Contracting frictions and inefficient layoffs over the life-cycle

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NOeG Annual Meeting

May 12, 2018

Motivation

- OECD Employment Outlook 2013: the economic consequences of a job loss vary by age
  - older workers (age 55-64) are more likely to be dismissed during a mass layoff event than prime-age workers (age 35-44)
  - older workers are 35–70% less likely to be re-employed after one year
  - a large part instead exits the labor force (LTU, early retirement)
- due to poor re-employment opportunities, losing a job in old age can be very costly for the individual, aggregate output and welfare systems
- policies typically concentrate on the hiring margin: incentivize companies to hire elderly unemployed (OECD, 2006; Konle-Seidl 2017)
- however, it is not clear that the separation margin is working efficiently either

Efficiency of separations

- in the workhorse models of labor economics separations are either exogenous or *bilaterally efficient* (Mortensen and Pissarides, 1999)

DEFINITION: bilateral efficiency

the firm–worker match is continued if and only if there is a wage such that both worker and firm are better off staying in the match

⇒ the date of job loss only depends on match productivity and worker's outside option, but not on the wage contract itself

- Frimmel et al. (JPubE *forthcoming*) suggest this does not hold for older workers: steeper wage–tenure profiles cause earlier job loss
- a likely reason is some friction that disentangles wages and productivity *(contracting friction)*

Idea of the paper

impose a contracting friction in an otherwise standard life-cycle search and matching model

1. what are the micro effects of the friction on contracted wages, job-finding and layoff probabilities for different age groups?
2. what are the macro effects of the friction in terms of employment, output, and welfare?
3. how does the friction interact with public policies?
    - reform to the early retirement system
    - identify labor market reforms that counteract the friction

Related literature

- search and matching frictions over the life cycle

  Chéron, Hairault, Langot (2007, 2011, 2013); Jaag, Keuschnigg, Keuschnigg (2010); Bagger, Fontaine, Postel-Vinay, Robin (2014); Hairault, Langot, Zylberberg (2015); Jung, Kuhn (2016); Menzio, Telyukova, Visschers (2016)

- bilaterally inefficient layoffs
  - institutional distortions: Dustmann and Schönberg (2009); Díez-Catalán and Villanueva (2015); Guimarães, Martins, Portugal (2017)
  - market failures: Lazear (1979); Hashimoto (1981); Hall and Lazear (1984); Ramey and Watson (1997); Weiss (1980)
  - interaction of market failures and public policies: Winter-Ebmer (2003); Boeri, Garibaldi, Moen (2017)

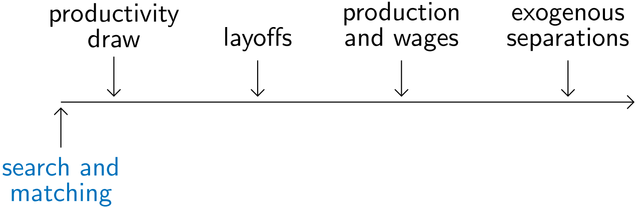
The contracting friction

- assume that some market failure implies the following restriction on private wage contracts:
  1. wages can depend on age but not on productivity,
  2. no possibility to renegotiate wages
- Hall and Lazear (JOLE, 1984); Alvarez and Veracierto (JME, 2001); Boeri, Garibaldi, Moen (JPubE, 2017)
- can be motivated by asymmetric information about match productivity, but also by worker motivation or fairness considerations

Model setup – general

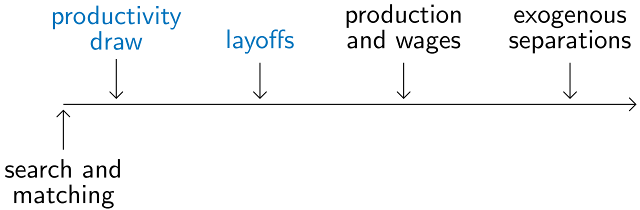
- overlapping generations model
- time is discrete: $t = 0, 1, 2, \dots$
- each period a mass 1 of identical, risk averse individuals is born
- every individual lives through two stages of life: prime working age (m) and old working age (o)
  - stochastic aging: individuals age with probability π_a, $a \in \{m, o\}$
  - for the sake of exposition, assume $\pi_a = 1$ in the theory presented here
- in each period t an individual is either employed or unemployed
  - unemployed workers receive income $b_a = z_a + g_a$, $a \in \{m, o\}$
  - z_a is value of leisure/home production, g_a is government transfer financed through lump sum taxes τ
  - employed workers receive wage according to contract ω_a, $a \in \{m, o\}$
- cannot accumulate savings, hand-to-mouth consumers

Model setup – search and matching



- separate labor markets for prime-age (m) and old job seekers (o)
- firms can enter freely into each market
- in market $a \in \{m, o\}$, firms can post a wage contract ω_a at cost $c > 0$
- workers costlessly observe wage offers and decide to which ω_a to apply
- Acemoglu and Shimer (1999): the directed search equilibrium can be characterized as the solution to a simple maximization problem

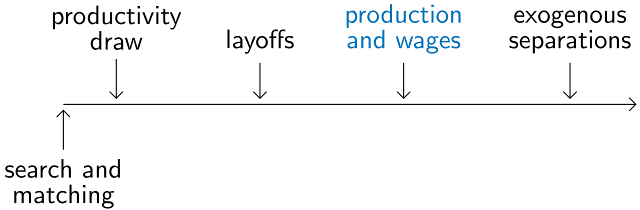
Model setup – productivity and layoffs



- productivity draws are i.i.d. and emerge from a cdf F_a, $a \in \{m, s, o\}$
  distributional assumptions
- a layoff occurs if and only if realized firm surplus is negative, which is equivalent to $y < \underline{y}_a(\omega_a)$
- *threshold productivity* $\underline{y}_a(\omega_a)$ = current wage – cont. value

$\Rightarrow$ endogenous layoff probability $= F_a\big(\underline{y}_a(\omega_a)\big)$

Model setup – wages



- wages are paid according to the prevailing wage contract: $\omega_m = (w_m, w_s)$ or $\omega_o = (w_o)$
- with contracting friction: $w_a \in \mathbb{R}$, $a \in \{m, s, o\}$
- counterfactual: state-contingent wages, $w_a : \mathbb{R} \to \mathbb{R}$ (measurable)

eq. old job seekers   eq. prime-age job seekers

The effect of the friction (1)

I. Rent Sharing

- define expected joint match surplus as $\mathbb{E}S_a(\omega_a) = \frac{\mathbb{E}W_a^+(\omega_a)}{u'(w_a - \tau)} + \mathbb{E}J_a^+(\omega_a)$
- equilibrium surplus sharing **without** the friction: value functions

$$u'(w_a^\bullet - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_a^+(\omega_a^\bullet)}{\mathbb{E}J_a^+(\omega_a^\bullet)} \quad \Rightarrow \quad \mathbb{E}J_a^+(\omega_a^\bullet) = (1-\gamma)\mathbb{E}S_a(\omega_a^\bullet)$$

where γ is elasticity of the matching function, $m(u, v) = Au^\gamma v^{1-\gamma}$

The effect of the friction (1)

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where γ is elasticity of the matching function, $m(u,v) = Au^\gamma v^{1-\gamma}$

- equilibrium surplus sharing **with** the friction:

$$u'(w_a^* - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_a^+(\omega_a^*)}{\mathbb{E}J_a^+(\omega_a^*)} + \underbrace{h_a(\underline{y}_a^*) W_a(\omega_a^*)}_{>0} \Rightarrow \mathbb{E}J_a^+(\omega_a^*) > (1-\gamma)\mathbb{E}S_a(\omega_a^*)$$

$\Rightarrow$ because workers act against the layoff risk by lowering wages, the firm earns an additional rent (cf. Kennan [REStud, 2009])

The effect of the friction (2)

II. Firing and hiring

- with the friction, a layoff occurs iff $y < \underline{y}_a$ *(threshold productivity)*

$$J_a(\omega_a; \underline{y}_a) = 0, \quad W_a(\omega_a; \underline{y}_a) > 0$$

- without the friction, a layoff occurs iff $y < y_a^r$ *(reservation productivity)*

$$J_a(\omega_a; y_a^r) = W_a(\omega_a; y_a^r) = 0$$

in equilibrium: graphical illustration

- the layoff probability is higher with the friction because $\underline{y}_a^* > y_a^r$

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- the job-finding probability is higher with the friction because (a) firm surplus is zero for $y \in [y_a^r, \underline{y}_a^*]$ and (b) eq. wages are lower

The effect of the friction (2)

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$\Rightarrow$ friction has ambiguous net effect on employment

The effect of the friction (3)

III. Employment and welfare

calibrate model to Austrian economy with the generous early retirement options of year 2000 (here incorporated into g_o)

- prime age = age 25 to 54, old age = age 55 to 64
- friction reduces prime-age employment rate by 1.1pp,
  old age employment rate by 2.7pp
  - the negative effect on the layoff margin is increasing in age
  - the positive effect on the hiring margin is decreasing in age

  $\Rightarrow$ steady state employment reduces more for the old
- aggregate welfare loss equals 2.9% in consumption equivalents

general value functions | general FOCs | aggregate variables | calibration | eq. with friction | eq. without friction

The effect of the friction (4)

IV. Interaction with early retirement reforms

- abolishing access to early retirement ($g_o = g_m$) has large employment and welfare effects post-reform eq. with friction
  - +11.8pp old age employment rate (36.6% $\nearrow$ 48.4%)
  - +1.9% welfare in consumption equivalents
- gains would be even higher without the friction post-reform eq. w/o friction figure
  - 15% of potential gain in old age employment foregone due to friction
  - 10% of potential gain in aggregate welfare foregone

$\Rightarrow$ presence of contracting friction reduces effectiveness of ER reforms

$\Rightarrow$ complementary labor market reforms are necessary to unleash full potential, e.g. severance pay or training programs

Conclusion

- analyze an overlapping generations search and matching model with a contracting friction
- theoretical findings:
  - rational workers give up wage income for job security
  - layoff rates and job-finding rates higher under the friction $\Rightarrow$ ambiguous effect on employment
- numerical findings:
  - friction particularly reduces employment during old age, and may lead to sizable welfare loss
  - friction reduces the effectiveness of early retirement reforms on employment and welfare
  - such reforms should be accompanied by measures that increase firms' willingness to keep older workers employed

Part II

Appendix

		Relative displacement rate	Relative re-emp. rate	% of displaced workers out of labor force within one year of displacement	
	country	ratio 55-64 years to 35-44 years		35-44 years	55-64 years
Self-defined disp.	AUS	1.27	0.65	53.2	74.1
	CAN	0.97	0.78	34.5	57.5
	FRA	1.83	0.26	22.4	78.9
	JAP	1.53	0.68	16.6	35.7
	KOR	1.30	0.50	51.3	68.1
	NEZ	1.12	0.94	–	–
	RUS	1.63	0.84	52.7	89.4
Firm-identified disp.	DEN	0.94	0.66	–	–
	FIN	0.96	0.77	–	–
	GER	1.23	0.36	–	–
	POR	1.09	0.52	–	–
	SWE	0.66	0.87	–	–
	UK	1.15	0.69	–	–
	US	0.93	0.88	22.5	35.0

Table: Selected characteristics from OECD (2013)

back

Empirical motivation

Frimmel, Horvath, Schnalzenberger, Winter-Ebmer: Seniority Wages and the Role of Firms in Retirement Decisions (JPubE, *fortcoming*)

- Austrian social security data, male workers aged 57 to 65
- focus on age at which workers exit the last job before retirement
- job exit age varies substantially between relatively similar firms
- control for various worker characteristics (fixed effect, social security wealth, social insurance months, tenure, experience, sickness days, ...) and firm characteristics (fixed effect, industry, region, firm size)
- account for unobserved age-productivity profile by analyzing deviations from the industry average
- use local prime-age unemployment rate 10 years before job exit as instrument for the firm-level seniority wage gradient
- a one-standard deviation increase in the wage gradient causes a 5–6 months earlier job exit from the last job

back

Distributional assumptions

- there exists a random variable Z with cdf F such that for all $a \in \{m, s, o\}$:
$$F_a(y) = F(\tfrac{y-\mu_a}{s_a})$$
where $\mu_a \in \mathbb{R}$, $s_a > 0$
- F is twice continuously differentiable and $\mathrm{supp}(Z) = \mathbb{R}$
- $0 \leq \mathbb{E}Z < \infty$
- the hazard rate $h := f/(1-F)$ is strictly increasing, while h'/h is non-increasing

back

Labor market equilibrium of old job seekers (1)

$$\max_{(w_o,\theta_o)} p(\theta_o)\mathbb{E}W_o^+(w_o) \;\; \text{s.t.} \;\; q(\theta_o)\mathbb{E}J_o^+(w_o) = c$$

- value functions at the production stage:

$$J_o(w_o; y) = y - w_o, \qquad W_o(w_o) = u(w_o - \tau) - u(b_o - \tau)$$

- layoff threshold $\underline{y}_o$ solves

$$J_o(w_o; \underline{y}_o) = 0 \quad \Leftrightarrow \quad \underline{y}_o = w_o$$

- value functions at the search stage:

$$\mathbb{E}J_o^+(w_o) = \int_{\underline{y}_o}^{\infty} J_o(w_o; y)\, dF_o(y) = \int_{\underline{y}_o}^{\infty} y - \underline{y}_o\, dF_o(y),$$
$$\mathbb{E}W_o^+(w_o) = (1 - F_o(\underline{y}_o))W_o(w_o)$$

Labor market equilibrium of old job seekers (2)

first order condition for w_o^*:

$$u'(w_o^* - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_o^+(w_o^*)}{\mathbb{E}J_o^+(w_o^*)} + h_o(w_o^*) W_o(w_o^*)$$

where

- γ is the elasticity of the matching function, $m(u,v) = Au^\gamma v^{1-\gamma}$,
- the hazard rate h_o measures the (semi)elasticity of the retention probability,

$$h_o(x) = \frac{f_o(x)}{1 - F_o(x)} = -\frac{\partial \ln(1 - F_o(x))}{\partial x}$$

$\Rightarrow$ worker faces trade-off between wage income and job security

back

Labor market equilibrium of prime-age job seekers

first order conditions for $\omega_m^* = (w_m^*, w_s^*)$:

$$u'(w_m^* - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_m^+(\omega_m^*)}{\mathbb{E}J_m^+(\omega_m^*)} + h_m(\underline{y}_m^*) W_m(\omega_m^*) \tag{1}$$

$$u'(w_s^* - \tau) = u'(w_m^* - \tau) + h_s(w_s^*) W_s(w_s^*) \tag{2}$$

- equation (1) determines optimal surplus sharing
- equation (2) determines optimal age profile of wages:

$$(2) \quad \Rightarrow \quad u'(w_s^* - \tau) > u'(w_m^* - \tau) \quad \Leftrightarrow \quad w_s^* < w_m^*$$

- intuition: a higher w_m^* increases layoff risk during prime-age, a higher w_s^* increases layoff risk during prime-age *and* old age

back

Labor market equilibrium of old job seekers (1)

Wage-dependent contracts

value functions at the production stage:

$$J_o(w_o; y) = y - w_o(y),$$
$$W_o(w_o; y) = u(w_o(y) - \tau) - u(b_o - \tau)$$

reservation productivity y_o^r:

$$u(y_o^r - \tau) - u(b_o - \tau) = 0 \quad \Rightarrow \quad y_o^r = b_o$$

value functions at the search stage:

$$\mathbb{E}J_o^+(w_o) = \int_{\underline{y}_o^r}^{\infty} y - w_o(y) \, dF_o(y),$$
$$\mathbb{E}W_o^+(w_o) = \int_{\underline{y}_o^r}^{\infty} u(w_o(y) - \tau) - u(b_o - \tau) \, dF_o(y)$$

Labor market equilibrium of old job seekers (2)

Wage-dependent contracts

first order conditions:

$$
\begin{aligned}
w_o^\bullet(y) &= \min\{\overline{w}_o^\bullet, y\} \text{ for } y \geq y_o^r \\
u'(\overline{w}_o^\bullet - \tau) &= \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_o^+(w_o^\bullet)}{\mathbb{E}J_o^+(w_o^\bullet)} \\
q(\theta_o^\bullet)\mathbb{E}J_o^+(w_o^\bullet) &= c
\end{aligned}
$$

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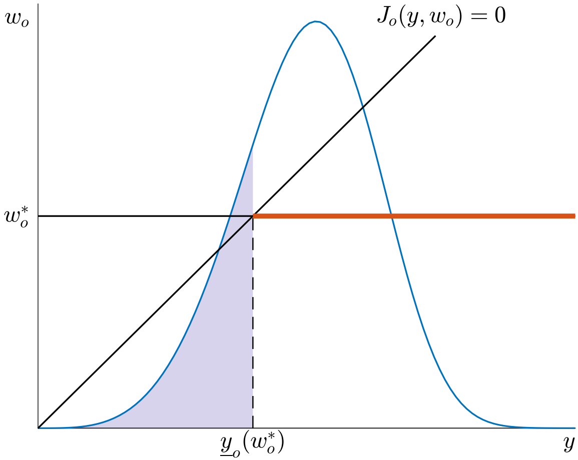
The effect of the contracting friction – Hiring and firing (1)

Equilibrium with flat wage: w_o^*:



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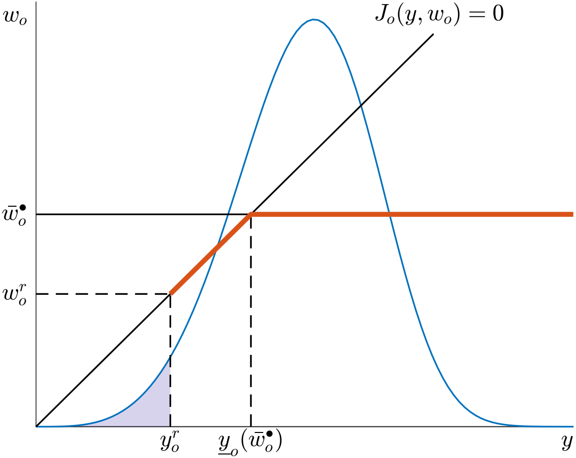
The effect of the contracting friction – Hiring and firing (2)

Equilibrium with state-contingent wage: $w_o^\bullet(y)$ is piecewise linear



back

Value functions of old job seekers

Bellman equations:

$$J_o(w_o; y) = y - w_o + \beta_o[\phi \mathbb{E} J_o^+(w_o) + (1-\phi) J_o(w_o; y)]$$
$$W_o(w_o) = u(w_o - \tau) - u(b_o - \tau) + \beta_o[\phi \mathbb{E} W_o^+(w_o) + (1-\phi) W_o(w_o) - V_o]$$

where $\beta_o := \beta(1-\pi_o)(1-\sigma)(1-\delta)$

layoff threshold $\underline{y}_o = \underline{y}_o(w_o)$ solves

$$J_o(w_o; \underline{y}_o(w_o)) = \underline{y}_o - w_o + \tfrac{\beta_o \phi}{1-\beta_o(1-\phi)} \int_{\underline{y}_o}^{\infty} y - \underline{y}_o dF_o(y) = 0$$

value functions at the search stage:

$$\mathbb{E} J_o^+(w_o) = \frac{\int_{\underline{y}_o}^{\infty} y - \underline{y}_o dF_o(y)}{1 - \beta_o(1-\phi)}$$
$$\mathbb{E} W_o^+(w_o) = (1 - F_o(\underline{y}_o)) W_o(w_o)$$

in equilibrium: $V_o = p(\theta^*) \mathbb{E} W_o^+(w_o^*)$

Value functions of prime-age job seekers

Bellman equations:

$$J_m(\omega_m; y) = y - w_m + \beta_m[\phi \mathbb{E} J_m^+(\omega_m) + (1-\phi) J_m(\omega_m; y)] + \beta\pi_m(1-\sigma)\mathbb{E} J_s^+(w_s)$$

$$W_m(\omega_m) = u(w_m - \tau) - u(b_m - \tau) + \beta_m[\phi \mathbb{E} W_m^+(\omega_m) + (1-\phi) W_m(\omega_m) - V_m] + \beta\pi_m(1-\sigma)[\mathbb{E} W_s^+(w_s) - V_o]$$

where $\beta_m := \beta(1-\pi_m)(1-\sigma)$

layoff threshold $\underline{y}_m = \underline{y}_m(\omega_m)$ solves

$$J_m(\omega_m, \underline{y}_m(\omega_m)) = \underline{y}_m - w_m + \frac{\beta_m \phi}{1-\beta_m(1-\phi)} \int_{\underline{y}_m}^{\infty} y - \underline{y}_m dF_m(y) + \beta\pi_m(1-\sigma)\mathbb{E} J_s^+(w_s) = 0$$

value functions at the search stage:

$$\mathbb{E} J_m^+(\omega_m) = \frac{\int_{\underline{y}_m}^{\infty} y - \underline{y}_m dF_m(y)}{1 - \beta_m(1-\phi)}$$

$$\mathbb{E} W_m^+(\omega_m) = (1 - F_m(\underline{y}_m)) W_m(\omega_m)$$

in equilibrium: $V_m = p(\theta_m^*)\mathbb{E} W_m^+(\omega_m^*)$

back

First order conditions

old job seekers:

$$u'(w_o^* - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_o^+(w_o^*)}{\mathbb{E}J_o^+(w_o^*)} + \lambda_o h_o(\underline{y}_o^*) \frac{\partial \underline{y}_o(w_o^*)}{\partial w_o} W_o(w_o^*)$$

prime-age job seekers:

$$u'(w_m^* - \tau) = \frac{1-\gamma}{\gamma} \frac{\mathbb{E}W_m^+(\omega_m^*)}{\mathbb{E}J_m^+(\omega_m^*)} + \lambda_m h_m(\underline{y}_m^*) \frac{\partial \underline{y}_m(\omega_m^*)}{\partial w_m} W_m(\omega_m^*)$$

$$u'(w_s^* - \tau) = u'(w_m^* - \tau) + \lambda_o h_s(\underline{y}_s^*) \frac{\partial \underline{y}_s(w_s^*)}{\partial w_s} W_s(w_s^*)$$

where $\lambda_a = 1 - \beta_a(1-\phi) > 0$

back

Economic aggregates (1)

Demography

Assume a stationary age distribution. Then the size of the age groups is

$$N_1 = (1 - \pi_m)N_1 + 1, \quad N_2 = (1 - \pi_o)N_2 + \pi_m N_1,$$

which implies $N_1 = 1/\pi_m$, $N_2 = 1/\pi_o$.

Individuals capable of working:

$$\begin{aligned} LF_1 &= N_1, \\ LF_2 &= (1 - \pi_o)(1 - \delta)LF_2 + \pi_m N_1 \end{aligned}$$

Economic aggregates (2)

Employment

$$E_1 = E_m = p(\theta_m^*)(1 - F_m(\underline{y}_m^*))JS_m + (1-\pi_m)(1-\sigma)(1-\phi F_m(\underline{y}_m^*))E_m$$

$$E_2 = E_s + E_o$$

$$E_s = \pi_m(1-\sigma)(1-F_s(\underline{y}_s^*))E_m + (1-\pi_o)(1-\sigma)(1-\delta)(1-\phi F_s(\underline{y}_s^*))E_s$$

$$E_o = p(\theta_o^*)(1-F_o(\underline{y}_o^*))JS_o + (1-\pi_o)(1-\sigma)(1-\delta)(1-\phi F_o(\underline{y}_o^*))E_o$$

Tenure

$$P[0 < E_m < \Delta t \,|\, E_m > 0] = \frac{1-(1-\pi_m)(1-\sigma)(1-\phi F_m(\underline{y}_m^*))}{1-(1-\pi_m)(1-\sigma)(1-\phi)F_m(\underline{y}_m^*)}$$

Duration of unemployment

$$P[0 < U_m < \Delta t \,|\, U_m > 0] = 1-(1-p(\theta_m^*))(1-\pi_m)$$

Economic aggregates (3)

Output

$$Y_1 = E_m \bar{Y}_m - c\theta_m^* J S_m$$
$$Y_2 = E_s \bar{Y}_s + E_o \bar{Y}_o - c\theta_o^* J S_o$$

where $\bar{Y}_a = \mathbb{E}[Y_a | Y_a \geq \underline{y}_a^*] = \int_{\underline{y}_a^*}^{\infty} y \, dF_a(y) / (1 - F_a(\underline{y}_a^*))$

Government expenditures

$$G_1 = (N_1 - E_1) g_m, \quad G_2 = (N_2 - E_2) g_o$$

balanced budget: $G_1 + G_2 = \tau(N_1 + N_2)$

Welfare

$$\mathcal{W}_1 = E_1 u(w_m^* - \tau) + (N_1 - E_1) u(b_m - \tau)$$
$$\mathcal{W}_2 = E_s u(w_s^* - \tau) + E_o u(w_o^* - \tau) + (N_2 - E_2) u(b_o - \tau)$$

back

Functional forms

- Normal productivity distribution $Y_a \sim N(\mu_a, s_a^2)$
- CARA utility

$$u(w) = (1 - e^{-\kappa w})/\kappa, \quad \kappa > 0,$$

  - no wealth effects
  - lump sum tax τ does not affect equilibrium wages and tightness
- Cobb-Douglas matching function

$$m(u, v) = A u^{\gamma} v^{1-\gamma}, \quad A > 0, \ \gamma \in (0, 1)$$

Calibration

Parameters set directly:

parameter	value	comment
π_m	0.033	prime age = age 25 to 54
π_o	0.100	old age = age 55 to 64
β	0.971	interest rate of 3% p.a.
κ	3.000	relative risk aversion: 2–3
μ_m, μ_s	1.000	normalization
μ_o	0.900	reducing learning ability (Skirbekk, 2004, 2008)
s_m, s_s	0.260	90th to 10th percentile ratio: 2
s_o	0.234	90th to 10th percentile ratio: 2
ϕ	0.117	average duration of productivity draw: 8.5 years (Menzio et al., 2016)
γ	0.500	Petrongolo and Pissarides (2001)

Calibration (2)

Policy parameters refer to year 2000, labor market characteristics refers to Austrian men in 2004 (sources: OECD, Statistik Austria):

parameter	value	calibration target
g_m	0.518	prime-age UI replacement rate, $g_m/w_m^* = 0.531$
g_o	0.673	mean of UI and net pension RR, $g_o/w_2^* = 0.704$
z_m	0.179	employment rate age 25 to 54, $E_1/N_1 = 0.881$
z_o	0.255	employment rate age 55 to 64, $E_2/N_2 = 0.366$
σ	0.024	share of employed with tenure < 1 year: 0.093
A	0.741	share of unemp. with duration < 1 year: 0.638
c	0.982	labor market tightness $\theta_m^* = 0.714$
δ	0.054	share of elderly capable of work, $LF_2/N_2 = 0.675$

back

Equilibrium with flat wages

individual variables	prime-age job seekers m	prime-age job seekers s	old job seekers o^{noER}	old job seekers o^{ER}
wage w_i^*	0.975	0.950	0.888	1.000
layoff probability $F_i(\underline{y}_i^*)$	0.276	0.344	0.411	0.634
job-finding probability $p(\theta_i^*)$	0.626	——	0.256	0.123

per capita variables	prime age	old age	total
job-finding rate	0.626	0.151	0.455
endog. layoff rate	0.060	0.156	0.073
employment rate	0.881	0.366	0.752
gov. expenditures	0.062	0.415	0.150
output	0.877	0.403	0.758
welfare in cons. eq.	0.779	0.765	0.775

back

Equilibrium with state-contingent wages

individual variables	prime-age job seekers		old job seekers	
	m	s	o^{noER}	o^{ER}
base wage $\overline{w}_i^\bullet$	1.009	0.988	0.915	1.022
average wage $\mathbb{E}[w_i^\bullet \| y \geq y_i^r]$	0.991	0.983	0.897	1.004
layoff probability $F_i(y_i^r)$	0.161	0.313	0.261	0.504
job-finding probability $p(\theta_i^\bullet)$	0.498	—	0.217	0.105

per capita variables	prime age	old age	total
job-finding rate	0.498	0.127	0.366
endog. layoff rate	0.031	0.122	0.044
employment rate	0.892	0.393	0.767
gov. expenditures	0.056	0.398	0.141
output	0.895	0.430	0.779
welfare in cons. eq.	0.802	0.786	0.798

back

Equilibrium after pension reform – flat wages

individual variables	prime-age job seekers		old job seekers
	m	s	o
wage w_i^*	0.978	0.883	0.888
layoff probability $F_i(\underline{y}_i^*)$	0.268	0.230	0.411
job-finding probability $p(\theta_i^*)$	0.641	——	0.256
per capita variables	**prime age**	**old age**	**total**
job-finding rate	0.641	0.256	0.535
endog. layoff rate	0.058	0.099	0.064
employment rate	0.888	0.484	0.787
gov. expenditures	0.058	0.267	0.110
output	0.881	0.507	0.787
welfare in cons. eq.	0.823	0.707	0.790

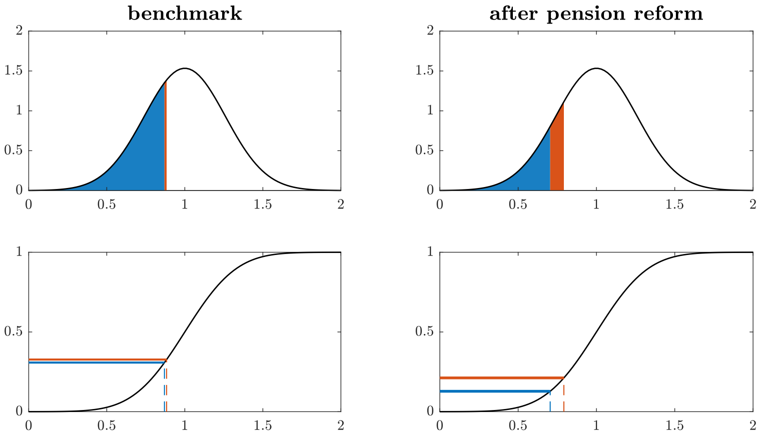
back

Equilibrium after pension reform – state-contingent wages

individual variables	prime-age job seekers		old job seekers
	m	s	o
base wage $\overline{w}_i^\bullet$	1.006	0.986	0.915
average wage $\mathbb{E}[w_i^\bullet \mid y \geq y_i^r]$	0.988	0.954	0.897
layoff probability $F_i(y_i^r)$	0.155	0.141	0.261
job-finding probability $p(\theta_i^*)$	0.507	——	0.217
per capita variables	**prime age**	**old age**	**total**
job-finding rate	0.507	0.217	0.438
endog. layoff rate	0.030	0.053	0.034
employment rate	0.897	0.532	0.806
gov. expenditures	0.053	0.242	0.101
output	0.897	0.549	0.810
welfare in cons. eq.	0.843	0.745	0.815

back

Early retirement reform – senior workers



the reservation productivity (upper bound of blue area) responds more sensitively to changes in unemployment income g_o than the threshold productivity (upper bound of orange area) back