Robert Wagner & Thomas Zwick

How Acid are Lemons?

Signaling and Adverse Selection at the Second Labour Market Barrier for Apprenticeship Graduates

Agenda

Motivation

Issues:

- 2009: 468,852 appr. graduates
- Around 100,000 graduates change firm and/or occupation
- Qualification function of DS
- Outcome quality of DS
- Labour market success of firm changers?

- Adverse Selection vs. Signaling at second labour market barrier
- Theory 1: Changers are a negative selection and receive wages below their productivity
- Theory 2: Graduation creates signal to the labour market and signals differ between graduates

Which signals improve the labour market success / outcome quality of apprenticeship training?

(BIBB, 2010; Ebbinghaus, 2007; Wachter, 2008; Akerlof, 1970; Spence, 1973; Greenwald, 1986; Salop & Salop, 1976, Katz & Ziderman, 1990, Acemoglu & Pischke, 1998; Weiss, 1995)

Motivation

Take-over decision of the training firm – an illustrative example:

Assumption: 10 apprentices with different ability levels (Rank order)

Firm decides that 7 out of 10 graduates have the required ability level
Retention rate: 70%
3 graduates leave firm as "negative selection"

1
2
3
4
5
6
7
8
9
10

Firm decides that 3 out of 10 graduates have the required ability level
Retention rate: 30%
7 graduates leave firm as "negative selection"

► According to this take-over rule, changers should be a negatively selected group

Motivation

Hiring decision at second labour market barrier – an illustrative example:

3 firm changers from a firm with a high retention rate and good reputation and 7 from a firm with a low retention rate and bad reputation:

High retention rate and good reputation: 8, 9, 10

Low retention rate and bad reputation: 4, 5, 6, 7, 8, 9, 10

- Firm has to hire from inferior group (= lemons)
  - ➢ Adverse selection problem
- Signal 1: Average ability of Red-Group higher than average ability of Green-Group => Red-Group should receive higher wages than Green-Group
- Signal 2: Green-Group from firm with good training reputation, Red-Group from firm with bad training reputation => Red-Group should receive lower wages than Green-Group
- Signal 3: Training firm evaluates individual ability level by assessing IHK / HWK grades

What signal is credible for the wage determination of the hiring firm?

Prior Evidence

Evidence on entry wages at second labour market barrier:

Firm Changers	- Evidence not conclusive – wage losses and gains
Occupation Changers	- Wage gains when changing to a close occupation - Wage losses if changing to a distant occupation
Further Effects	- Positive post-apprenticeship wage effects found for age, education, firm size, IHK-Grade
Training Intensity & Occupational groups	- Training wage and duration / crafts & construction, manufacturing, commercial & trade

Our contribution: Assess importance of individual and training firm factors for entry wages of apprenticeship graduates

(Werwatz, 1997; Harhoff & Kane, 1997; Acemoglu & Pischke, 1998; Wydra-Somaggio et al., 2010; Clark & Fahr, 2001; Fitzenberger & Spitz, 2003; Bougheas & Georgellis, 2004; Euwals & Winkelmann, 2004; Geel & Backes-Gellner, 2009; Goeggel & Zwick, 2010; Mohrenweiser & Zwick, 2009)

Research Question and Hypotheses

Research question:

Which apprenticeship signals influence entry wages of skilled employees?

Hypotheses:

1. Firm changers have on average a lower productivity rank in their training firm than stayers
2. The higher the retention rate in the training firm, the lower entry wages in the first skilled job for firm changers
3. The better the training reputation of the training firm, the higher entry wages in the first skilled job for firm changers
4. The higher the productivity rank of a graduate in the training firm, the higher entry wages in the first skilled job

Agenda

Overview

Data:

- Linked employer-employee data provided by the IAB (LIAB)
- Waves from 1993 to 2007 – used as pooled data set
- Sample definition: one apprenticeship training, age < 25, full-time position after apprenticeship training, no university degree

Sample restrictions:

- Hypothesis 1: Restrict sample to apprentices in last training spell
  - Enables us to create rank order within each training firm
- Other hypotheses: Restrict sample to those who do not change occupational at 2-digit level and use entry wage of the first skilled job
  - Excludes learning effects of hiring firm

Agenda

1. Introduction
2. Data and Sample Restrictions
3. Estimation Strategy
4. First Results
5. Identification in the Data

Overview

Hypothesis 1:

- Calculate relative wage rank of apprentices in their last apprenticeship spell as a proxy for relative productivity / ability level (RR = rank/N+1)
- Compare average RR for movers and stayers at different retention rates

Other Hypotheses:

- $y_{it} = \alpha' + \beta' X_{it} + \gamma' W_{it-1} + \delta' Z_{it} + \varepsilon_{it}$
- y = individual wage deviation from occupational mean in first skilled job
- X = individual characteristics (age, sex, education)
- W = training characteristics (retention rate, wage level, individual ability / productivity level at training firm)
- Z = covariates (training firm characteristics (sector, size), works council, union)

Estimation Strategy

Estimation Issues

Estimation Issues	Solution
No random sorting in training firm	Wage level of training firm
No random sorting of firm changers	Mass lay-off information
No random sorting in occupation	Wage deviation from occ. mean
Timing of the separation	Sample restrictions
Ability bias	Relative ability rank

(Gibbons & Katz, 1991; von Wachter & Bender, 2006; Goeggel & Zwick, 2010)

Agenda

1. Introduction
2. Data and Sample Restrictions
3. Estimation Strategy
4. First Results
5. Identification in the Data

Hypothesis 1

	Stayer	Mover
Retention rate		
RR ≤ 40%	0.52 (0.25)	0.50 (0.23)
40% < RR ≤ 60%	0.52 (0.23)	0.47 (0.23)
60% < RR ≤ 80%	0.52 (0.25)	0.46 (0.28)
80% < RR ≤ 90%	0.51 (0.26)	0.43 (0.31)
RR > 90%	0.50 (0.24)	0.44 (0.29)

Mover-stayer differential seems to increase with retention rate – supports H1

Hypothesis 2-4 (Basic models)

	All	Firm Change	No Change
RR Occupation	-0.297 (0.008)***	-0.207 (0.029)***	-0.232 (0.031)***
RR-Ref-Cat ≤ 40%			
40% < RR ≤ 60%	-0.002 (0.004)	-0.017 (0.007) **	0.006 (0.005)
60% < RR ≤ 80%	0.011 (0.003)***	0.004 (0.007)	0.003 (0.004)
80% < RR ≤ 90%	0.030 (0.004) ***	0.012 (0.010)	0.029 (0.004)***
RR > 90%	0.035 (0.004)***	0.004 (0.023)	0.035 (0.004)***
Wage Rank	0.018 (0.003)***	-0.000 (0.009)	0.020 (0.003)***
Wage Level	0.007 (0.000)***	0.001 (0.000)***	0.011 (0.000)***
R-squared	0.25	0.15	0.29

Hypothesis 2-4 (Interactions with mass-layoff)

	Model with Interactions	
RR Occupation	-0.232 (0.031)***	0.178 (0.129)
RR-Ref-Cat ≤ 40%		
40% < RR ≤ 60%	-0.016 (0.008)**	-0.122 (0.051)**
60% < RR ≤ 80%	0.005 (0.008)	-0.126 (0.056)**
80% < RR ≤ 90%	0.015 (0.011)	-0.064 (0.092)
RR > 90%	-0.011 (0.027)	-
Wage Rank	0.002 (0.010)	0.013 (0.072)
Wage Level	0.001 (0.000)***	0.001 (0.001)
Mass-layoff	-0.030 (0.093)	
R-squared	0.16	

Core Findings (Summary)

Hypothesis 1:

- Increasing difference between movers and stayers with retention rates
- Differences significant at the 1%-level

Other Hypotheses:

- No effect for individual signal (Rank in training wage distribution) for movers
- Positive wage effect of retention rate for stayers – not for movers
- Negative effect for occupational retention rate
- Training firm reputation might be important – further specifications and robustness checks necessary
- No wage penalty for changers from mass-layoff firm

Outlook:

- Further Instrument: Variation in retention rates
- Compare wages three years after entering the labour market

Agenda

1. Introduction
2. Data and Sample Restrictions
3. Estimation Strategy
4. First Results
5. Identification in the Data

Last Apprenticeship Spell

```
sort id spell_nr

***Transition at second labour market barrier
    gen Aus = 1 if (berstell[_n+1]>=1 & berstell[_n+1]<=4 | berstell[_n+1]==8 | berstell[_n+1]==9) & berstell==0 & id==id[_n+1] & leistart[_n+1]==. & leistart==. & pers_gr==102

*** Transition with unemployment spell
    replace Aus = 2 if (berstell[_n+2]>=1 & berstell[_n+2]<=4 | berstell[_n+2]==8 | berstell[_n+2]==9) & leistart[_n+1]<3  & berstell==0 & id==id[_n+1] & id==id[_n+2] & pers_gr==102

*** Identify cases with two training programs
    gen aus2 = 1 if Aus==1 | Aus==2
    egen ausx = sum(aus2), by (id)
    drop aus2

*** Date for last spell in apprenticeship period
gen date = .
    replace date = endepi if (Aus==1 | Aus==2) & ausx==1
    egen date_b = sum(date), by(id)
    replace date_b = . if date_b==0
```

First Employment Spell

```
sort id spell_nr

*** Direct transition in first job
    gen Besch = 1 if (berstell>=1 & berstell<=4 | berstell==8 | berstell==9) & berstell[_n-1]==0 & id==id[_n-1] & leistart[_n-1]==. & leistart==. & pers_gr[_n-1]==102

*** Transition with unemployment detour
    replace Besch = 2 if (berstell>=1 & berstell<=4 | berstell==8 | berstell==9) & leistart[_n-1]<3 & berstell[_n-2]<3 & id==id[_n-1] & id==id[_n-2] & pers_gr[_n-2]==102

*** Identify cases with only one first job
    gen besch = 1 if Besch==1 | Besch==2
    egen beschx = sum(besch), by (id)
    drop besch

*** Generate date for first full time employment spell
    gen date = .
    replace date = begepi if (Besch==1 | Besch==2) & beschx==1
    egen date_a = sum(date), by(id)
    replace date_a = . if date_a==0
```

Firm Changer

```
sort id spell_nr

gen agw=.
replace agw = 1 if Aus[_n-1]==1 & idnum!=idnum[_n-1] & id == id[_n-1] & Besch==1

replace agw = 1 if Aus[_n-2]==2 & leistart[_n-1]<3 & idnum!=idnum[_n-2] & id==id[_n-1] &
        id==id[_n-2] & Besch==2

replace agw = 0 if agw!=1

egen agwechsel = sum(agw), by(id)
```

Wages

```
*** Wage in the last apprenticeship spell

    gen wage = .
    replace wage = lohn if date_b == endepi
    egen w_ausende = max(wage), by(id)
    drop wage


*** Wage in first full time job

    gen wage = .
    replace wage = lohn if date_a == begepi
    egen w_beschbeg = max(wage), by(id)
    drop wage
```

Retention Rate

```
sort id spell_nr

gen anz_azu_ende = 1 if date_b==endepi & pers_gr==102 & leistart==. & berstell==0
replace anz_azu_ende = 0 if anz_azu_ende==.
egen anz_azu_firm = sum(anz_azu_ende), by(idnum jahr)

gen uebernahme = 1 if id==id[_n-1] & idnum==idnum[_n-1] & anz_azu_ende[_n-1]==1
replace uebernahme = 0 if uebernahme==.
egen uebernahme_firm = sum(uebernahme), by(idnum jahr)
drop uebernahme
drop anz_azu_ende

gen u_quote_ind=uebernahme_firm/anz_azu_firm

replace u_quote_ind=. if u_quote_ind>1
```

Relative Wage Rank

```
sort idnum jahr beruf2 w_ausende

by idnum jahr beruf2: egen rank = rank(w_ausende) if (Aus==1 | Aus==2) & ausx==1

by idnum jahr beruf2: egen n = count(w_ausende) if (Aus==1 | Aus==2) & ausx==1

replace n = n+1

gen gg = rank/n

egen rel_rank_b = max(gg), by(id)

by idnum jahr berufg: egen nr_rank = sum(rank)
```

Thank you for your attention!

robert.wagner@bwl.lmu.de