Lecture 2: Labour Economics and Wage-Setting Theory

Spring 2017

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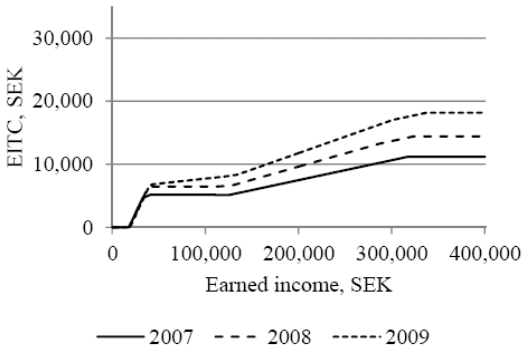
Literature: Laun
Egebark-Kaunitz
Chapter 5 Cahuc-Carcillo-Zylberberg (pp 253-269)

Topics

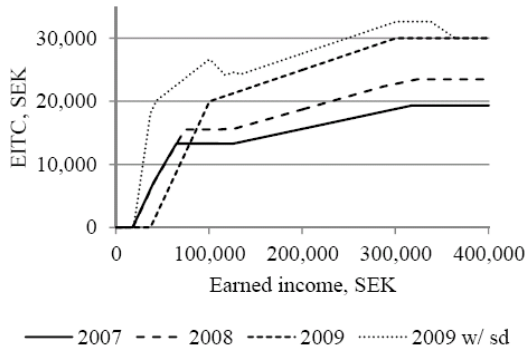
- **Evaluation of Swedish EITC**
- **Payroll tax cuts for youth in Sweden**
- **Search theory**
- **The reservation wage**
- **Unemployment duration**

Swedish EITC (jobbskatteavdrag)

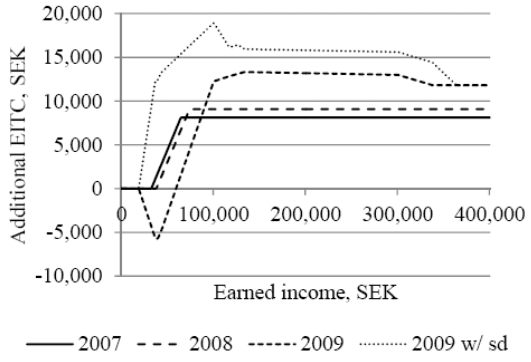
- **Introduced from 2007 – five steps**
- **Difficult to study since it applies to all groups**
- **Double EITC for workers above 65**
- **Difference-in-differences study**
- **Lisa Laun (2012) has compared employment outcomes in year *t* for those becoming 65 in November/December year *t*-1 (receiving supplementary EITC in year *t*) and those becoming 65 in January/February year *t* (and not receiving supplementary EITC in year *t*).**
- **Similar incentives in the pension system**



(a) EITC below age 65



(b) EITC above age 65



(c) Additional EITC above age 65

Figure 1: The earned income tax credit as a function of earned income 2007–2009, below age 65 in (a), above age 65 in (b), additional tax credit above age 65 in 1(c), with and without additional standard deduction in 2009

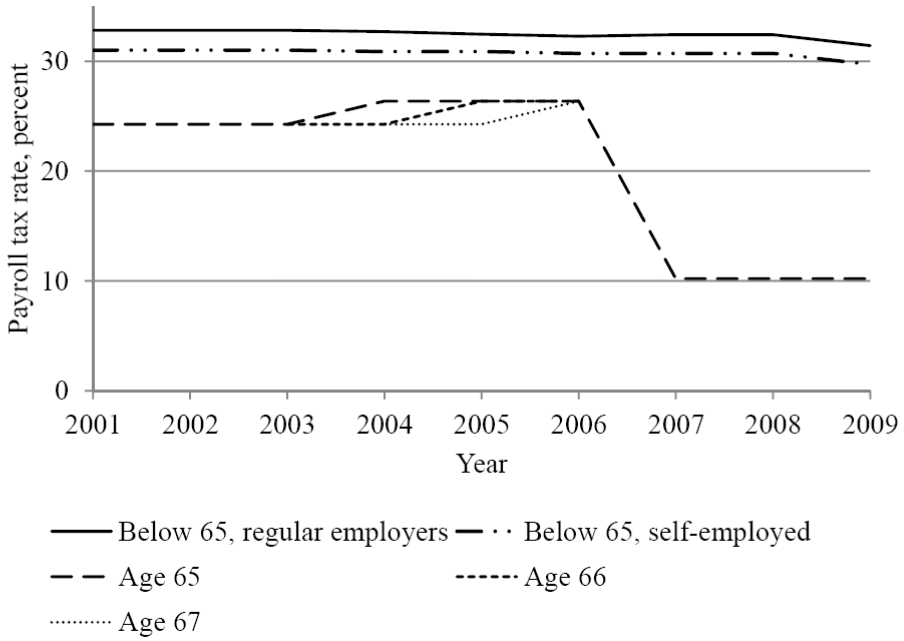
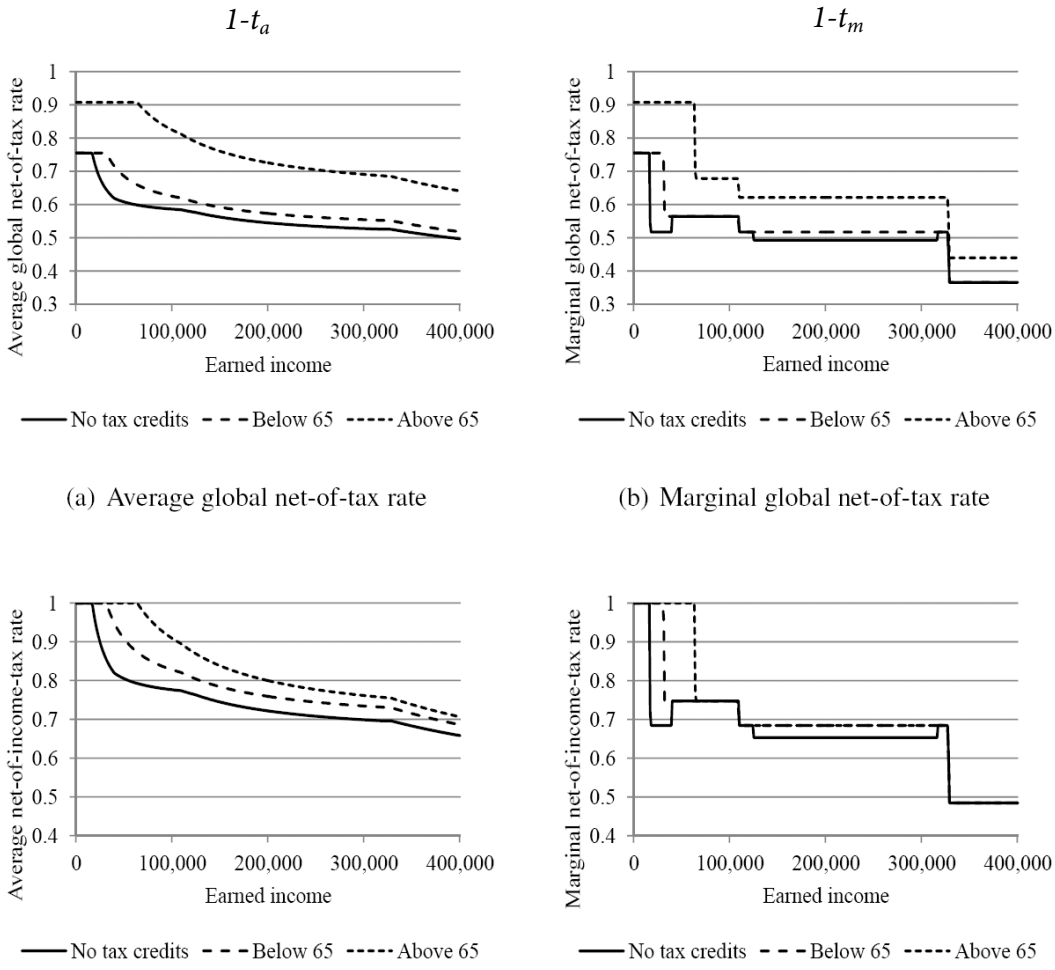


Figure 2: The payroll tax rate by age at the beginning of the tax year 2001–2009



(a) Average global net-of-tax rate

(b) Marginal global net-of-tax rate

(c) Average net-of-income-tax rate

(d) Marginal net-of-income-tax rate

Figure 4: The average and marginal global net-of-tax rate and net-of-income-tax rates in 2007, without tax credits and with tax credits above and below age 65

$$y_{it} = \alpha + \gamma Reform_{it} + \beta' X_{it} + \lambda_a + \lambda_t + \varepsilon_{it} \quad \textbf{(3)}$$

y_{it} = labour outcome

X_{it} = vector of individual characteristics

λ_a = set of indicator variables for the individual's age in months at the beginning of the tax year

λ_t = set of indicator variables for the year in which the outcome is measured

$Reform_{it}$ = indicator value which takes the value 1 if the individual is aged 65 or more at the beginning of the tax year and the year is 2007 or later (when the age-targeted credit was in place)

$$y_{it} = \alpha + \sum_{t=s}^{S} \gamma_t \delta_{treat} \times \lambda_t + \beta' X_{it} + \lambda_a + \lambda_t + \varepsilon_{it}$$

$$y_{it} = \alpha + \sum_{a=m}^{M} \gamma_a \delta_{post} \times \lambda_a + \beta' X_{it} + \lambda_a + \lambda_t + \varepsilon_{it}$$

Table 2: Summary statistics, outcome variables

	Treatment Group (1)	Control Group (2)	Difference (3)
Employment	0.226	0.295	-0.070***
	(0.002)	(0.002)	(0.003)
Taxable labor earnings	45,183	54,900	-9,717***
	(512)	(474)	(697)
Share of previous earnings	0.184	0.222	-0.038***
	(0.002)	(0.002)	(0.003)
Remunerated months	3.844	4.318	-0.475***
	(0.024)	(0.023)	(0.033)
Observations	51,019	55,565	

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Treatment and control groups consist of individuals turning 65 in Nov–Dec and Jan–Feb, respectively, 2001–2009, with previous earnings above 17,100 (2007 SEK). Employed if earnings>1 income base amount.

Table 3: The effect of the age-targeted tax credits on labor market outcomes

Variables	Employment	Taxable labor earnings	Share of previous earnings	Remunerated months
	(1)	(2)	(3)	(4)
Reform	0.015***	1,518	0.018***	0.133***
	(0.004)	(1,335)	(0.004)	(0.051)
Female	-0.069***	-27,134***	-0.035***	-0.439***
	(0.002)	(718)	(0.003)	(0.029)
High School	0.027***	8,910***	0.022***	0.396***
	(0.002)	(538)	(0.002)	(0.029)
College	0.138***	56,949***	0.099***	1.693***
	(0.003)	(948)	(0.003)	(0.034)
Immigrant	-0.003	2,815**	0.017***	-0.246***
	(0.003)	(1,188)	(0.004)	(0.040)
Self-employed	0.114***	14,563***	0.206***	2.843***
	(0.005)	(1,495)	(0.007)	(0.055)
Previously sick	-0.129***	-34,974***	-0.090***	-1.458***
	(0.002)	(529)	(0.002)	(0.026)
Older spouse	-0.063***	-12,465***	-0.058***	-0.582***
	(0.003)	(722)	(0.003)	(0.032)
Younger spouse	-0.004	1,358*	-0.017***	0.066**
	(0.003)	(812)	(0.003)	(0.032)
Constant	0.282***	62,577***	0.207***	3.920***
	(0.005)	(1,409)	(0.006)	(0.062)
County dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes
R-squared	0.086	0.096	0.055	0.077
Observations	181,184	181,184	181,184	181,184
p-val parallel trends test	0.327	0.192	0.639	0.919
Mean of dep. variable	0.306	64,382	0.242	4.541
Effect in percent	0.049	0.024	0.076	0.029

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Individuals turning 65 Nov–Feb 2001–2009 with previous earnings above 17,100 (2007 SEK). Employed if earnings>1 income base amount.

Table 4: The effect of the age-targeted tax credits on labor market outcomes, estimation with treatment×year interactions

Variables	Employment (1)	Taxable labor earnings (2)	Share of previous earnings (3)	Remunerated months (4)
Treatment × Year 2004	0.005	-403	-0.001	0.003
	(0.007)	(2,046)	(0.007)	(0.090)
Treatment × Year 2005	0.010	780	0.009	0.035
	(0.007)	(1,802)	(0.007)	(0.089)
Treatment × Year 2006	-0.008	-1,011	-0.003	0.034
	(0.008)	(1,998)	(0.008)	(0.091)
Treatment × Year 2007	0.007	2,434	0.018***	0.043
	(0.007)	(2,373)	(0.007)	(0.086)
Treatment × Year 2008	0.018***	-191	0.020***	0.191**
	(0.007)	(2,102)	(0.008)	(0.083)
Treatment × Year 2009	0.023***	2,046	0.020***	0.189**
	(0.007)	(2,084)	(0.007)	(0.081)
R-squared	0.366	0.259	0.258	0.448
Observations	181,184	181,184	181,184	181,184

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individuals turning 65 Nov–Feb 2001–2009 with previous earnings above 17,100 (2007 SEK). Employed if earnings>1 income base amount. Excluded interactions: 2001–2003. Includes the controls in Table *Table 3*.

Table 5: The effect of the age-targeted tax credits on labor market outcomes, estimation with post×age interactions

Variables	Employment (1)	Taxable labor earnings (2)	Share of previous earnings (3)	Remunerated months (4)
Post × 65 in February	0.004	-984	-0.004	0.034
	(0.006)	(1,805)	(0.006)	(0.067)
Post × 65 in January	0.007	-3,372*	-0.007	-0.057
	(0.006)	(1,788)	(0.005)	(0.067)
Post × 65 in December	0.017***	-645	0.010*	0.083
	(0.006)	(1,979)	(0.006)	(0.068)
Post × 65 in November	0.023***	-720	0.016**	0.161**
	(0.006)	(1,858)	(0.006)	(0.070)
Post × 65 in October	0.012**	-3,421*	-0.000	0.103
	(0.006)	(1,797)	(0.006)	(0.068)
R-squared	0.384	0.267	0.270	0.453
Observations	281,944	281,944	281,944	281,944

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individuals turning 65 Oct–Mar 2001–2009 with previous earnings above 17,100 (2007 SEK). Employed if earnings>1 income base amount. Excluded interaction: 65 in March. Includes the controls in Table *Table 3*.

Table 6: Heterogeneous effects of the age-targeted tax credits on labor market outcomes

Group	Obs Prob>F	Employ- ment	Taxable labor earnings	Share of previous earnings	Remune- rated months
	(1)	(2)	(3)	(4)	(5)
A. Gender					
Men	93,048	0.024***	2,962	0.030***	0.190***
	0.878	(0.006)	(2,274)	(0.007)	(0.073)
Women	88,136	0.005	-368	0.006	0.066
	0.166	(0.006)	(1,299)	(0.005)	(0.072)
B. Education					
Less than high school	61,498	0.006	-114	0.016**	0.100
	0.373	(0.007)	(1,588)	(0.007)	(0.088)
High school	72,492	0.016**	1,196	0.014**	0.079
	0.366	(0.007)	(1,653)	(0.007)	(0.081)
College	47,194	0.021**	4,903	0.025**	0.192*
	0.884	(0.009)	(3,782)	(0.010)	(0.103)
C. Health					
Previously sick	71,986	0.008	-97	0.015**	0.122
	0.403	(0.006)	(1,347)	(0.006)	(0.078)
Not previously sick	109,198	0.020***	2,561	0.021***	0.142**
	0.303	(0.006)	(2,009)	(0.006)	(0.068)
D. Age of spouse					
Older spouse	52,969	0.010	3,723*	0.013*	0.030
	0.246	(0.007)	(2,072)	(0.007)	(0.092)
Younger spouse	68,252	0.028***	2,360	0.033***	0.227***
	0.723	(0.007)	(2,557)	(0.007)	(0.085)
No spouse	59,963	0.006	-882	0.008	0.117
	0.339	(0.007)	(2,100)	(0.008)	(0.089)
E. Type of employment					
Regular employee	169,050	0.011**	711	0.012***	0.140***
	0.176	(0.004)	(1,355)	(0.004)	(0.053)
Self-employed	12,134	0.066***	12,499*	0.100***	0.064
	0.683	(0.018)	(6,446)	(0.027)	(0.212)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individuals turning 65 Nov–Feb 2001–2009 with previous earnings above 17,100 (2007 SEK). Employed if earnings>1 income base amount. Separate estimations for different population groups. Includes the controls in Table *Table 3*.

Summary of results for supplementary EITC

- **1.5 percentage points higher probability employment**
- **No significant effect on taxable labour earnings**
- **Significant effect on taxable labour earnings as a share of previous earnings**
- **Significant effect on remunerated months**
- **Effects only on males**
- **Effects increase with education**
- **Effects concentrated among healthier individuals**
- **Effects for those with younger spouse**
- **Larger effects for self-employed**
- **EITC or payroll tax rate reduction?**
- **Effects are likely to be larger on already employed than on non-employed**

Egebark-Kaunitz

- **Cuts in payroll taxes for youth in Sweden 2007 and 2009**
  - **2007: 11 percentage points cut for 18-25-year olds**
  - **2009: Reduction extended to 25-year olds; additional 6 percentage points and for those eligible**
- **Effects on employment of youth**
- **Difference-in-Differences approach**

Linear controls

$Y_{i,t} = \delta_t \cdot D(i,t) + x'_{i,t}\,\beta + \varepsilon_{i,t}$

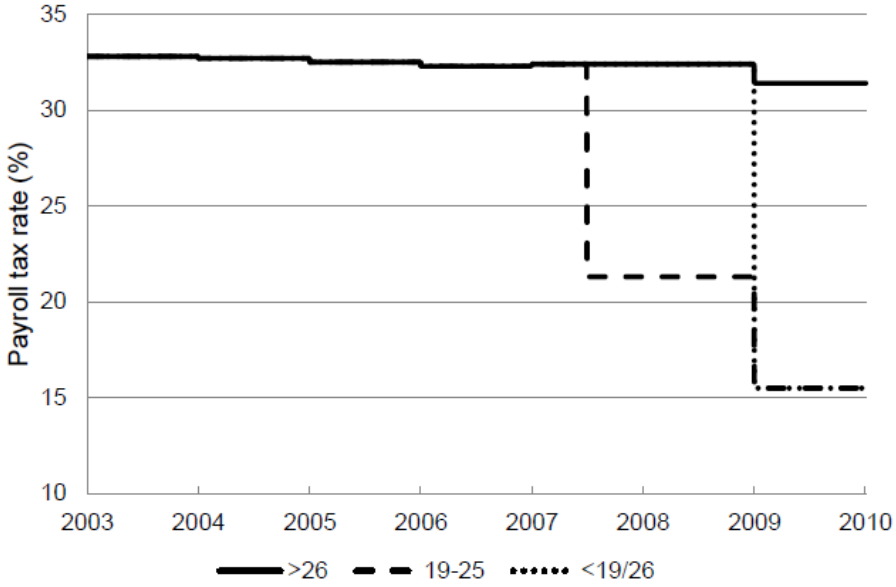
$Y_{i,t}$ = **Employment status**

$D(i,t)$ = **Treatment indicator**

$x_{i,t}$ = **Vector of control variables**

- **Also matching of treatment-control group pairs in local markets**

Figure 1: The payroll tax reductions

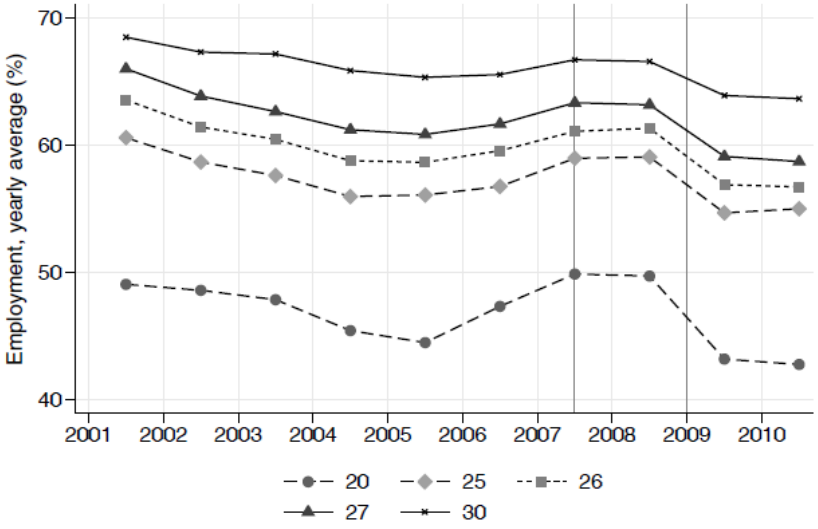


Egebark-Kaunitz, cont.

- **Assumption of parallel trends**
  - **not testable**
  - **examine “treatment effects” before treatment**
  - **reduce bandwidth**

- **Relative effects vs absolute effects because of spillovers**
  - **substitution effects**
  - **scale effects**
  - **substitution effects likely to dominate**
  - **thus upper bound for effects**

Figure 4: Employment trends for different age groups



Notes: Employment is defined as working at least quarter–time. The two vertical lines indicate the reform years.

Table 2: Employment effects of the 2007 reduction, main results

	Local		25 vs. 26		19–25 vs. 26	
	Linear	Matched	Linear	Matched	Linear	Matched
DD 2005	0.001	0.001	0.003	0.002	−0.002	−0.003'
	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
DD 2006	−0.001	0.000	−0.001	−0.001	0.003	0.002
	(0.004)	(0.004)	(0.001)	(0.002)	(0.003)	(0.002)
DD 2007	0.006*	0.006	0.008***	0.008***	0.014***	0.013***
	(0.003)	(0.005)	(0.002)	(0.002)	(0.003)	(0.001)
DD 2008	0.007*	0.007'	0.005*	0.005*	0.007*	0.007***
	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
R^2	0.09	0.11	0.09	0.10	0.10	0.11
N	419,153	419,153	1,735,836	1,735,836	6,902,252	6,902,252
$\overline{y}_{\text{TG}}$	0.59	0.59	0.59	0.59	0.52	0.52

*** $p < 0.1\%$, ** $p < 1\%$, * $p < 5\%$, ' $p < 10\%$

Notes: Outcome is average employment status during the year (ranging from 0 to 1), $\overline{y}_{TG}$ denotes treatment group average employment in the treatment period. All treatment effects are relative to the reference period 2001–04. Fixed effects included for year and demographic characteristics. Standard errors are cluster-robust w.r.t. local labor markets (Linear) or obtained by bootstrapping with 250 replications (Matched). 'Local' compares 25-year-olds born in Jan-Mar to 26-year-olds born in Oct-Dec.

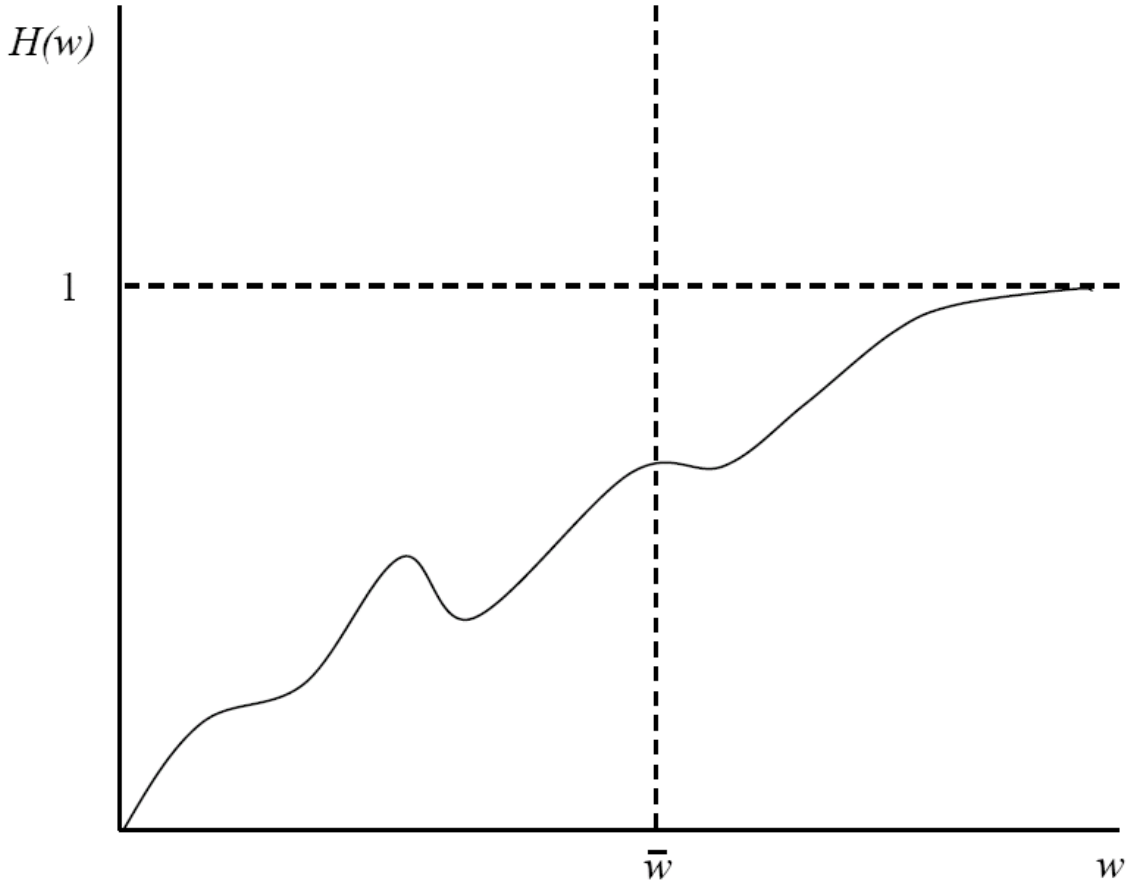
Basic job search theory

- **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

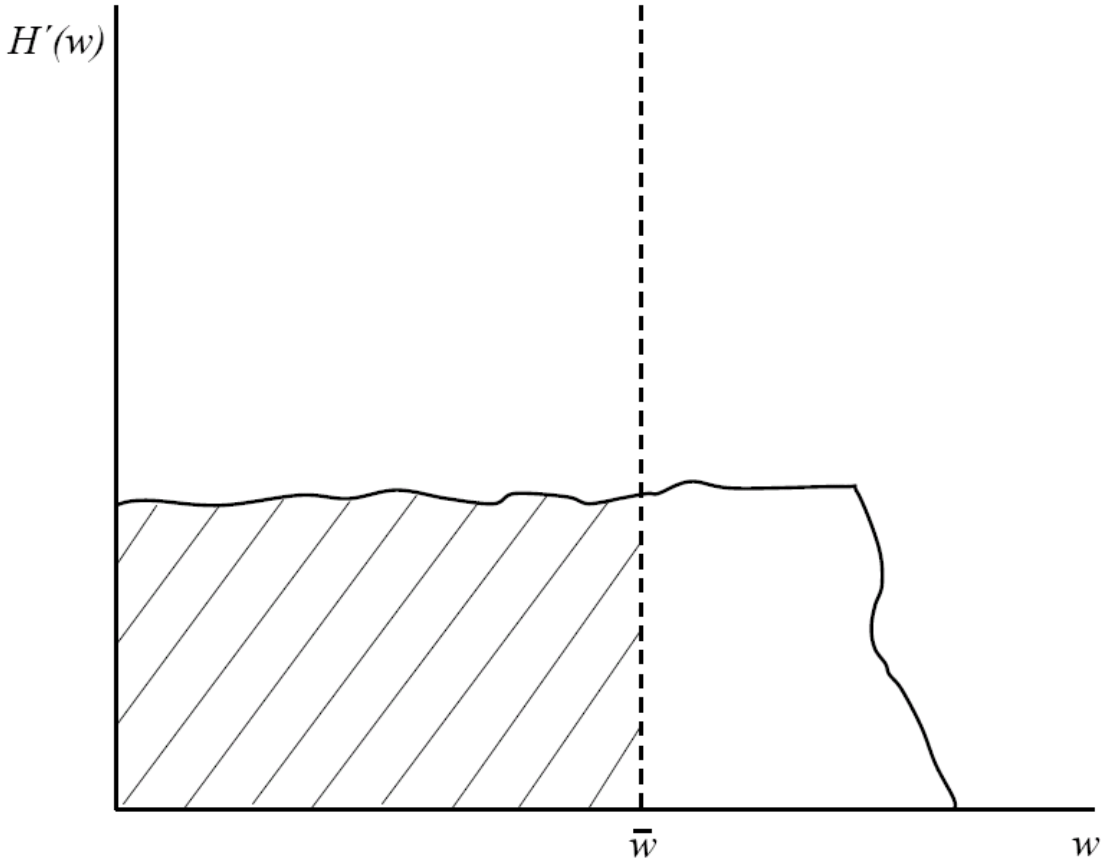
- **McCall (1970) and Mortensen (1970)**
- **Model can be applied to other markets as well**
  - finding an apartment
  - finding the best loan
  - finding a wife (husband)
- **A distribution of jobs with different wages**
- **Decision problem of job searcher: when to stop searching and accept a job 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 function $H(w)$



$H(\bar{w})$ = Probability of job offer below $\bar{w}$

Probability density function



$H'(\bar{w})$ = *Probability of job offer* $\bar{w}$

$$H(\bar{w}) = \int_0^{\bar{w}} H'(w)dw$$

- **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 value of employment**
- **V_u = discounted value of unemployment**

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

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:

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

Optimal search strategy

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 $x = rV_u$ (stopping rule)**
- **x is the reservation wage**

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

Derivation of $V_e - V_u = (w - rV_u)/(r + q)$

$$rV_e = w + q(V_u - V_e)$$

$$rV_e - rV_u = w + q(V_u - V_e) - rV_u$$

$$r(V_e - V_u) = w + q(V_u - V_e) - rV_u$$

$$(r + q)(V_e - V_u) = w - rV_u$$

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

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

V_λ = discounted value of getting a job offer

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

$$dH(w) = H'(w)dw$$

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):

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

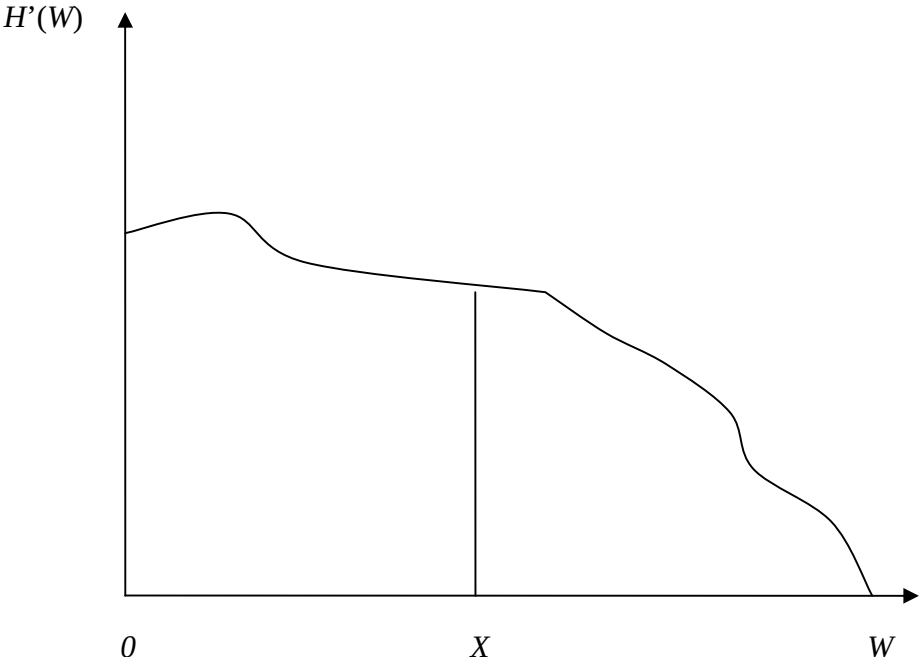
$$= V_\lambda - V_u \left[\int_0^x dH(w) + \int_x^{\infty} dH(w) \right] = V_\lambda - V_u \left[H(x) + 1 - H(x) \right]$$

$$= V_\lambda - V_u$$

Note that:

$$\int_0^x H'(w)dw = H(x) - H(0) = H(x)$$

$$\int_x^\infty H'(w)dw = 1 - H(x)$$



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

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

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

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**

$x \uparrow \Rightarrow H(x) \uparrow \Rightarrow (1 - H(x)) \downarrow \Rightarrow T_u \uparrow$

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:

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

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

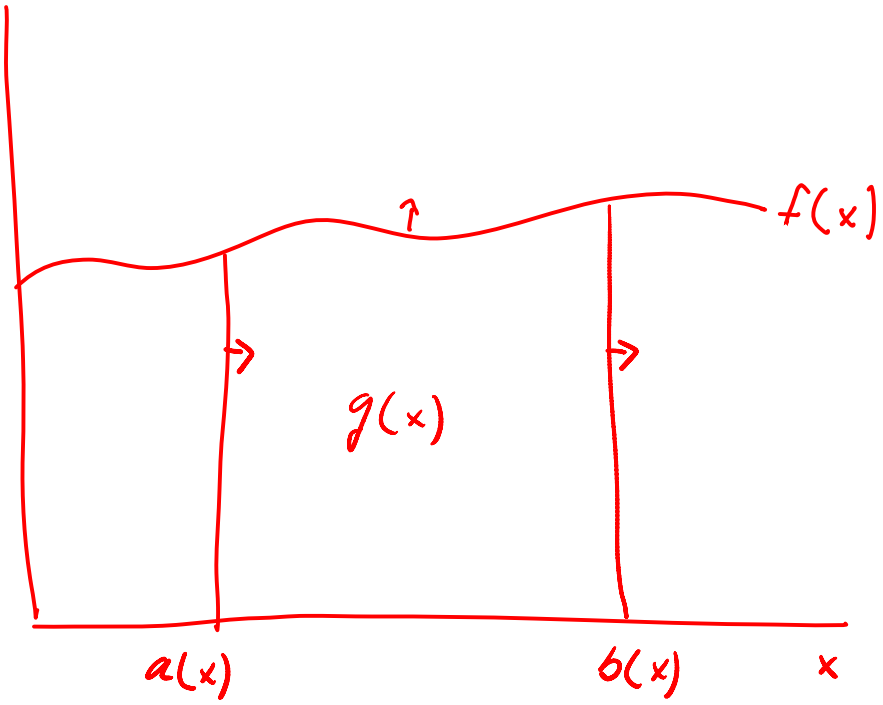
We are interested in the effects on the reservation wage of changes in utility when unemployed, the real interest rate, the arrival rate of job offers and the rate of job destruction.

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

$$= 1 + \frac{\lambda}{r+q}\int_x^{\infty}H'(w)dw = 1 + \frac{\lambda}{r+q}\big(1 - H(x)\big) > 0$$

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

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



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

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

$$\Phi_z = -1$$

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

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

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

(−) (+)

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

(+) (+)

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

(+) (+)

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**

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: $E_w = \int_0^\infty w dH(w) = \int_0^\infty w H'(w) dw$

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 3.2

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).