Lecture 2: Labour economics

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Empirical research

$\ln h = \alpha_w \ln w + \alpha_R \ln R + x\theta + \varepsilon$

R = measure of non-wage income

$x = [x_1, \ldots . x_n]$ = vector of other determinants

$\theta = \begin{bmatrix} \theta_1 \\ \vdots \\ \theta_m \end{bmatrix}$ = vector if parameters

ε = random term

Problem: How to define R.

$R_t = r_t A_{t-1} + B_t$

r_t = real rate of interest

A_{t-1} = assets

B_t = exogenous income

- This formulation assumes myopic behaviour
- More reasonable to assume intertemporal decisions
- More complex model is required

Empirical results

- **Movements in labour supply are mainly due to variations in the participation rate**
- **Female labour supply is much more elastic than male labour supply**
- **Hump-shaped labour supply as predicted by theory**
- **Leisure is a normal good**
- **Substitution effect dominates income effect of wage change**

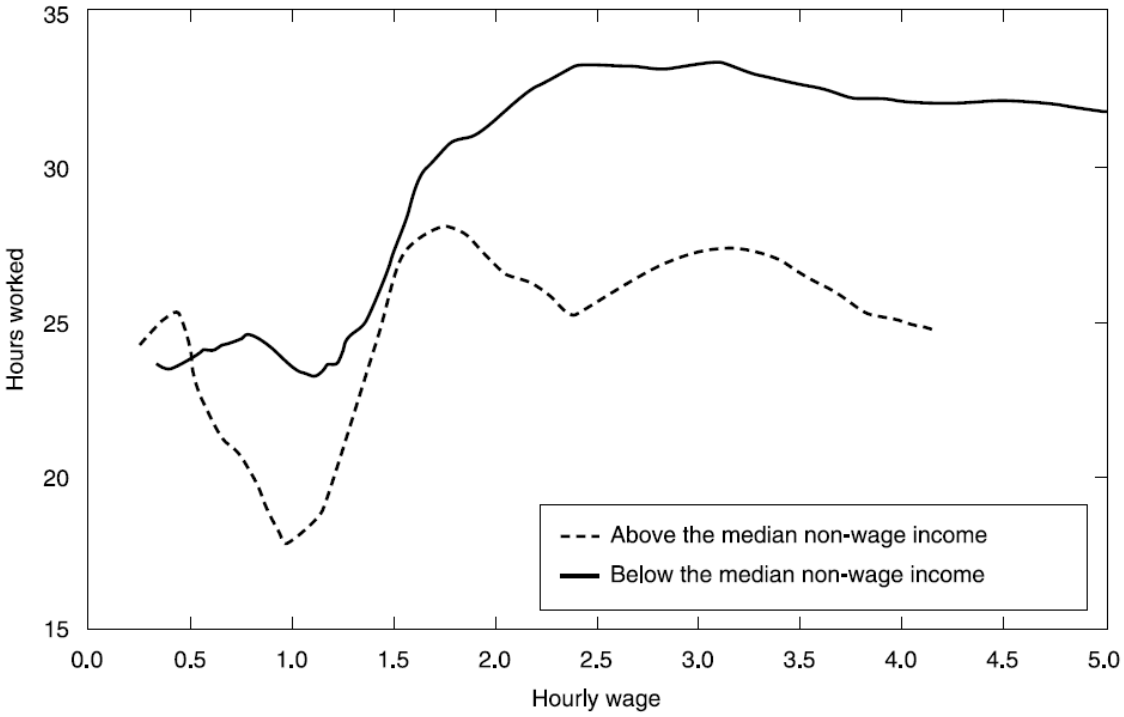


FIGURE 1.8
The labor supply of single mothers.

Source: Blundell et al. (1992).

Table 1.1
The elasticity of the labor supply of married women.

Authors	Sample	Uncompensated wage elasticity	Income elasticity
Hausman (1981)	U.S.	0.995	−0.121
Arrufat and Zabalza (1986)	U.K.	2.03	−0.2
Blundell et al. (1988)	U.K.	0.09	−0.26
Arellano and Meghir (1992)	U.K. (young children)	0.29	−0.40
Triest (1990)	U.S.	0.97	−0.33
Bourguignon and Magnac (1990)	France	[0.05; 1]	[−0.2; −0.3]

Source: Blundell and MaCurdy (1999, table 2, pp. 1649–1651).

Table 1.2
The elasticity of the labor supply of married men.

Authors	Sample	Uncompensated wage elasticity	Income elasticity
Hausman (1981)	U.S.	[0; 0.03]	[−0.95; −1.03]
Blomquist (1983)	Sweden	0.08	[−0.03; −0.04]
Blundell and Walker (1986)	U.K.	0.024	−0.287
Triest (1990)	U.S.	0.05	0
Van Soest et al. (1990)	Netherlands	0.12	−0.01

Source: Blundell and MaCurdy (1999, table 1, pp. 1646–1648).

Natural experiments and difference-in-differences estimators

Population of size N

N_M has been affected by policy change.

N_C is control group which has not been affected.

$\delta_{it} = 1$ if policy change applies to an individual

$\delta_{it} = 0$ if policy change does not apply to an individual

$$y_{it} = \alpha\delta_{it} + x_{it}\theta + \gamma_i + \xi_t + \varepsilon_{it} \qquad (21)$$

γ_i = individual fixed effect

ξ_t = fixed time effect

ε_{it} = random term distributed independently among individuals

x_{it} = vector of observable characteristics

Eliminate individual fixed effects by estimating equation in differences:

$$\Delta y_{it} = \alpha\Delta\delta_{it} + (\Delta x_{it})\theta + \Delta\xi_t + \Delta\varepsilon_{it}$$

- **Two periods**
- **Same treatment for all in t -1**
- **Different treatment in t**
- **Assume $\Delta x_i = 0$**
- **Set $\beta = \Delta\xi_t$ and $u_i = \Delta\varepsilon_{it}$**

$$\Delta y_i = \beta + \alpha\Delta\delta_i + u_i$$

$$\hat{\alpha} = \frac{\sum_{i \in M} \Delta y_i}{N_M} - \frac{\sum_{i \in C} \Delta y_i}{N_C}$$

$\hat{\alpha}$ is a "difference-in-differences" estimator.

- **Calculate difference between the two periods within each group.**
- **Then calculate the difference between the two differences.**
- **Estimator of the treatment effect**

<u>Example</u>: Eissa and Liebman (1996) study of EITC in the US for single women

- **Only single women with children received the EITC**
- **Probit estimation of (21)**

Table 1.3

Participation rates of single women.

	Pre-TRA86	Post-TRA86	Difference	$\hat{a}$
Treated group	0.729 (0.004)	0.753 (0.004)	0.024 (0.006)	
Control group	0.952 (0.001)	0.952 (0.001)	0.000 (0.002)	0.024 (0.006)

Standard errors in parentheses.

Source: Eissa and Liebman (1996, table 2).

Value and limits of natural experiments

- **Methodological simplicity**
- **Few situations**
- **Particular event which perhaps cannot be generalised**
- **Social experiments**

Swedish Fiscal Policy Council

- **Evaluation of Swedish employment tax credit (jobbskatteavdrag)**

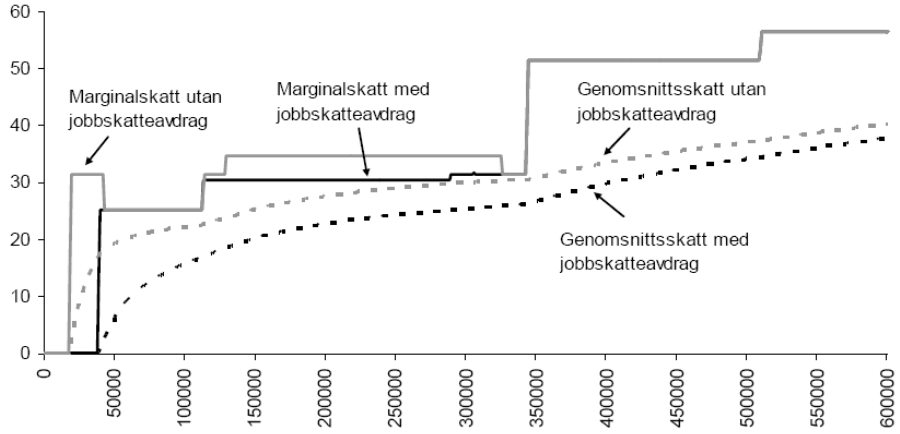
- **Participation elasticity for low-income groups 0.8 (gradual exponential fall with average = 0.2)**

- **Employment tax credits with no phasing out: high degree of self-financing because of increased employment**

- **Phasing out of tax credit reduces hours worked in phasing-out interval – low degree of self-financing**

Reductions of marginal tax rates in high-income brackets also have a high degree of self-financing, but do not reduce income inequality

Figur 8.2 Marginal- och genomsnittskatt med och utan jobbskatte-avdrag 2008



Anm: Kommunalskatten antas vara 31,55 i beräkningarna.
Källa: Lundgren m fl (2008).

Tabell 8.1 Beräknad självfinansieringsgrad och budgetkostnad per skapad arbetad timme för olika skattereformer

	Självfinansieringsgrad		Kostnad i kr / arbetad timme	
	Basfall	Alternativ	Basfall	Alternativ
	Fallande deltagande-elasticitet	Konstant deltagande-elasticitet	Fallande deltagande-elasticitet	Konstant deltagande-elasticitet
Jobbskatteavdrag I	0,71	0,87	106	51
Jobbskatteavdrag II	0,69	0,86	118	64
Jobbskatteavdrag I med utfasning	0,40	0,20	348	3416
Borttagande av värn-skatt	0,56	1,30	285	0
Höjd inkomstgräns för statlig skatt	0,80	1,39	54	0

Anm: I kolumn 1 och 3 antas deltagandeelasticiteten vara 0,8 för grupper med låga inkomster och sedan falla exponentiellt med en genomsnittlig elasticitet på 0,2. I kolumn 2 och 4 är deltagandeelasticiteten 0,2 för alla. Timelasticiteten har satts till 0,1 för alla. Timelasticiteten kan delas upp i effekter härledda från substitutions- och inkomsteffekterna. Dessa effekter är 0,15 respektive 0,05 i våra beräkningar. I det tredje reformalternativet börjar utfasningen vid en årsinkomst på 180 tkr och ökar den effektiva marginalskatten med 5 procentenheter.
Källa: Beräkningar av Konjunkturinstitutet på uppdrag av Finanspolitiska rådet.

Tabell 8.3 Dynamiska fördelningseffekter av olika skattereformer

	Basfall Fallande deltagande-elasticitet			Alternativ Konstant deltagande-elastiticet		
	P90/ P10	P90/ P50	Gini	P90/ P10	P90/ P50	Gini
Utan reform	*2,92*	*1,56*	*0,264*	*2,92*	*1,56*	*0,260*
Jobbskatteavdrag I	2,86	1,53	0,258	2,89	1,53	0,258
Jobbskatteavdrag II	2,84	1,53	0,256	2,88	1,53	0,257
Jobbskatteavdrag I med utfasning	2,82	1,54	0,259	2,84	1,54	0,265
Borttagande av värnskatt	2,94	1,57	0,268	2,95	1,57	0,268
Höjd inkomstgräns för statlig skatt	2,99	1,58	0,268	2,99	1,58	0,268

Anm: Med P90/P10 avses kvoten mellan inkomster i 90:e och 10:e percentilen av inkomstfördelningen. Med P90/P50 avses kvoten mellan inkomster i 90:e och 50:e percentilen. I kolumnerna med beteckningen Gini anges värdet på den s k Ginikoefficienten. Se Tabell 8.1.
Källa: Konjunkturinstitutets beräkningar på uppdrag av Finanspolitiska rådet.

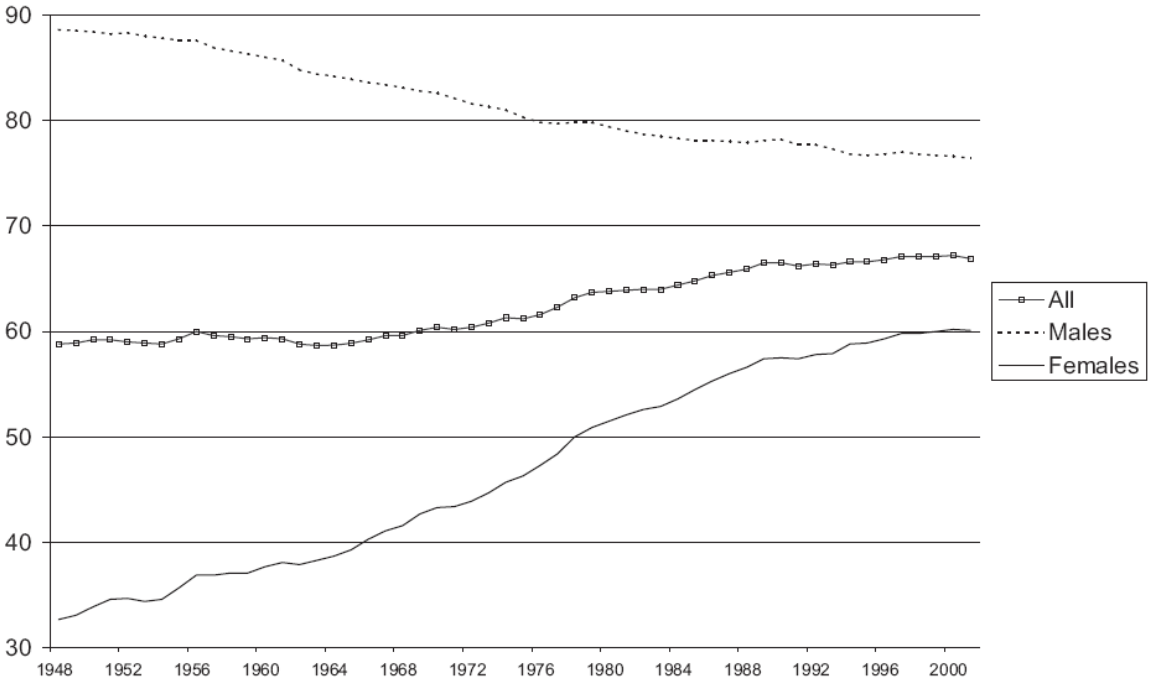


FIGURE 1.9

The evolution in participation rates in the United States for persons 16 years of age and older, 1948–2001.

Source: Bureau of Labor Statistics.

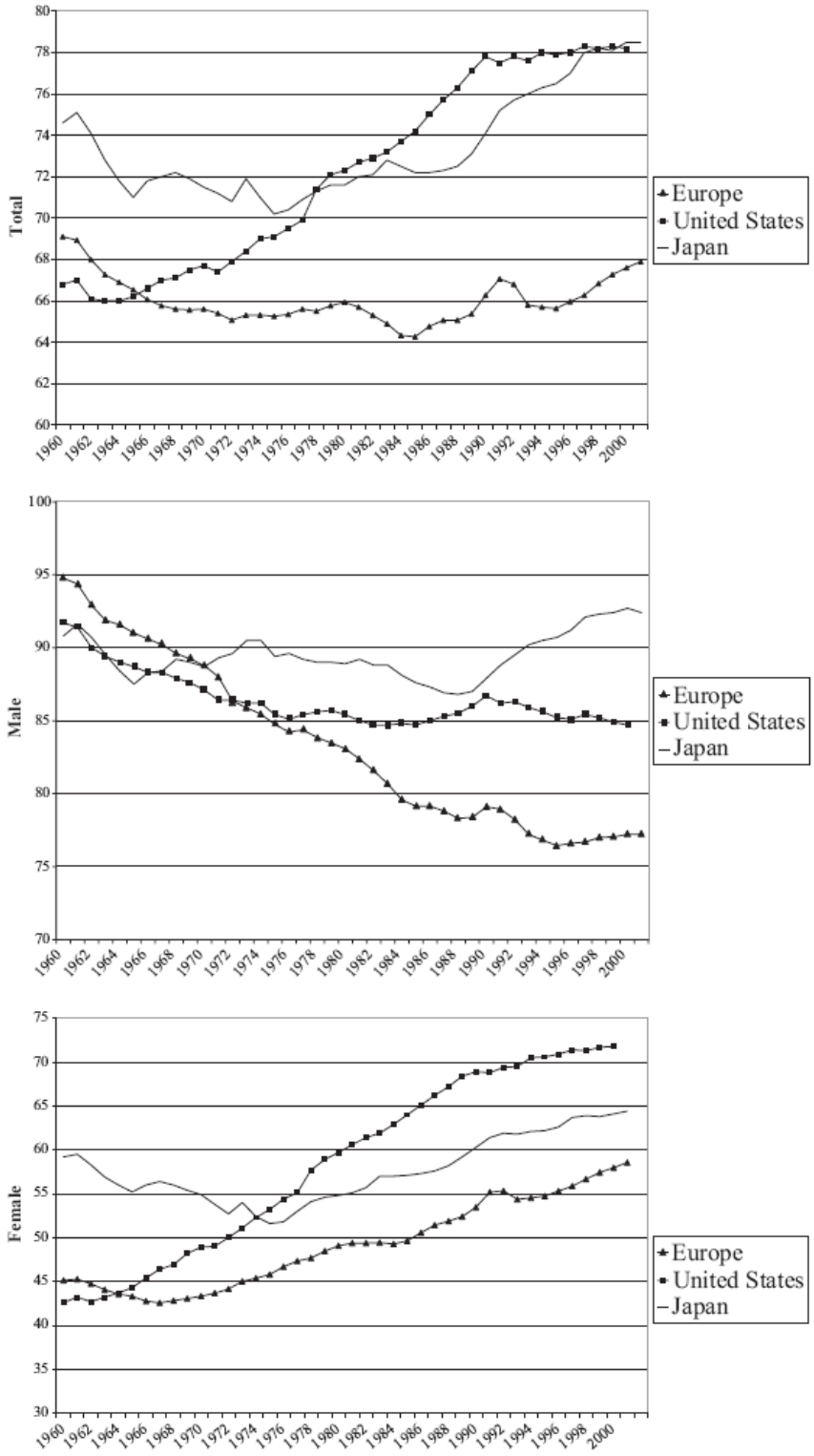


FIGURE 1.10
Participation rates in the United States, Europe (Germany, France, Italy), and Japan.

Source: OECD data.

Table 1.5

Hours worked annually per person and real hourly wages in the manufacturing sector.

	Amount of time worked				
	1870	1913	1938	1997	2000
Germany	2941	2584	2316	1507	1467
United States	2964	2605	2062	1850	1821
France	2945	2588	1848	1603	1532
United Kingdom	2984	2624	2267	1731	1711
Sweden	2945	2588	2204	1629	1603
			Wages		
Germany	100	185	285	1505	1569
United States	100	189	325	586	605
France	100	205	335	1579	1785
United Kingdom	100	157	256	708	819
Sweden	100	270	521	1601	1839

Source: Maddison (1995) for 1870, 1913, and 1938, and OECD data for 1997 and 2000.

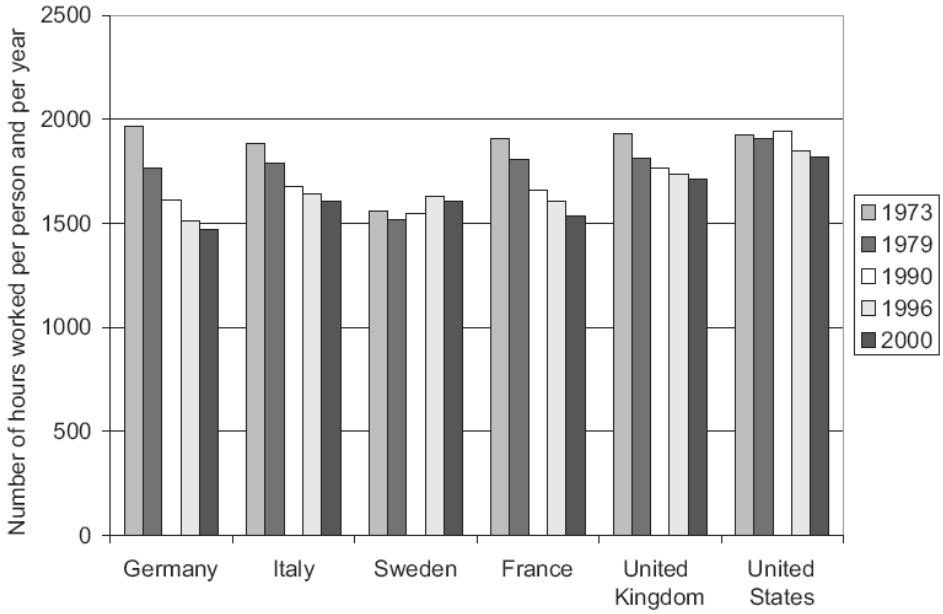
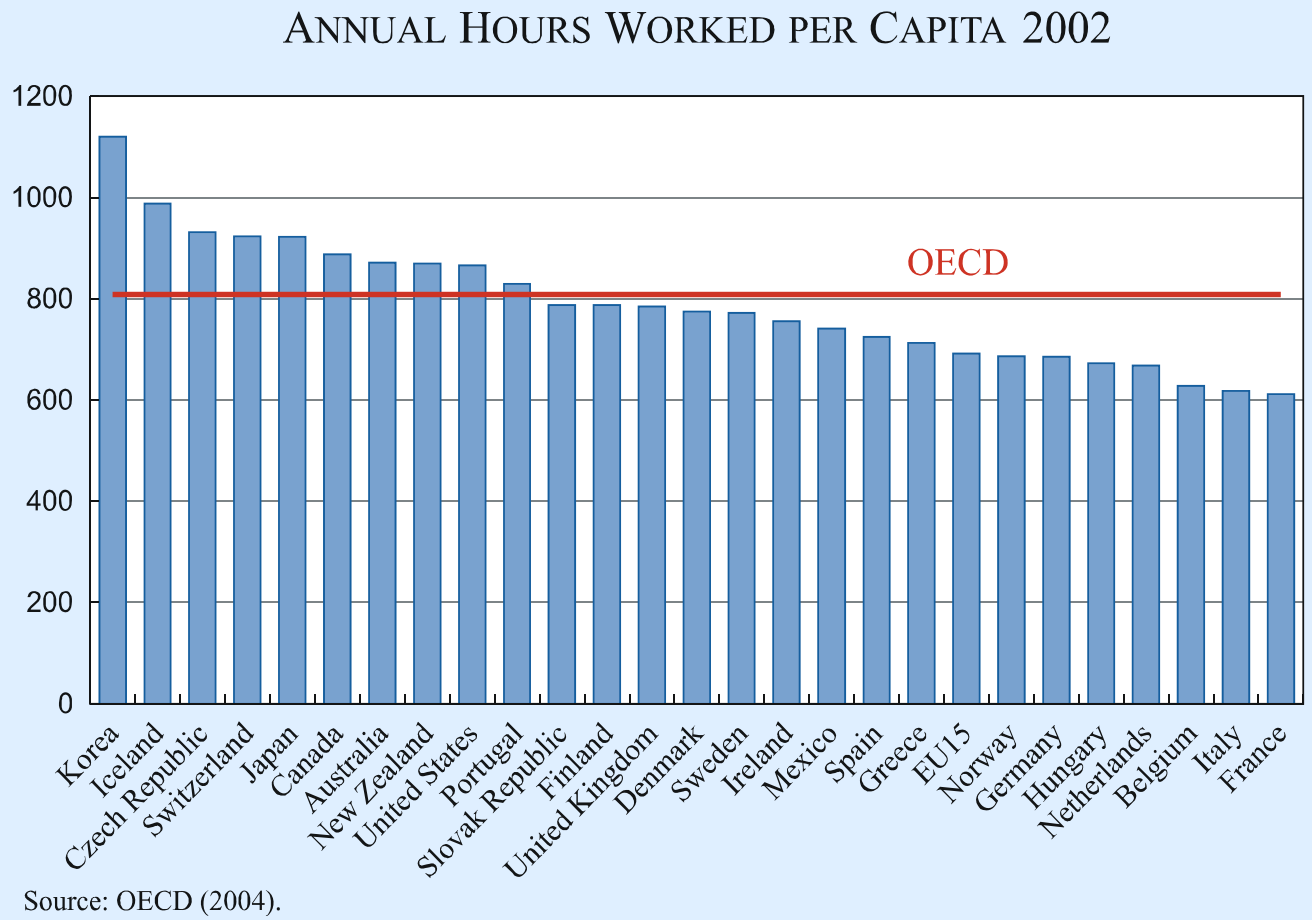


FIGURE 1.11

Amount of time worked annually in six OECD countries over the period 1973–2000 (total number of hours worked during the year divided by the average number of persons holding a job).

Source: OECD data.

Fig. 3.1

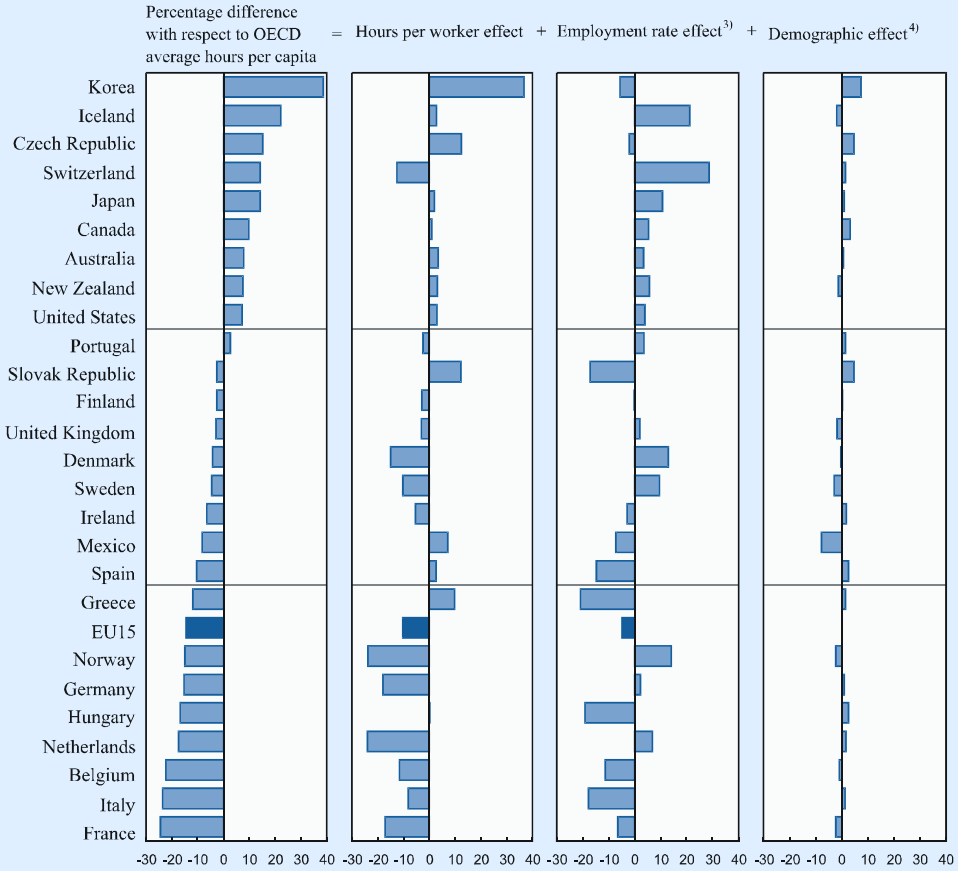


Source: OECD (2004).

Fig. 3.2

DECOMPOSITION OF DIFFERENCES IN HOURS WORKED PER CAPITA

Percentage point differences in hours worked per capita with respect to the OECD average in 2002[1) 2)]



1) OECD averages are calculated as the population-weighted average for the countries shown for hours per capita and the demographic effects, employment-weighted average for hours per worker and working-age population-(15-64 years)-weighted average for the employment effect. 2) Countries in descending order of the percentage difference from OECD average hours per capita.- 3) Based on the ratio of employment to working-age population (15-64 years).- 4) Based on the ratio of working-age population (15-64 years) to total population.
Source: OECD (2004).

Table 3.3

Average actual and standard working time for full-time employees in EU-15, 2002

	Actual working time	Standard working time	Difference between actual and standard working time
UK	43.3	37.2	6.1
Greece	41.0	40.0	1.0
Spain	40.4	38.5	1.9
Portugal	40.3	39.0	1.3
Austria	40.1	38.5	1.6
EU-15	**40.0**	**38.5**	**1.5**
Sweden	39.9	38.8	1.1
Germany	39.9	37.4	2.5
Ireland	39.5	39.0	0.5
Luxembourg	39.5	39.0	0.5
Belgium	39.3	38.5	0.8
Finland	39.2	39.3	-0.1
Denmark	39.1	39.0	0.1
Netherlands	38.9	37.0	1.9
Italy	38.5	38.0	0.5
France	37.7	35.7	2.0

Source: Actual working time: *European Labour Force Survey* (2002); Standard working time: *Working-Time Developments* (2003), EIROnline.

Table 4.10

Employment rates, percentages of population in various age and gender groups, 2005

	Total 15–64	Men 15–64	Women 15–64	Total 15–24	Total 25–54	Total 55–64
Denmark	75.5	80.1	70.8	62.0	83.9	59.8
Finland	68.0	69.4	66.5	39.2	81.7	52.6
Sweden[a]	73.5	75.0	71.8	51.5	82.9	69.5
Average Scandinavian countries	**72.3**	**74.8**	**62.7**	**50.9**	**82.8**	**60.6**
Austria	68.6	75.4	62.0	53.1	82.6	31.8
Belgium	61.0	67.7	54.1	26.6	78.3	32.1
France	62.3	67.8	56.9	26.0	79.6	40.7
Germany	65.5	71.4	59.6	42.6	77.4	45.5
Greece	60.3	74.5	46.2	25.3	74.3	41.6
Ireland	67.1	76.2	58.0	46.3	78.0	51.7
Italy	57.5	69.7	45.3	25.5	72.2	31.4
Netherlands[a]	72.0	78.8	65.0	63.6	81.5	44.8
Portugal	67.5	73.4	61.7	36.1	80.8	50.5
Spain	64.3	76.4	51.9	41.9	74.7	43.1
Average euro area except Finland	**63.4**	**71.7**	**55.2**	**36.2**	**76.9**	**41.0**
Switzerland	77.2	83.9	70.4	59.9	85.1	65.0
UK	72.6	78.6	66.8	58.1	81.1	56.8
US	71.5	77.6	65.6	53.9	79.3	60.8
Australia	71.6	78.5	64.7	63.6	78.8	53.7
New Zealand	74.6	81.5	68.0	56.9	82.0	69.7
Average Anglo-Saxon countries	**72.6**	**79.1**	**66.3**	**58.1**	**80.3**	**60.3**
Japan	69.3	80.4	58.1	40.9	79.0	63.9
South Korea	63.7	75.0	52.5	29.9	73.4	58.7

Note: [a] 2004.

Sources: OECD LFS Database and OECD (2006c).

Table 4.11

Contributions to differences in total employment rates relative to the euro area average from differences in employment rates for various gender and age groups, 2005[a)]

	Total 15–64	Men 15–64	Women 15–64	Total 15–24	Total 25–54	Total 55–64
Denmark	12.1	4.2	7.8	4.1	4.3	3.7
Finland	4.6	−1.2	5.7	0.3	2.4	1.9
Sweden[b)]	10.1	1.7	8.3	1.0	3.5	5.6
Average Scandinavian countries	9.2	1.6	7.5	1.7	3.5	4.0
Austria	5.2	1.8	3.5	3.0	3.8	−1.5
Belgium	−2.4	−2.0	−0.4	−1.7	1.0	−1.4
France	−1.1	−2.0	1.0	−2.4	1.4	0.0
Germany	2.1	−0.2	2.3	1.1	0.3	0.7
Greece	−3.1	1.4	−4.4	−1.8	−1.6	0.2
Ireland	3.7	2.3	1.5	1.9	0.6	1.3
Italy	−5.9	−1.0	−4.8	−1.5	−2.8	−1.5
Netherlands[b)]	8.6	3.6	5.0	4.9	3.0	0.7
Portugal	4.1	0.8	3.4	0.0	2.6	1.6
Spain	0.9	2.4	−1.5	1.3	−1.1	0.6
Average euro area except Finland	0.0	0.0	0.0	0.0	0.0	0.0
Switzerland	13.8	6.1	7.7	4.1	5.4	4.3
Australia	8.2	3.4	4.9	5.4	1.1	1.8
New Zealand	11.2	4.8	6.6	4.2	3.0	4.1
UK	9.2	3.4	6.0	3.7	2.6	2.9
US	8.1	2.9	5.4	3.4	1.6	3.2
Average Anglo-Saxon countries	8.3	3.0	5.5	3.5	1.8	3.1
Japan	5.9	4.4	1.6	0.6	1.0	4.5
Korea	0.3	1.6	−1.2	−0.6	−1.9	2.8

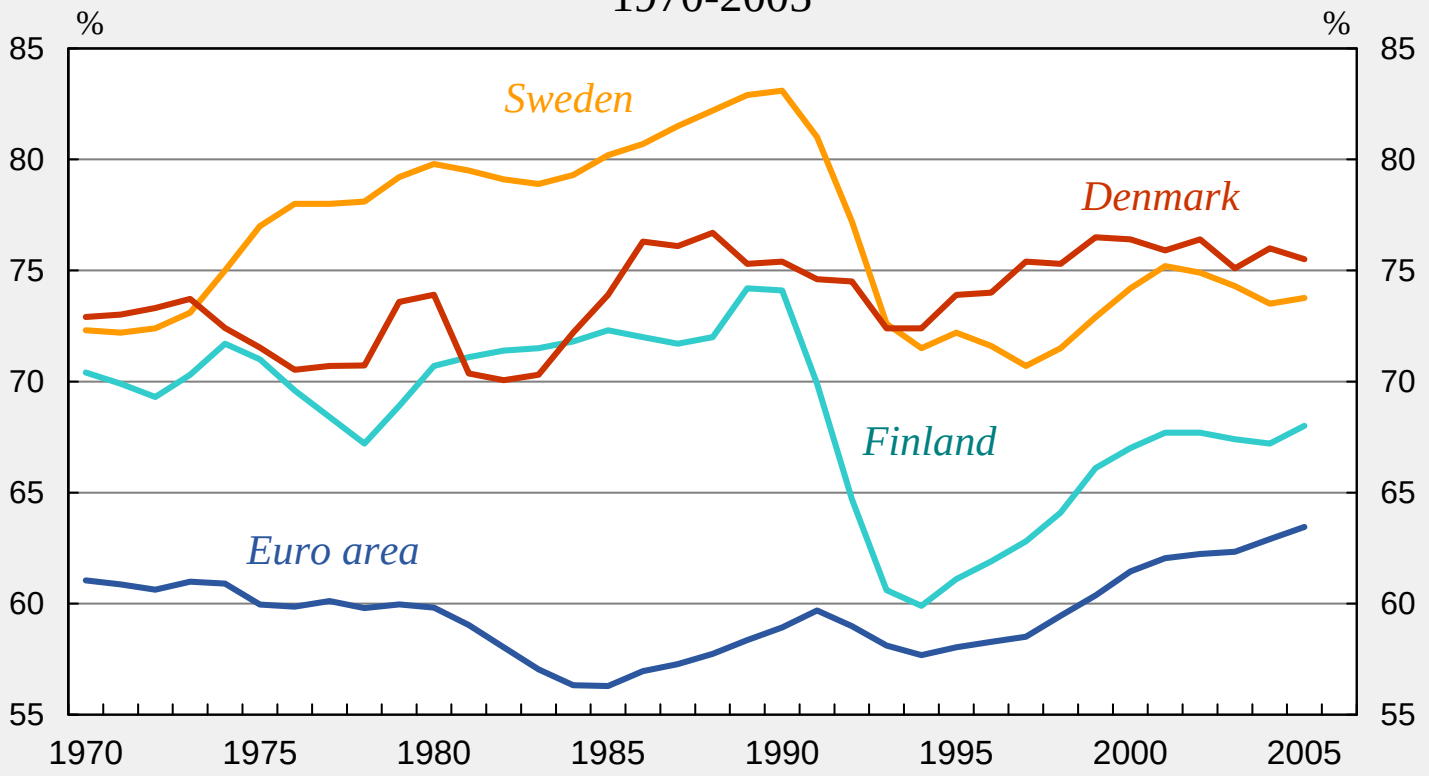
Notes: [a)] Column 2, labeled "Total 15–64", shows how much higher the total employment rate is than the average for the euro area (except Finland). Columns 3 and 4 decompose this difference into contributions in percentage points from males and females, respectively. Columns 5–7 decompose the difference instead in contributions from different age groups. – [b)] 2004.

Source: OECD (2006c).

Fig. 4.8

Employment rates, percentages of working-age population

1970-2005



Note: Incomplete LFS time series have been complemented with data from the Economic Outlook Database. Differences in levels have been accounted for by adjusting for differences in five-year-averages.

Sources: OECD LFS and OECD Economic Outlook Database.

EEAG Report 2007

Basic job search theory

- **Labour supply model leaves out many crucial aspects**
- **There are costs of looking for work**
- **Imperfect information on jobs**
- **Important to distinguish between:**
  - **non-participation**
  - **unemployment** } **participation**
  - **employment** }

Modern theory of job search

- **McCall (1970) and Mortensen (1970)**
- **Model can be applied to other markets as well**
  - finding an apartment
  - finding the best loan
  - finding a wife (husband)
- **A distribution of jobs with different wages**
- **Decision problem of job searcher: when to stop searching and accept a job offer**
  - choose a reservation wage and accept the first job offer above the reservation wage
- **Only unemployed persons search for a job**
  - **no on-the-job search**
- **Analysis of a steady state**

- **Cumulative distribution of wage offers (jobs): *H*(.)**
- **A job offer is a proposal of a constant real wage *w* for all future periods on the job**
- **Risk-neutral agents; no disutility of work**
- **Instantaneous utility over time interval *dt*: *wdt***
- **Rate of job destruction: *qdt***
- ***r* = real rate of interest**
- **Discounted value at time *t* of a dollar received at time *t* + *dt* is thus 1/1 + *rdt***
- **V_e = discounted expected utility of an employed person**
- **V_u = discounted expected utility of an unemployed person**

$$V_e = \frac{1}{1+rdt}\left[wdt + (1 - qdt)V_e + qdtV_u\right] \qquad \textbf{(1)}$$

Multiply by (1 + *rdt),* divide by *dt* and rearrange:

$$rV_e = w + q(V_u - V_e) \qquad \textbf{(2)}$$

<u>Interpretation</u>:

***LHS*: Expected flow of income from employment (return *r* on asset V_e)**

***RHS*: certain wage - expected capital loss (probability of becoming unemployed x capital loss of going from employment to unemployment)**

(2) can be written:

$$V_e - V_u = \frac{w - rV_u}{r + q}$$

<u>Optimal search strategy</u>

1. **If no job offer, continue searching!**
2. **If job offer, accept if $V_e(w) > V_u$! Otherwise continue searching!**

- **$V_e = V_u$ if $w = rV_u$**
- **Hence, a job offer is accepted if the wage is above the threshold value $x = rV_u$ (<u>stopping rule</u>)**
- **x is the <u>reservation wage</u>**

λdt = job offer arrival rate

c = cost of job search (both financial costs and opportunity costs)

b = revenue while searching for a job (unemployment benefit)

$z = b - c$ = instantaneous utility from looking for a job

Job offer is accepted if w > *x*. Otherwise not.

V_λ = discounted value of getting a job offer

$$V_\lambda = \int_0^x V_u dH(w) + \int_x^\infty V_e(w) dH(w)$$

If no job offer, the job searcher continues to look for a job. Then discounted value of job search is:

$$V_u = \frac{1}{1+rdt}\left[zdt + \lambda dt V_\lambda + (1 - \lambda dt)V_u\right]$$

Multiply by (1 + *rdt*), divide by *dt* and combine with equation for V_λ:

$$rV_u = z + \lambda(V_\lambda - V_u = z + \lambda\int_x^\infty \left[V_e(w) - V_u\right]dH(w) \quad \textbf{(5)}$$

<u>Interpretation</u>:

LHS: Return from the "asset" of being unemployed

RHS: Instantaneous flow of income *z* + expected capital gain from getting a job offer (= probability of job offer) x capital gain from getting a job offer

$\lambda \int_x^{\infty} \left[V_e(w) - V_u \right] dH(w) = \lambda (V_\lambda - V_u)$ **has been used in (5).**

To see this:

$$\int_x^{\infty} \left[V_e(w) - V_u \right] dH(w) = \int_x^{\infty} V_e(w) dH(w) - \int_x^{\infty} V_u dH(w) \qquad \textbf{(A)}$$

Use:

$$V_\lambda = \int_0^x V_u dH(w) + \int_x^{\infty} V_e(w) dH(w)$$

$$\int_x^{\infty} V_e(w) dH(w) = V_\lambda - \int_0^x V_u dH(w) \qquad \textbf{(B)}$$

Insert (B) into (A):

$$\int_x^{\infty} \left[V_e(w) - V_u \right] dH(w) = V_\lambda - \int_0^x V_u dH(w) - \int_x^{\infty} V_u dH(w) =$$

$$= V_\lambda - V_u \left[\int_0^x dH(w) + \int_x^{\infty} dH(w) \right] = V_\lambda - V_u \left[H(x) + 1 - H(x) \right]$$

$$= V_\lambda - V_u$$

$$V_e(w) - V_u = \frac{w - rV_u}{r + q} \quad \textbf{(3)}$$

$$x = rV_u \quad \textbf{(4)}$$

$$rV_u = z + \lambda \int_x^{\infty} \left[V_e(w) - V_u \right] dH(w) \quad \textbf{(5)}$$

Plug (3) and (4) into (5):

$$x = z + \lambda \int_x^{\infty} \frac{w - rV_u}{r + q} \, dH(w) = z + \lambda \int_x^{\infty} \frac{w - x}{r + q} \, dH(w) =$$

$$= z + \frac{\lambda}{r + q} \int_x^{\infty} (w - x) dH(w)$$

- **Exit rate from unemployment (hazard rate)**
- **A job searcher becomes employed when:**
  1. **A job offer is received: probability λ**
  2. **The wage offer is above the reservation wage x: probability [1-*H*(*x*)]**
- **Hence the exit (hazard) rate is: λ[1-*H*(*x*)]**
- **Duration of unemployment is:**

$$T_u = \frac{1}{\lambda\left[1 - H(x)\right]}$$

- **If the exit rate per week is 1/10, then the average duration of unemployment is 10 weeks.**
- **Not unexpectedly: a higher reservation wage prolongs the duration of unemployment**

Comparative statics of job search model

$$x = z + \frac{\lambda}{r+q}\int_x^{\infty}(w - x)dH(w)$$

Write it:

$$\Phi(x,z,r,\lambda,q) = x - z - \frac{\lambda}{r+q}\int_x^{\infty}(w - x)dH(w) = 0$$

Let $i = z,r,\lambda,q$

Total differentiation of Φ gives:

$$\Phi_x dx + \Phi_i di = 0$$

$$\frac{dx}{di} = -\frac{\Phi_i}{\Phi_x}$$

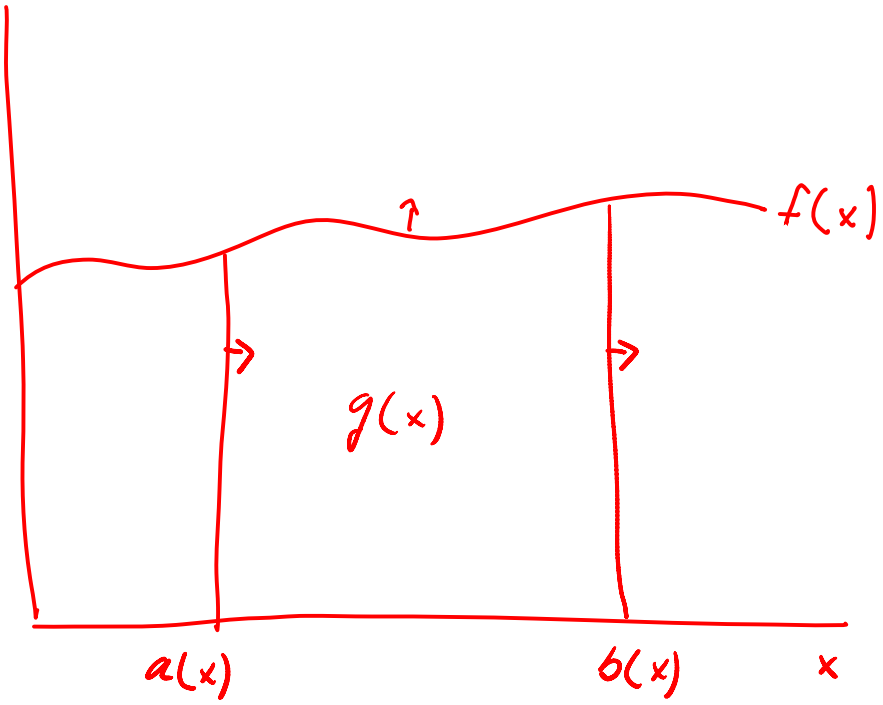
We are interested in the effects on the reservation wage of changes in utility when unemployed, the real interest rate, the arrival rate of job offers and the rate of job destruction.

$$\Phi_x = 1 - \frac{\lambda}{r+q}\left[(x - x)H'(x) - \int_x^{\infty}H'(w)dw\right] =$$

$$= 1 + \int_x^{\infty}H'(w)dw > 0$$

$$g(x) = \int_{a(x)}^{b(x)} f(x,i)di$$

$$g'(x) = b'(x) f(x,b(x)) - a'(x) f(x,a(x)) + \int_{a(x)}^{b(x)} f'(x,i)di$$



$$A = \int_x^{\infty} (w - x)dH(w) = \int_x^{\infty} (w - x)H'(w)dw$$

$$\frac{dA}{dx} = -H'(x)(x - x) + \int_x^{\infty} H'(w)(-1)dw = 0 - \int_x^{\infty} H'(w)dw < 0$$

$$\Phi_z = -1$$

$$\Phi_r = \frac{\lambda}{(r+q)^2}\int_x^{\infty}(w - x)dH(w) > 0$$

$$\Phi_q = \frac{\lambda}{(r+q)^2}\int_x^{\infty}(w - x)dH(w) > 0$$

$$\because \frac{dx}{dz} = -\frac{\Phi_z}{\Phi_x} > 0$$

$(-)$ $(+)$

$$\frac{dx}{dr} = -\frac{\Phi_r}{\Phi_x} < 0$$

$(+)$ $(+)$

$$\frac{dx}{dq} = -\frac{\Phi_q}{\Phi_x} < 0$$

$(+)$

Intuition:

- **Utility of unemployment ↑ ⇒ Reservation wage ↑ and duration of unemployment ↑**
- **Real interest rate ↑ ⇒ Reservation wage ↓ and duration of unemployment ↓**
  - Less gain from high income in the future: accept job with lower wage
- **Job destruction ↑ ⇒ Reservation wage ↓ and duration of unemployment ↓**
  - Less gain from a job as it is held for a shorter time

$$\Phi_\lambda = -\frac{1}{r+q}\int_x^\infty (w - x)dH(w) < 0$$

$$\frac{dx}{d\lambda} = -\frac{\overset{(-)}{\Phi_\lambda}}{\underset{(+)}{\Phi_x}} > 0$$

- **Job offer arrival rate ↑ ⇒ Reservation wage ↑**
  - **Job searchers can be more choosy the more offers they get**
- **But ambiguous effect on duration of unemployment**

$$T_u = \frac{1}{\lambda\left[1 - H(x)\right]}$$

On the one hand: $x \uparrow \Rightarrow H(x) \uparrow \Rightarrow T_u \uparrow$

On the other hand: $\lambda \uparrow \Rightarrow T_u \downarrow$

Empirical result: $T_u \downarrow$

Alternative models

1. **Labour supply model**
   - **employed participant**
   - **non-participant**
2. **Job search model (everyone is participating)**
   - **unemployed job searcher**
   - **employed**
3. **Hybrid model**
   - **non-participant**
   - **unemployed job searcher** } **participant**
   - **employed**

Labour supply model

Participation depends on comparison of current wage w with reservation wage w_A

$w > w_A \Rightarrow$ employee

$w \leq w_A \Rightarrow$ non-participant

Hybrid model with job search

- **The reservation wage x is the wage at which the job seeker is indifferent between accepting a job and continuing to search**
- **$\Omega = \Omega(H, z, q, \lambda, r)$ denotes the overall characteristics of the labour market**
- **Choice between participation and non-participation is based on comparison between expected value of being a job seeker V_u and that of a non-participant V_I.**
- **Expected utility flow of a non-participant $rV_I = R_I$, if R_I is constant income at each date.**
- **Expected utility of a job seeker is $rV_u = x$**
- **Participation if $V_u \geq V_I \Leftrightarrow x(\Omega) \geq R_I$**
- **Acceptance of job offer if $w > x(\Omega)$**
- **Participation decision does not only depend on w but on all factors affecting the labour market**
  - **increase in z (unemployment benefit) raises x and hence participation**
  - **at the same time unemployment rises**
  - **increase in the unemployment rate reduces λ and hence the reservation wage, which reduces participation. Extra incentive – in addition to lower wage – to withdraw from the labour market.**

Discouraged workers

- **Those workers who would like to have a job, but are not actively searching because the costs of searching are regarded as too large**

Average of possible wages: $E_w = \int_0^\infty w dH(w)$

Discouraged workers are those for whom: $x(\Omega) \leq R_I \leq E_w$

- **Expected wage above income as non-participant – the worker would accept a job if it could be obtained without searching**
- **Reservation wage below income as non-participant – it does not pay to search for a job**

Real world

- **Unclear distinction between participants and non-participants**
- **Jones and Ridell (1999). Study for Canada**
  - **employed**
  - **unemployed**
  - **marginally attached to labour-market participation**
  - **non-participants**

Marginally attached to labour-market participation

- **"waiting to be recalled by former employer"**
- **"have found a job but haven't been hired yet"**
- **"waiting for an answer form an employer"**
- **"no jobs matching their qualifications"**

Table 3.1

Discouraged workers and job-seekers in 2000 (as a percentage of the labor force).

Country	Discouraged workers	Job-seekers
Denmark	0.2	4.5
Spain	0.8	13.9
France	0.1	10.1
Sweden	1.7	5.9
United States	0.4	4.0
Japan	3.1	5.0

Source: OECD data.

Table 3.2

The transition matrix between different states in the labor market. Monthly rates for the year 1992 in Canada.

From To → ↓	Employed	Unemployed	Nonparticipant + Marginally attached
Unemployed	0.112 (0.004)	0.708 (0.005)	0.180 (0.005)
Marginally attached	0.098 (0.005)	0.171 (0.007)	0.731 (0.008)
Nonparticipant	0.026 (0.001)	0.030 (0.001)	0.944 (0.002)

Standard errors are in parentheses.

Source: Jones and Riddell (1999).