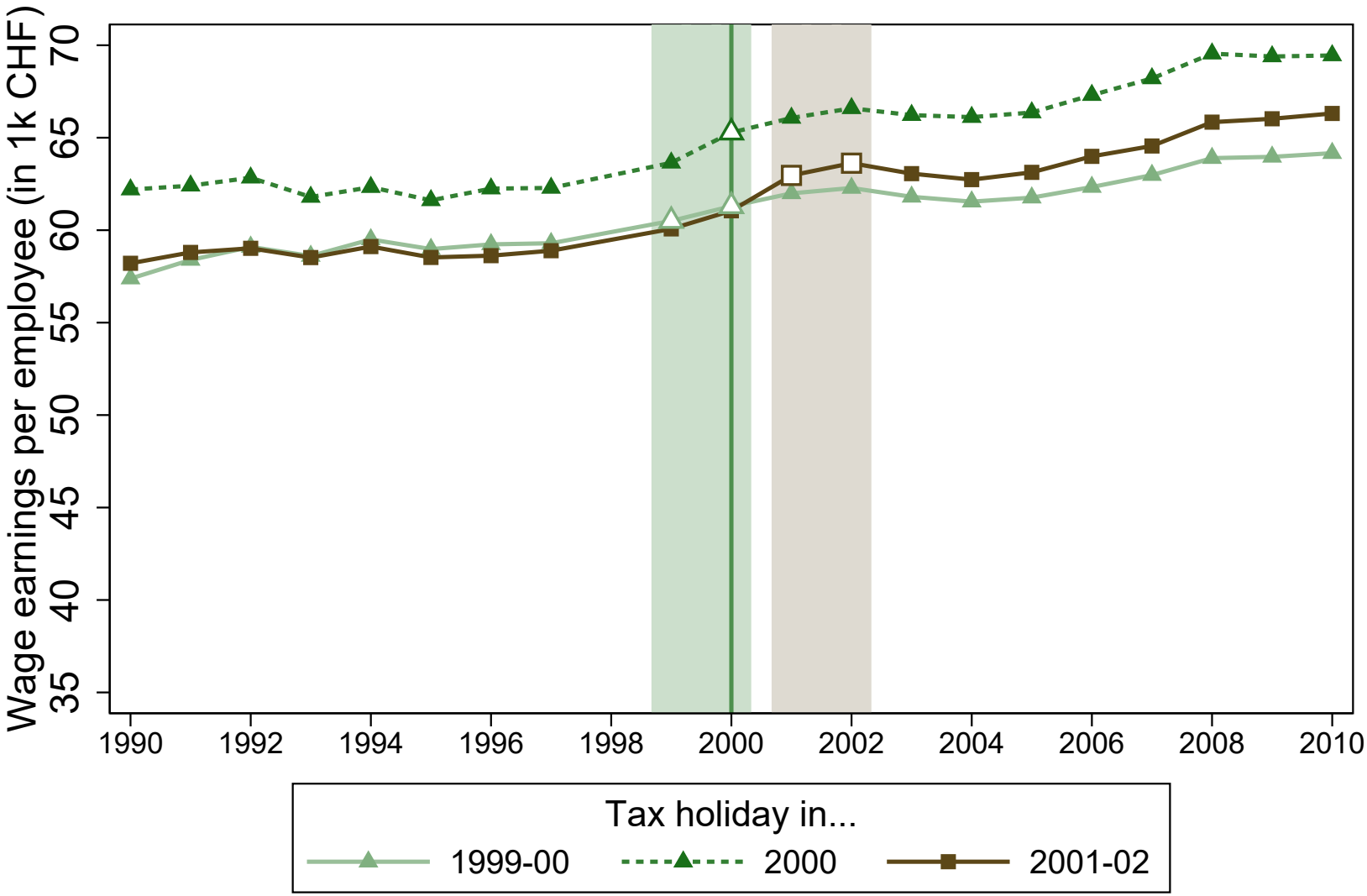
▸ detail

Nothing Ever Happens at the Extensive Margin

- Married women
- Older workers (age 51-60)
- Number of jobs
- Months employed
- Entry or exit of self-employed
- ...

Outline

Average Wage Earnings per Employee



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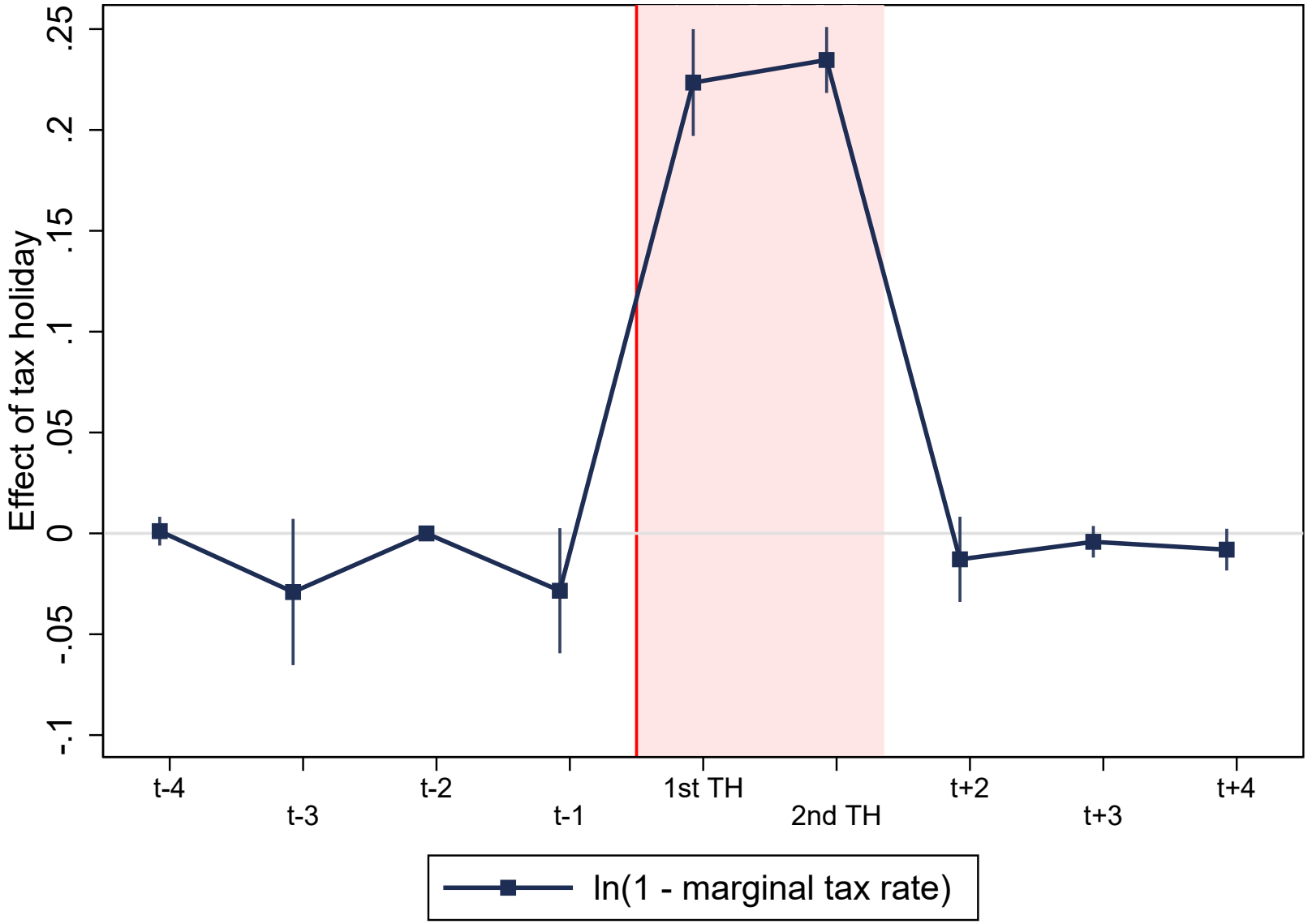

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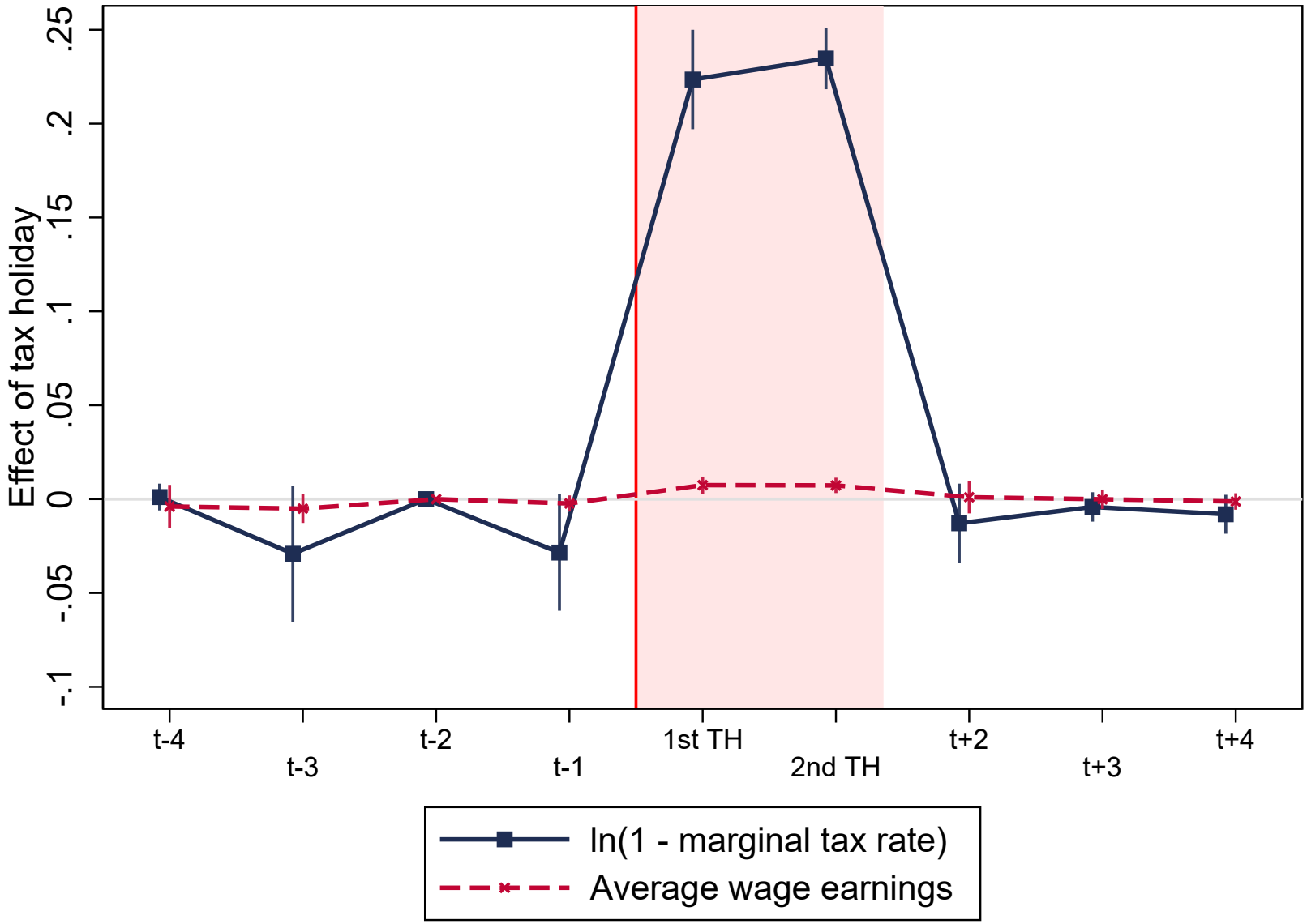

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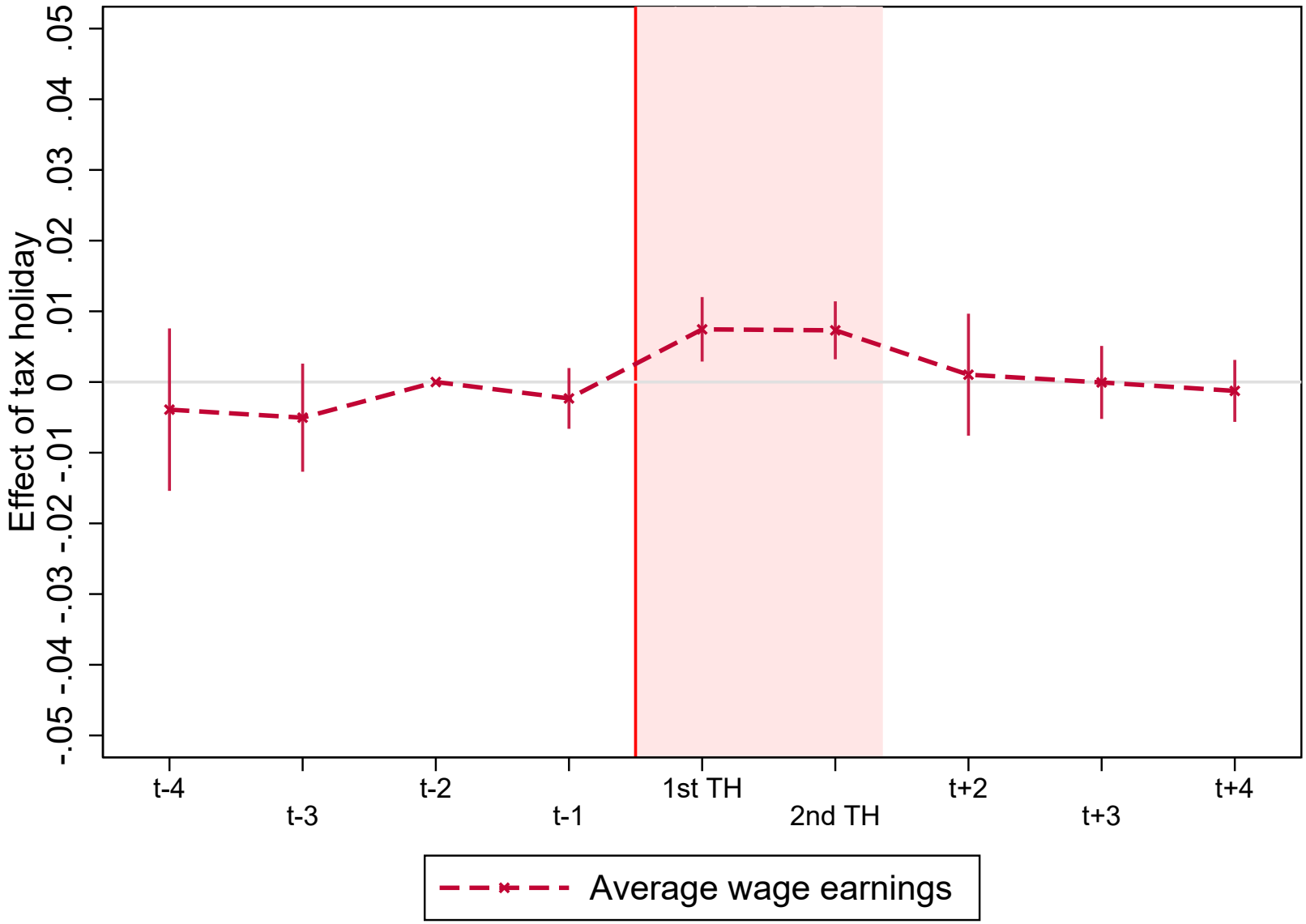


Frisch Elasticity Estimates

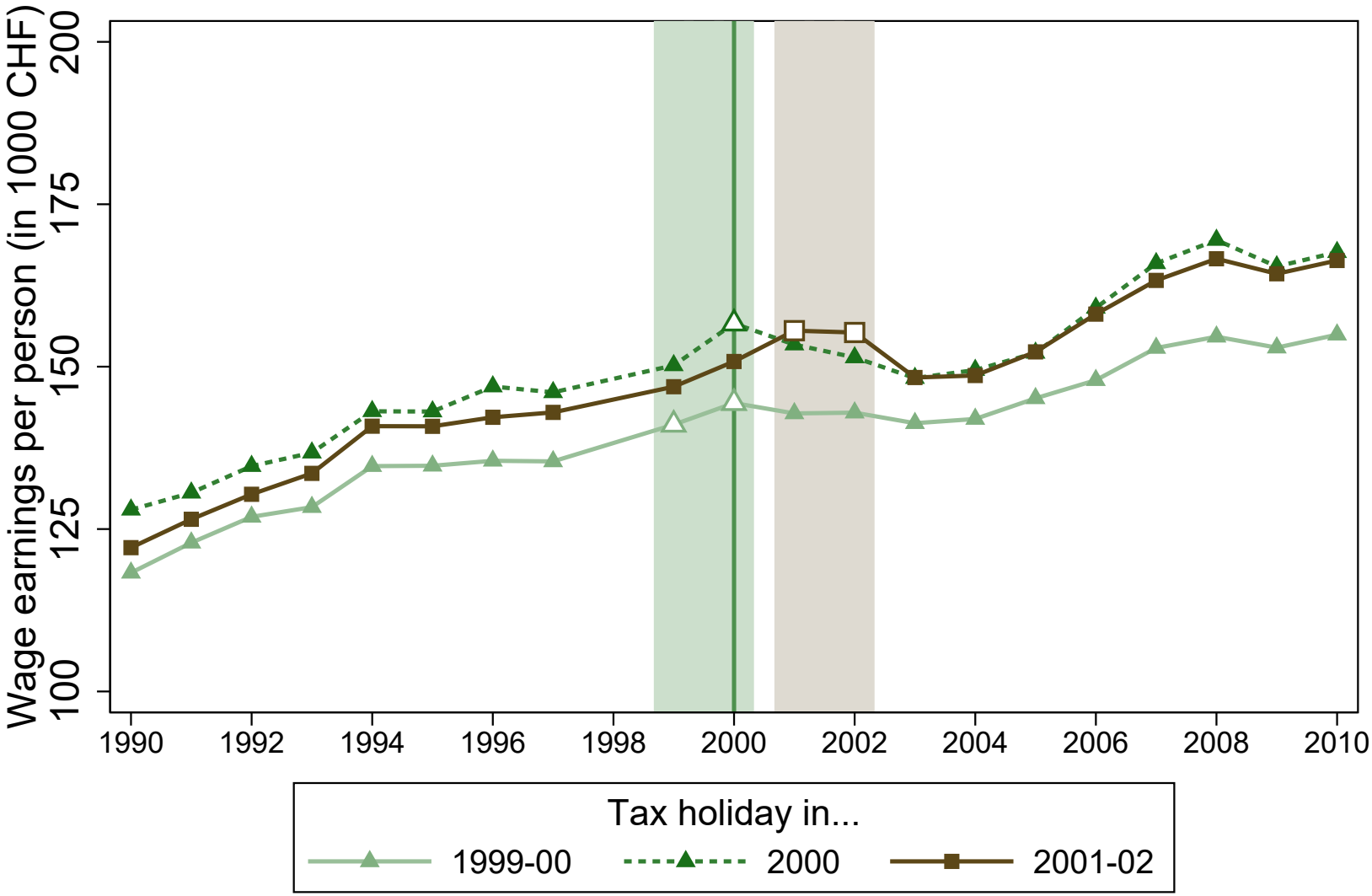
▸ IV estimates

$$\textit{Frisch elasticity } \eta^F = \Delta \ln y / \Delta \ln[1-\tau]$$

	Men		Women	
	Employ-ment rate	Earnings* p. employee	Employ-ment rate	Earnings* p. employee
A: Total sample				
Frisch elasticity η^F	-0.00	**0.05****	0.00	0.02
B: Married with children				
Frisch elasticity η^F	0.00	0.06	-0.01	0.03
C: Married without children				
Frisch elasticity η^F	0.00	**0.05****	0.02	0.02
Observations	60	60	60	60
Canton group FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes

* In 1000 CHF

Average Wage Earnings: High-income Employees



High income: avg. real wage earnings in 1994-1996 $> 100k$ CHF/year

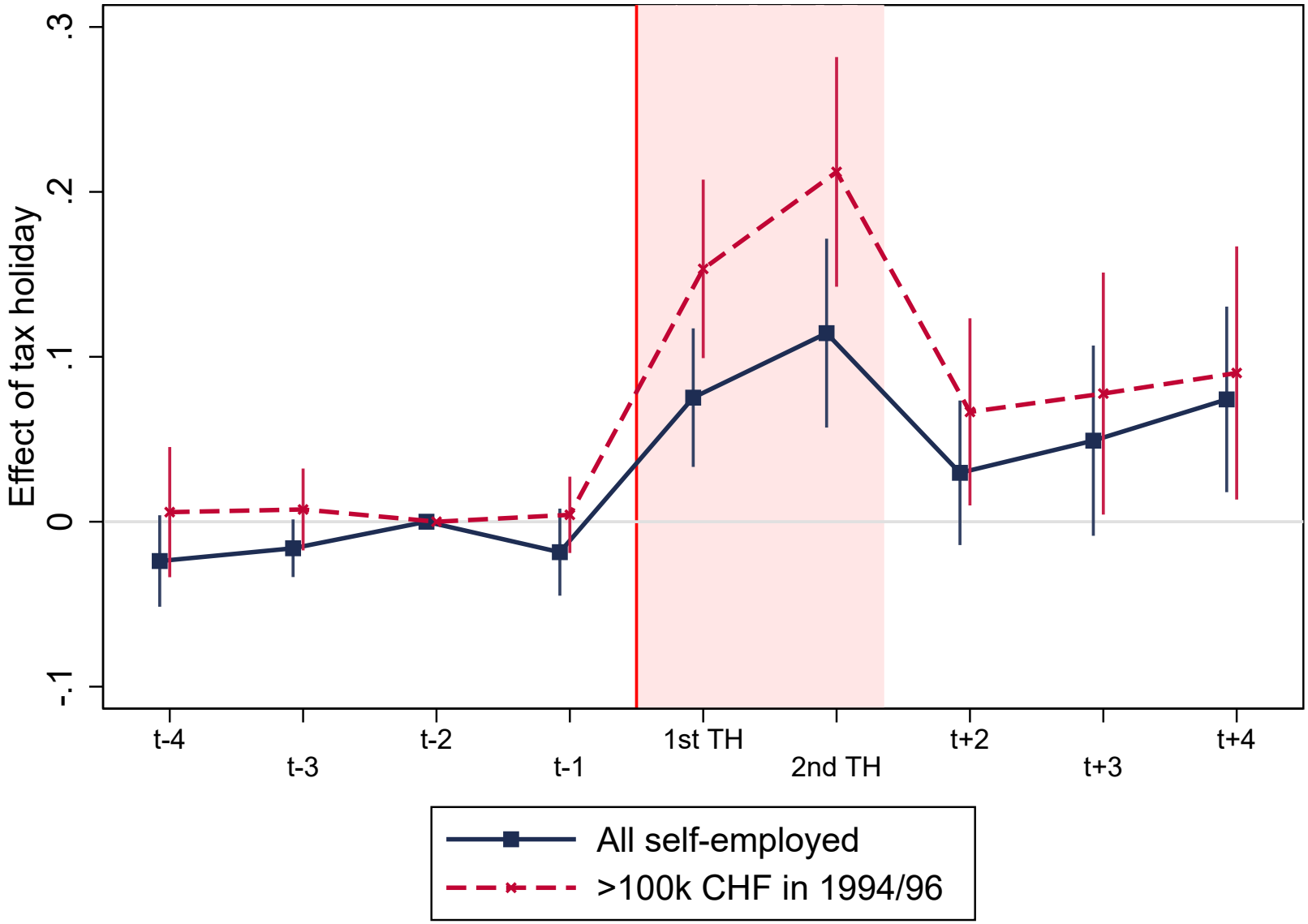
Frisch by Pre-Reform Earnings (annual avg. 1994-1996)

▸ IV estimates

	Earnings p.p. (incl. 0)	Earnings per employee
1–25k CHF		
Frisch elasticity η^F	0.04	0.05
25k–50k CHF		
Frisch elasticity η^F	0.02	0.03
50k–100k CHF		
Frisch elasticity η^F	**0.03***	0.02
100k–200k CHF		
Frisch elasticity η^F	**0.05*****	**0.04****
More than 200k CHF		
Frisch elasticity η^F	**0.09****	**0.09****
Observations	60	60
Canton group FE	Yes	Yes
Period FE	Yes	Yes

Event Study: Self-Employment Income

▸ By gender



Conclusion

1. Significant but quantitatively small responses of earnings consistent with an observed Frisch elasticity of 0.05
2. No responses along the extensive margin, even for groups less attached to the labor force
3. Self-employed and high income earners display larger responses
4. Estimates may even be upward biased due to tax avoidance

Our results do not support the idea that the labor supply channel plays a major role in explaining business cycles.

Thank you.

Comments and questions welcome:
isabel.martinez@unisg.ch

Appendix

Empirical Evidence: Extensive Margin Elasticity

$$\epsilon^{F}_{ext} = \frac{\Delta log(E/P)}{\Delta log(w^{net})}$$

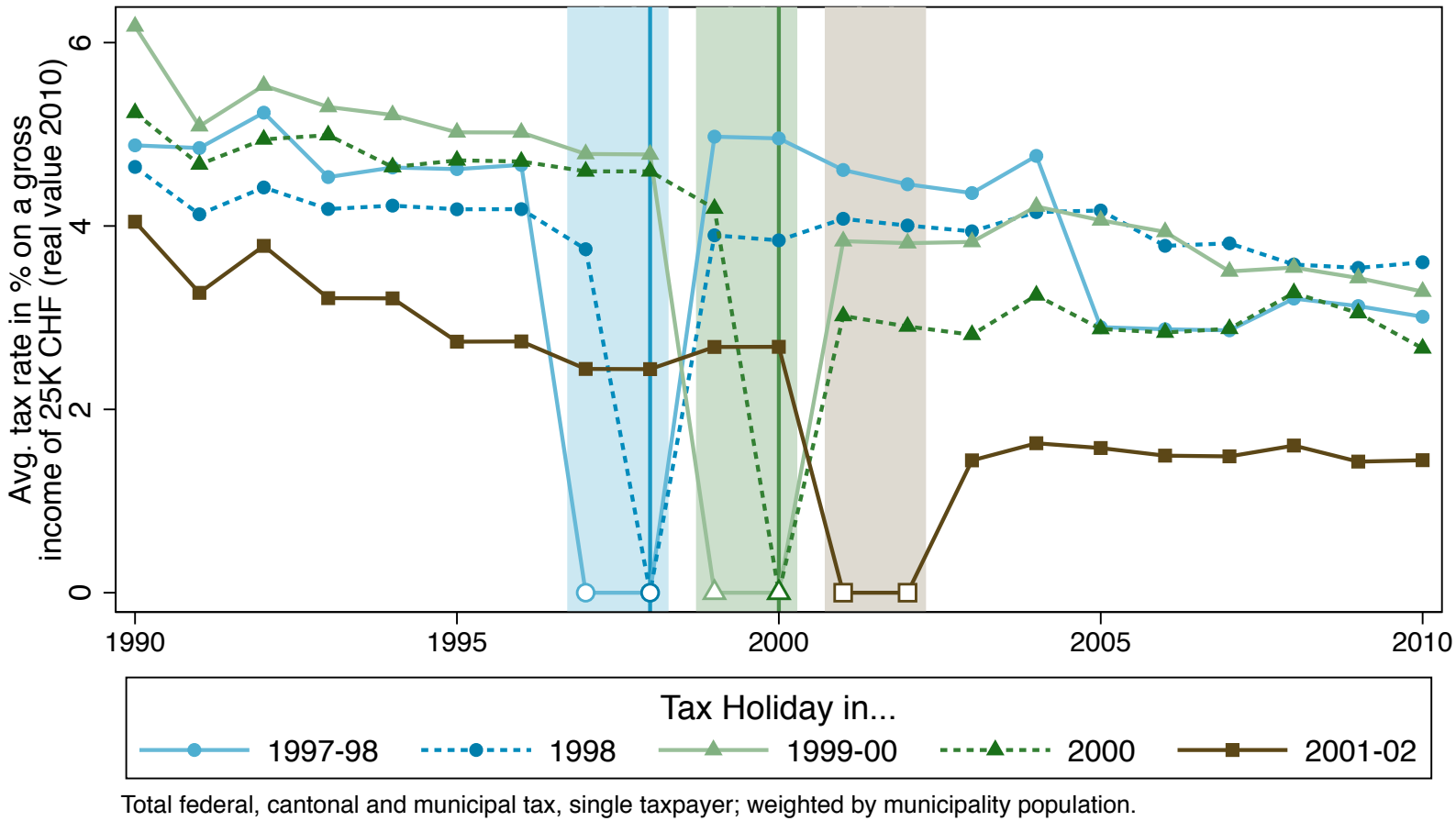
Chetty et al. (2013), Table 1

Table 1
Extensive margin elasticity estimates from quasi-experimental studies

B. Intertemporal Substitution (Frisch) Elasticities			
10. Carrington (1996)	0.43	0.08	Full Population of Alaska, Trans-Alaska Pipline, 1968–1983
11. Gruber and Wise (1999)	0.23	0.07	Men, Age 59, variation in social security replacement rates
12. Bianchi, Gudmunndsson, and Zoega (2001)	0.42	0.07	Iceland, 1987 zero tax year
13. Card and Hyslop (2005)	0.38	0.03	Single Mothers, Canadian Self-Sufficiency Project
14. Brown (2009)	0.18	0.01	Teachers Near Retirement, California Pension System Cutoffs
15. Manoli and Weber (2011)	0.25	0.01	Workers Aged 55-70, Austria severance pay discontinuities
Unweighted Mean	0.32		

▸ back

Average Tax Rates over Time: Low Income Households

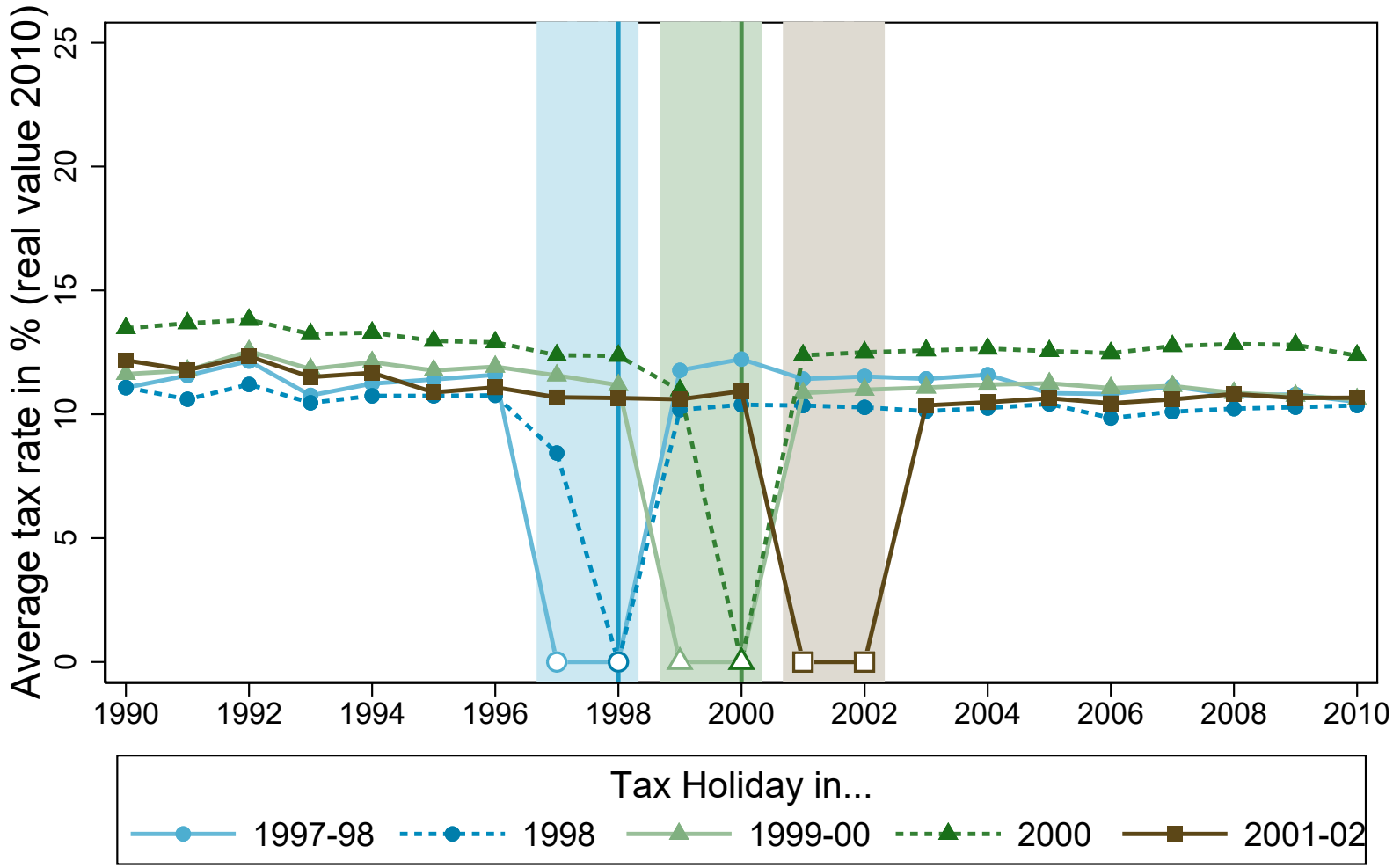


Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

Data source: Parchet (2018) and ESTV, own calculations

back

Average Tax Rates over Time: SSER-Sample

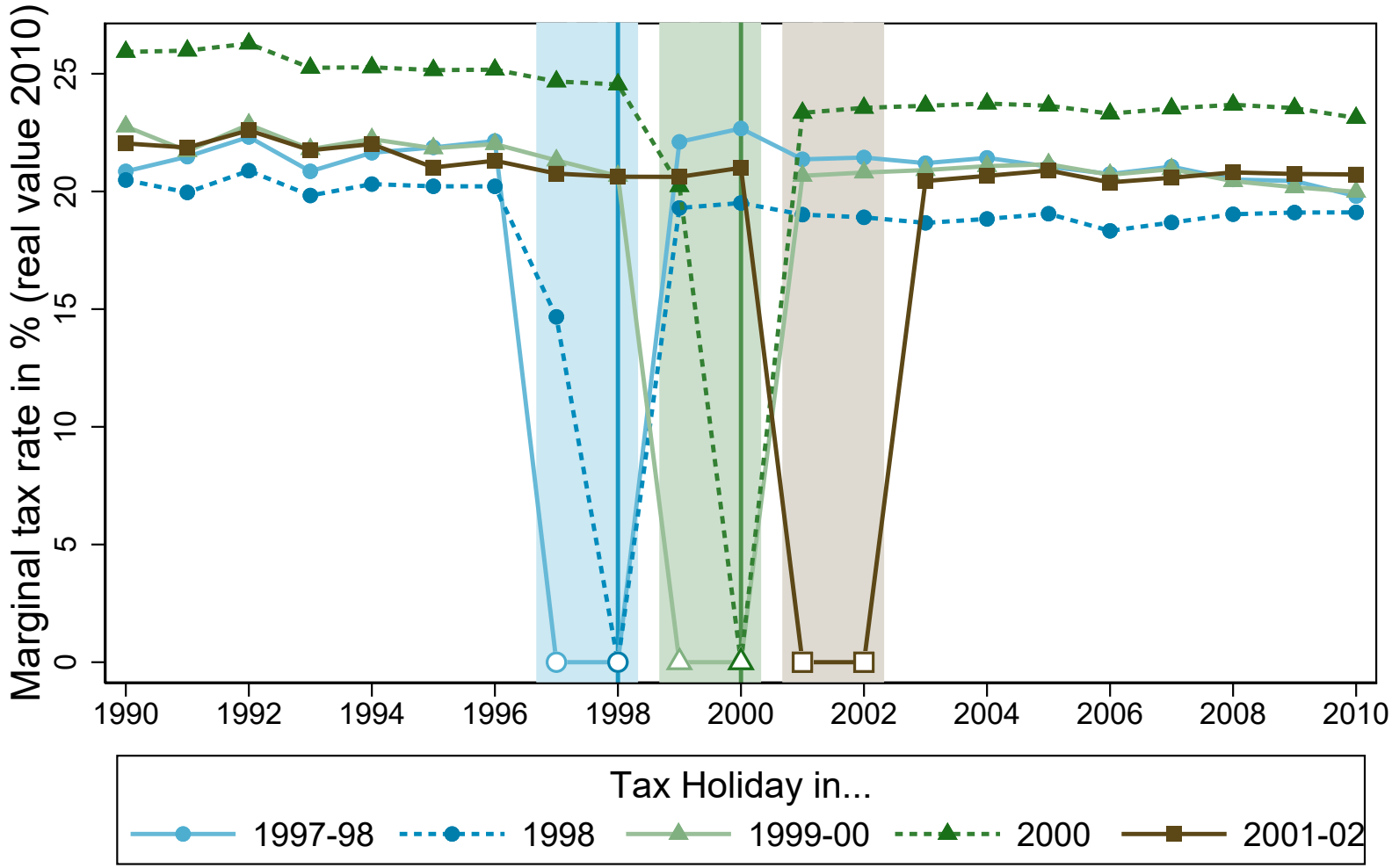


Total federal, cantonal and municipal tax; weighted by municipal employment.

Data source: Parchet (2018) and ESTV, SSER-data, own calculations

back

Marginal Tax Rates over Time: SSER-Sample



Total federal, cantonal and municipal tax; weighted by municipal employment.

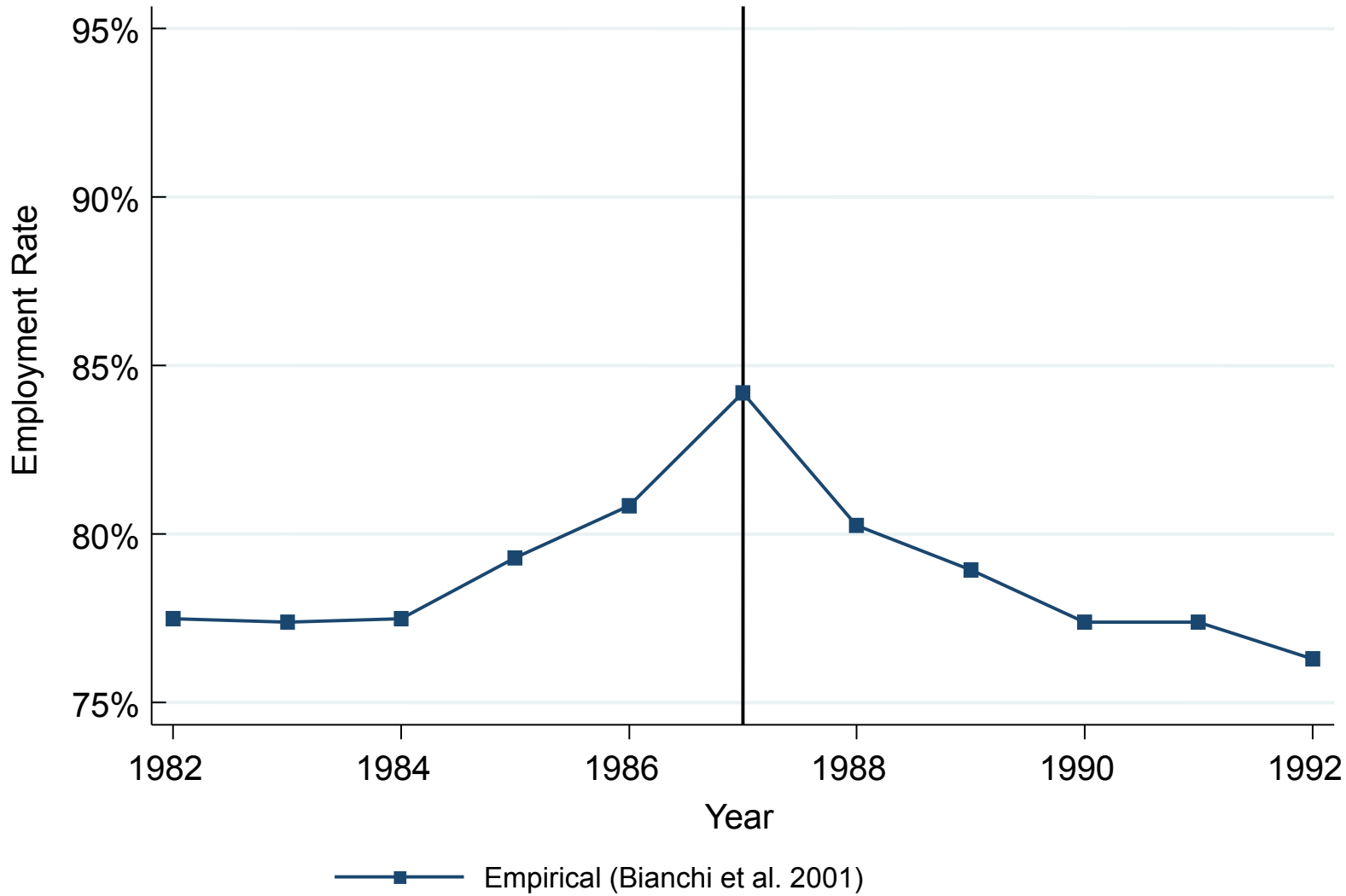
Data source: Parchet (2018) and ESTV, SSER-data, own calculations

back

Iceland 1987 Tax Holiday: No Obvious Counterfactual

back

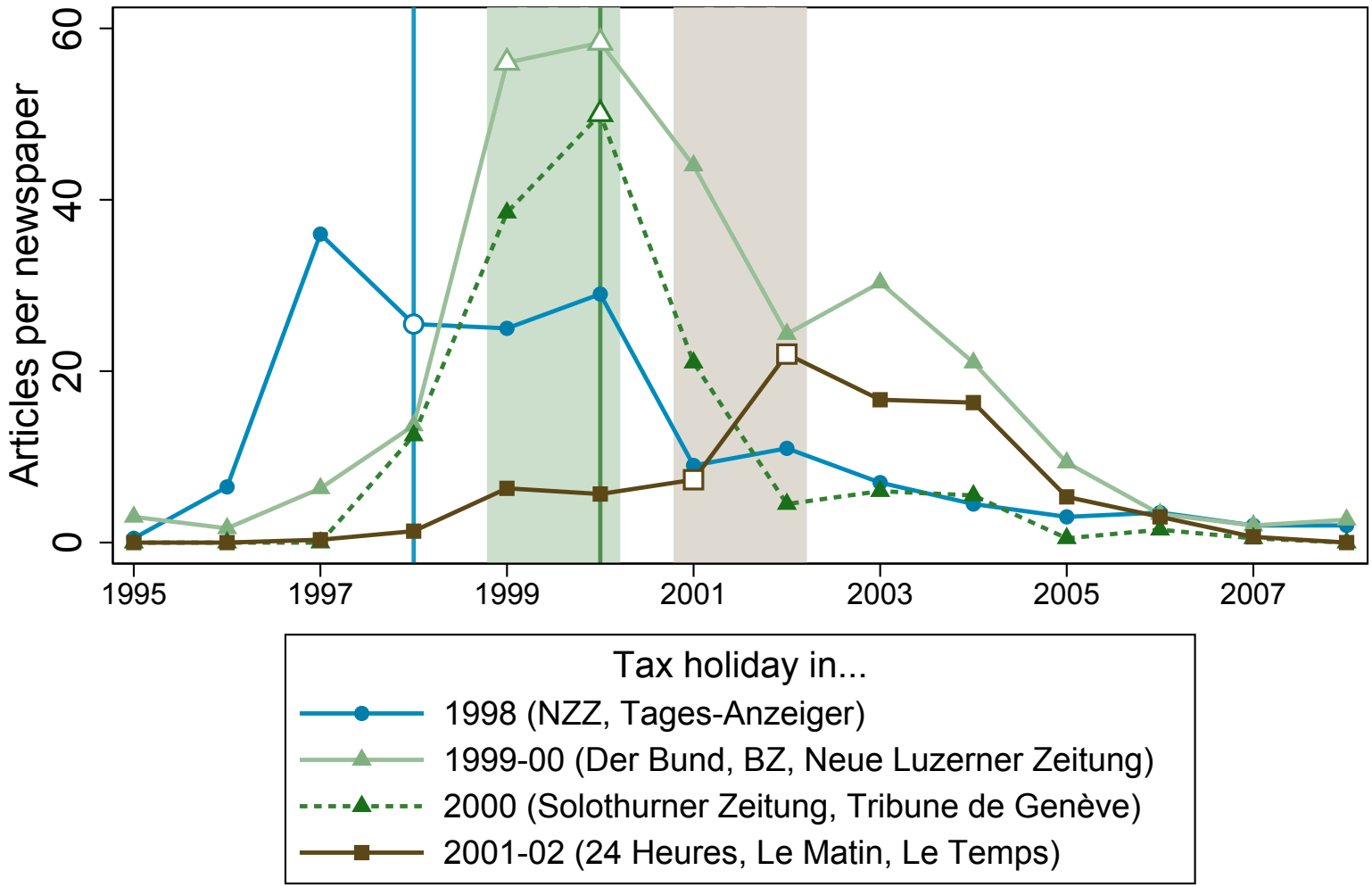
Figure 1a: 1987 Tax Holiday in Iceland



Salience: Newspaper Coverage by Region

Number of articles per outlet referring to the tax holidays

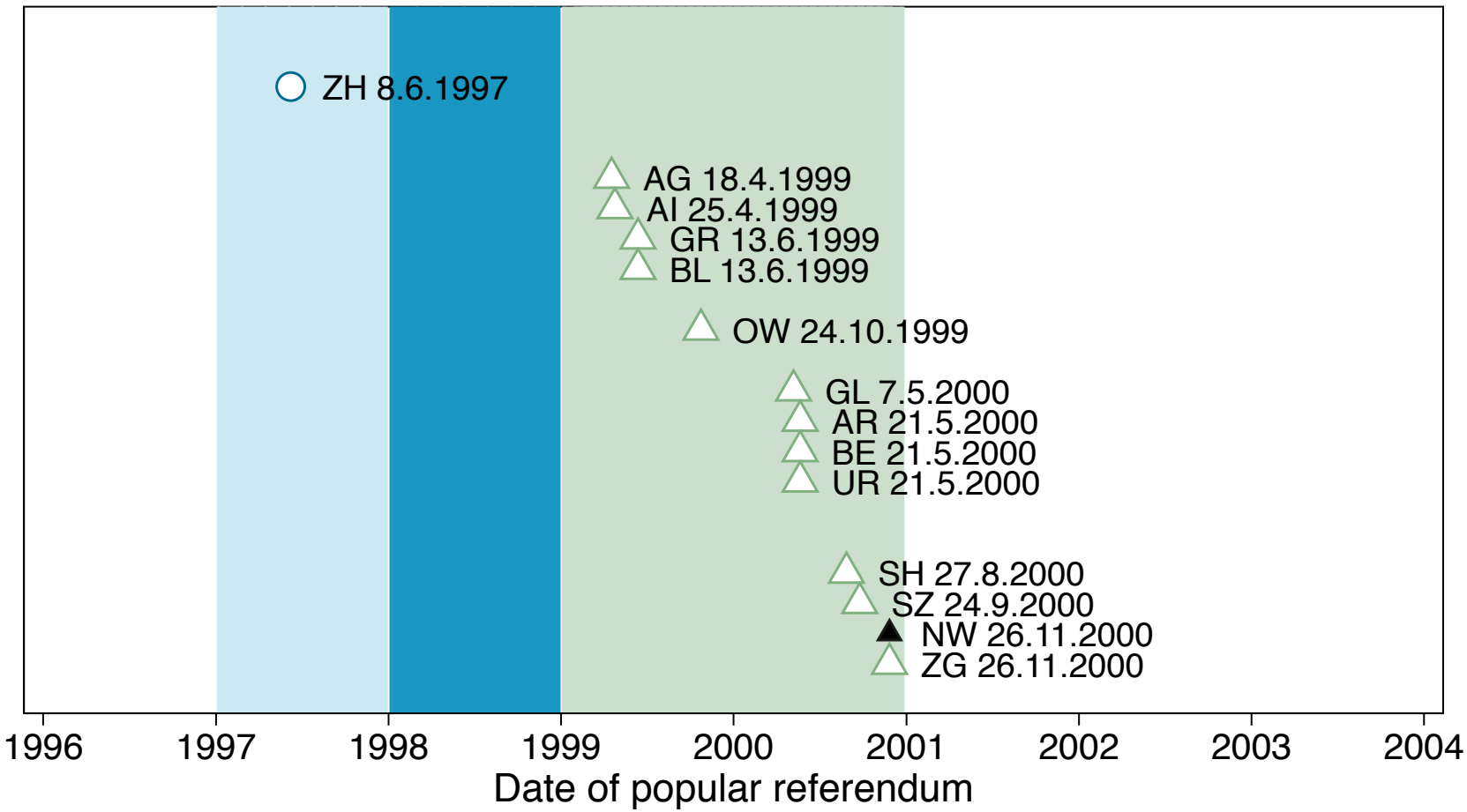
back



Salience: Popular Referenda Held in 14 Cantons

Dates of popular referenda on the reform

back



Salience: Newspaper Coverage

back

Gewusst wie!

2003 wird im Wallis die Gegenwartsbemessung eingeführt. Was hat dieser Steuersystemwechsel für Auswirkungen in der Bemessunglsücke 2001 und 2002

Am 1. Januar 1993 trat das Gesetz zur Steuerharmonisierung in Kraft mit der Auflage an die Kantone, ihre Gesetzgebung innert 8 Jahren anzupassen. Nebst einer Vereinheitlichung, die die Steuerpflicht, der Gegenstand der Besteuerung, das Verfahrens- oder Strafrecht betrifft, wird im Wallis der Wechsel der zeitlichen Bemessungsgrundlage von Bedeutung sein.

Das bis anhin gültige Veranlagungssystem der Vergangenheitsbemessung mit Pränumerando wird im Wallis im Jahr 2003 gegen die Gegenwartsbemessung mit Postnumerando getauscht. Was dieser Wechsel bedeuten kann, zeigt Alois Kämpfen von der Kämpfen Treuhand AG anhand einiger ausgewählter Themen auf.

Von Alois Kämpfen, dipl. Wirtschaftsprüfer

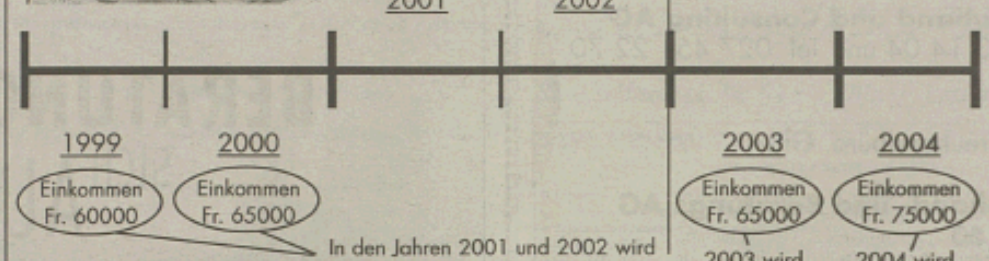
Die Einführung der so genannten einjährigen Gegenwartsbemessung, die im Kanton Wallis – wie in den Kantonen TI und VD – auf den 1. Januar 2003 vorgenommen wird, bedeutet, dass Sie jedes Jahr (statt wie bisher alle zwei Jahre) eine Steuererklärung einreichen müssen.

Vorteile der neuen Methode

Was auf den ersten Blick nach zusätzlichem Papierkrieg aussieht, hat jedoch auch klare Vorteile:

Ablauf des Wechsels des Veranlagungssystems

Die ordentlichen Einkommen 2001 und 2002 fallen aufgrund des Wechsels in die Bemessungslücke. Ausserordentliche Erträge wie z. B. Lottogewinne werden jedoch zur Besteuerung herangezogen.



In den Jahren 2001 und 2002 wird das Durchschnittseinkommen von 1999 und 2000 (Fr. 62500) aufgrund der diesjährigen Steuererklärung versteuert.

2003 wird aktuelles Einkommen 2003 (Fr. 65000) versteuert.

2004 wird aktuelles Einkommen 2004 (Fr. 75000) versteuert.

Beim Wechsel auf die Gegenwartsbemessung im Jahr 2003 wird Anfang des Jahres eine provisorische Steuererklärung ausgefüllt. Die definitive Veranlagung erfolgt Anfang des nächsten Jahres aufgrund der effektiv erzielten Einkünfte des abgeschlossenen Jahres.

sammenhängenden Aufwendungen bei der direkten Bundessteuer und den Kantons- und Gemeindesteuern in die Bemessungslücke.

Ausserordentliche Einkünfte während der Bemessungslücke, d. h. während den Jahren 2001 und 2002 unterliegen für das Steuerjahr in dem sie zugeflossen sind einer separaten Jahressteuer zu dem Satz, der sich für diese Einkünfte allein ergibt und die Aufwendungen, die mit diesen ausserordentlichen Einkünften unmittelbar zusammenhängen, können abgezogen werden. Sozialabzüge werden nicht gewährt. Weitere ausserordentliche Aufwendungen, die in die Bemessungslücke fallen, können im Durchschnitt 2001–2002 noch zusätzlich abgezogen werden. Die Veranlagung 2001–2002 wird nachträglich revidiert. Der Gesetzgeber zählt die ausserordentlichen Einkünfte sowohl bei der direkten Bundessteuer als auch bei den Kantons- und Gemeindesteuern beispielhaft, also nicht abschliessend auf. Ausserordentliche Einkünfte von Unselbständigerwerbenden könnten u. a. Kapitalabfindungen für wiederkehrende Leistungen, Aperiodische Vermögenserträge oder Lotteriegewinne sein. Bei Selbständig-Erwerbenden könnten dies u.a. Kapitalgewinne, Aufwertungen, Auflösung von Rückstellungen und nicht vorgenommene Abschreibungen sein.

Die ausserordentlichen Aufwendungen sind im Gegensatz zu den Einkünften abschliessend aufgezählt. Es sind dies: Unterhaltskosten für überwiegend privat genutzte Liegenschaften, soweit sie den Pauschalabzug übersteigen, Beiträge an die 2. Säule (Einkauf von Beitragsjahren

Salience: Cantonal Voting Material

Vereinfachtes Zahlenbeispiel:

Jahr	1997	1998	1999	2000	2001
Einkünfte:					
Ordentliches Jahreseinkommen	70'000	70'000	80'000	90'000	65'000
ausserordentliche Einkünfte			100'000	20'000	inkl.
ausserordentliche Aufwendungen			30'000	0	inkl.
Steuerveranlagung:					
ordentl. Einkommen: Revision vorbehalten! (80'000 und 90'000 fallen in die Bemessungslücke)			**70'000**	**70'000**	**65'000**
ausserordentliches Einkommen: (separate Jahressteuer)			**100'000**	**20'000**	
ausserordentliche Aufwendungen:					
***Revision** der HE 1999/2000:* 70'000 – (30'000 : 2) = 55'000			**55'000**	**55'000**	

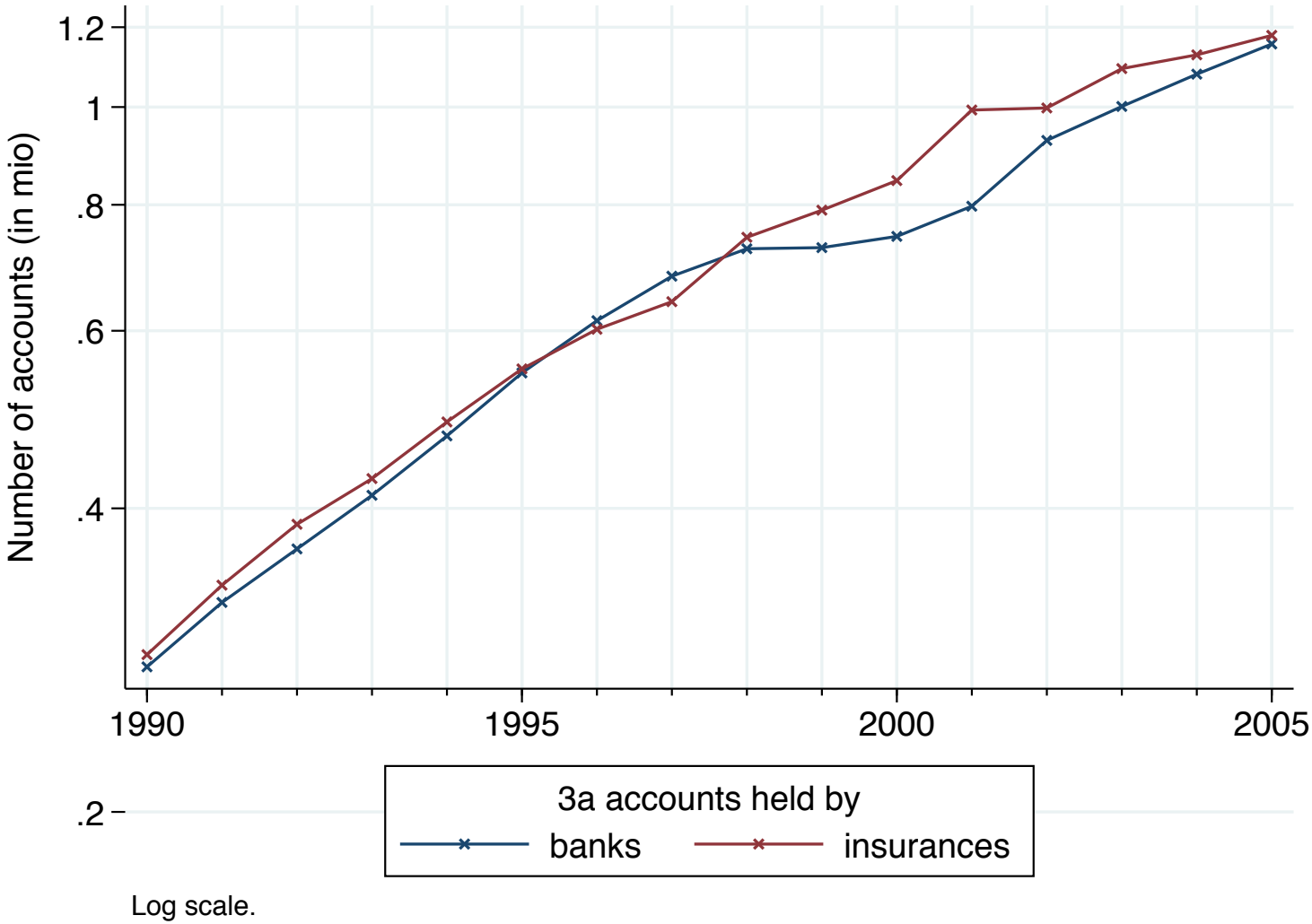
This table explains the transition with a numerical example, pointing out the blank years and extraordinary incomes and expenses (canton AI).

back

Salience: Pillar 3a Savings

No incentives to contribute to pillar 3a during blank years

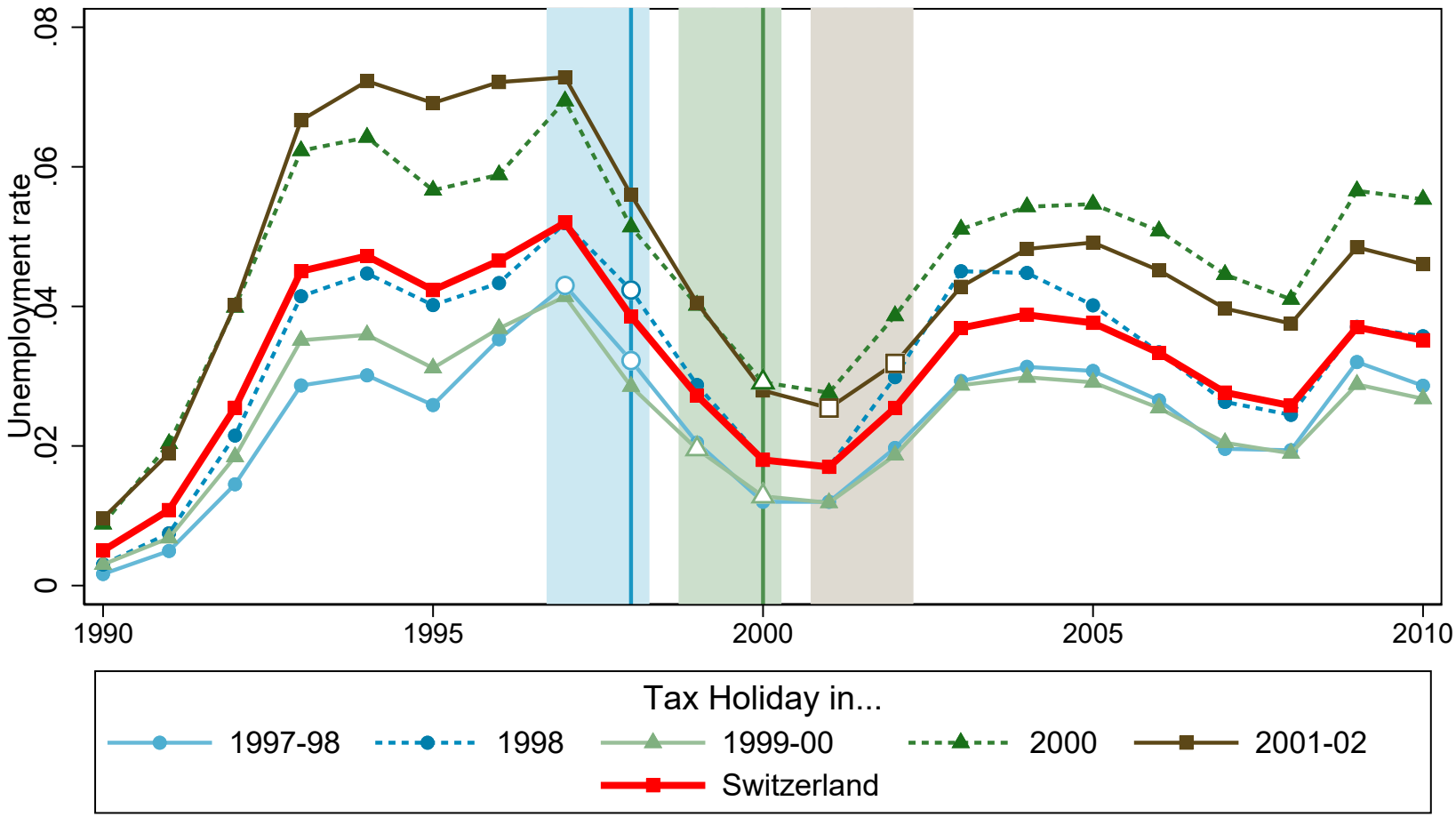
back



Log scale.

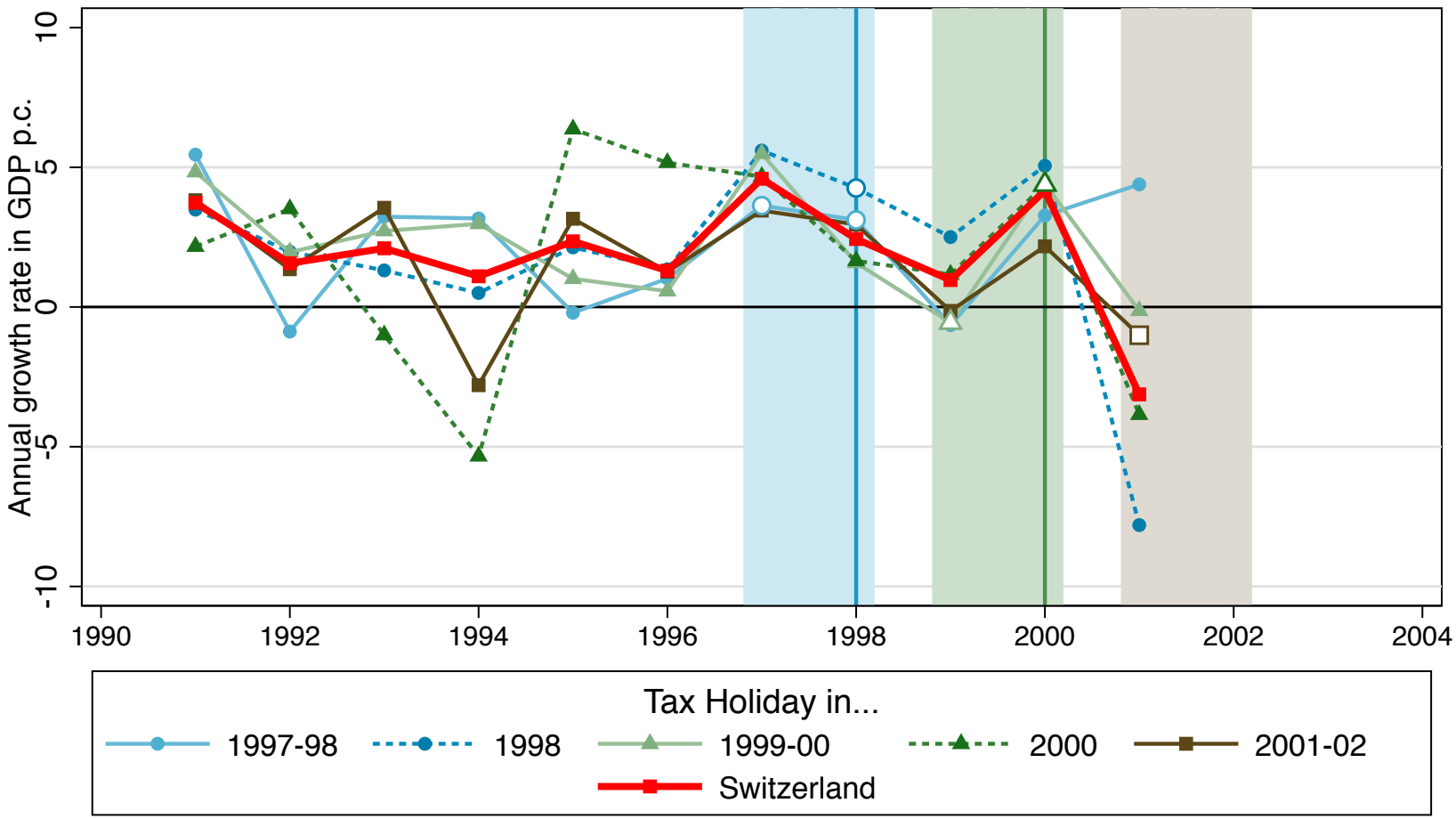
Source: BFS, BSV

Common Macro Trends: Unemployment Rates



▸ GDP ▸ back

Common Macro Trends: Growth in GDP p.c.



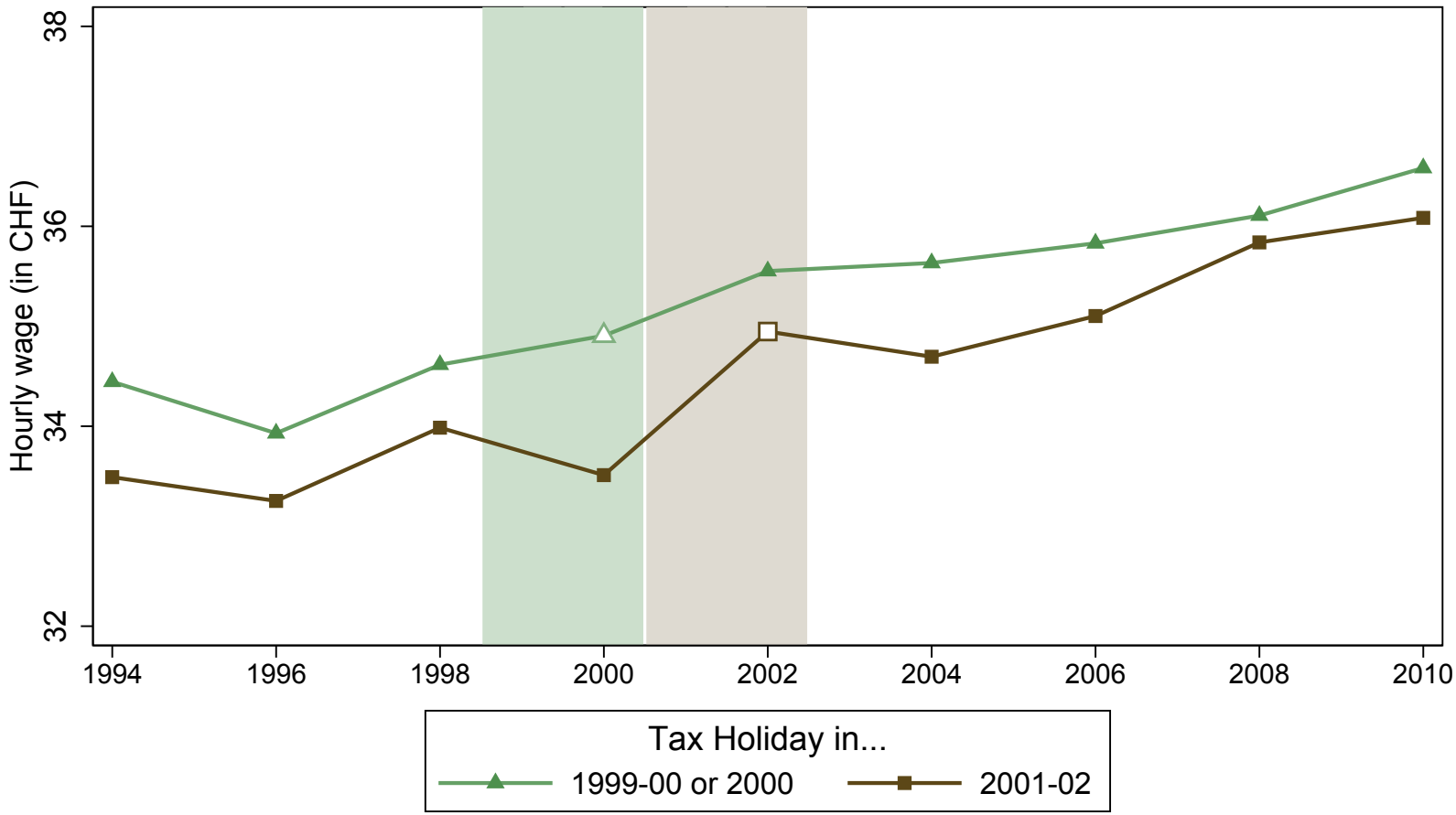
▸ to: unemployment ▸ to: ES regression

Was Labor Demand Elastic?

- Tax holidays create incentive to increase labor supply
- If labor demand is not perfectly elastic: wage rate could fall
  $\rightarrow$ dampened effect on earnings
  $\rightarrow$ estimated Frisch elasticity too low
- BUT: Wage Structure Survey (LSE) shows:
  - If anything increasing wage rates
  - Small but positive response of hours worked

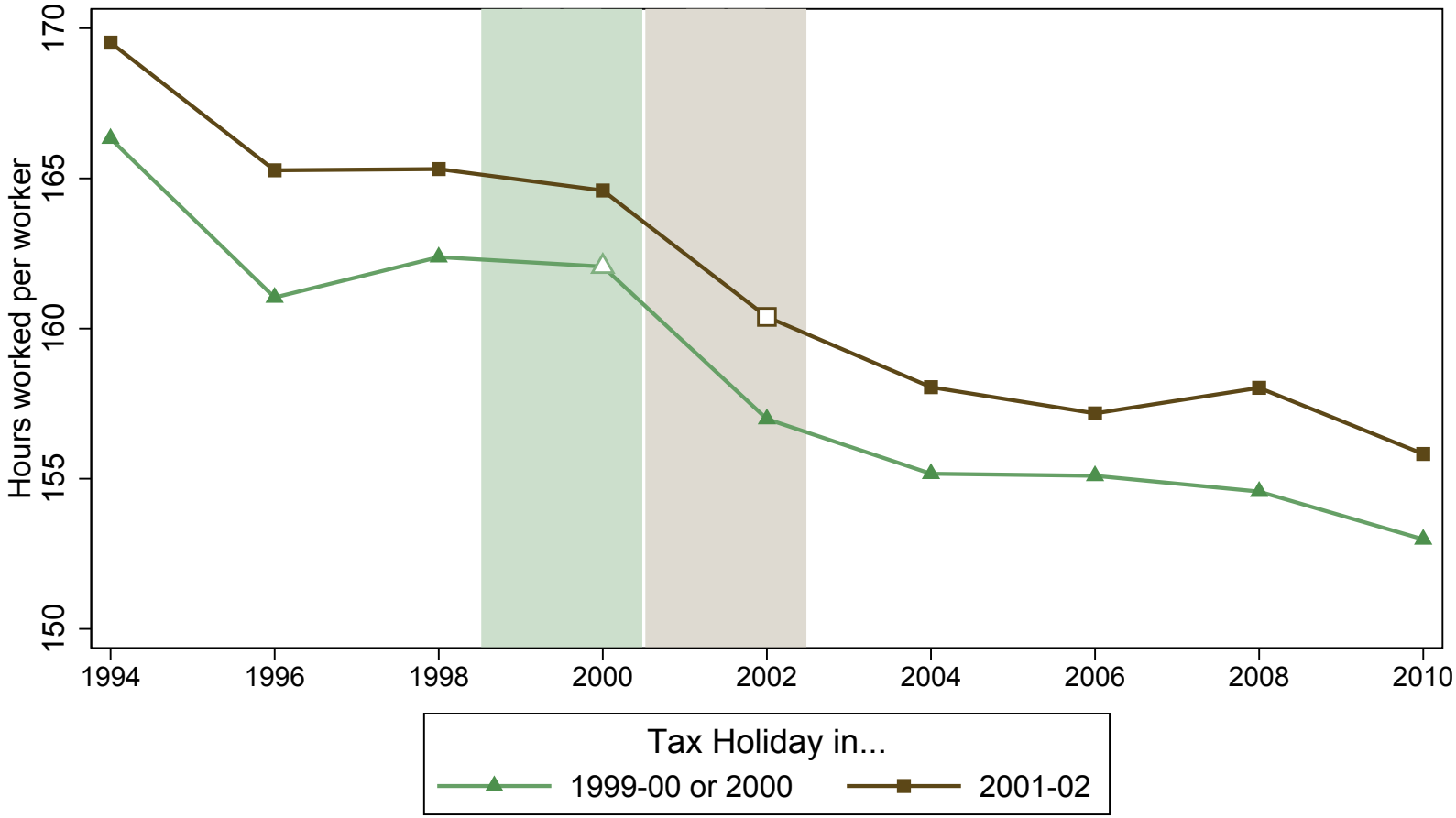
back

Wage Rate



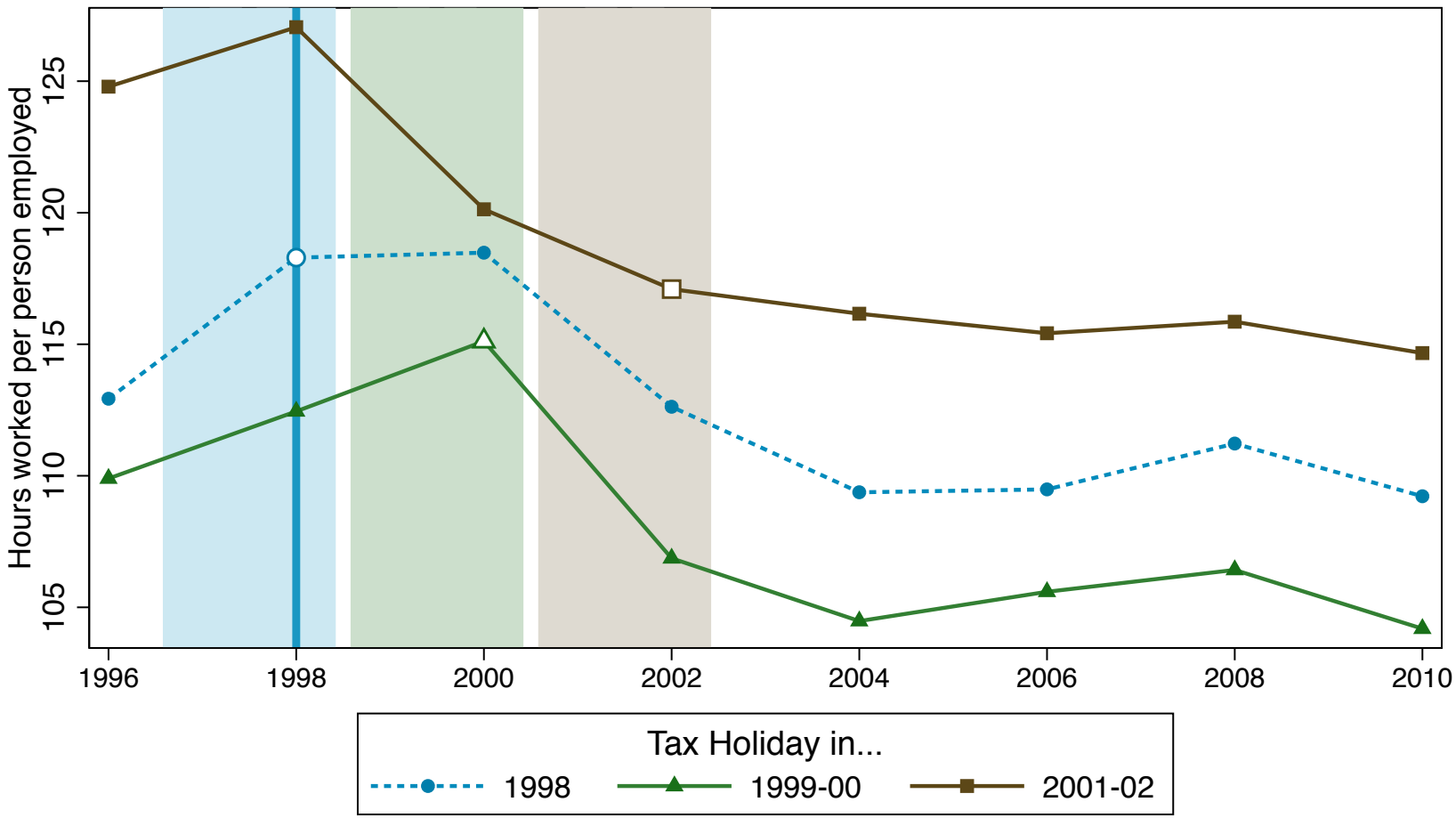
Data Source: Wage Structure Survey (LSE) ▸ back

Hours Worked



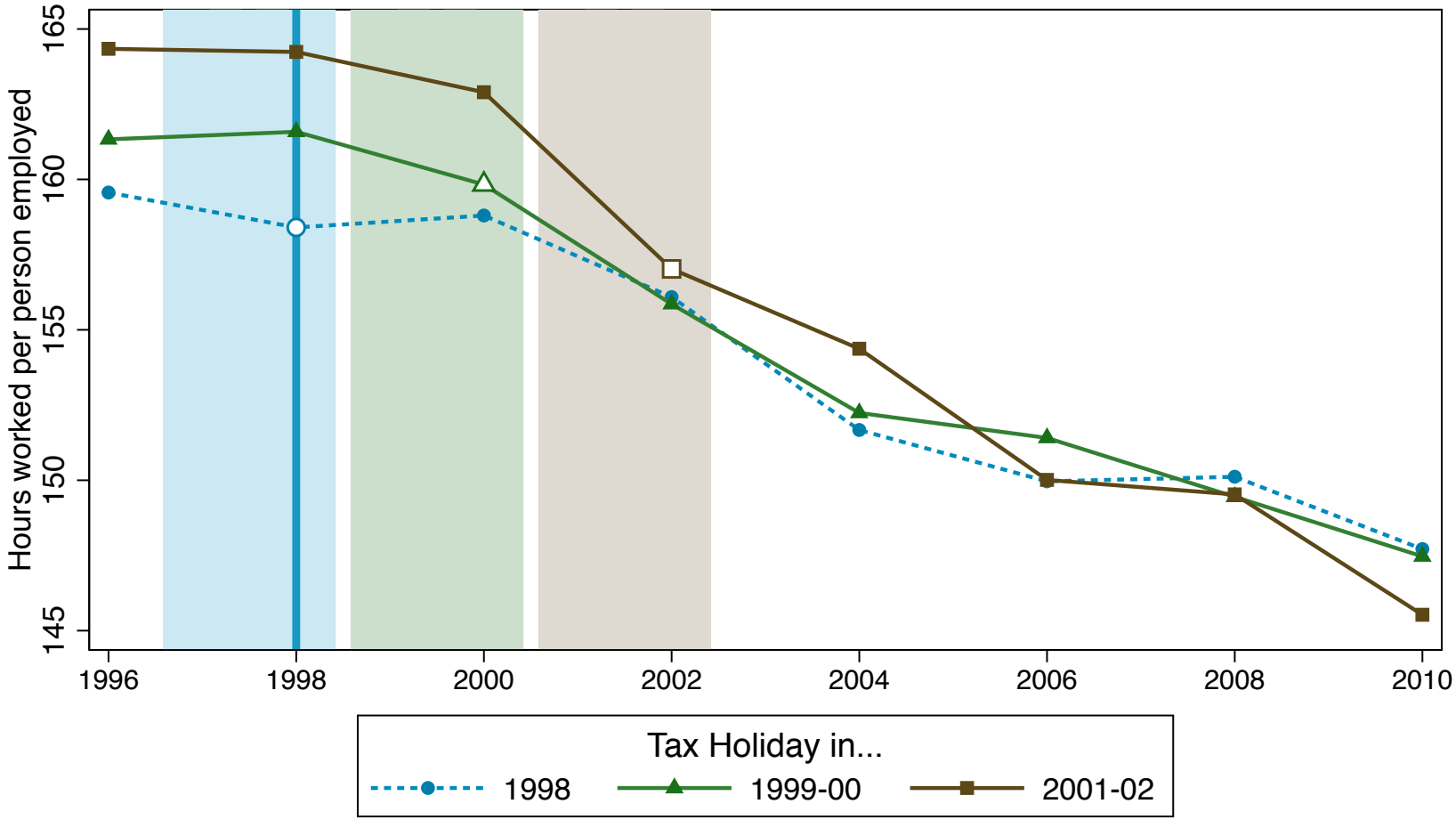
Data Source: Wage Structure Survey (LSE) ▸ back

Hours Worked per Month: Married Women



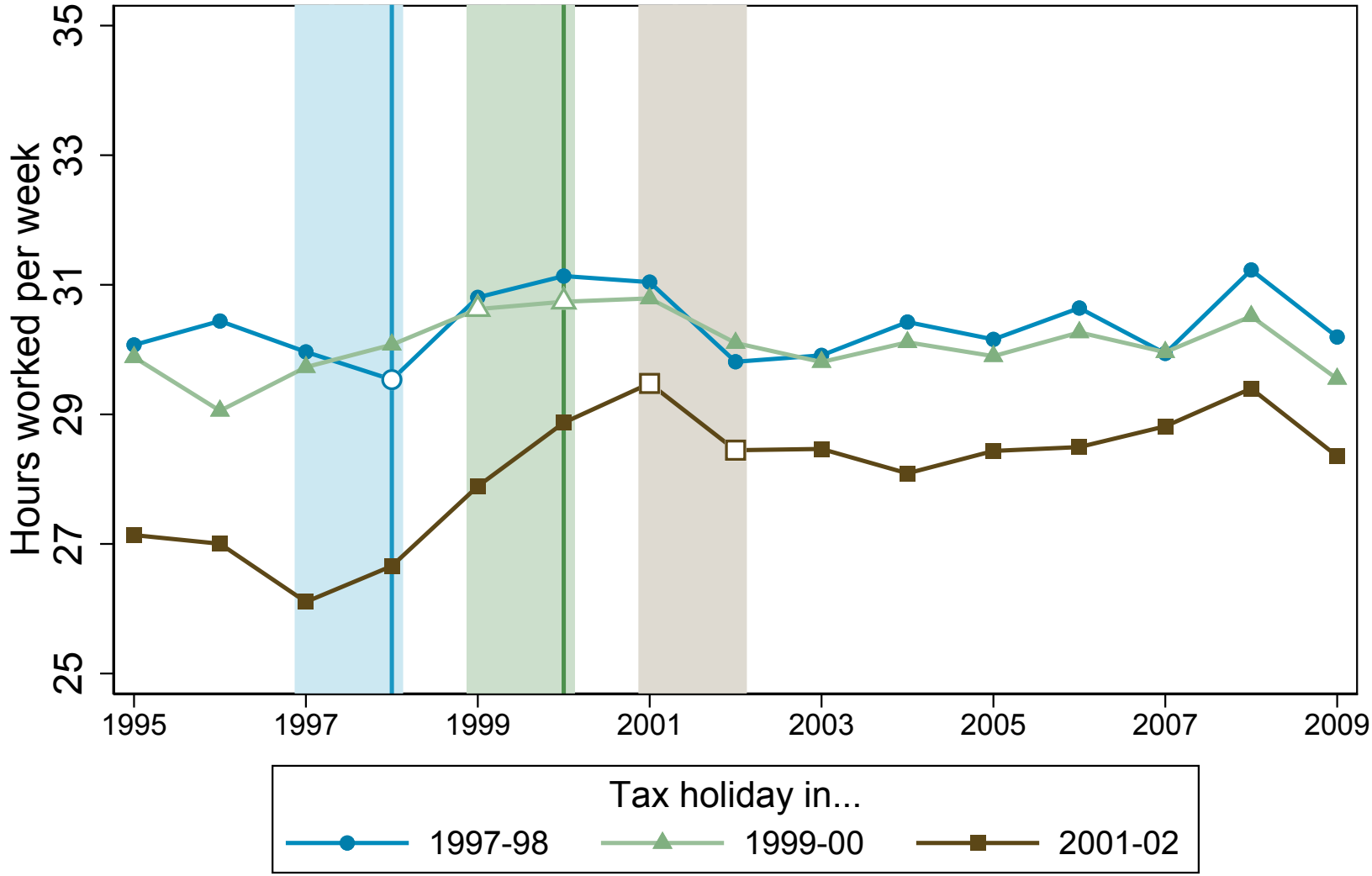
Data Source: Wage Structure Survey (LSE)

Hours Worked per Month: Single Women



Data Source: Wage Structure Survey (LSE)

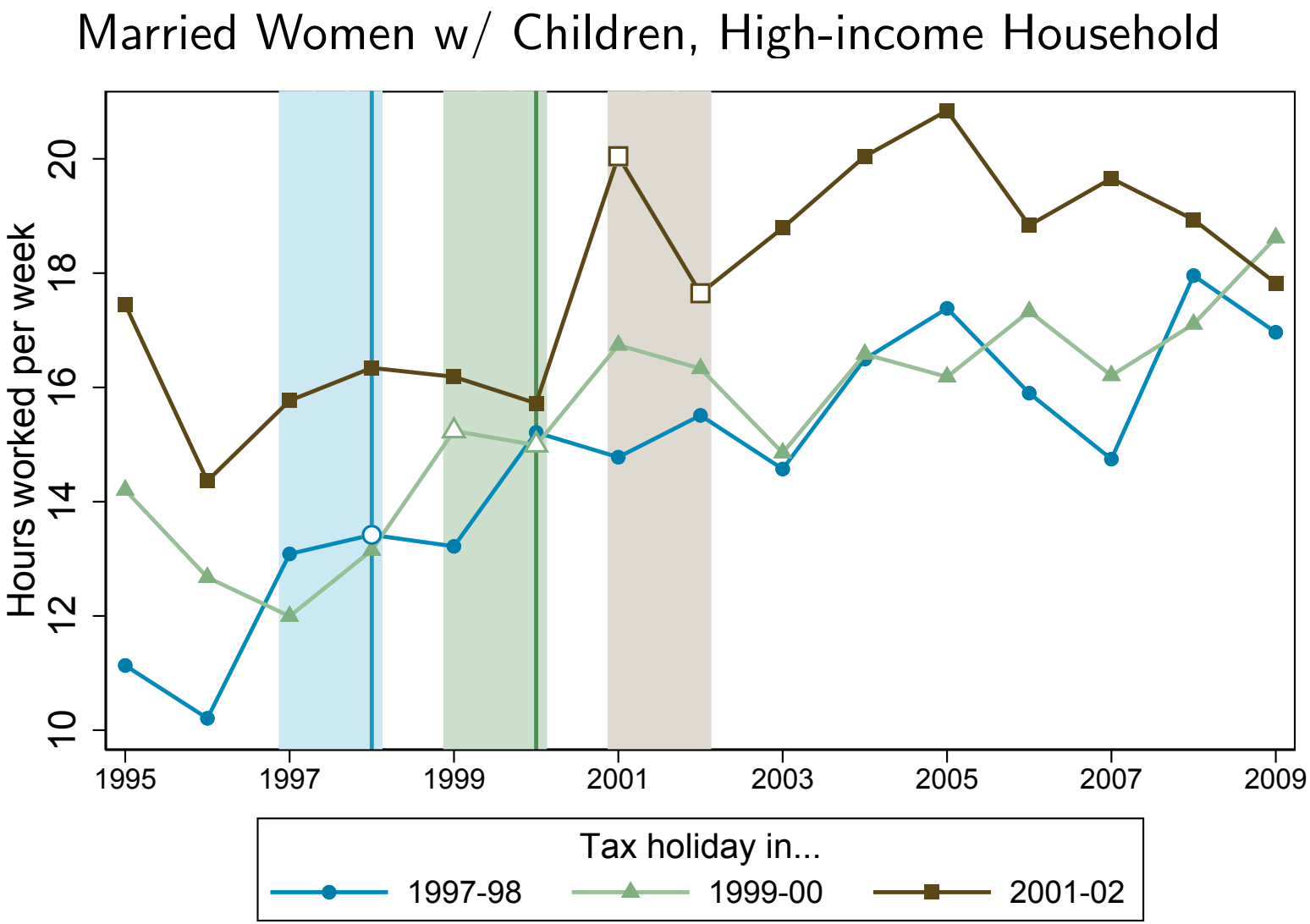
Hours Worked per Week (SLFS)



Data Source: SLFS

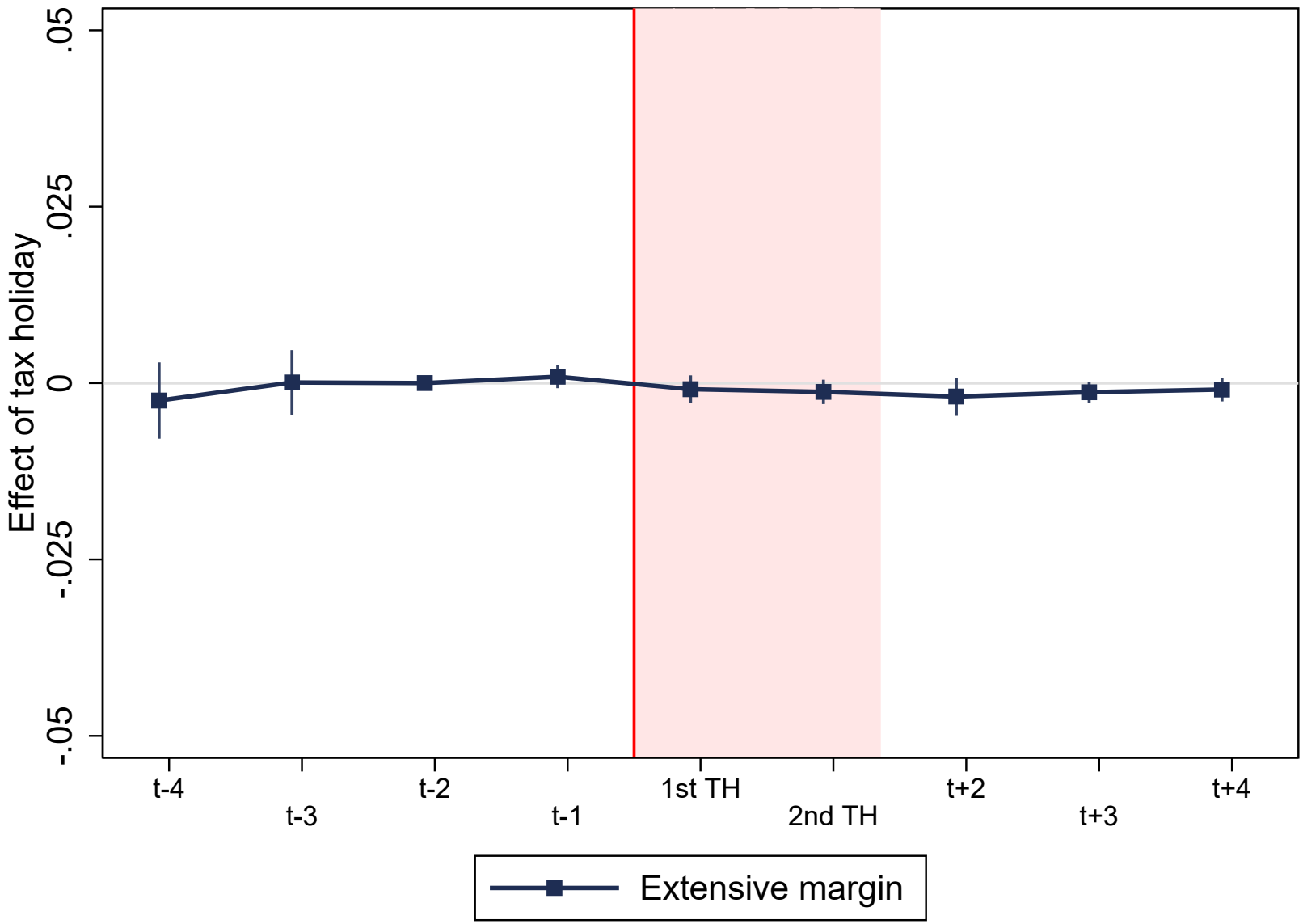
Hours Worked per Week (SLFS)

back



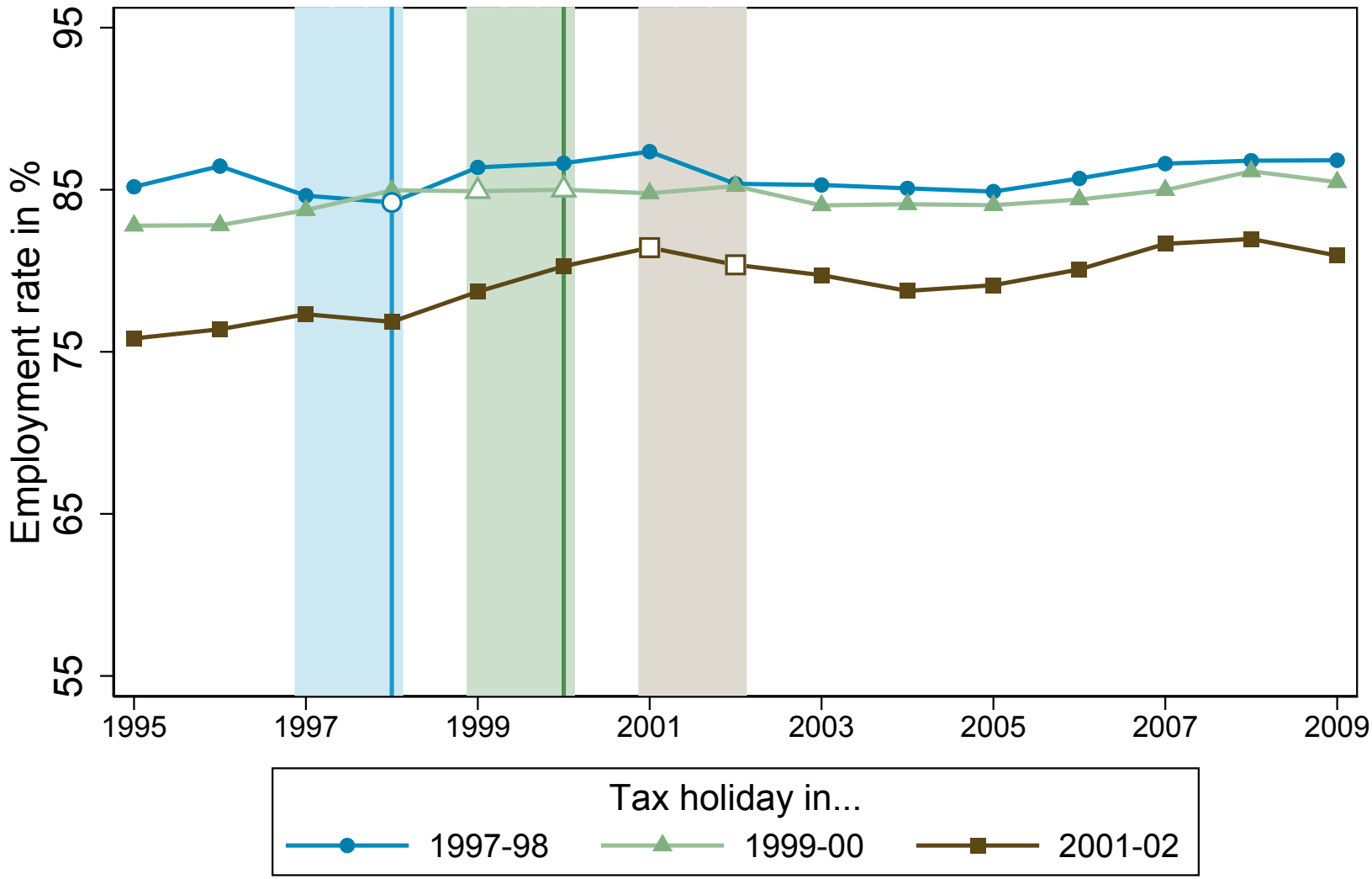
Data Source: SLFS

Event Study: Extensive Margin (Wage Earners)



▸ back

Employment Rate (SLFS)



Data source: SAKE

Employment Rate: Women

Data source: AHV-STATPOP

back

Employment Rate: Married Women

back

Months Employed, Number of Jobs, the Share of Self-Employed, and Between-Canton Migration

	(1) Jobs per employed	(2) Months employed per employed	(3) Self employed p.p. (in %)	(4) In-migrant p.p. (in %)
Total sample				
Blank year	0.0036	0.0099	-0.274	-0.017
	(0.0075)	(0.0167)	(0.177)	(0.077)
Men				
Blank year	0.0050	0.0117	-0.411	-0.020
	(0.0090)	(0.0139)	(0.288)	(0.069)
Women				
Blank year	0.0022	0.0083	-0.146	-0.014
	(0.0069)	(0.0253)	(0.116)	(0.084)
Married women				
Blank year	0.0029	0.0018	-0.168	-0.003
	(0.0051)	(0.0292)	(0.116)	(0.037)
Observations	60	60	60	60
Canton group FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes

back

Wage Earners: Individual-level IV Estimates

▸ Macro estimates

	Employee 0/1 Men	Avg. wage earnings * Men	Employee 0/1 Women	Avg. wage earnings * Women
Total sample				
1st stage	0.115	0.248	0.107	0.239
Effect on $ln(1-\tau_{it})$	(0.002)	(0.004)	(0.002)	(0.004)
2nd stage	-0.006	3,397	-0.015	369
$ln(1-\tau_{it})$	(0.005)	(376)	(0.006)	(235)
Frisch elasticity η^F	**-0.01** (0.006)	**0.04** (0.004)	**-0.02** (0.008)	**0.01** (0.005)
Observations	11,838,260	9,952,854	12,143,005	8,687,931
Married w/ children				
Frisch elasticity η^F	0.00 (0.005)	**0.04** (0.005)	0.00 (0.015)	**0.04** (0.008)
Married no children				
Frisch elasticity η^F	-0.01 (0.004)	**0.03** (0.004)	-0.02 (0.005)	**0.01** (0.003)
Tertiary edu.				
Frisch elasticity η^F	-0.01 (0.007)	**0.04** (0.005)	-0.03 (0.010)	**0.01** (0.006)

* In CHF

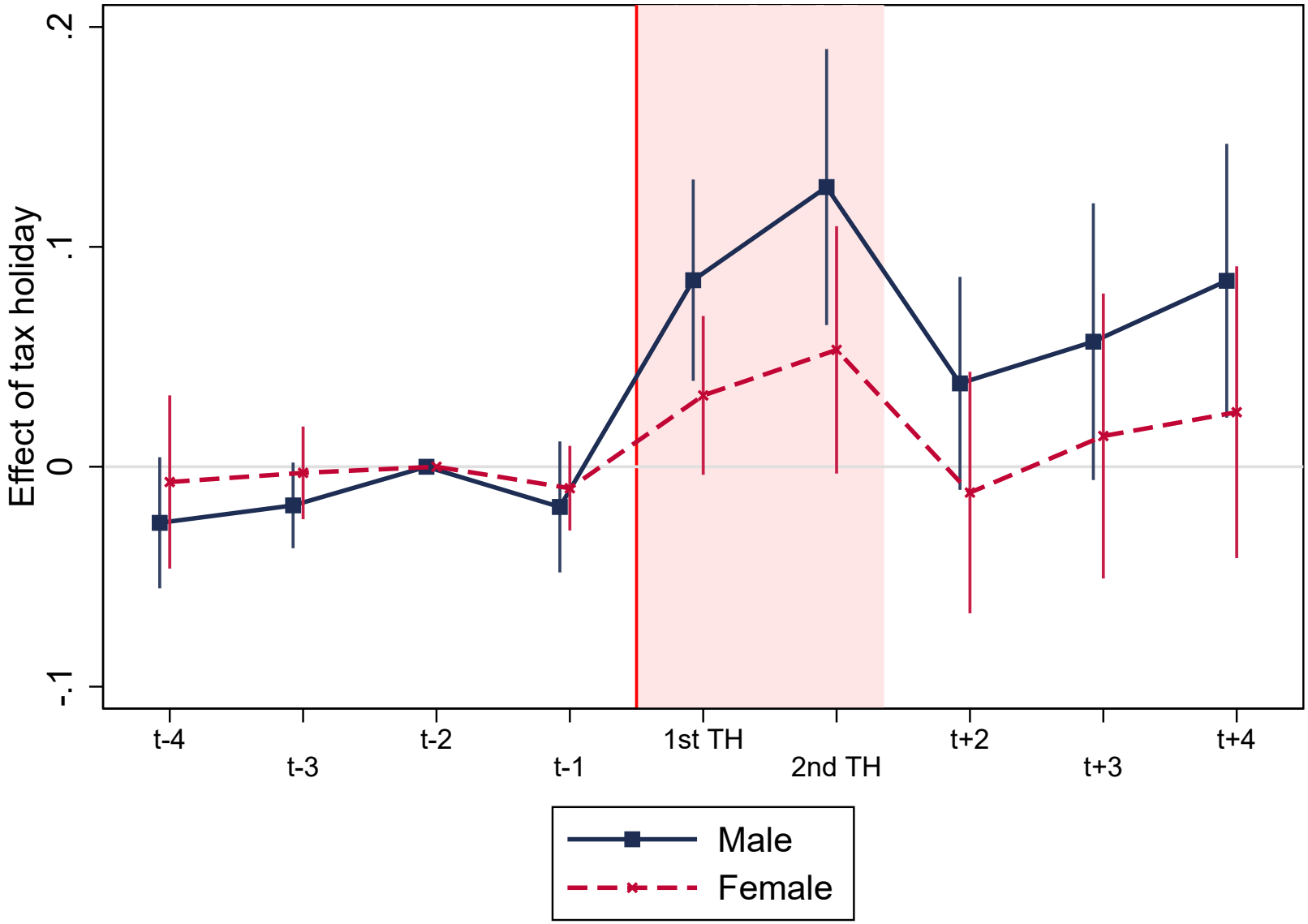
IV-Regressions by Pre-Holiday Earnings (Wage Earners)

▸ Macro estimates

	Employee 0/1 Men	Aver. wage earnings Men	Employee 0/1 Women	Aver. wage earnings Women
1–25k CHF				
Frisch elasticity η^F	0.00 (0.024)	0.01 (0.014)	-0.02 (0.011)	-0.01 (0.013)
25–50k CHF				
Frisch elasticity η^F	0.00 (0.007)	**0.03** (0.004)	-0.02 (0.006)	0.01 (0.004)
50–100k CHF				
Frisch elasticity η^F	-0.01 (0.003)	**0.03** (0.003)	-0.01 (0.007)	0.00 (0.003)
100–200k CHF				
Frisch elasticity η^F	0.00 (0.006)	**0.04** (0.004)	-0.01 (0.013)	**0.02** (0.009)
More than 200k				
Frisch elasticity η^F	0.00 (0.007)	**0.07** (0.013)	-0.07 (0.060)	**0.10** (0.042)

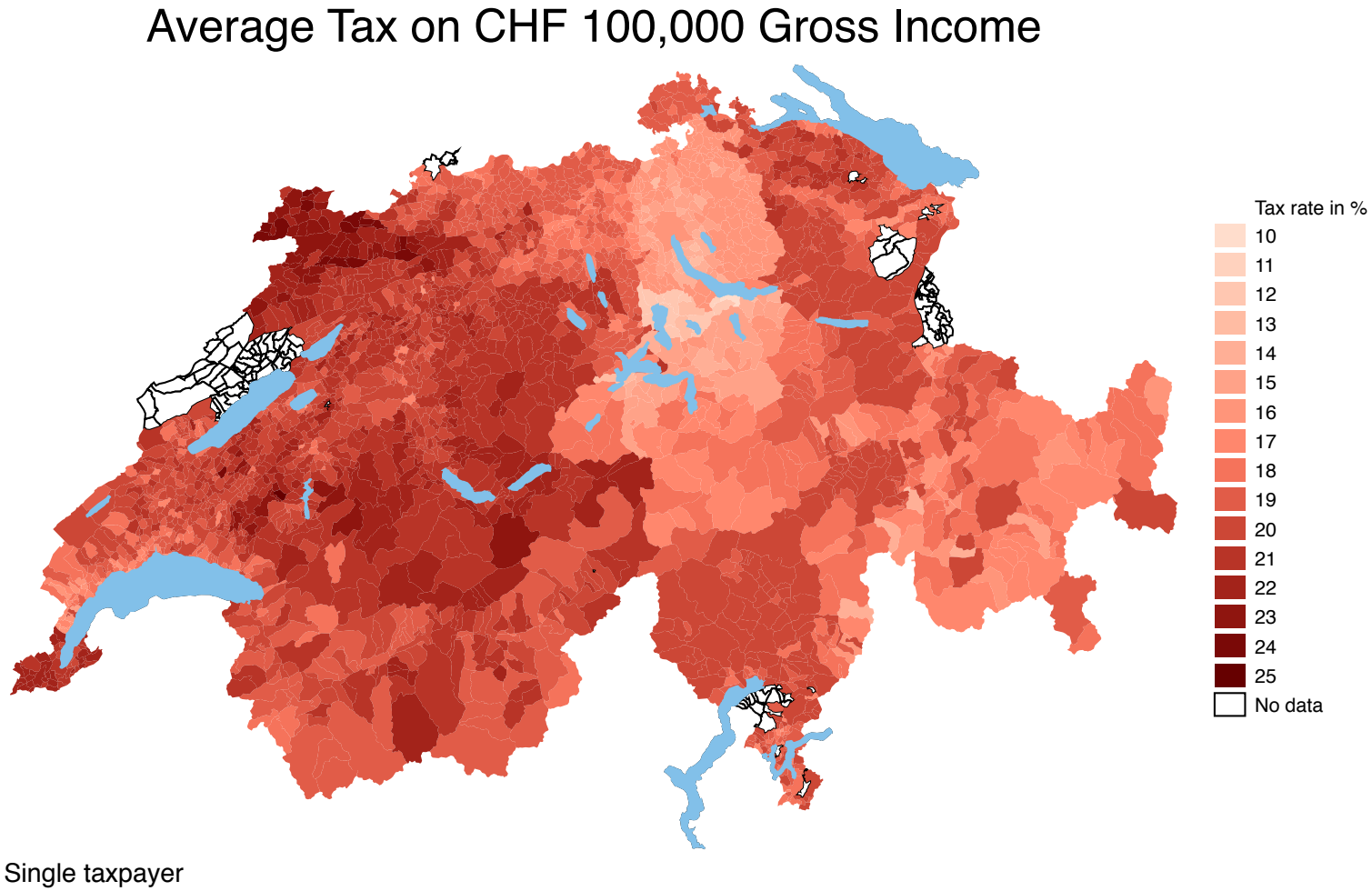
Event Study: Self-Employment Income by Gender

back

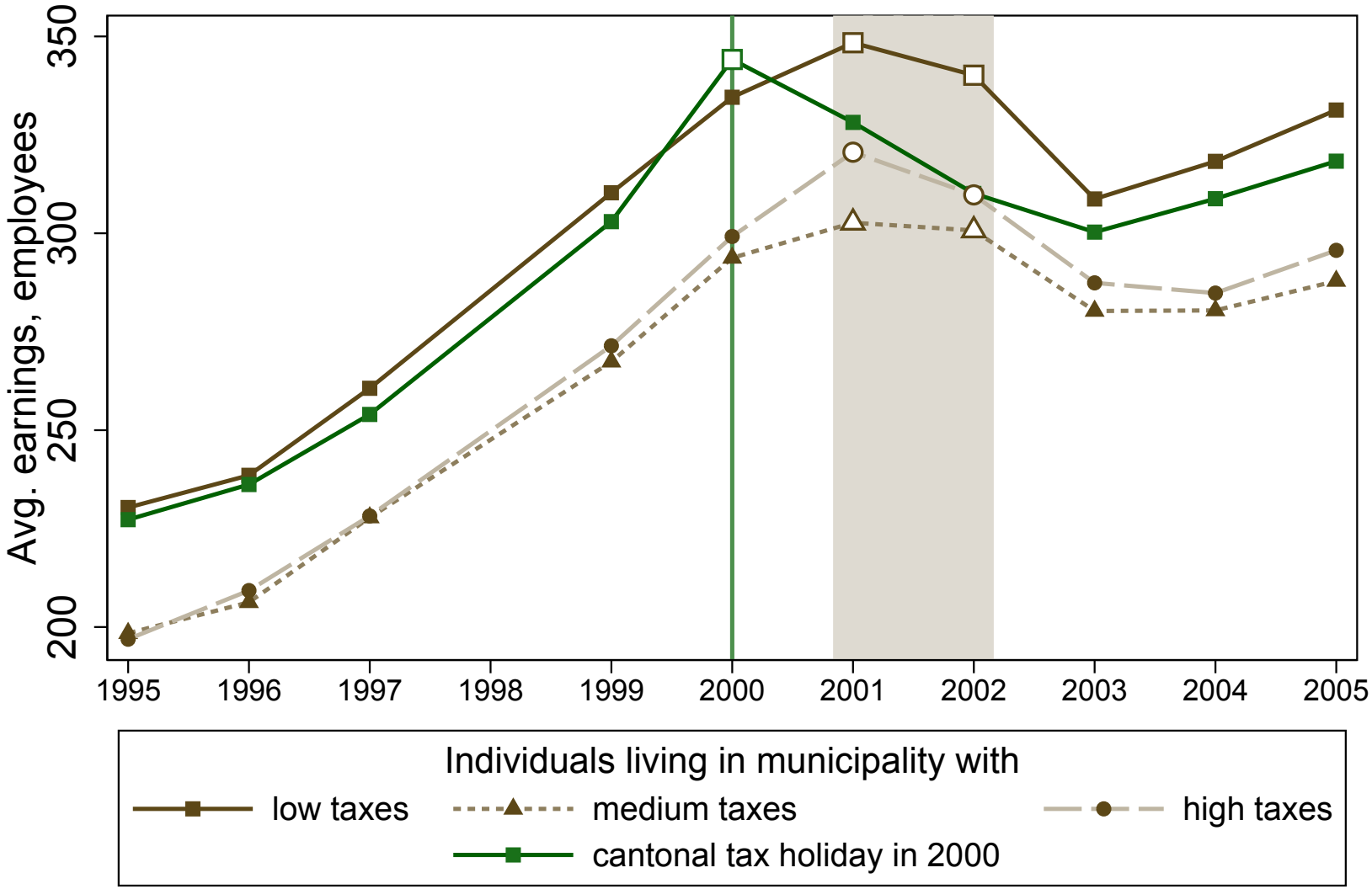


Exploiting Variation in Municipal Tax Burden

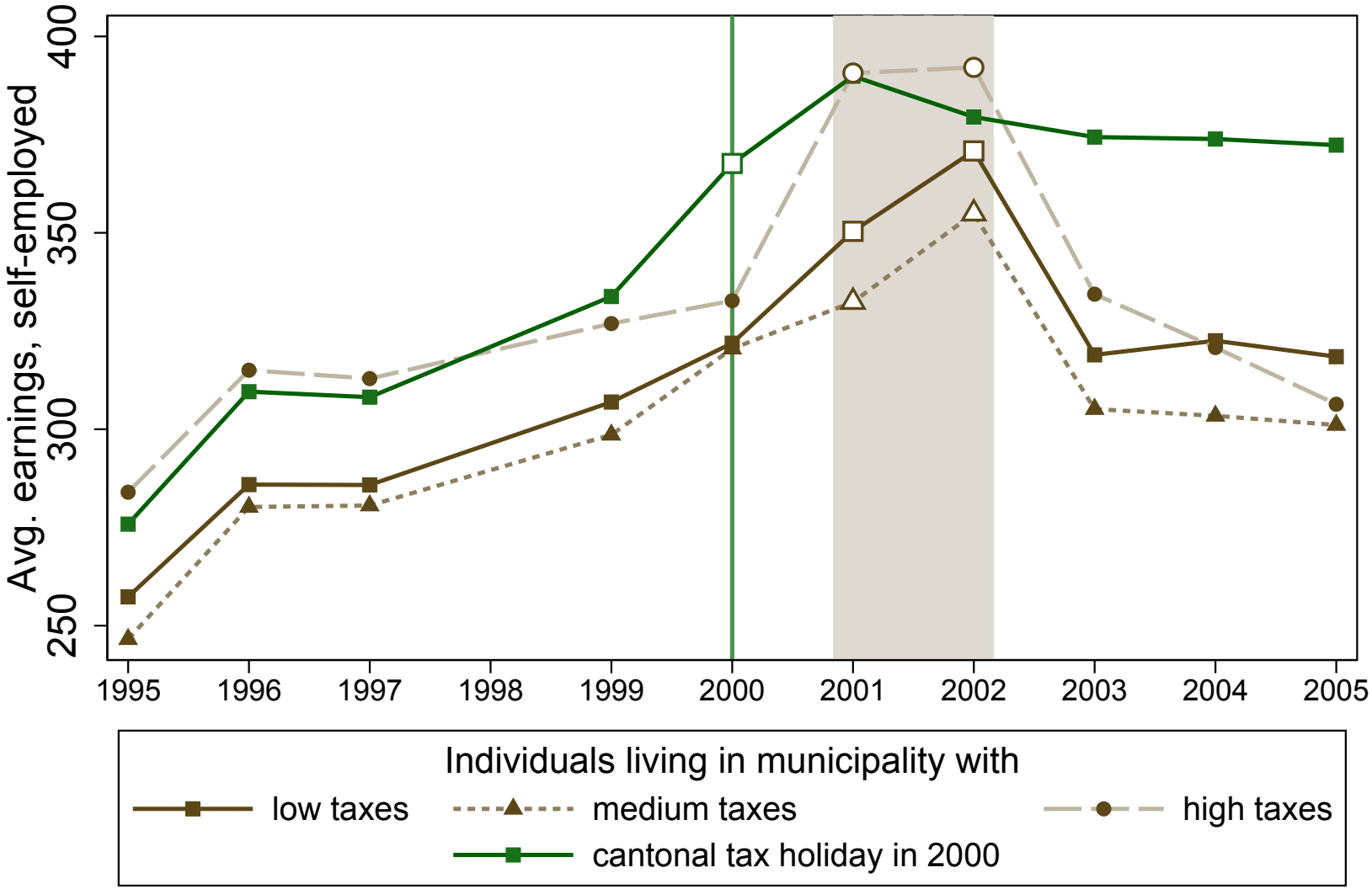
▸ back ▸ Conclusion



High vs. Low Tax Municipalities: High Wage Earners

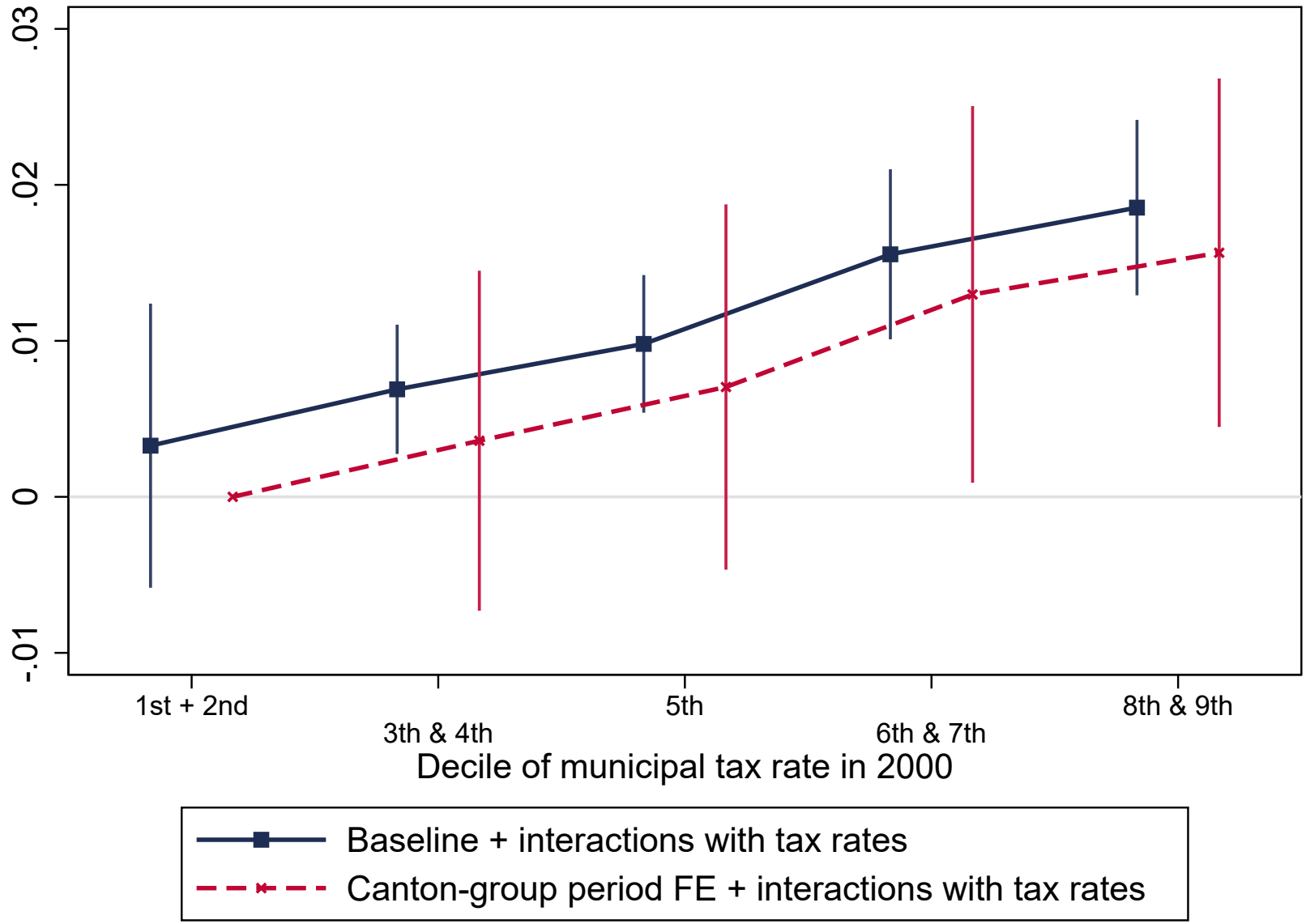


High vs. Low Tax Municipalities: High Self-Empl Earners



Effect on Male Wage Earners by Municipal Tax Burden

▸ map tax variation ▸ Conclusion



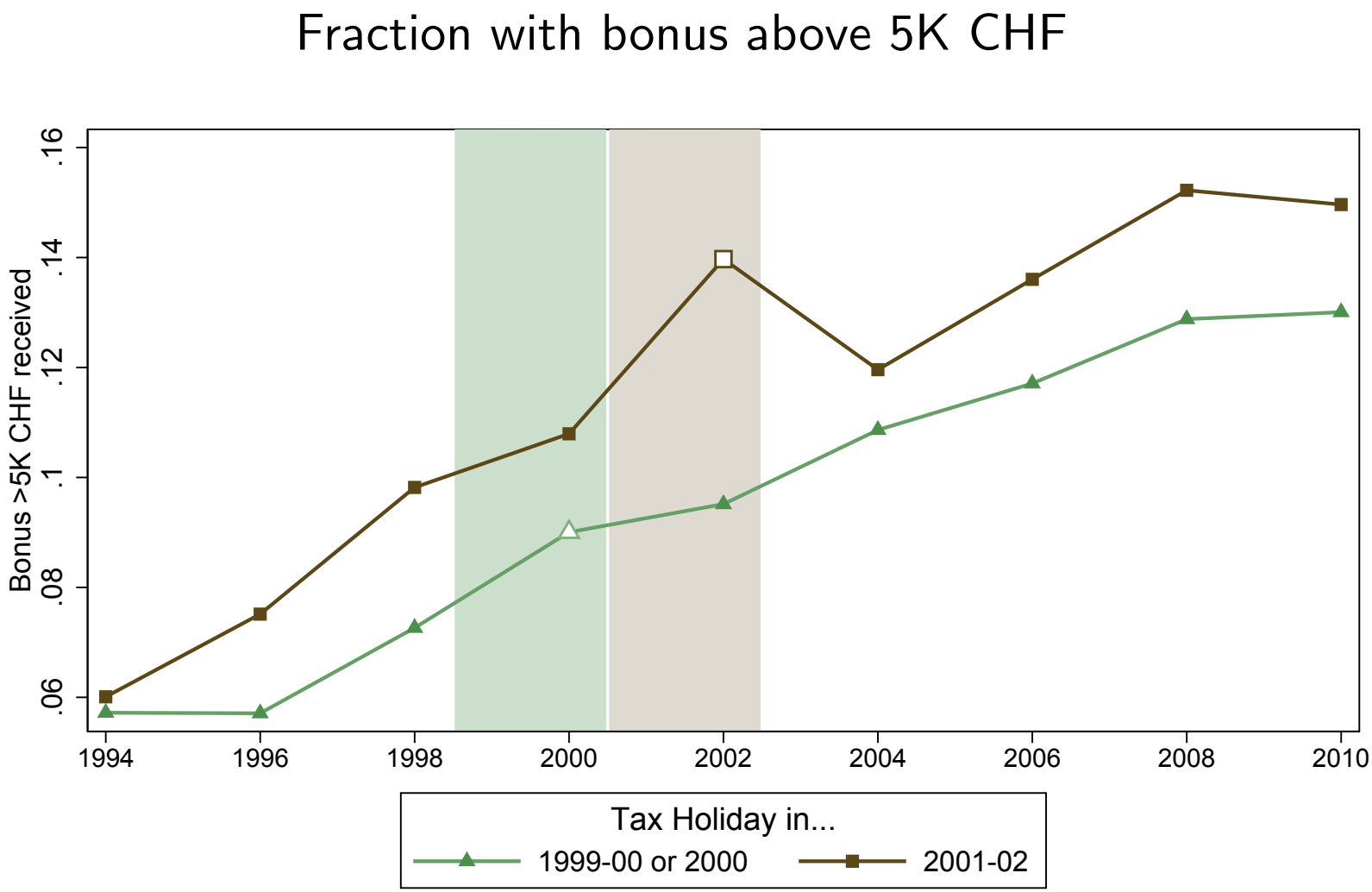
Average Wage Earnings: High-Income Employees

High income: avg. income in 1994-1996 $> 200,000$ CHF/year

Data source: AHV-STATPOP

back

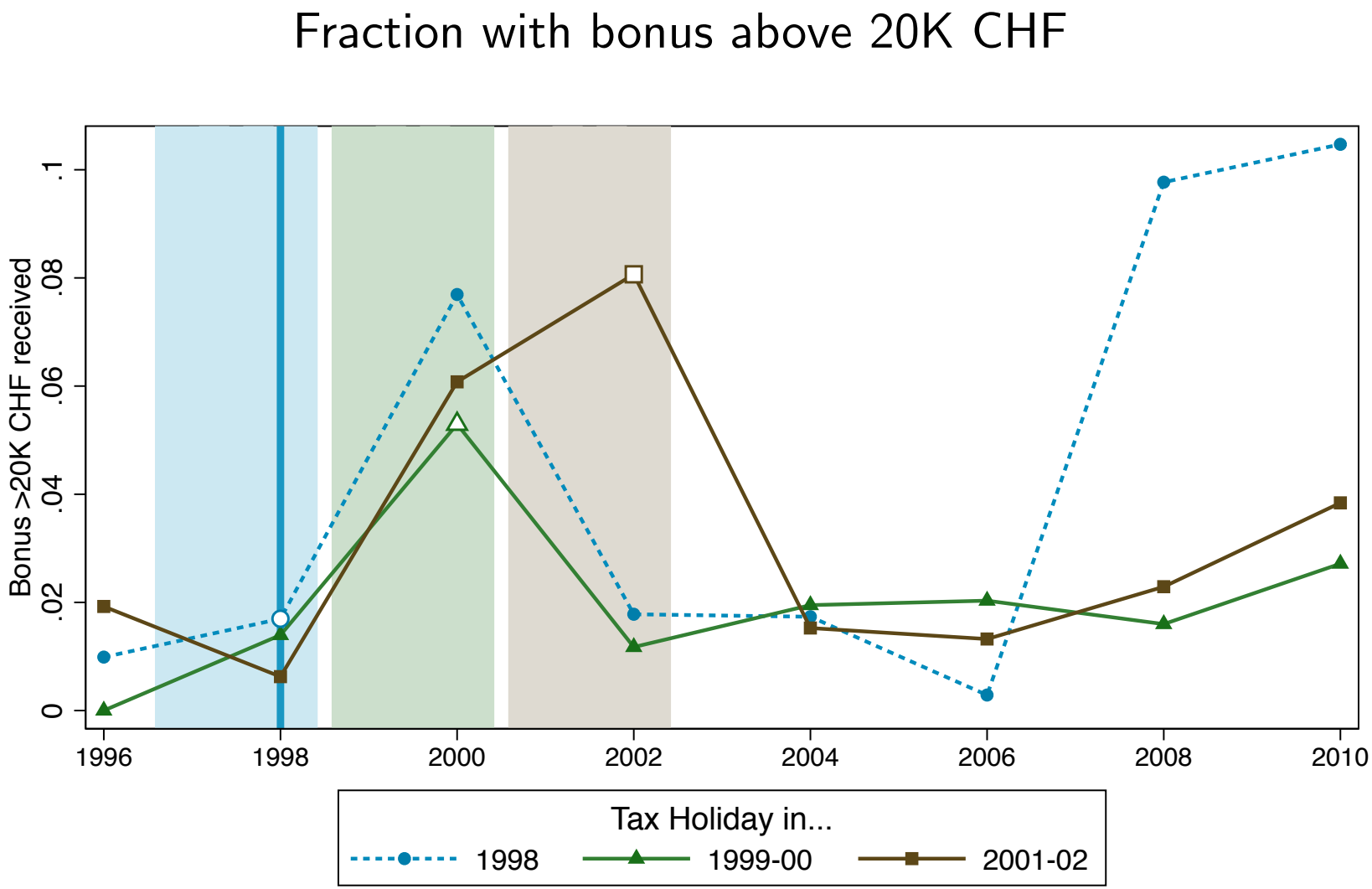
Bonus-Incidence: Male Employees in the Private Sector



Data Source: Wage Structure Survey (LSE)

▸ Insurances ▸ Anecdotal evidence ▸ Conclusion

Bonus Incidence: Insurance Industry



Data Source: Wage Structure Survey (LSE)

▸ back ▸ Conclusion

Anecdotal Evidence: Doctors Shift Billing of Treatment Costs

Tages-Anzeiger

24. März 1999

Raffinierte Ärzte

Bern. - Auch Krankenkassen sind vor Überraschungen nicht gefeit. So stellte Rudolf Gilli, KSK-Vizepräsident und Direktor der Konkordia, für die Monate Januar und Februar 1999 einen unerklärlichen Zuwachs der Arztkosten fest. In einzelnen Kantonen hätten die Mediziner im Vergleich zum Vorjahr bis zu 10% mehr in Rechnung gestellt.

Genauere Abklärungen hätten dann ergeben, dass es sich um Kantone handle, die gegenwärtig auf die einjährige Steuerveranlagung umstellen. Das Jahr 1999 fällt daher dort in die **Bemessungslücke.** Schlaue Ärzte verrechneten deshalb letztjährige Leistungen erst in diesem Jahr, um das so erzielte Einkommen nicht versteuern zu müssen. So viel Raffinesse haben ihnen die Krankenkassen offenbar nicht zugetraut.

▸ back ▸ Conclusion

References I

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