

# Why do Americans Work So Much More than Europeans?

## Motivation

- ▶ Annual hours of work differ dramatically across countries

# Why do Americans Work So Much More than Europeans?

## Motivation

aggregate hours =  
emp × hours worked per worker

Annual Hours Per Person Aged 15-64

$H < .75$	$.75 < H < .85$	$.85 < H < .95$	$H > .95$
Bel (.70)	Nor (.78)	Spa (.86)	Can (.96)
Ger (.71)	Ita (.79)	Fin (.87)	Swi (.96)
Fra (.72)	Ire (.84)	Den (.89)	Aus (.99)
Net (.73)	Aut (.85)	Swe (.89)	Jap (1.00)
		Por (.91)	US (1.00)
		UK (.93)	NZ (1.04)
		Isr (.90)	

# Why do Americans Work So Much More than Europeans?

## Motivation

- ▶ Are these differences big?
- ▶ What are sources of these differences?

vacation days

unions, wage setting, minimum wages

preferences, work ethics, culture, religion

parental leave

gender equality

social security, retirement programs, UI

taxes

structural change/structure of economy

competition

training programs, flexibility, regulation

demographics

child care, family structure

returns to education, education finance

healthcare

migration

informal economy

discrimination

housing

resource endowments

# Why do Americans Work So Much More than Europeans?

Prescott (2004)

- ▶ Let's investigate one candidate, labor and consumption taxes, in order to account for differences in aggregate hours of work between US and continental Europe
- ▶ Take Prescott (2004) as premise, but use a two-period OLG setting
  - ▶ Endogenize labor supply decision

# Why do Americans Work So Much More than Europeans?

## Environment

- ▶ In each period,  $N(t) = N$  agents born
- ▶ Agents supply  $h_t^h(t)$  units of labor when young, at the wage rate  $w(t)$
- ▶ Agents save for retirement using a storage technology with storage parameter  $\lambda = 1$
- ▶ Production technology  $Y(t) = AH(t)$ , where  $H(t) = N(t)h$  and  $A$  is a technology parameter

# Why do Americans Work So Much More than Europeans?

## Government

- ▶ Government levies a proportional labor income tax and a proportional consumption tax
- ▶ Government uses tax revenue to finance government consumption (in the period the revenue is generated)
- ▶ Assume government consumption is a perfect substitute for private consumption
  - ▶ Households indifferent between private and public schools, private and public daycare, private and public healthcare, etc.
- ▶ Assume revenue generated from young (old) generation used for public consumption of young (old) generation

# Why do Americans Work So Much More than Europeans?

## Preferences

- ▶ Utility function given by:

$$u_t^h = \log [c_t^h(t) + g_t^h(t)] + \beta \log [c_t^h(t+1) + g_t^h(t+1)] \\ + \alpha \log [1 - h_t^h(t)]$$

where  $g(\cdot)$  is public consumption,  $\beta = 1$ , and  $\alpha = 2$

*1-h  
leisure*

# Why do Americans Work So Much More than Europeans?

## Individual's Budget Constraints

Budget constraints faced by individual  $h$ :

$$(1 + \tau^c)c_t^h(t) = (1 - \tau^w)w(t) * h_t^h(t) - k^h(t+1) - l(t)$$
$$(1 + \tau^c)c_t^h(t+1) = \lambda k^h(t+1) + r(t)l(t)$$

$$\frac{(1 + \tau_c)c_t^h(t) + (1 + \tau_c)c_t^h(t+1)}{r(t)} = (1 - \tau_w)w(t)h_t^h(t) + k(t+1)\left(\frac{\lambda}{r(t)} - 1\right)$$

$$\rightarrow r(t) = \lambda$$

$$c_t^h(t+1) = \frac{(1-\tau_w)}{(1+\tau_c)} r(t) w(t) h_t^h(t) - r(t) c_t^h(t)$$

FUC

$$c_t^h(t) : \frac{\frac{1}{c_t^h(t) + g_t^h(t)} - \frac{r(t) \beta}{c_t^h(t+1) + g_t^h(t+1)}}{= 0} = 0 \quad \beta = 1$$

$$\rightarrow c_t^h(t) + g_t^h(t) = c_t^h(t+1) + g_t^h(t+1)$$

$$h_t^h(t) : \frac{\frac{1}{c_t^h(t+1) + g_t^h(t+1)} - \frac{(1-\tau_w)}{(1+\tau_c)} \underbrace{r(t) w(t)}_{=1} - \frac{\alpha}{1-h_t^h(t)}}{= 0} = 0$$

$$(1 + \tau_c) c_t^h(t) = (1 - \tau_w) w(t) h_t^h(t) - k^h(t+1)$$

$$c_t^h(t) + \tau_c c_t^h(t) = w(t) h_t^h(t) - \underbrace{\tau_w w(t) h_t^h(t)}_{\text{blue bracket}} - k^h(t+1)$$

$$c_t^h(t) + g_t^h(t) = w(t) h_t^h(t) - k^h(t+1)$$

$$(1 + \tau_c) c_t^h(t+1) = \lambda k^h(t+1)$$

$$c_t^h(t+1) + \underbrace{\tau_c c_t^h(t+1)}_{g_t^h(t+1)} = k^h(t+1)$$

since  $c_t^h(t) + g_t^h(t) = c_t^h(t+1) + g_t^h(t+1)$

$$\rightarrow k^h(t+1) = w(t) h_t^h(t) - k^h(t+1)$$

$$\rightarrow k^h(t+1) = \underline{w(t) h_t^h(t)}$$

$$\rightarrow c_t^h(t) + g_t^h(t) = \frac{w(t) h_t^h(t)}{2}$$

Plug into  
for for  
he  $h_t^h(t)$

# Why do Americans Work So Much More than Europeans?

## Government Budget Constraints

Government's budget constraints given by:

$$\begin{aligned}g_t^h(t) &= \tau^w w(t) * h_t^h(t) + \tau^c c_t^h(t) \\g_t^h(t+1) &= \tau^c c_t^h(t+1)\end{aligned}$$

# Why do Americans Work So Much More than Europeans?

## Household Utility Maximization

First order conditions to the agent's problem (savings and labor supply):

$$\frac{du_t^h -}{dk^h(t+1)} = -\frac{1}{c_t^h(t) + g_t^h(t)} + \frac{1}{c_t^h(t+1) + g_t^h(t+1)} = 0$$

$$\frac{du_t^h}{dh_t^h(t)} = \frac{(1 - \tau^w)w(t)}{(1 + \tau^c)[c_t^h(t) + g_t^h(t)]} - \frac{\alpha}{1 - h_t^h(t)} = 0$$

# Why do Americans Work So Much More than Europeans?

## Firm Profit Maximization

First order condition to the firm's problem (labor demand):

$$\max Y(t) - w(t) * H(t)$$

thus

$$A = w(t)$$

# Why do Americans Work So Much More than Europeans?

## Solving for Equilibrium

Substitute government's budget constraints into household's budget constraints:

$$c_t^h(t) + g_t^h(t) = w(t) * h_t^h(t) - k^h(t+1)$$

$$c_t^h(t+1) + g_t^h(t+1) = k^h(t+1)$$

From the first order condition w.r.t savings we have

$$c_t^h(t) + g_t^h(t) = c_t^h(t+1) + g_t^h(t+1)$$

thus

$$k^h(t+1) = \frac{w(t) * h_t^h(t)}{2}$$

and thus

$$c_t^h(t) + g_t^h(t) = \frac{w(t) * h_t^h(t)}{2}$$

# Why do Americans Work So Much More than Europeans?

## Solving for Equilibrium

From the first order condition w.r.t labor supply we have

$$\frac{(1 - \tau^w)w(t)}{(1 + \tau^c)[c_t^h(t) + g_t^h(t)]} = \frac{\alpha}{1 - h_t^h(t)}$$

thus

$$\frac{(1 - \tau^w)w(t)}{(1 + \tau^c)\frac{w(t)*h_t^h(t)}{2}} = \frac{\alpha}{1 - h_t^h(t)}$$

and since  $\alpha = 2$

$$\frac{(1 - \tau^w)}{(1 + \tau^c)} = \frac{h_t^h(t)}{1 - h_t^h(t)}$$

# Why do Americans Work So Much More than Europeans?

## Solving for Equilibrium

- ▶ Let  $\theta = \frac{(1-\tau^w)}{(1+\tau^c)}$

- ▶ Then

$$h_t^h(t) = \frac{\theta}{1 + \theta}$$

# Why do Americans Work So Much More than Europeans?

Compare US and France

OECD tax base /  
calculator  
Care McDaniel

- ▶ Plug in taxes for US and France

	US	France
$\tau^w$	0.32	0.49
$\tau^c$	0.13	0.33
$\theta$	0.602	0.384
$h$	0.376	0.277

# Why do Americans Work So Much More than Europeans?

What if  $g$  not perfect substitute?

- ▶ What would model predict if government instead used tax revenue for something that isn't perfect substitute for private consumption, e.g., military expenditure?
- ▶ Or used revenue for their own benefit, i.e., didn't transfer back to households?

# Why do Americans Work So Much More than Europeans?

How Plausible is Story?

- ▶ What does government do with tax revenue?
- ▶ How much does labor supply respond to tax changes?