

Appendix

Table A1. Descriptive statistics for whole workforce socioeconomic characteristics by industry and time period

Socioeconomic characteristics	2000–2009				2009–2019			
	All sectors (%)	Public sector (%)	Mining (%)	Manufacturing (%)	All sectors (%)	Public sector (%)	Mining (%)	Manufacturing (%)
Gender								
Women	46.86	74.07	13.47	18.14	46.42	72.97	21.23	17.86
Men	53.14	25.93	86.53	81.86	53.58	27.03	78.77	82.14
Income								
Average income	2 849	2 833	3 816	3 097	3 374	3 488	5 008	3 820
Educational level								
Compulsory to 2 years of secondary	80.90	65.14	84.58	94.65	75.33	55.90	86.26	90.64
Post-secondary 3 to 5 years	17.89	32.33	14.17	5.12	23.01	40.46	12.60	8.99
Postgraduate	1.21	2.53	1.24	0.23	1.67	3.63	1.14	0.37
Educational direction								
Agriculture, forestry, and animal health	2.16	0.83	1.21	2.37	2.51	0.99	2.08	2.72
General education	18.64	11.21	14.69	21.99	15.38	8.65	13.52	16.56

Health, medical and social care	16.25	35.31	1.18	3.25	16.99	36.94	3.25	3.80
Humanities and arts	2.68	2.07	0.82	1.35	3.85	2.66	2.27	2.25
Natural science, math and data	2.34	2.38	3.02	1.33	2.81	3.02	3.35	1.67
Pedagogy and teacher education	8.85	20.34	0.84	0.87	8.70	19.27	1.36	1.15
Service	7.64	8.41	3.46	4.20	7.93	7.66	5.70	4.84
Social sciences, law and business	14.60	13.04	6.55	9.31	13.96	13.40	7.29	8.90
Technology and manufacturing	26.84	6.41	68.24	55.33	27.87	7.42	61.17	58.11
<i>Occupation</i>								
Handicraft in construction and manufacturing	10.81	1.15	30.20	21.11	10.70	0.79	29.87	25.94
Management	5.81	4.57	6.79	5.88	6.34	5.75	6.07	6.84
Office and customer service	8.38	5.37	3.79	5.84	6.68	4.33	3.46	5.88
Process and machine operator works	12.55	0.21	15.78	41.61	10.70	0.35	33.02	35.97
Service, care and sales	20.72	33.41	1.03	1.89	21.35	31.37	0.77	1.99
Work in agriculture, garden, forestry	1.18	0.13	0.22	0.23	2.33	0.13	0.03	0.30
Work that requires shorter university education	17.30	21.14	20.84	10.81	15.30	15.80	12.66	15.02
Work that requires special theoretical education	17.35	30.17	17.32	3.56	21.16	38.94	9.84	4.62
Work without the need for special education	5.91	3.85	4.04	9.09	5.43	2.53	4.27	3.43

Civil status

Married with children	46.47	54.27	44.85	40.18	41.79	49.53	31.93	39.24
Married without children	3.97	4.31	4.22	3.64	4.41	4.64	3.71	4.14
Single with children	21.20	20.94	21.73	22.84	23.32	24.32	27.55	25.23
Single without children	28.36	20.48	29.21	33.34	30.49	21.52	36.82	31.39

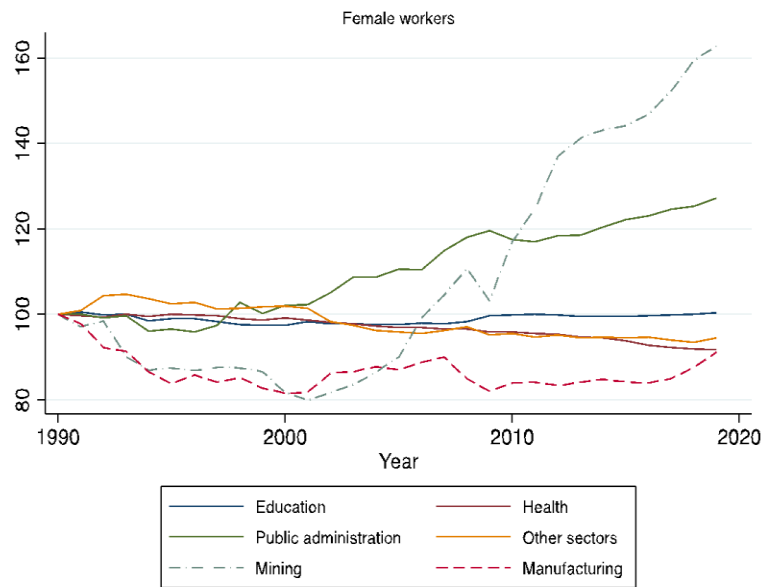
Country of birth

Sweden	94.10	93.31	95.86	94.29	91.78	90.35	95.39	93.73
Other Europe	4.30	5.05	3.67	4.40	4.48	5.34	3.60	4.01
Other countries	1.61	1.65	0.47	1.31	3.74	4.31	1.01	2.25

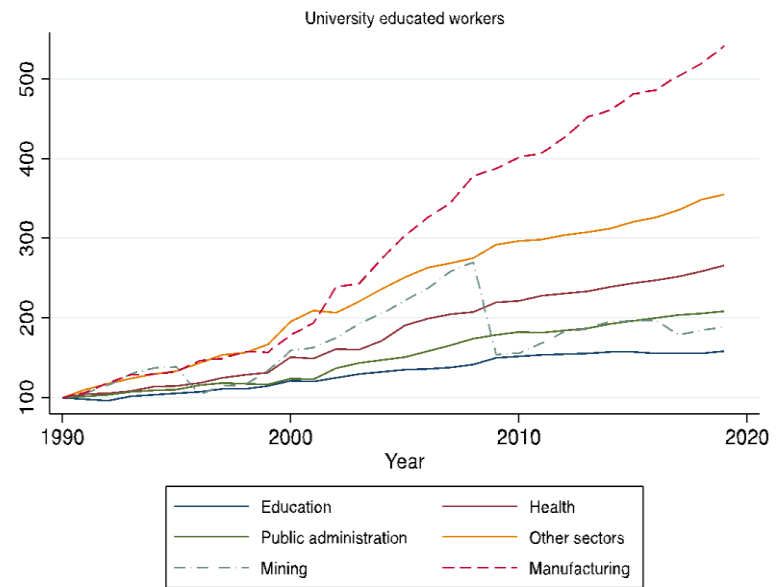
Source: Authors' own calculation based on data from SCB via ASTRID database.

Figure A1. Female worker dynamics in Norrbotten and Västerbotten (A) and university-educated worker dynamics in Norrbotten and Västerbotten (B)

A



B



Source: Authors' own calculation based on data from SCB.

Note: Index 100 in 1990.

Table A2. Descriptive statistics (in absolute and natural log values)

Variable	Full sample (1990–2019)				Post growth (2006–2019)				Emp. 2019
	Mean	Std. dev.	Min.	Max.	Mean	Std. dev.	Min.	Max.	
Absolute values									
Mining and manufacturing	36,141	4,300	29,997	45,709	32,871	3,530	29,997	40,359	29,997
Mining	6,423	888	4,549	8,143	5,988	926	4,549	7,862	5,719
Manufacturing	29,719	3,601	24,278	37,566	26,882	2,805	24,278	32,821	24,278
Public sector (total)	75,628	2,689	71,733	81,508	75,578	2,614	71,971	80,010	7,6491
Public sector: education	26,098	1,711	23,873	30,258	24,722	657	23,873	26,129	24,365
Public sector: healthcare	36,037	1,089	33,784	38,196	36,090	1,126	34,545	38,196	35,554
Public sector: administration	13,494	1,721	11,384	16,684	14,765	1,597	12,023	16,684	16,572
Natural log values									
Mining and manufacturing	10.49	0.12	10.31	10.73	10.40	0.10	10.31	10.61	10.31
Mining	8.76	0.14	8.42	9.00	8.69	0.15	8.42	8.97	8.65
Manufacturing	10.29	0.12	10.10	10.53	10.19	0.10	10.10	10.40	10.09
Public sector (total)	11.23	0.04	11.18	11.31	11.23	0.03	11.18	11.29	11.24
Public sector: education	10.17	0.06	10.08	10.32	10.12	0.03	10.08	10.17	10.10

Public sector: healthcare	10.49	0.03	10.43	10.55	10.49	0.03	10.45	10.55	10.48
Public sector: administration	9.50	0.12	9.34	9.72	9.59	0.11	9.39	9.72	9.71

Source: Authors' own calculation based on data from SCB.

Table A3. Effects of expansion in mining and manufacturing on public sector employment

Steps/time	% change in public sector upon mining & manufacturing expansion	Effects	% change in education upon mining expansion	Effects	% change in public administration upon mining expansion	Effects	% change in public administration upon manufacturing expansion	Effects
1	-0.001427 * 75 672	108	-0.003489 * 27 301	95	-0.005414 * 12 381	67	-0.023237 * 12 381	287
2	-0.00692 * 75 672	524	-0.007176 * 27 301	196	-0.005127 * 12 381	63	-0.023353 * 12 381	289
3	-0.008836 * 75 672	668	-0.009056 * 27 301	247	-0.007986 * 12 381	99	-0.024657 * 12 381	305
4	-0.007748 * 75 672	586	-0.00577 * 27 301	158	-0.011208 * 12 381	139	-0.020681 * 12 381	256
5	-0.007212 * 75 672	546	-0.001629 * 27 301	44	-0.015054 * 12 381	186	-0.024141 * 12 381	299
6	-0.0073 * 75 672	552	-0.000768 * 27 301	21	-0.015977 * 12 381	198	-0.024465 * 12 381	303
7	-0.006838 * 75 672	517	-0.001706 * 27 301	47	-0.015374 * 12 381	190	-0.024819 * 12 381	307
8	-0.005936 * 75 672	449	-0.001923 * 27 301	52	-0.01419 * 12 381	176	-0.022542 * 12 381	279
9	-0.005158 * 75 672	390	-0.001644 * 27 301	45	-0.013558 * 12 381	168	-0.021765 * 12 381	269
10	-0.004543 * 75 672	344	-0.001599 * 27 301	44	-0.01307 * 12 381	162	-0.020934 * 12 381	259
Average		468		95		145		285

Source: Authors' own calculation based on data from SCB.

Note: Effects are computed at one standard deviation expansion in mining and/or manufacturing (before growth, see Table A2).

Table A4. Occupational moves from the public sector

Occupation classification – 2-digit level	Educational direction									Educational level			
	Total move	General education	Pedagogy and teacher education	Humanities and arts	Social sciences, law and business	Natural science, math and data	Technology and manufacturing	Agriculture, forestry and animal health	Health, medical and social care	Service	High	Medium	Low
Service professions	4,279	22.1	6.5	5.0	10.4	1.5	8.9	1.8	30.6	10.4	12.9	80.5	6.6
Professions requiring advanced competence in education	1,533	2.8	57.4	6.7	5.6	6.5	10.5	0.5	7.8	1.7	78.5	21.2	0.3
Professions requiring advanced competence in finance and management	1,382	5.4	7.3	5.2	36.7	3.2	6.8	1.2	30.5	3.0	66.3	32.3	1.4
Cleaning professions	712	31.0	2.8	3.8	12.4	1.1	11.0	1.8	11.7	21.2	5.5	74.9	19.7
Occupations requiring higher education qualification or equivalent in finance and management	633	3.0	82.5	1.7	2.4	1.3	0.5	0.0	6.6	1.7	41.7	57.5	0.8
Office assistants and secretaries	616	15.4	6.7	2.8	45.5	3.9	9.3	1.1	9.3	4.7	15.1	80.7	4.2
Occupations requiring higher education qualification or equivalent in culture and social work	608	8.6	5.3	4.8	32.1	1.5	7.4	1.0	28.1	10.2	38.8	58.7	2.5
Occupations requiring higher education qualification or equivalent in health care and lab	531	1.1	3.6	0.2	1.3	4.0	2.3	4.9	77.0	5.6	66.7	33.0	0.4
Professions requiring advanced competence in health care	424	0.2	1.4	0.7	1.2	2.6	0.5	4.7	88.0	0.0	87.7	11.8	0.5
Occupations requiring higher education qualification or equivalent In technology	329	7.3	2.7	1.2	6.7	7.3	63.2	1.8	4.3	4.6	25.2	72.6	2.1
Administrative and commercial managers	315	2.2	35.6	2.5	19.4	3.5	8.9	0.6	22.2	4.4	63.5	35.9	0.6
Building and construction professions	288	19.8	4.2	1.0	4.5	0.3	61.8	2.4	1.7	3.1	2.1	85.1	12.8

Production and specialised services managers	220	5.9	7.3	0.9	17.3	0.9	4.5	0.5	62.3	0.0	57.7	39.5	2.7
Professions requiring advanced competence in sciences and technology	177	1.7	4.0	1.7	11.9	18.1	53.1	0.0	6.8	2.8	58.8	40.7	0.6
Officers	140	0.0	1.4	0.0	2.9	2.1	10.7	0.7	5.0	77.1	70.0	30.0	0.0
Metalworking and repair professions	83	8.4	0.0	0.0	2.4	3.6	77.1	1.2	2.4	3.6	6.0	88.0	6.0
Sales professions in retail	78	24.4	5.1	6.4	19.2	15.4	3.8	0.0	15.4	7.7	15.4	78.2	6.4
Customer service occupations	75	18.7	4.0	6.7	21.3	1.3	10.7	4.0	17.3	9.3	13.3	81.3	5.3
Transport and machine driver professions	58	25.9	0.0	0.0	6.9	1.7	37.9	5.2	1.7	15.5	1.7	81.0	17.2
Agricultural and horticultural occupations	54	24.1	0.0	1.9	5.6	22.2	27.8	0.0	5.6	11.1	1.9	83.3	14.8
Assemblers	47	25.5	4.3	2.1	2.1	2.1	53.2	0.0	2.1	8.5	10.6	72.3	17.0
Process and machine operators	22	27.3	0.0	0.0	9.1	9.1	31.8	9.1	4.5	9.1	22.7	59.1	18.2
Berry pickers and planters	14	21.4	0.0	0.0	0.0	57.1	21.4	0.0	0.0	0.0	0.0	78.6	21.4
Labourers in construction, manufacturing and transport	13	23.1	7.7	7.7	0.0	46.2	0.0	0.0	0.0	7.7	7.7	76.9	15.4
Fine mechanics, graphics, and arts and crafts professions	10	0.0	0.0	0.0	10.0	10.0	60.0	10.0	10.0	0.0	10.0	90.0	0.0
Electricity and electronics work	9	22.2	0.0	0.0	22.2	22.2	0.0	0.0	22.2	11.1	11.1	77.8	11.1
Politicians, CEOs, and senior officials	8	0.0	0.0	0.0	50.0	12.5	25.0	0.0	12.5	0.0	50.0	50.0	0.0

Source: Authors' own calculation based on data from SCB.

Note: We have not included a category of observations with an unknown education type in the table, though they were used in the computation. The analysis covers the period 2006–2008.

Table A5. Occupational hires or recruits to the public sector

Occupation classification – 2-digit level	Educational direction										Educational level		
	Total hired	General education	Pedagogy and teacher education	Humanities and arts	Social sciences, law and business	Natural science, maths and data	Technology and manufacturing	Agriculture, forestry and animal health	Health, medical and social care	Service	High	Medium	Low
Service professions	1,825	21.7	8.4	4.9	9.6	1.3	6.0	1.4	36.1	8.3	12.4	80.3	7.3
Professions requiring advanced competence in finance and management	878	2.6	8.9	2.6	29.6	2.7	4.7	0.0	46.6	1.8	72.7	26.8	0.6
Professions requiring advanced competence in education	841	1.8	63.6	4.5	4.8	1.9	4.0	0.5	15.3	3.2	83.5	16.4	0.1
Occupations requiring higher education qualification or equivalent in finance and management	552	1.6	89.7	0.9	1.6	0.0	0.2	0.0	4.9	1.1	52.9	46.7	0.4
Occupations requiring higher education qualification in culture and social work	380	6.1	7.6	2.6	21.3	4.5	4.2	0.8	42.1	9.2	46.6	52.1	1.3
Occupations requiring higher education qualification in health care and lab	373	0.3	2.7	0.5	1.9	2.1	0.5	0.3	88.5	3.2	68.1	31.6	0.3
Professions requiring advanced competence in health care	333	0.0	0.9	0.6	0.0	1.2	0.6	0.0	96.1	0.0	93.1	6.3	0.6
Office assistants and secretaries	325	13.5	8.6	4.0	44.3	2.5	5.5	1.2	14.5	4.9	16.3	80.6	3.1
Administrative and commercial managers	286	0.7	41.6	2.8	11.2	1.0	1.4	0.3	38.8	1.7	68.9	31.1	0.0
Cleaning professions	263	34.2	3.4	3.4	8.7	0.8	7.2	0.4	12.5	25.9	2.3	76.8	20.9
Production and specialised services managers	117	4.3	7.7	1.7	12.8	0.9	4.3	0.0	67.5	0.9	55.6	43.6	0.9

Occupations requiring higher education qualification or equivalent in technology	101	9.9	6.9	0.0	4.0	8.9	53.5	2.0	7.9	5.9	35.6	62.4	2.0
Building and construction professions	90	22.2	7.8	2.2	5.6	1.1	54.4	2.2	1.1	2.2	3.3	83.3	13.3
Officers	50	0.0	4.0	0.0	0.0	0.0	10.0	0.0	2.0	84.0	66.0	34.0	0.0
Professions requiring advanced competence in sciences and technology	41	12.2	2.4	0.0	12.2	17.1	34.1	0.0	22.0	0.0	53.7	46.3	0.0
Customer service occupations	25	16.0	4.0	12.0	32.0	4.0	0.0	0.0	24.0	4.0	40.0	52.0	8.0
Agricultural and horticultural occupations	11	9.1	9.1	0.0	9.1	0.0	18.2	36.4	0.0	18.2	9.1	90.9	0.0
Metalworking and repair professions	8	0.0	0.0	0.0	12.5	0.0	75.0	0.0	12.5	0.0	0.0	100.0	0.0
Sales professions in retail	7	14.3	14.3	0.0	0.0	0.0	14.3	14.3	28.6	0.0	0.0	100.0	0.0
Politicians, CEOs and senior officials	5	0.0	60.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0	0.0
Assemblers	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0
Fine mechanics, graphics, and arts and crafts professions	4	0.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	25.0	0.0	100.0	0.0
Transport and machine driver professions	3	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	100.0	0.0
Labourers in construction, manufacturing and transport	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0
Process and machine operators	1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0

Source: Authors' own calculation based on data from SCB.

Note: We have not included a category of observations with an unknown education type in the table, though they were used in the computation. The analysis covers the period 2006–2008.

Table A6. Summary and description of variables

Variable	Category	Definition
Dependent variable		
Move from the public sector	Stayer	If reported as employed in public sector in period $t - 1$
	Move to mining	If reported as employed in mining in period t but was employed in public sector in period $t - 1$
	Move to manufacturing	If reported as employed in manufacturing in period t but was employed in public sector in period $t - 1$
	Move to other sector	If reported as employed in other sectors in period t but was employed in public sector in period $t - 1$
Independent variable		
Real income	Below SEK 250,000	Average annual real income less than SEK 250,000
	SEK 250,000–390,000	Average annual real income between SEK 250,000 and SEK 390,000
	Above SEK 390,000	Average annual real income above SEK 390,000
Relative income		Relative within occupation in a region
Gender	Male	1 for male and 0 for female
Age	18–25	Age between 18 and 25
	26–35	Age between 26 and 35
	36–64	Age between 36 and 64

	65–75	Age between 65 and 75
Level of education	High education	Persons with post-secondary education of 3–5 years or postgraduate education
	Medium education	Persons with secondary education, post-secondary less than 2 years or post-secondary of 2 years
	Low education	Persons with compulsory education, unknown or missing education code
Field of education	STEM	Education in natural science, maths and data; technology and manufacturing; and agriculture, forestry and animal health
	General education	Education in general education, humanities and arts, services; unknown; and missing
	Health, medicine and social care	Education in health, medicine and social care
	Pedagogy and teacher education	Education in pedagogy and teacher education
	Social sciences, law and business	Education in social sciences, law and business
Municipal type	Mining municipality	Municipalities with over 18% of the workforce in the last 3 years in the mining industry
	Mining fringe	Municipalities with some mining activities
	Regional centre	County capitals, Luleå and Umeå
	Other small municipality	Small municipalities with no mining activities in the last 3 years
Marital status	Married with children	Married with children
	Married without children	Married without children
	Single with children	Single with children

Single without children

Single without children

Source: Authors' own calculation based on data from SCB.

Table A7. Factors influencing moves from the public sector

	Mining	Manufacturing	Other
<i>Income – Referenced: Between SEK 250,000–390,000 (medium income)</i>			
Below SEK 250,000 (low income)	0.399*	0.670***	0.502***
	(0.171)	(0.123)	(0.035)
Above SEK 390,000 (high income)	0.784***	0.394*	0.291***
	(0.190)	(0.171)	(0.042)
Relative income	0.446*	-0.334	-0.806***
	(0.213)	(0.237)	(0.074)
Man	0.407**	0.997***	0.239***
	(0.157)	(0.100)	(0.026)
<i>Age – Referenced: 36–64 years</i>			
18–25 years	2.450***	1.974***	1.356***
	(0.233)	(0.142)	(0.041)
26–35 years	1.187***	0.905***	0.443***
	(0.160)	(0.106)	(0.028)
65–75 years	0.792	-0.282	0.146
	(0.455)	(0.454)	(0.080)
<i>Education – Referenced: Medium education</i>			
High education	0.534**	0.208	0.355***
	(0.179)	(0.134)	(0.033)
Low education	-0.392	-0.119	-0.179***
	(0.346)	(0.179)	(0.051)
<i>Education type – Referenced: Social sciences, law and business</i>			
General education	0.474	-0.062	0.149***
	(0.265)	(0.144)	(0.037)
Health, medicine and social care	-0.775*	-0.526***	-0.086*
	(0.308)	(0.155)	(0.039)

Pedagogy and teacher education	-1.189**	-0.827***	0.045
	(0.367)	(0.237)	(0.053)
STEM	1.804***	0.778***	0.295***
	(0.240)	(0.145)	(0.042)
<i>Municipality Referenced: Large regional centres</i>			
Mining municipality	3.472***	1.077***	0.548***
	(0.161)	(0.144)	(0.037)
Mining fringes	1.044***	0.858***	0.071*
	(0.207)	(0.110)	(0.031)
Other small municipality	0.098	0.601***	0.281***
	(0.218)	(0.103)	(0.025)
<i>Marital status – Referenced: Married with children</i>			
Married without children	0.689**	0.350	0.072
	(0.253)	(0.197)	(0.054)
Single with children	0.314	0.234*	0.072*
	(0.164)	(0.111)	(0.028)
Single without children	0.337*	0.130	0.260***
	(0.170)	(0.121)	(0.031)
Others	-0.237	0.190	0.251***
	(0.254)	(0.148)	(0.033)
Constant	-10.048***	-7.898***	-2.474***
	(0.582)	(0.557)	(0.099)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Occupation FE	Yes	Yes	Yes
Observations	210 440	210 440	210 440
R ²	0.101	0.101	0.101

Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Source: Authors' own calculation based on data from SCB.

Note: Table uses a multinomial logistic regression: Parameter estimates are relative to the referent group 'stayers in the public sector'. Therefore, results are estimated specifications for 'moving to the mining industry' relative to 'staying in the public sector'; 'moving to the manufacturing industry'

relative to 'staying in the public sector'; and 'moving to other sectors' relative to 'staying in the public sector'. The standard interpretation is that for a unit change in the predictor variable, the logit of the outcome relative to the referent group ('staying in the public') is expected to change by its respective parameter estimate given all variables in the specification are held constant. The analysis covers the period 2006–2008.