The Effect of Old-Age Insurance on Male Retirement:

Evidence from Historical Cross-Country Data

Richard Johnson

Research Division,
Federal Reserve Bank of Kansas City,

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Is earlier male retirement due to OAI?

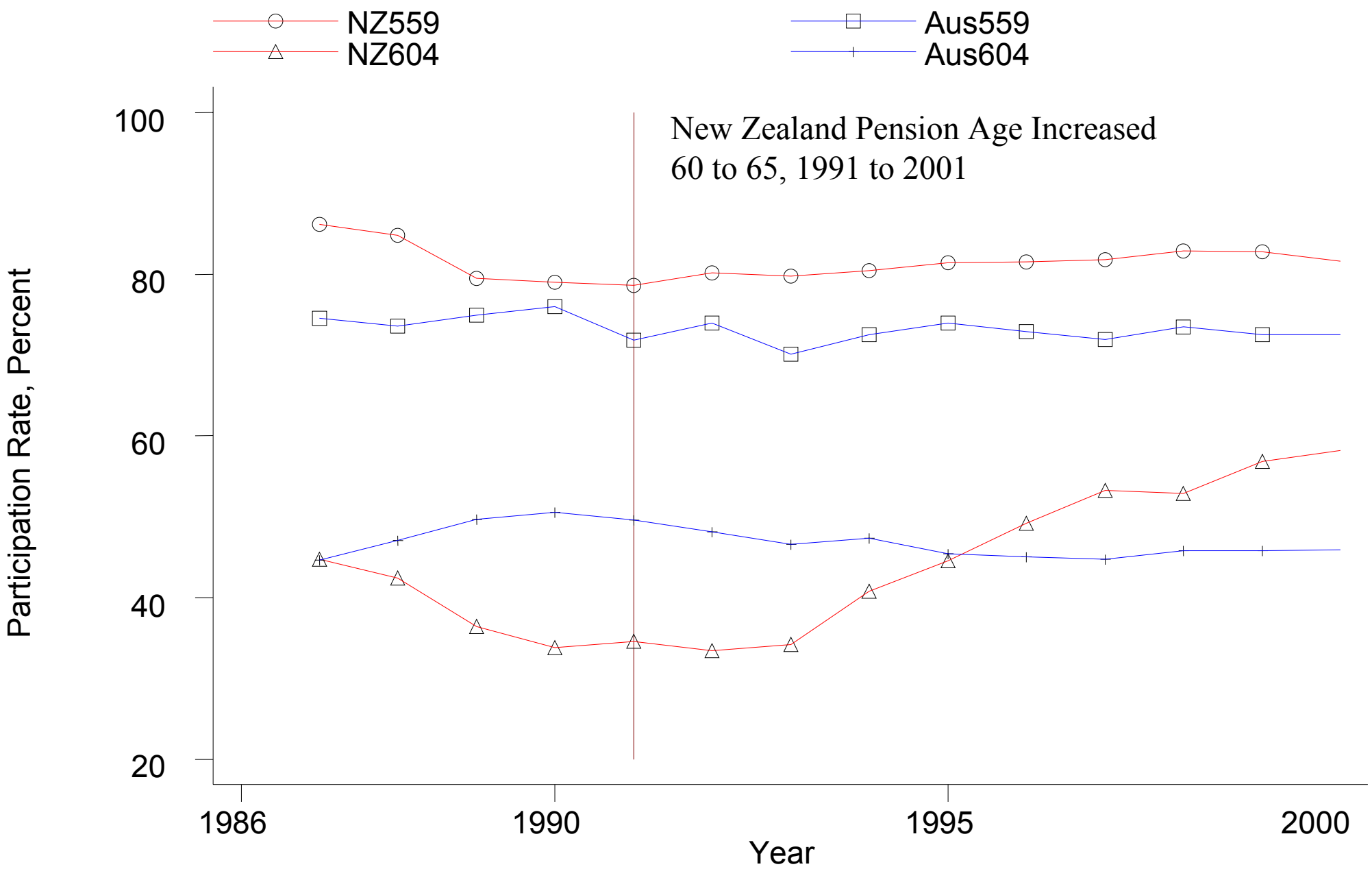
- Costa (1998): earlier male retirement a long-term trend, no role for Social Security.

- Gruber and Wise (1998): OAI rules and retirement age strongly correlated across countries in 1995.

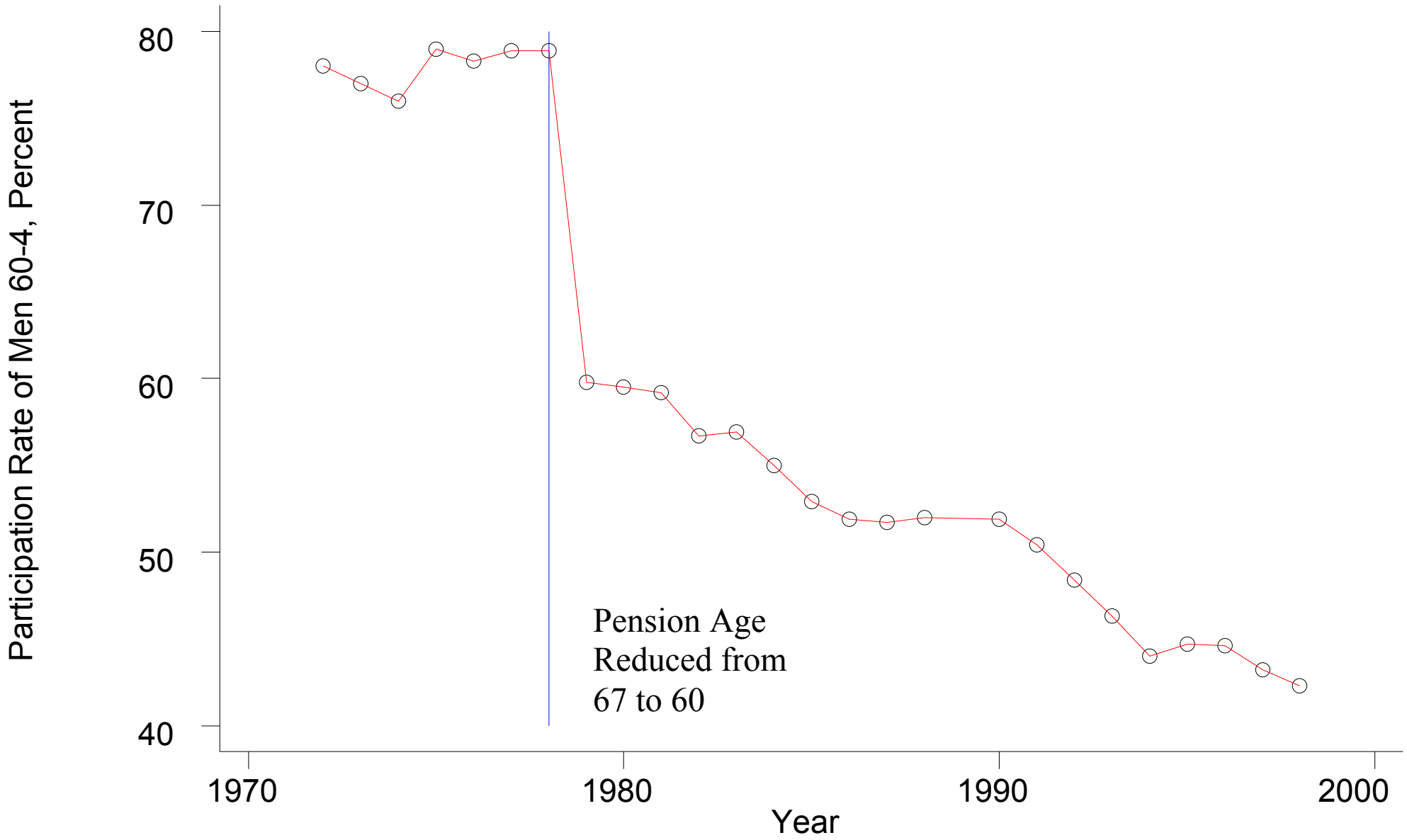
- This paper: OAI affects male retirement in national time-series. There is also a time trend.

Results from regressing LF participation on OAI variables:

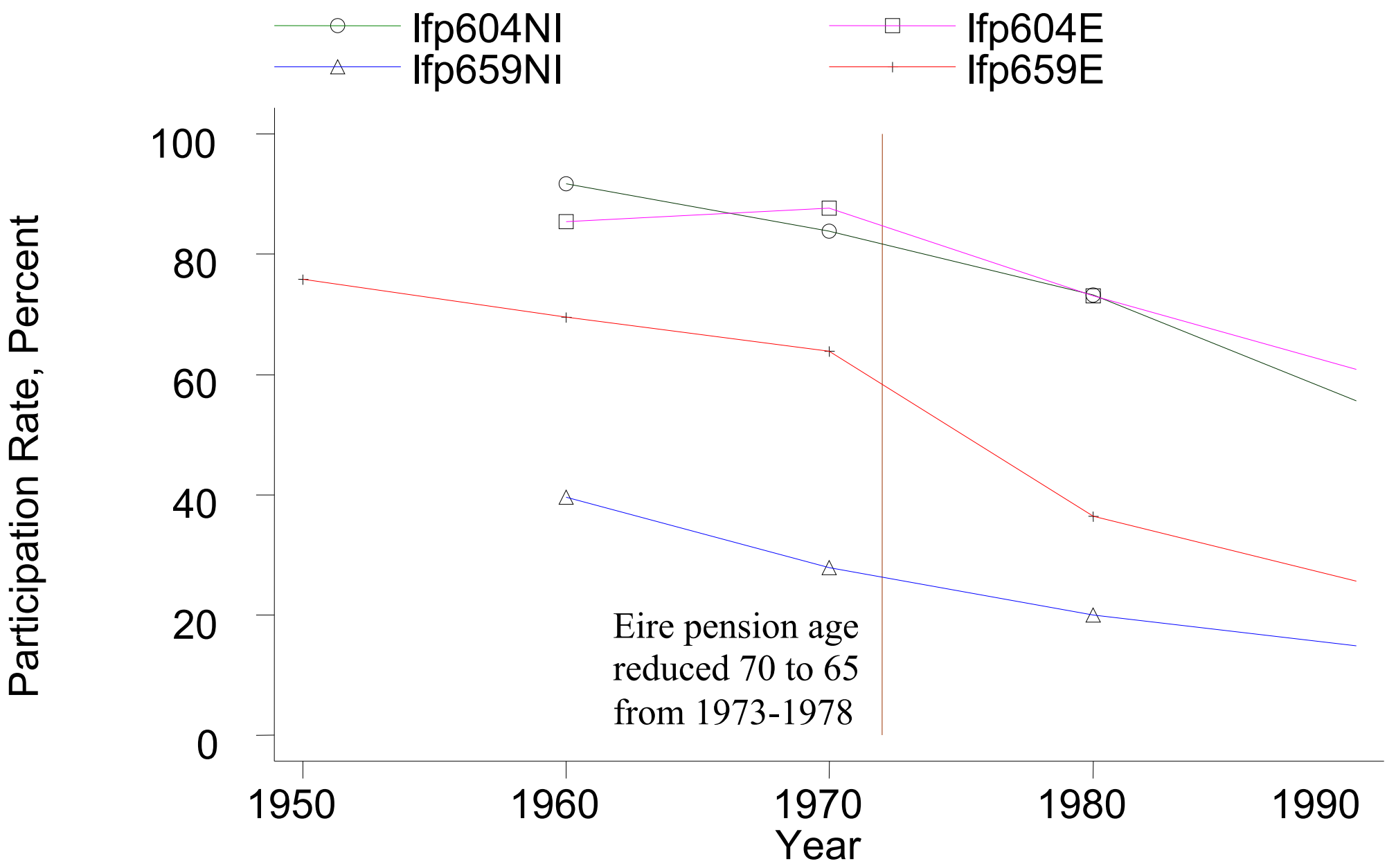
- OAI variation from episodes when eligibility age changed from 65 to 60 or vice versa
- These changes were followed by rapid changes in labour-force participation of men 60-4
- Panel elasticities are smaller than cross-section elasticities
- OAI variables explain 10.5 percent of participation rate declines from 1920 to 2000



Australia and New Zealand: Participation of Men 55-9 and 60-4



Denmark: Participation of Men 60-4



Participation of Men in Eire and Northern Ireland

Theory of labour-force participation decision

- Model choice of retiring at 64 or 65
- Depends on wealth, and
- Net wage – possibly affected by OAI
- Suppose worker eligible for OAI benefits at 64

Relevant parameters of the OAI system:

- Payroll tax rate τ_P , benefit recalculation rate k
- Year 1 OAI benefit B_1
- Earnings test tax rate τ_{SS}
- Accrual rate a reducing future benefits B_{2+} if claim OAI in Year 1:

$$B_{2+} = \overline{B} - aB_1$$

Man chooses both whether to work and when to claim.

Wealth if retire at 64: $$\frac{\overline{B}}{r+p}+\max\left[B_1\left(1-\frac{a}{r+p}\right),0\right]$$

Wealth if work until 65:

$$\frac{\overline{B}+k\tau_P W}{r+p}+W\left(1-\tau_I-\tau_P\right)+\max\left[B_1\left(1-\frac{a}{r+p}\right)-\tau_{ss}W,0\right]$$

Ergo two cases to consider in calculating net wage

Case 1: $$\tau_{SS} W > B_1 \left(1 - \frac{a}{r+p}\right)$$

Tax rate on labour: $$\tau_I + \tau_P \left(1 - \frac{k}{r+p}\right) + \frac{B_1}{W}\left(1 - \frac{a}{r+p}\right)$$

Case 2 : $$\tau_{SS} W < B_1 \left(1 - \frac{a}{r+p}\right)$$

Tax rate on labour: $$\tau_I + \tau_P \left(1 - \frac{k}{r+p}\right) + \tau_{SS}$$

Table 1
Male Participation Rates in 1950 ,1970 and 2000

	Age 60-4			Age 65-9		
Country	**1950**	**1970**	**2000**	**1950**	**1970**	**2000**
German-Speaking						
Germany	73.2	74.7	29.5[3]	44.4	30.6	7.3[3]
Austria	69.9	44.9	13.2[3]	27.9	12.7	6.5[3]
Switzerland	87.9	87.3	…	65.9	49.3	…
Scandinavian						
Sweden	79.8	76.6	56.4	57.3	33.9	17.5
Norway	89	79	60.5	73.8	60	22.4[3]
Denmark	85.9	81.4	41.8	…	46.5	22.9
Other European						
France	71.7[1]	65.2	15.3[3]	52.8[1]	24.3	2.9[3]
U.K.	87.5	86.5	50.8	48.7	30.5	14.6
Ireland	...	87.6	53.7	75.8	63.9	14.7
Oceanic						
Australia	79.8[1]	75.6	45.9	…	…	17.2
New Zealand	67.5[2]	69.2	58.2	41.7[2]	36.1	15.5[3]
North-American						
Canada	81.4	74.1	45.5[3]	60.1	38	16.1
U.S.A.	79.4	73	55.4[3]	59.8	39	28[3]

Note: [1] Data taken from 1954 census, [2] 1956 census, [3] 1998 labour force survey.

OAI Data:

- I calculate OAI tax rates, replacement rates at specific ages
- Time-series variation from eligibility-age changes
- OAI tax, replacement rates move together
- Omit τ_I, τ_P, disability, unemployment benefits for lack of information
- Omit private pensions since these are not earnings-tested

Table 3
Implicit OAI Tax Rates at Ages 60-4, Percent

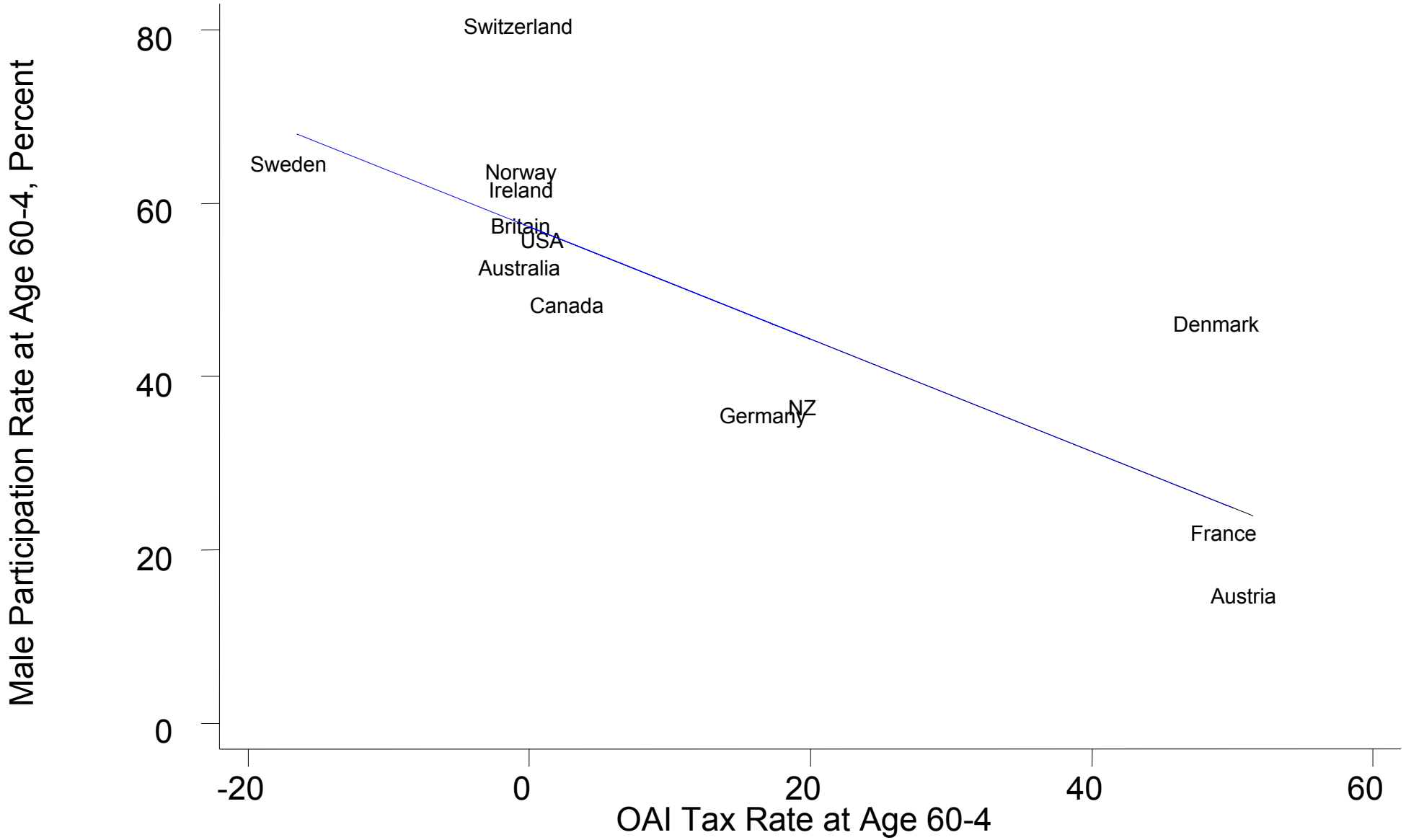
	1930	1940	1950	1960	1970	1980	1990	2000
Australia	0	0	0	0	0	0	0	0
Austria	0	0	0	0	51.4	51.4	51.4	16.8
Canada	0	0	0	0	0	0	3.3	3.3
Denmark	...	30.4	0	0	0	83.9	49.5	58.8
France	0	0	0	0	0	0	50	50
Germany	0	0	0	0	0	17.3	17.3	13
Ireland	0	0	0	0	0	0	0	0
New Zealand	0	66.2	56.3	57.2	60.2	0	19.9	0
Norway	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	-16.5	-16.5	-11
Switzerland	0	0	0	0	0	0	0	0
U.K.	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0.8	1.1	1.4	1.6

In national cross-sections

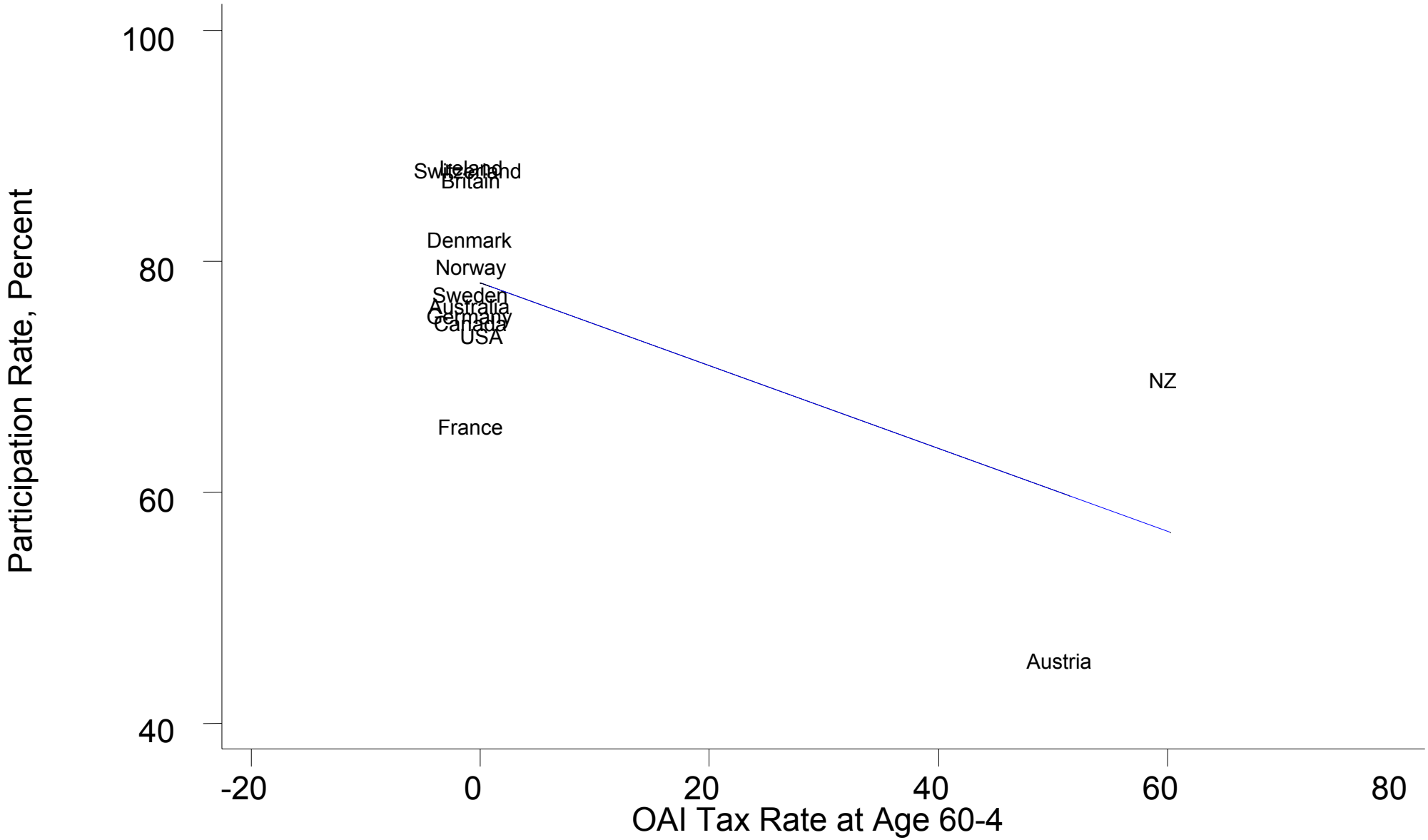
- 1990 cross-section similar to Gruber-Wise result, though different countries, disagree on OAI tax rates

- 1990 Participation elasticity w.r.t. net-of-tax wage is 1.05

- Austria, New Zealand suggest OAI effect in 1970



OAI Tax Rates and Participation Rates at Age 60-4 in 1990



OAI Tax Rates and Participation Rates at Age 60-4 in 1970

Table 5
Dependent Variable: Columns 1-5, Labour Force Participation of Men Aged 60-4
Columns 6-7, Participation of Men 60-4 – Participation of Men 55-9

	1	2	3	4	5	6	7
Social Security							
Implicit Tax Rate at ages 60 – 4	-0.23** (-5.50)		-0.16** (-2.98)	-0.15** (-2.74)	-0.16** (-2.97)	-0.13** (-2.80)	-0.11** (-2.53)
Replacement Rate at ages 60 – 4		-0.19** (-4.85)	-0.10* (-1.91)	-0.09* (-1.77)	-0.08 (-1.38)	-0.08* (-1.95)	-0.10** (-2.32)
Benefits Paid Before 65? (0 or 1)					-0.92 (-0.32)		
Controls							
Unemployment Rate				-0.24 (-0.98)			-0.54** (-2.15)
Growth of GDP/Capita *t-5 to t*				11.95* (1.93)			4.99 (0.78)
Growth of GDP/Capita *t-10 to t*				-9.52 (-1.54)			-5.82 (-0.90)
N	93	93	93	93	93	81	81
R^2	0.93	0.92	0.93	0.94	0.93	0.91	0.92
Participation Elasticities							
Net-of-Tax Wage	0.47		0.33	0.30	0.33	0.26	0.23
Replacement Rate		-0.11	-0.06	-0.05	-0.05	-0.05	-0.06

Note: All regressions include country and year fixed effects. T statistics are in brackets.
** Denotes coefficients significant at the 5% level, * at the 10% level.

Table 6
Dependent Variable: Participation of Men Aged 60-4
OAI Effects Assuming Different Annuity Rates *r+p*

	Annuity Rate			
	5%	**7%**	**9%**	**11%**
Replacement Rate	-0.11**	-0.10*	-0.09*	-0.086*
	(-2.28)	(-1.91)	(-1.74)	(-1.68)
Tax Rate	-0.14**	-0.16**	-0.17**	-0.169**
	(-2.57)	(-2.98)	(-3.11)	(-3.10)
Elasticity w.r.t. Net-of-Tax Wage	0.29	0.33	0.34	0.34
Elasticity w.r.t. Replacement Rate	-0.07	-0.06	-0.05	-0.05

Note: Country and year effects were included in these regressions. T statistics are in brackets. ** Denotes coefficients significant at the 5% level, * at the 10% level.

Table 7: Effects of OAI on Labour-Force Participation Before and After the Oil Shocks

	Years ≤1970	**Years ≤1970**	**Years ≤1970**	**Years ≤1970**	**Years ≥1970**	**Years ≥1970**	**Years ≥1970**	**Years ≥1970**
Social Security								
Implicit Tax Rate	-0.29**		-0.02	0.01	-0.16**		-0.07	-0.06
at ages 60 - 4	(-6.26)		(-0.10)	(0.03)	(-2.48)		(-0.92)	(-0.77)
Replacement Rate		-0.24**	-0.23	-0.23		-0.19**	-0.15*	-0.18**
at ages 60 - 4		(-6.63)	(-1.50)	(-1.54)		(-3.04)	(-1.86)	(-2.30)
Controls				0.10				-1.22*
Unemployment				(0.63)				(-1.91)
Growth of				4.89				31.76
GDP/Capita *t-5 to t*				(1.20)				(0.87)
Growth of				-4.45				-30.68
GDP/Capita *t-10 to t*				(-1.18)				(-1.38)
N	55	55	55	55	51	51	51	51
R^2	0.91	0.92	0.92	0.93	0.93	0.93	0.94	0.95

Note: all regressions include country and time dummies. T-statistics are in parentheses. **Denotes coefficients significant at the 5% level, * at the 10% level.

Results for participation of men 60-4:

- OAI tax, replacement rates reduce participation, hard to separate

- Results robust to business-cycle controls, time period, annuity rate

- Coefficients imply average benefit extension reduced participation by 11 percentage points

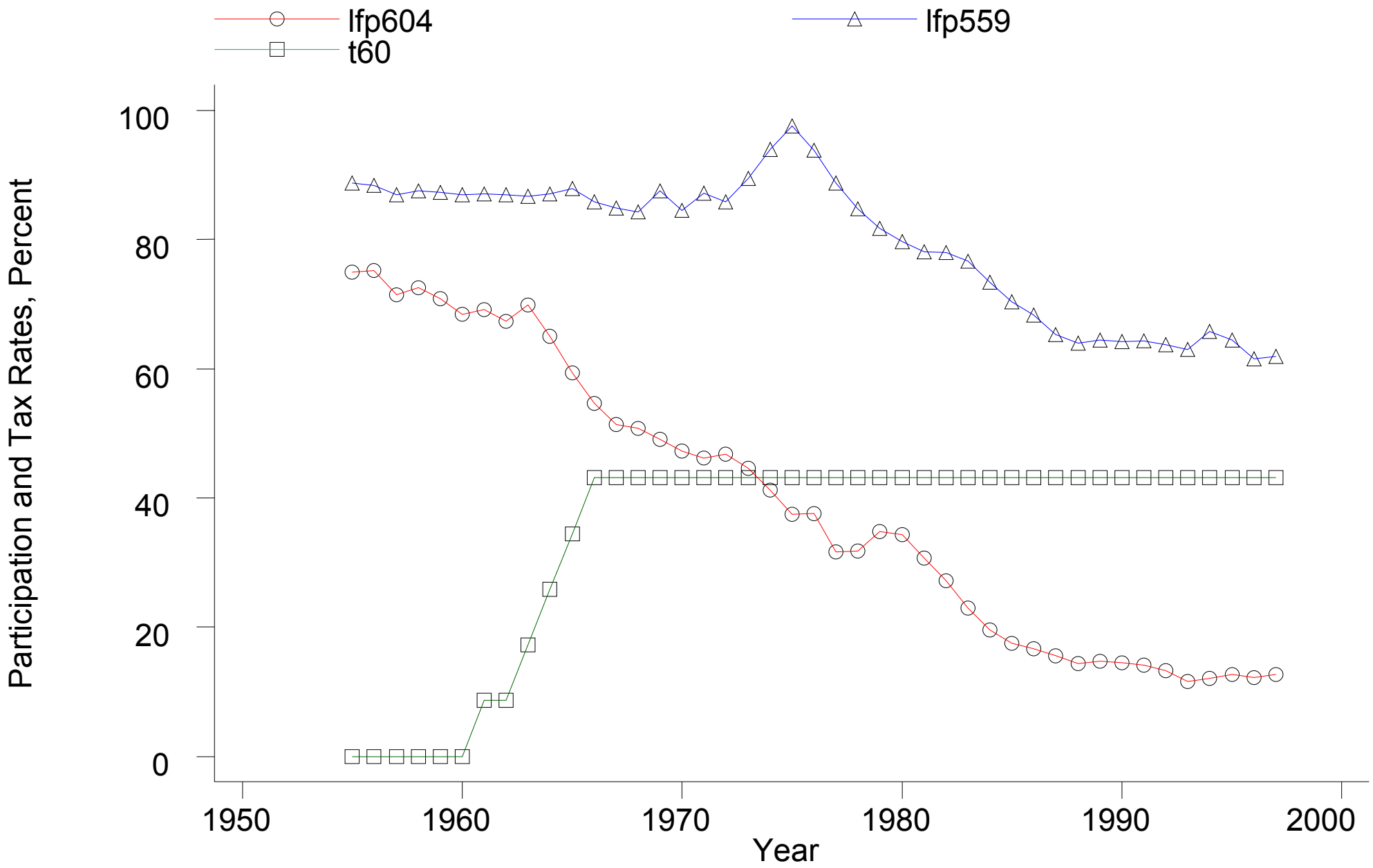
Annual data across OAI reforms:

- Participation responds quickly to OAI changes

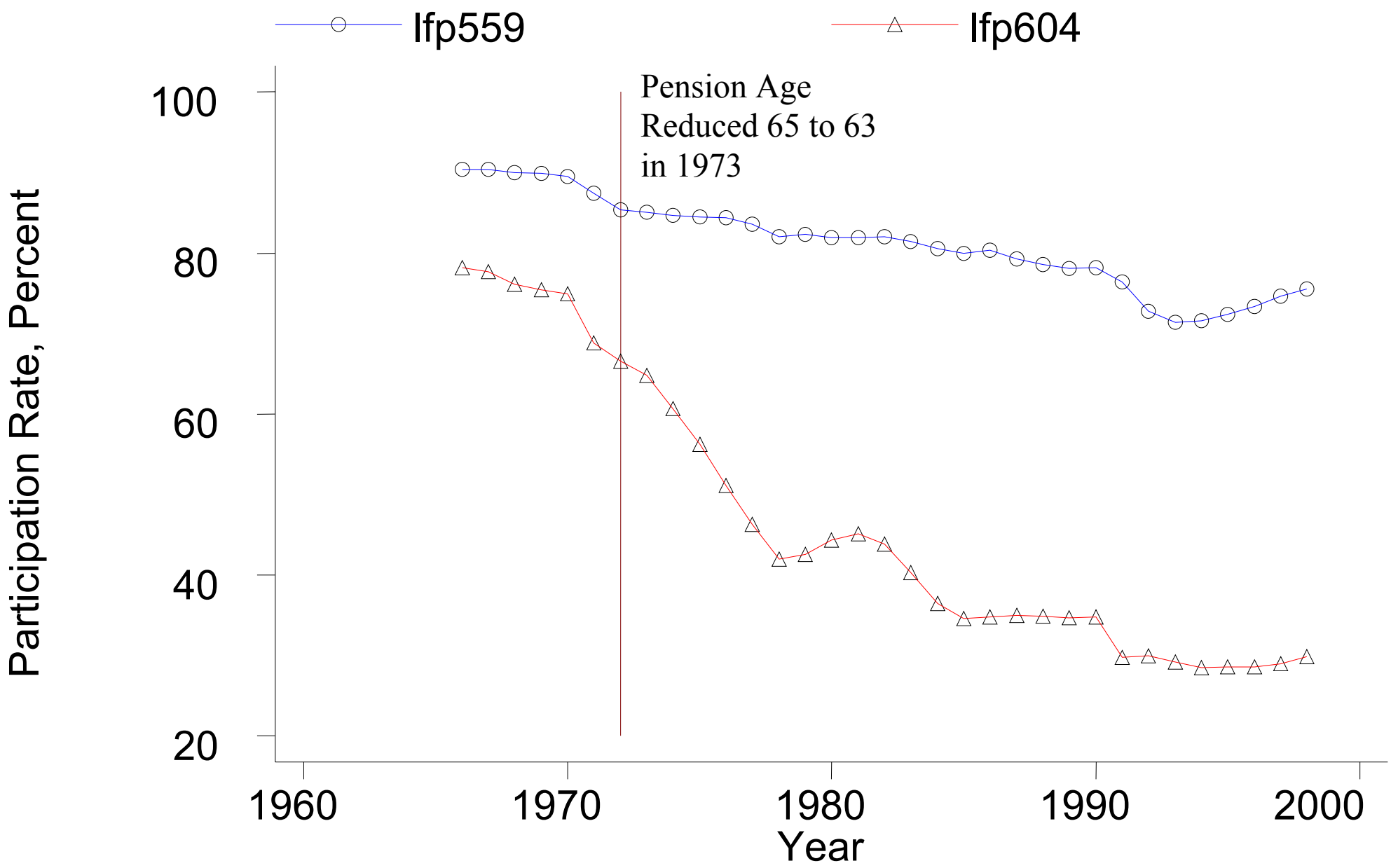
- Unlikely that other variables produce fast, age-specific responses

- OAI reforms do not appear endogenous – participation fell after, not before

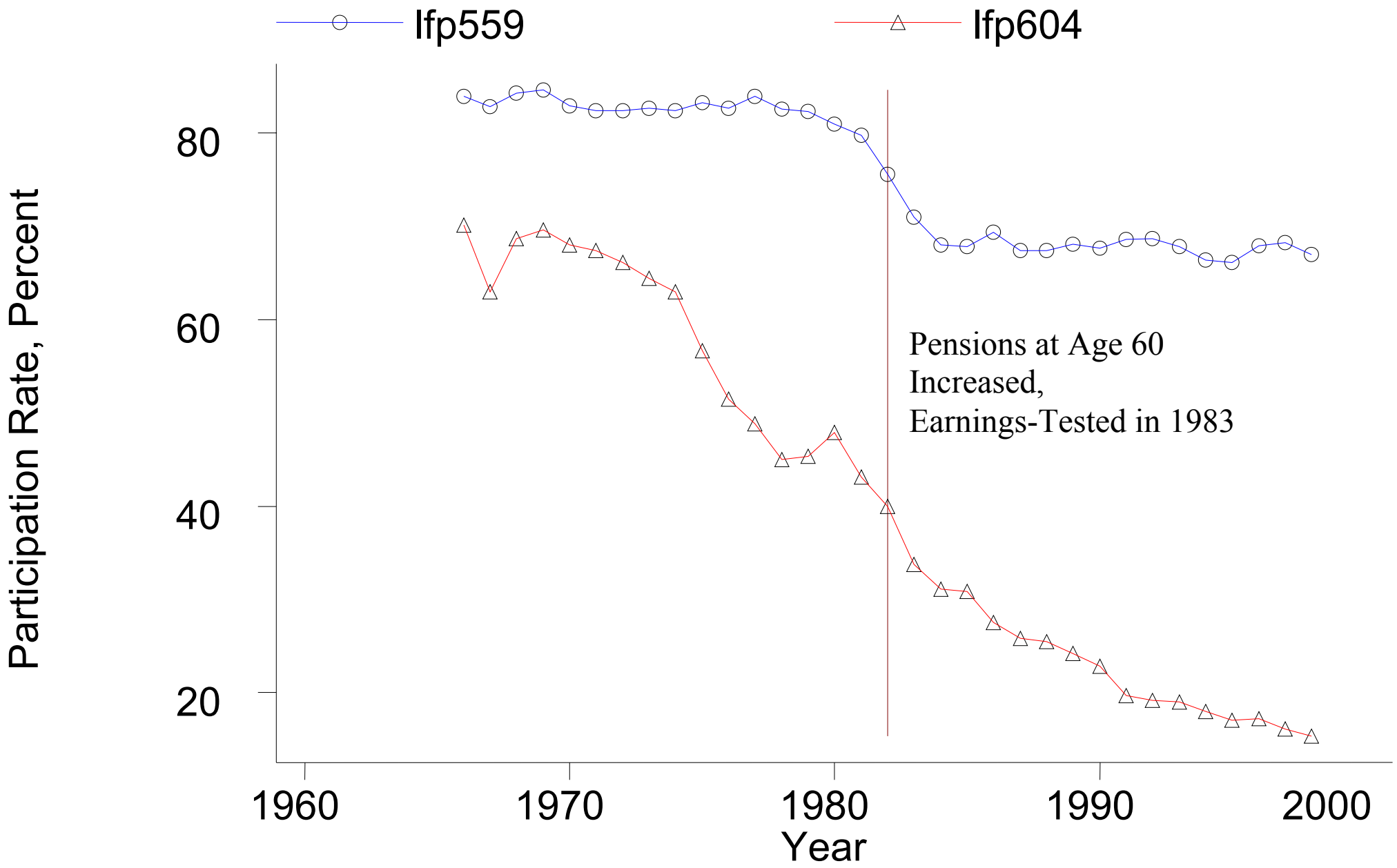
- Test endogeneity formally with regressions on lags



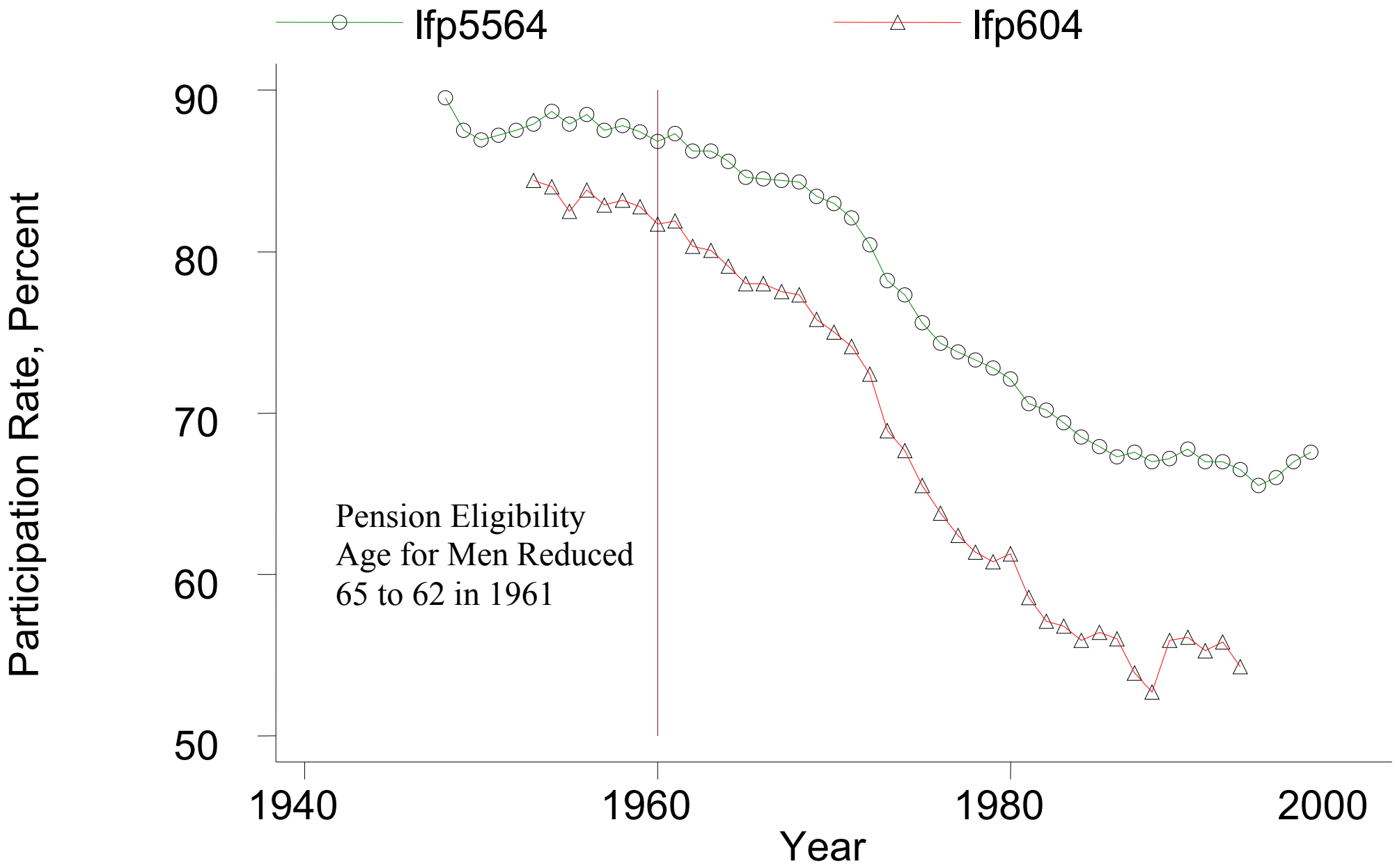
Austria: Participation at Ages 55-9 and 60-4, OAI Tax at Age 60-4



Participation of (West) German Men



Participation of French Men



Participation of US Men

Participation Rates of US Men by Single Year of Age

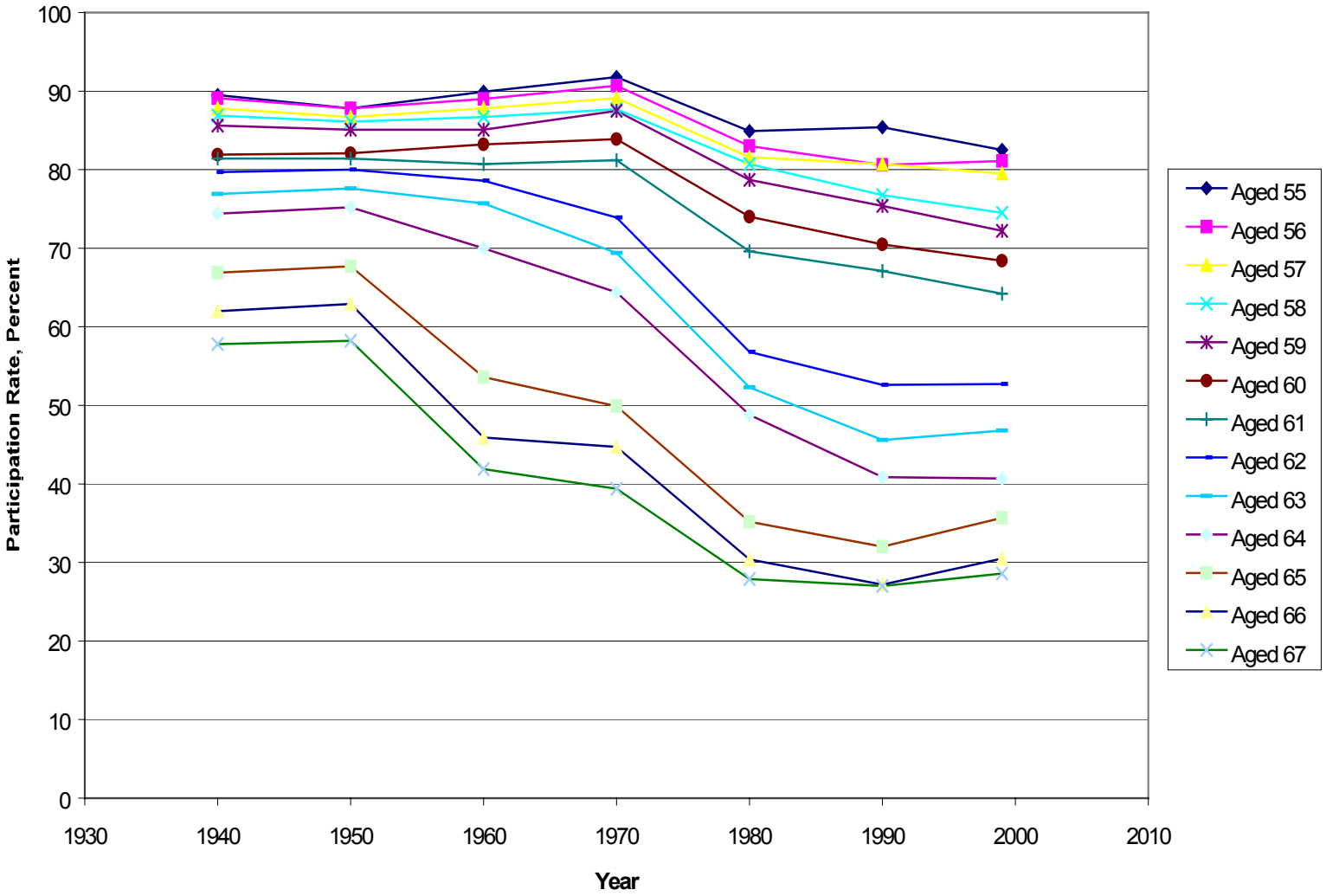


Table 10
Tests for Endogeneity with Annual Data, Men Aged 60-4

Dependent Variable:	**Legislated Tax Rate**	**Participation Rate**
Participation Rate *(t-1)*	0.17 (0.79)	1.1** (14.08)
Participation Rate *(t-2)*	-0.11 (-0.52)	-0.23** (-2.88)
Legislated Tax Rate for Year t+10 *(t-1)*	0.84** (12.37)	
Legislated Tax Rate for Year t+10 *(t-2)*	-0.01 (-0.19)	
Tax Rate *t-1*		0.01 (0.54)
Tax Rate *t-2*		-0.04 (-1.41)
Country Effects	Yes	Yes
Year Effects	Yes	Yes
N - k	268 - 57	268 – 57
R^2	0.94	0.99
F statistic	F(2,211) = 0.4	F(2,211) = 2.08
Lagged X Predicts?	**No**	**No**

Note: t statistics are in parentheses. ** Denotes t statistics significant at the 5% level. The 5% critical value of $F(2,\infty)$ is 3.

Mechanism by which OAI affects participation in doubt:

- Wealth effect $\Rightarrow$ 'Over-control' with participation at age 55-9
- Participation data by single year of age rule out wealth effect
- OAI replacement rates could 'trigger' retirement
- Few events of OAI tax, replacement rates changing in different directions
- Evidence from these is mixed

Participation of Danish Men by Single Year of Age, 2000

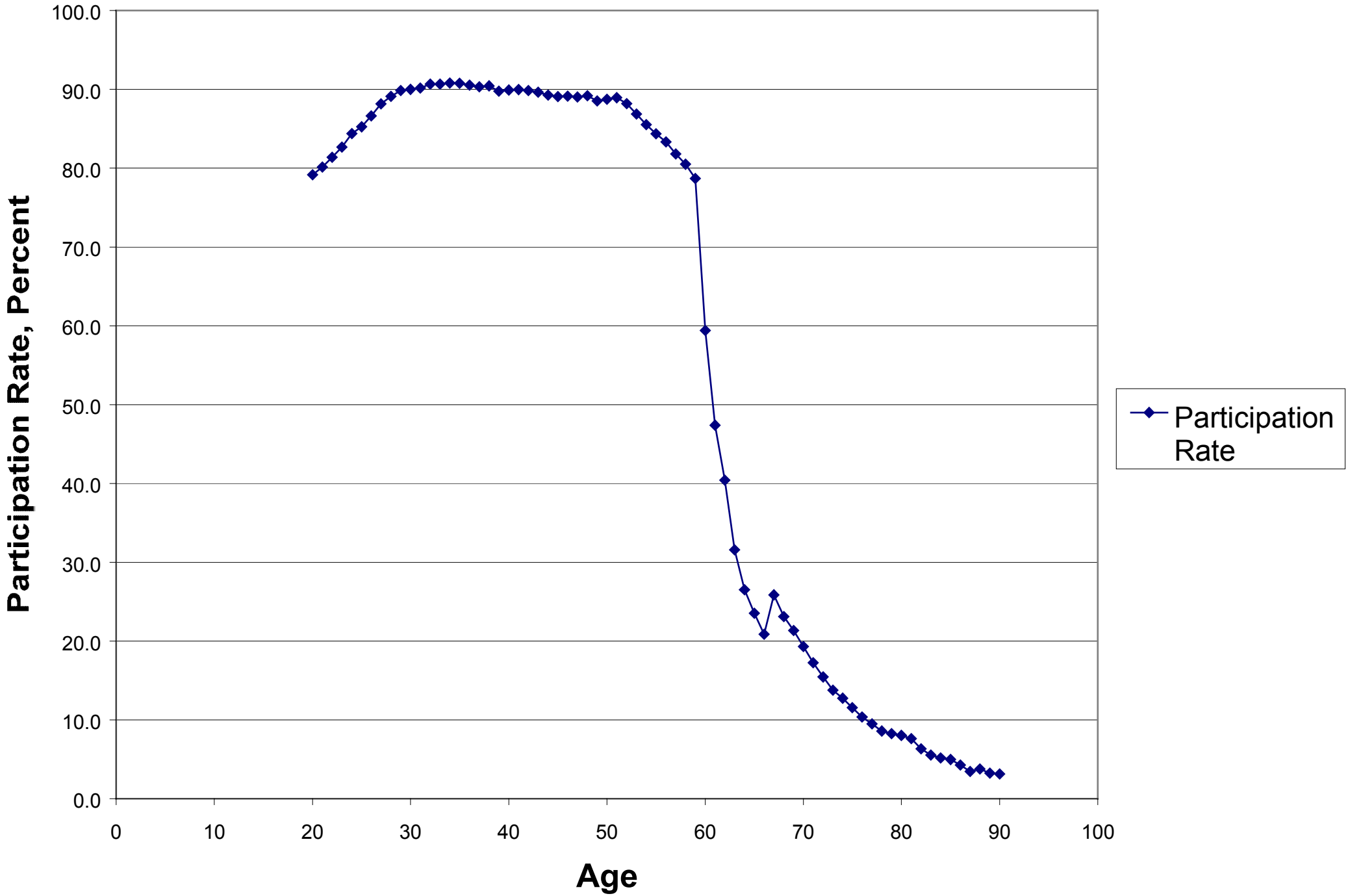
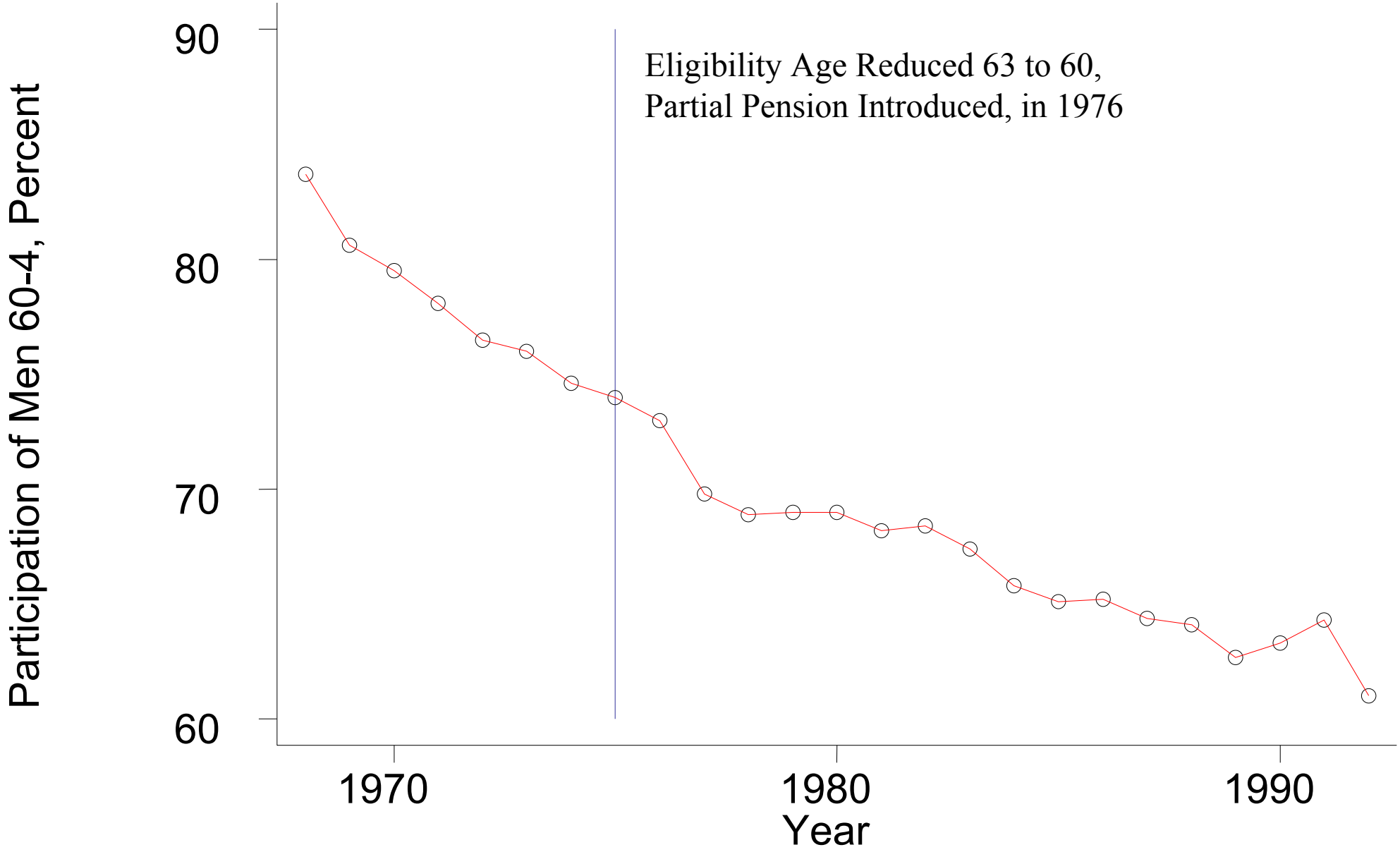
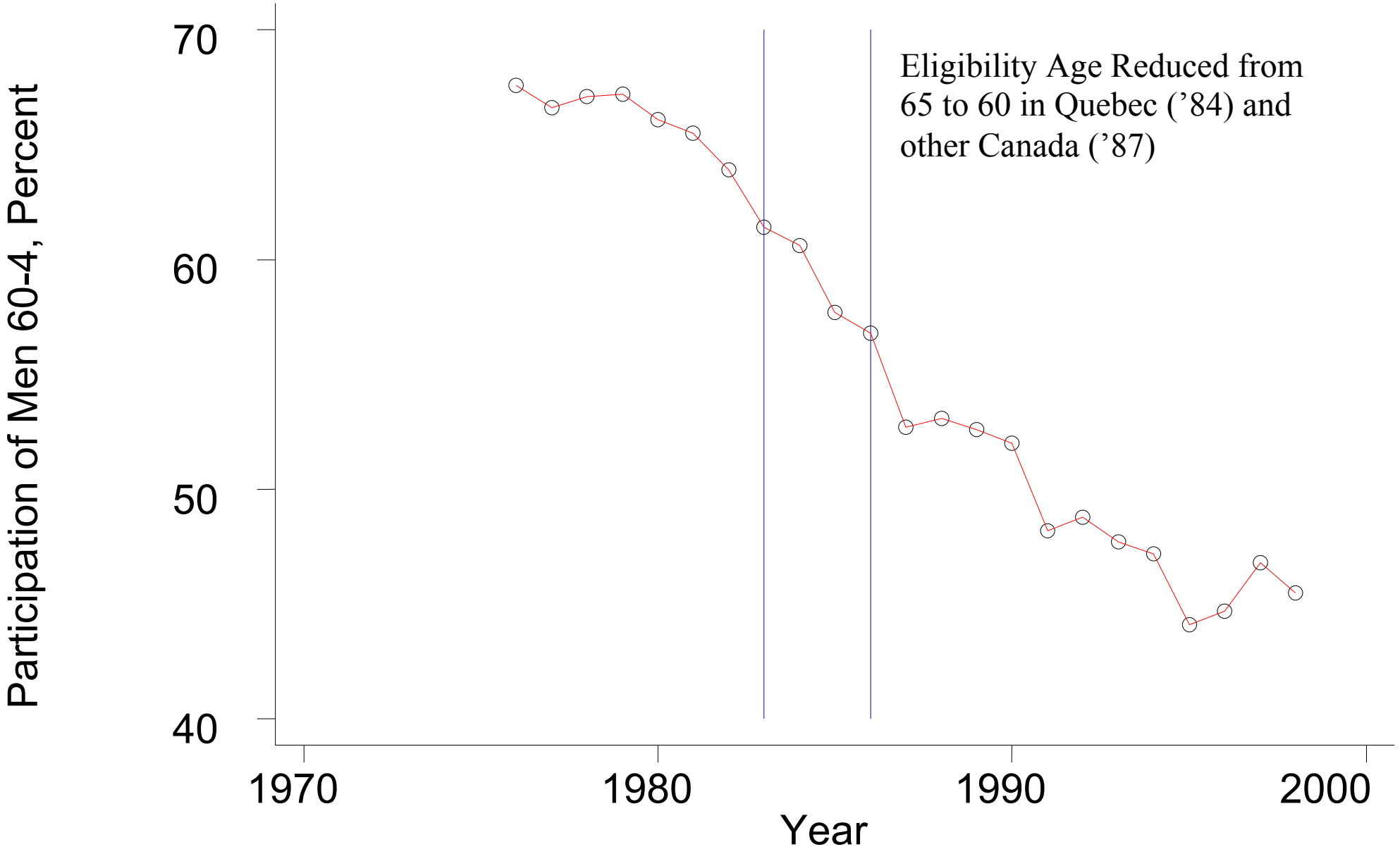


Table 9: Ten-Year Changes in Male Participation Rates Across OAI Reforms					
Event	Treatment Country, Age, Δ LFP / Control Country, Age Δ LFP / Δ LFP- Δ LFP	Treatment Country, Age_2 Δ LFP_2 / Control Country, Age_2 Δ LFP_2 / Δ LFP_2 - Δ LFP_2	D-in-D-in-D, Δ RR, Δ Tax	D-in-D-in-D, Participation	Elasticity to RR, W(1-τ)
Events Suggesting OAI Taxes are More Important than Replacement Rates					
Sweden 1976 Eligibility age cut from 63 to 60	Swe, 60-4 -10.7 UK, 60-4 -12 1.3	Swe, 55-9 -4.5 UK, 55-9 -3.7 -0.8	Δ RR = 50.9 Δ Tax= -16.5	2.1	0.05 0.17
USA 1961 Eligibility age cut from 65 to 62	US, 60-4 -4.6 Canada, 60-4 -1.7 -2.9	US, 55-9 -0.9 Canada, 55-9 -1.8 0.9	Δ RR = 17.3 Δ Tax = 0.8	-3.8	-0.28 6.12
Canada 1984-7 Eligibility age cut from 65 to 60	Canada, 60-4 -21.2 US, 60-4 -5.3 -15.9	Canada, 55-9 -6.1 US, 55-9 -1.9 -4.2	Δ RR = 10 Δ Tax = 3	-11.7	-1.7 5.67
Events Suggesting OAI Replacement Rates are More Important than OAI Taxes					
New Zealand 1977 Earnings test dropped, benefits increased.	NZ, 60-4 -22.5 Australia, 60-4 -22.5 0	NZ, 55-9 -3.2 Australia, 55-9 -7.1 3.9	Δ RR = 13.9 Δ Tax =-60.2	-3.9	-0.16 -0.04
Ireland 1973-7 Eligibility age cut from 70 to 65	Ireland, 65-9 -27.4 UK, 65-9 -13.4 -14	Ireland, 60-4 -14.5 UK, 60-4 -12 -2.5	Δ RR = 35.8 Δ Tax = 4.4	-11.5	-0.18 3.91



Participation of Swedish Men Aged 60-4



Participation of Canadian Men Aged 60-4