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DECLINING OCCUPATIONS AND CAREER OUTCOMES IN NORWAY

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ABSTRACT

Occupational change is a central feature of modern labor markets. This paper examines the career consequences in Norway of being initially employed in an occupation that subsequently declines during 2007–2024. Workers initially employed in occupations that later decline by at least 25% demonstrate 0.4 lower future years of work, although this employment difference is mostly explained by other individual traits. These workers, conditional on controls, experience a 4.7% reduction in future cumulative earnings relative to starting earnings, akin to losing one year's worth of earnings over 2007–2024.

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Introduction

Occupational change is a central feature of modern labor markets. Workers move across jobs and occupations as technologies, global trade, and consumer demand reshape what firms produce and how tasks are performed. Recent evidence argues that the pace and scope of disruption has increased, raising the economic salience of occupational reallocation (Deming, Ong, and Summers, 2025). These adjustments also shape the incidence of automation-related gains and losses (Acemoglu and Restrepo, 2019). Understanding the micro-level adjustment process helps evaluate the distributional effects of structural change, the persistence of inequality, and the effectiveness of social insurance and retraining policies.

Several broad forces motivate renewed attention to occupational decline. Large trade and productivity shocks have reallocated employment away from some production-intensive activities and toward services (Autor, Dorn, and Hanson, 2013). Additionally, interpersonal and “social” skills have become more important in the labor market (Deming, 2017). Rapid digitalization and the diffusion of AI tools are also reshaping the task content of work (e.g., Barth et al., 2023, McElheran et al., 2024, Hampole et al., 2025).

A central question is what are the career consequences of being initially employed in an occupation that subsequently declines? Edin et al. (2023) provide an important benchmark using Swedish administrative data, estimating that workers in declining occupations suffered a 2-5% decline in cumulative earnings over 1986-2013. This reflects lower earnings conditional on employment and fewer years of employment. Losses are substantially larger for workers starting at the bottom of their occupation’s earnings distribution. See also Schmitten (2019), Hensvik and Nordström Skans (2023), and Ek (2025).

This paper documents comparable patterns for Norway using linked employer–employee register data from 2007–2024. Like Sweden, Norway is a high-income economy with institutions designed to mitigate labor-market shocks, but it also has distinctive sectoral features (e.g., petroleum-related activities, high public employment), and is an important comparison point in a more recent period.

Employment consequences of occupational decline in Norway

We use Statistics Norway’s administrative register data linked across workers, jobs, and establishments from 2007 to 2024. The linked structure allows us to follow individuals over time

and observe employment spells, job-level wages, annual taxable labor earnings, industry, and demographics. Details on the data are provided in the appendix. Occupations are coded using 3-digit STYRK-98 classifications, and occupational growth is computed from changes in occupational employment from 2007 to 2024.

Most of our analyses center on occupations with employment decline of 25% or more during 2007–2024. We also divide occupations into quartiles of growth in employment shares, with Q1 including the most declining occupations and Q4 the fastest growing.

The appendix provides a full list of occupations and their growth rates in Norway, showing that blue- and white-collar work appear in all four growth quartiles. Declining categories include printing and binding machine operators and manufacturing laborers, but also clerical occupations such as secretaries and keyboard-operating clerks. Fast-growing occupations include business professionals, health professionals, and computer systems designers and programmers. Aligned with earlier work, occupations involving routine work showed the sharpest declines, while those with abstract, social, and service components grew (Autor and Dorn 2013, Deming 2017).

Figure 1 plots indexed annual employment rates over 2007–2024 (2007=100) for individuals working in 2007 and aged 22–45. We group workers based on the subsequent growth of their initial 2007 occupation. Employment declines are persistent for workers whose initial occupations later contract. By 2024, the employment index for the most declining quartile is 80.7, versus 86.7 for the fastest-growing quartile. While the four series share common time variation, the gap between Q1 and Q4 is visible throughout the period and does not close by 2024.

Table 1 explores heterogeneity in 2024 outcomes. Employment declines are slightly larger for women in the most declining quartile (79.7 versus 81.7), but the patterns across occupational growth quartiles are overall quite similar. Differences between education levels are larger, and variations within educational levels across quartiles are diminished, consistent with declining occupations having a strong tie to education. Employment declines more for immigrants than for natives (Bratsberg et al., 2018). Differences between quartiles are larger for immigrant groups than for natives. Finally, urban and rural areas show similar patterns.

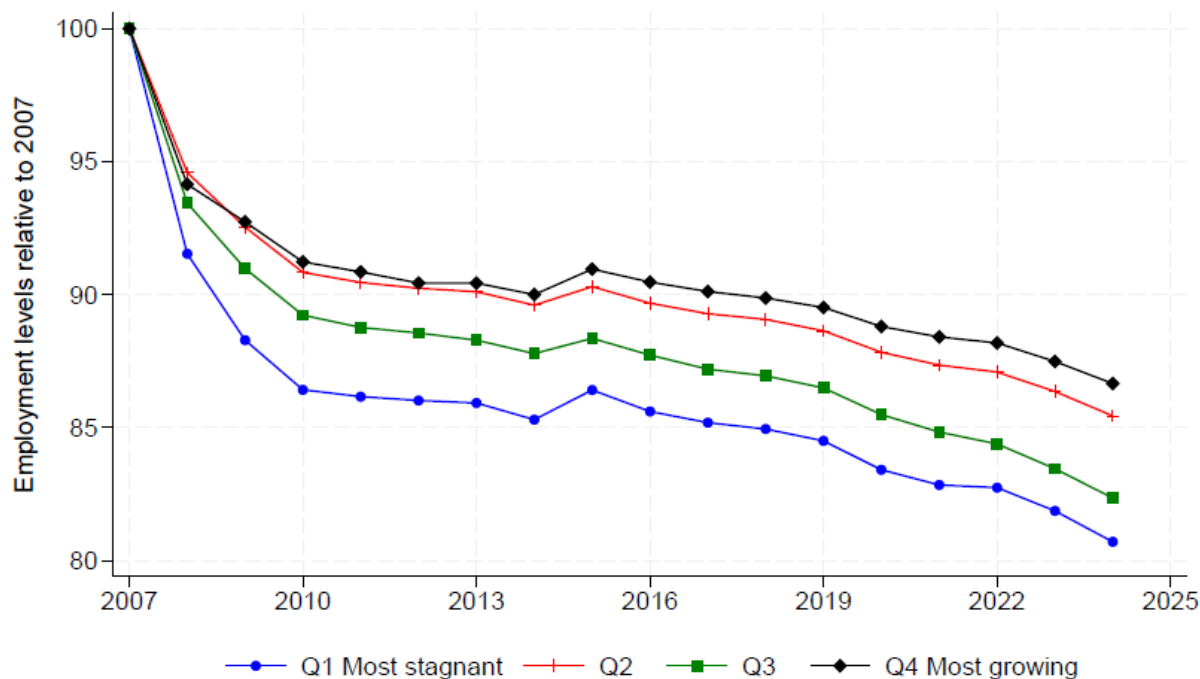


Figure 1: Employment levels by occupational growth rate of worker's initial occupation, 2007–2024

Notes: The figure displays indexed series of annual employment rates from 2007 to 2024 relative to 2007 levels. The sample includes residents in 2007 who were working, aged 22–45, and with minimum earnings in main occupation of 0.5 basic amounts in Norway, roughly US \$4,800 in 2022. Quartiles are by growth of initial occupation over 2007–2024. Q1 includes the most declining or stagnant occupations; Q4 the fastest growing. Non-employment includes mortality and outmigration (1.2% and 1.7%, respectively, of total sample in 2022). Between 2014 and 2015 there is a break in the series due to an administrative change. *Source:* Author calculations, based on administrative register data provided by Statistics Norway.

Table 1: Heterogeneity of Figures 1 and 2 for outcomes in 2024

	Indexed employment in 2024 compared to 2007				Indexed earnings in 2024 compared to 2007			
	Q1 slowest (1)	Q2 (2)	Q3 (3)	Q4 fastest (4)	Q1 slowest (5)	Q2 (6)	Q3 (7)	Q4 fastest (8)
Total	80.7	85.4	82.3	86.7	158.7	141.5	152.1	153.6
Sex: Male	81.7	85.9	83.4	86.6	150.7	136.7	144.9	150.7
Sex: Female	79.7	84.8	81.1	86.7	168.7	150.1	164.0	156.7
Education: Low	69.9	70.2	68.9	68.8	147.7	142.2	148.0	150.6
Education: Middle	83.3	85.3	83.4	84.5	148.0	134.7	143.8	145.9
Education: High	87.2	90.8	89.1	89.0	189.7	143.1	159.6	154.5
Native	82.3	87.5	84.1	88.2	158.0	140.1	151.3	153.1
Immigrant: High-Income Country	66.8	69.9	66.4	71.5	152.5	143.1	148.5	151.6
Immigrant: Others	64.5	64.8	67.6	73.2	169.6	157.2	163.6	166.2
Local geography: Urban	80.0	85.3	82.0	86.5	164.2	141.4	154.3	153.5
Local geography: Rural	81.2	85.6	82.6	86.9	154.7	141.7	150.3	153.8

Notes: See Figures 1 and 2. Table reports values in 2024 of sub-groups indexed to their 2007 levels. *Source:* Author calculations, based on administrative register data provided by Statistics Norway.

Earnings consequences of occupational decline in Norway

Figure 2 plots indexed annual labor earnings (2007=100) for the same individuals by their occupational growth quartiles. Earnings are measured conditional on employment as defined above, summed across jobs, and adjusted for inflation.

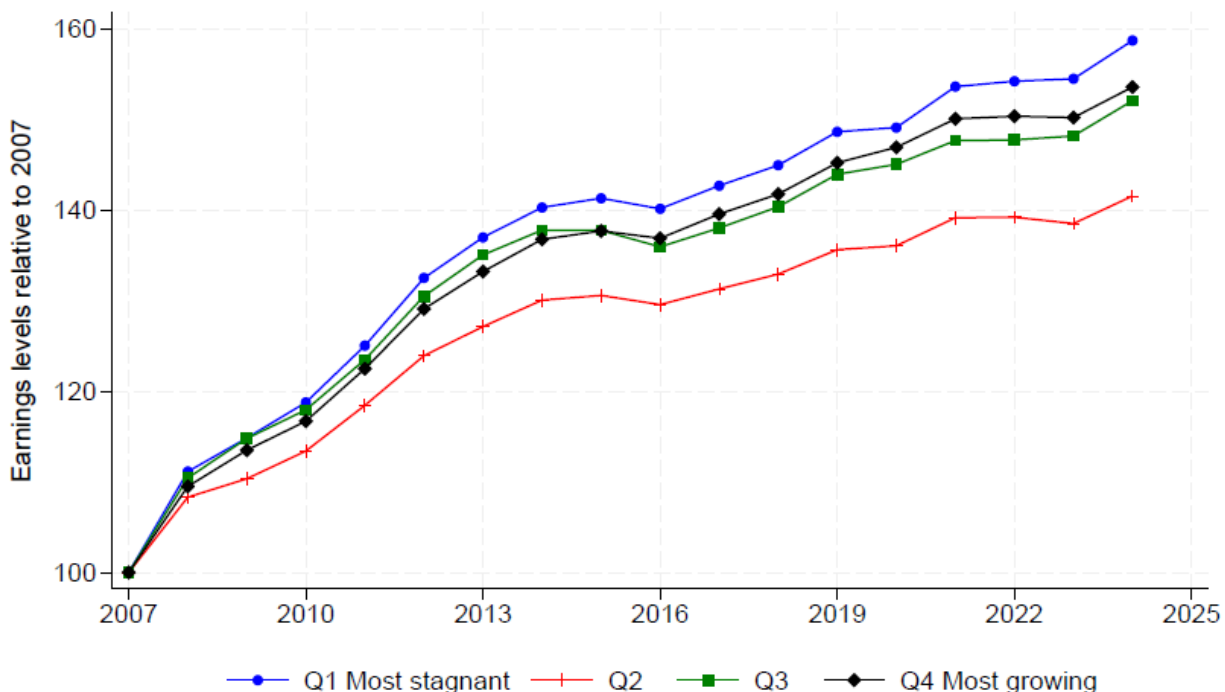


Figure 2: Earnings levels by occupational growth rate of worker's initial occupation, 2007–2024

Notes: See Figure 1. The figure plots indexed series of annual earnings from 2007 to 2024 relative to 2007 levels. Earnings sum over jobs, are measured conditional on working, and control for inflation. *Source:* Author calculations, based on administrative register data provided by Statistics Norway.

Indexed earnings rise strongly for all groups. By 2024, Q1's earnings index is 158.7 for those in the most declining occupations, compared with 153.6 for Q4's fastest growth occupations. As we will see, this higher value for the slowest growth quartile does not persist in the presence of individual covariates. Occupations with the slowest growth start from a lower overall wage level, as shown in the appendix.¹

¹ The appendix documents mean values of worker traits by 2007 growth quartile across occupational dimensions (e.g., share of tasks that are routine vs. abstract) and individual characteristics (e.g., share female, share urban). Average real earnings is NOK 377,237 in Q1 occupations versus NOK 500,646 in Q4 occupations. Norway thus shows a high correlation between the typical wage of occupations in 2007 and their 2007–2024 growth rates.

To isolate occupational features from other traits of the workers, we consider individual-level regressions of cumulative career outcomes over 2007–2024 on occupational growth from 2007. For individual i , we estimate:

$$(1) Y_i^{07-24} = \alpha + \beta OccDecl_i^{07} + \gamma X_i + \varepsilon_i,$$

where Y captures future career outcomes for the individual during 2007–24, $OccDecl$ measures the future growth of i 's occupation in 2007, and X includes individual covariates (sex, age, education, initial 2007 earnings, etc.). The β coefficient captures the conditional correlation of future careers of workers by their initial occupation's growth. Regressions are unweighted and cluster standard errors by occupation.

Panel A in Table 2 uses an indicator for starting in an occupation whose employment falls by 25% or more by 2024; Panel B compares the most stagnant quartiles to the top half of occupations. Outcomes include (i) a cumulative earnings ratio relative to 2007, (ii) cumulative earnings (inflation-adjusted to 2022 values), and (iii) cumulative years worked. Columns 1–3 show raw values without covariates, and Columns 4–6 add covariates. The appendix provides comprehensive regression tables and discussion of results for each outcome variable.

The fully controlled estimates in Columns 4–6 indicate modest but meaningful career scarring. Starting in an occupation that later declines by at least 25% is associated with a 4.7% reduction in the cumulative earnings ratio, relative to the mean career outcome, roughly akin to losing one year's worth of earnings over 2007–24. There is a 9.8% reduction in cumulative earnings, while the effect on cumulative years worked is close to zero. These patterns suggest that earnings losses primarily reflect wage and hours dynamics among those who remain employed, rather than differences in years worked.

Our plotted trends utilize wage earnings from employer-employee data to provide the most comparable estimates to prior work. We have also examined income, which includes self-employment earnings, showing similar results. Reported trends are likewise robust to dropping the large public sector in Norway, as shown in the appendix.

Table 2: Individual-level regressions of 2007-24 career outcomes and being in declining occupations in 2007

	Base analysis without controls			Analysis with full controls (see notes)		
	Cumulative earnings 2007-24 relative to 2007 level	Cumulative earnings 2007- 24 (in 2022 NOK)	Cumulative years worked 2007-24	Cumulative earnings 2007-24 relative to 2007 level	Cumulative earnings 2007- 24 (in 2022 NOK)	Cumulative years worked 2007-24
	(1)	(2)	(3)	(4)	(5)	(6)
<i>A. Models with occupation decline as single indicator variable for declines exceeding 25%</i>						
(0/1) declining occupation	-0.224 (1.899)	-1,858,998 (668,343)	-0.430 (0.189)	-1.207 (0.699)	kr -1,002,421 (308,304)	0.046 (0.132)
<i>B. Models with occupation decline/growth as quartile indicators relative to the top two quartiles</i>						
(0/1) most stagnant	1.617 (1.641)	kr -1,919,584 (1,010,222)	-0.537 (0.214)	-0.997 (0.612)	kr -588,811 (280,371)	0.045 (0.105)
(0/1) second-most stagnant	-2.131 (0.970)	kr 891,351 (1,193,724)	0.180 (0.329)	0.018 (0.858)	kr 45,137 (354,426)	0.008 (0.072)
Mean of dependent variable	25.76	kr 10,241,100	15.96	25.76	kr 10,241,100	15.96
Relative impact: Panel A	-0.9%	-18.2%	-2.7%	-4.7%	-9.8%	0.3%
Relative impact: Panel B for most stagnant occupations	6.3%	-18.7%	-3.4%	-3.9%	-5.7%	0.3%

Notes: Table reports individual-level regressions of career outcomes over 2007-24 by occupation in 2007. In Panel A, a single indicator variable models workers being in an initial occupation that will decline at least 25% in employment counts (12 of 97 occupations). Panel B models unweighted quartiles of relative occupation growth. Columns 1-3 are without controls. Columns 4-6 incorporate fixed effects for sex, age (3 groups), education (3 groups), and immigrant background (3 groups) and log initial earnings; NAICS2 fixed effects; fixed effects for six centrality levels of municipalities; and log initial employment of establishment and firm, indicators for whether the 2007 firm closed, shrank or grew in employment by 2016 and by 2024, respectively, and a private sector indicator variable. The appendix documents the full sequence of controls being incorporated and discusses the results further. Regressions are unweighted, have 1,111,041 observations, and cluster standard errors by occupation. Earnings ratios in Columns 1 and 4 are capped at a value of 500. Career earnings summations in Columns 2 and 4 are expressed in constant 2022 Norwegian kroner (NOK) and winsorized at 0.1% and 99.9% levels. *Source:* Author calculations, based on administrative register data provided by Statistics Norway.

Summary and future directions

Occupational decline is a routine feature of economic structural change, but it can generate persistent differences in employment and labor earnings for workers who start their careers in shrinking occupations. Using Norwegian linked employer–employee registers from 2007–24, we document lower employment trajectories for workers initially in declining occupations. The employment effects are not sustained in regression models with extensive individual controls. In similar regressions of the cumulative earnings ratio, we find a relative earnings loss of about 5%.

These findings are comparable with Edin et al.’s (2023) work in Sweden, who find larger relative differences in earnings than employment. The two studies together confirm that losses from occupational decline are modest in high-income settings with strong institutions, while still being economically meaningful and potentially concentrated among vulnerable workers. Our Norwegian

evidence motivates further work to trace occupation-to-occupation transitions directly and to quantify mechanisms such as retraining and unemployment spells.

Ongoing work extends this agenda to the United States for 2000–20, which may look different given the weaker U.S. labor market protections and greater income disparities. This work will consider occupation-to-occupation transitions and an intergenerational perspective on how parental exposure to declining occupations shapes children’s jobs. Building a multi-country base of information offers a promising approach for understanding how institutions and industrial structure mediate worker adjustment to occupational decline.

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DECLINING OCCUPATIONS AND CAREER OUTCOMES IN NORWAY

Supplemental Appendix

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Data and variable definitions

From administrative linked employer-employee register data for the full population from 2007–2024 from Statistics Norway, we select a sample of employees from 2007 and follow them annually to 2024.

The 2007 sample of employees

Our sample includes all 22–45-year-old employees in 2007 who were residents in Norway. For each employee we keep main occupation defined as the occupation with largest wage earnings, summing over all jobs (employers) in 2007. We require that annual earnings from main occupation must exceed 0.5 basic amounts of the Norwegian pension system (33,400 2007-NOK), roughly equal to 4,800 2022-USD (inflation and exchange-rate adjusted). Students are included (9.6% are students in 2007, of which 40% are 22–25 years old). The data do not include self-employed workers, and we drop military occupations.

Occupational classification

Occupation is reported for each annual observation by Statistics Norway, using the Norwegian Styrk-98 classification, based on ISCO-88. We measure occupations at the three-digit level. Because public sector classifications were reported using position codes (stillingskoder) rather than occupation codes in the earlier years of our data, with a gradual and lumpy transfer to Styrk-codes, we group together white-collar public-sector administrative jobs (including managers) into one occupation (Public sector administration) every year before calculating growth in annual employment shares, etc. Three-digit occupations with fewer than 250 observations in 2007 are lumped together with similar occupations (521 into 522, 912 into 913, 611 & 612 into 613, 631 into 641, 732 & 733 into 731, and 743 into 744). Observations with missing occupation are excluded but included in the denominator when calculating annual occupation shares. A full list of occupations, including employment growth between 2007 and 2024, is provided in Appendix Table 1.

We create an indicator of *declining occupations* for occupations where the employment share, that is, the count in 2024 minus the count in 2007 divided by the count in 2007, declines by at least 25% from 2007 to 2024.

We calculate *growth quartiles* based on relative change in occupation shares, correcting for overall employment growth, equal to the share in 2024 minus the share in 2007, divided by the share in 2007.

Variable definitions and data series 2007–2024

We measure outcomes in terms of employment and earnings series for every year from 2007 to 2024 for the entire 2007-sample of employees.

Employment series are defined from the observed *annual labor earnings from main occupation* that year being above a certain threshold as defined above. Non-employment status includes dead persons and emigrants. By 2022 (the last year with demographic data), 1.68% had emigrated and 1.19% were dead. There is a break in the series between 2014 and 2015 due to an administrative change in the reporting routines for the Employer-Employee register, from physical and annual reporting to monthly reporting mainly directly from digital payroll systems that include slightly more reported job-spells.

Earnings series include *total pre-tax wage earnings* from all jobs (employment spells) each year, conditional on employment. Income from self-employment is not included. Earnings are measured in real (inflation adjusted) 2022-NOK and winsorized at 0.1% and 99.9%. *Earnings ratio* is calculated as cumulative real earnings over 2007–2024 relative to the 2007-level (capped at 500 before winsorizing).

Covariates and group definitions measured in 2007

Education and student status by October 2007 is obtained from the Norwegian National Data Base managed by Statistics Norway.

An immigrant is defined as a worker born outside of Norway by two foreign-born parents. High-income countries include EU, EFTA (minus Norway), Great Britain, US, Canada, Australia, and New Zealand.

Control variables in regressions and group classifications in the heterogeneity analyses include sex, age (three groups), education (no/low, middle, and high), immigrant status (natives, high-income countries, and rest of the world), industry dummies (two-digit NAICS codes), five dummies for centrality of residential municipality (measured relative to the most central: Asker, Bærum, Drammen, Lørenskog, Moss, Oslo, Rælingen, Skedsmo), log annual wage earnings in 2007, rural vs. urban residential municipality according to classification by Statistics Norway (Urban: Asker, Askim, Bergen, Bærum, Drammen, Fet, Fredrikstad, Frogn, Gjerdrum, Hamar, Horten, Lier, Lørenskog, Moss, Nedre Eiker, Nittedal, Oppegård, Oslo, Randaberg, Rygge, Rælingen, Røyken, Sandefjord, Sandnes, Sarpsborg, Skedsmo, Ski, Sola, Stavanger, Trondheim, Tønsberg, Ullensaker, Vestby, Ås), log number of employees in 2007-establishment and -firm (count set to 1 if missing or 0/negative before taking logs), and six dummies for the change in firm employment from 2007–2016 and 2016–2024, respectively: grew, shrank or closed (relative to stayed constant and firms with missing employment info), private sector worker according to sectoral definition by Statistics Norway.

Occupational changes

Appendix Table A1 provides data on employment growth for three-digit occupations from 2007 to 2024. Column 2 shows employment growth as a share of the workforce, while Column 3 shows employment growth relative to the occupation's employment in 2007. Occupations with the largest relative growth (Q4) include STEM professionals such as Mathematicians, Statisticians and Computer system designers and computer programmers, Health and Life science professionals, Legal and Business professionals, Nurses and Health professionals, as well as Restaurant service workers. The most stagnant occupations (Q1) include Library, Mail and Related clerks, Secretaries and Keyboard-operating clerks, Metal- and Mineral-products Machine operators, Laborers in Manufacturing, Cashiers, Tellers and Related clerks, and Shop Salespersons. Column 1 shows the share of private-sector workers in each occupation, and Column 4 the respective growth quartile.

Correlations of growth and occupation traits

Appendix Table A2 provides correlations of occupation growth from 2007 to 2024 with skill features of the occupation and traits of individuals employed in the occupation in 2007. Correlations are weighted by counts of individuals in occupations in 2007. Columns 2–5 provide the mean values of each trait by growth quartile. In line with previous work, we find that occupations with a high degree of routine tasks decline, whereas occupations requiring service and abstract/cognitive tasks grow. Likewise, occupations with college educated workers grow, and those with less education decline. There is further a positive correlation between growth and the wage level in 2007.

Regression tables

Appendix Tables A3–A5 report the full sequence of controls from Table 2 in the paper. Appendix Table A3 reports the results for cumulative earnings relative to 2007 level. Column 1 shows the results from the base analysis without controls, replicating the results from Table 2, and then Column 2 adds demographics, Column 3 adds industry controls, Column 4 adds geography controls, and finally establishment and firm size and growth are added in Column 5, replicating the numbers from the analysis with full controls from Table 2. We note from Panel A that the coefficient for declining occupations starts out insignificant and unstable but becomes negative below -1 after adding industry fixed effects and ends up with at -1.2 with a t-value of 1.72 with the full set of controls. In Panel B the most stagnant group shows up with a positive coefficient, not significant, without controls, that declines with the addition of demographic controls and turns negative once industry fixed effects are added, down to the same level, still insignificant, as in the model with full controls. Declining occupations appear to be positively correlated with industries that display higher earnings growth for

individuals who start out there. For accumulated earnings, reported in Appendix Table A4, the baseline results are more negative, which reflects the fact that declining occupations display lower earnings at the initial level, as shown in Appendix Figure A1.

The results for cumulative years employed in Appendix Table A5 also show a similar development, where the results stabilize after adding industry fixed effects, and remain small and insignificant thereafter.

Appendix Table A1: Occupations and growth from 2007 to 2024

Occupation	Private sector share	Relative Growth in share of workforce	Relative Growth in count of workers	Quartile
	(1)	(2)	(3)	(4)
Library, mail and related clerks	0.80	-0.77	-0.74	1
Printing-, binding- and paper-products machine operators	1.00	-0.66	-0.61	1
Legislators	0.49	-0.66	-0.60	1
Graphic artists, photographers, and related trades workers	0.98	-0.59	-0.53	1
Wood-processing and papermaking-plant operators	0.99	-0.53	-0.46	1
Secretaries and keyboard-operating clerks	0.78	-0.52	-0.45	1
Technical illustrators	0.99	-0.45	-0.37	1
Metal- and mineral-products machine operators	0.98	-0.43	-0.35	1
Chemical-products machine operators	1.00	-0.40	-0.32	1
Chemical-processing-plant operators	0.99	-0.37	-0.27	1
Assemblers	0.99	-0.35	-0.25	1
Labourers in manufacturing	1.00	-0.35	-0.25	1
Precision workers in metal and related materials	0.96	-0.34	-0.24	1
Textile-, fur- and leather-products machine operators	0.93	-0.33	-0.24	1
Messengers, porters, doorkeepers and related workers	0.79	-0.33	-0.23	1
Cashiers, tellers and related clerks	0.97	-0.30	-0.20	1
Numerical clerks	0.97	-0.29	-0.18	1
Metal-processing-plant operators	1.00	-0.28	-0.17	1
Glass, ceramics and related plant operators	1.00	-0.27	-0.16	1
Stone cutters and related workers	0.99	-0.26	-0.15	1
Butchers, bakers and other related food preparers	1.00	-0.22	-0.11	1
Religious professionals	0.38	-0.21	-0.10	1
Ship and aircraft controllers and technicians	0.96	-0.20	-0.08	1
Shop salespersons and demonstrators	1.00	-0.19	-0.07	1
Wood treaters, cabinet-makers, and related trades workers	0.98	-0.18	-0.06	2
Other teaching professionals	0.51	-0.17	-0.05	2
Senior officials of interest organisations	0.94	-0.16	-0.04	2
Laboratory assistants	0.80	-0.16	-0.04	2
Business services agents and employment agents	0.98	-0.14	-0.02	2
Textile, garment and related trades workers	0.85	-0.14	-0.01	2
Directors and chief executives	0.96	-0.12	0.01	2
Founders, welders, sheet-metal workers, etc.	1.00	-0.12	0.01	2
Other department managers	0.95	-0.11	0.02	2
Journalists, librarians and information associate professionals	0.63	-0.11	0.02	2
Technical and subject teaching and other teaching associate and pedagogical professionals	0.51	-0.07	0.07	2
Finance and sales associate professionals	0.99	-0.07	0.07	2

Production and operations department managers	0.70	-0.07	0.07	2
Domestic and related helpers and cleaners	0.74	-0.06	0.07	2
Primary education teaching associate professionals	0.06	-0.06	0.08	2
Power-production and related plant operators	0.69	-0.05	0.09	2
Computer associate professionals	0.78	-0.03	0.11	2
Mobile-plant operators	0.97	-0.02	0.12	2
Machinery mechanics and fitters	0.96	-0.02	0.13	2
Other personal services workers	0.98	0.00	0.14	2
Material-recording and transport clerks	0.96	0.00	0.14	2
Life science technicians and related associate professionals	0.31	0.01	0.15	2
Public admin.	0.11	0.01	0.16	2
Building finishers and related trades workers	0.98	0.02	0.17	2
Painters, building structure cleaners and related workers	0.94	0.02	0.17	3
Electricians, electrical and electronic equipment mechanics and fitters	0.96	0.02	0.17	3
Writers and creative or performing artists	0.54	0.02	0.17	3
Oil, gas, mining- and mineral-processing-plant operators	1.00	0.03	0.18	3
Nursing and midwifery professionals	0.06	0.03	0.19	3
Secondary education teaching professionals	0.10	0.03	0.19	3
Food and related products machine operators	1.00	0.04	0.19	3
Building, vehicle and related cleaners	1.00	0.04	0.19	3
Police officers	0.00	0.05	0.21	3
Administrative and economic associate professionals	0.70	0.06	0.21	3
Crop and animal producers	0.99	0.08	0.23	3
Motor-vehicle drivers	0.99	0.08	0.24	3
Building frame and related trades workers	0.93	0.08	0.24	3
Physicists, chemists and related professionals	0.82	0.08	0.24	3
Client information clerks	0.98	0.09	0.25	3
Social science and related professionals	0.64	0.12	0.29	3
Engineering science technicians	0.88	0.13	0.29	3
Protective services workers	0.51	0.13	0.29	3
Personal care and related workers	0.24	0.14	0.31	3
Locomotive-engine drivers and related workers	0.99	0.15	0.31	3
Labourers in construction and maintenance, etc.	0.95	0.15	0.32	3
Garbage collectors and related labourers	0.75	0.16	0.34	3
Religious associate professionals	0.49	0.17	0.34	3
Travel attendants	0.93	0.18	0.36	3
Optical and electronic equipment operators	0.73	0.19	0.37	3
Pre-primary education teaching associate professionals	0.42	0.20	0.38	4
General managers of small enterprises	0.99	0.21	0.38	4
Nursery and Registered Nurses for the Mentally Subnormal (RNMS)	0.12	0.24	0.42	4
Modern health associate professionals (except nursing)	0.45	0.25	0.44	4
Blacksmiths, gunsmiths, locksmiths and related trades workers	0.99	0.28	0.47	4
Architects, engineers and related professionals	0.86	0.29	0.48	4

Forestry workers, etc.	1.00	0.33	0.53	4
College, university and higher education teaching professionals	0.10	0.34	0.53	4
Housekeeping and restaurant services workers	0.94	0.34	0.54	4
Special education teaching professionals	0.12	0.39	0.60	4
Ships/deck crews and related workers	0.98	0.40	0.60	4
Life science professionals	0.64	0.44	0.66	4
Health professionals	0.27	0.56	0.80	4
Fire and safety inspectors	0.82	0.57	0.80	4
Storing and goods handling labourers	0.99	0.58	0.81	4
Business professionals	0.81	0.74	1.00	4
Social workers (college-trained), child care officers, etc.	0.26	0.76	1.02	4
Computer systems designers and computer programmers	0.88	0.81	1.08	4
Legal professionals	0.73	0.85	1.12	4
Curators, librarians and related professionals	0.28	0.97	1.26	4
Agricultural, fishery and related labourers	0.98	1.03	1.33	4
Artistic, entertainment and sports associate professionals	0.97	1.21	1.54	4
Fish farmers, etc.	0.99	1.22	1.55	4
Mathematicians, statisticians and related professionals	0.47	3.55	4.22	4

Notes: Table provides occupational categories and occupation growth from 2007 to 2024.

Appendix Table A2: Correlations of occupation traits

	Correlation of trait with occupation growth 2007–24	Mean value in quartile [4=fastest growth]			
		Q1	Q2	Q3	Q4
	(1)	(2)	(3)	(4)	(5)
<u>Task/skill traits:</u>					
Autor-Dorn: Routine tasks	-0.236*	6.165	3.800	4.137	3.909
Autor-Dorn: Abstract tasks	0.353*	1.632	3.214	2.089	4.649
Autor-Dorn: Manual tasks	0.197*	0.396	1.124	1.962	1.426
Deming: Social tasks	0.271*	2.306	4.000	2.766	4.723
Deming: Math tasks	0.079*	3.938	4.057	3.361	4.568
Deming: Routine tasks	-0.260*	5.646	4.166	4.158	3.913
Deming: Service tasks	0.288*	2.944	3.751	4.224	5.573
<u>Traits of workers in occupation in 2007:</u>					
Share male	-0.014*	0.477	0.572	0.542	0.430
Share immigrants	-0.004*	0.093	0.098	0.103	0.097
Share with less than high school education	-0.107*	0.258	0.164	0.197	0.077
Share with completed high school education	-0.145*	0.556	0.396	0.527	0.202
Share with college education or more	0.230*	0.185	0.440	0.276	0.721
Average age	-0.009*	33.50	35.184	34.191	34.207
Average real income (2022-NOK)	0.072*	kr 377 237	kr 524 611	kr 429 671	kr 500 646
Share lives in rural area	-0.064*	0.570	0.492	0.577	0.459
Share private sector	-0.170*	0.830	0.618	0.535	0.463

Notes: Table provides descriptive statistics on occupations. Column 1 provides correlations of occupation growth from 2007 to 2024 with skill features of the occupation and traits of individuals employed in the occupation in 2007. Correlations are weighted by counts of individuals in occupations in 2007. * signifies statistically significant at a 5% level. Columns 2-5 provide mean values by quartile.

Appendix Table A3: Individual-level regressions of cumulative earnings 2007-24 relative to 2007 level

	Base analysis without controls	Col. 1 plus demographic controls	Col. 2 plus industry fixed effects	Col. 3 plus centrality of municipality	Col. 4 plus size and growth controls for establishment and firms and private sector dummy
	(1)	(2)	(3)	(4)	(5)
A. Models with occupation decline as single indicator variable for declines exceeding 25%					
(0/1) declining occupation	-0.224	0.073	-1.041	-1.021	-1.207
	(1.899)	(0.854)	(0.747)	(0.707)	(0.699)
B. Models with occupation decline/growth as quartile indicators relative to the top two quartiles					
(0/1) most stagnant	1.617	0.485	-0.998	-0.968	-0.997
	(1.641)	(0.771)	(0.630)	(0.618)	(0.612)
(0/1) second-most stagnant	-2.131	0.681	0.014	-0.005	0.018
	(0.970)	(1.161)	(0.840)	(0.823)	(0.858)

Notes: See Table 2. This table reports individual-level regressions of cumulative 2007-24 earnings relative to 2007 earnings. Earnings ratios are capped at a value of 500. In Panel A, a single indicator variable models the individual being in an occupation in 2007 that will decline in size by 25% or more in employment counts by 2024. Panel B models quartiles of relative occupation growth. Column header describes the control variables added in each column. Column 2 adds fixed effects to model sex, age (3 groups), education (3 groups), and immigrant background (3 groups) and includes the log initial earnings of the individual in 2007. Column 3 adds NAICS2 fixed effects. Column 4 adds fixed effects for six centrality levels of the individual's municipality in 2007. Column 5 adds controls the log initial employment sizes of an individual's establishment and firm in 2007, indicators for whether the 2007 firm closed, shrank, or grew in employment by 2016 and by 2024, respectively, and an indicator the individual being a private sector worker in 2007. Regressions are unweighted, have 1,111,041 observations, and cluster standard errors by occupation.

Appendix Table A4: Individual-level regressions of cumulative earnings 2007–24 (in 2022-NOK)

	Base analysis without controls		Col. 1 plus demographic controls		Col. 2 plus industry fixed effects		Col. 3 plus centrality of municipality		Col. 4 plus size and growth controls for establishment and firms and private sector dummy	
	(1)		(2)		(3)		(4)		(5)	
A. Models with occupation decline as single indicator variable for declines exceeding 25%										
(0/1) declining occupation	kr	-1 858 998	kr	-655 649	kr	-977 359	kr	-968 390	kr	-1 002 421
		(668 343)		(370 291)		(331 927)		(316 367)		(308 304)
B. Models with occupation decline/growth as quartile indicators relative to the top two quartiles										
(0/1) most stagnant	kr	-1 919 584	kr	-257 182	kr	-610 308	kr	-598 503	kr	-588 811
		(1 010 222)		(301 227)		(281 302)		(279 739)		(280 371)
(0/1) second-most stagnant	kr	891 351	kr	168 016	kr	44 552	kr	36 409	kr	45 137
		(1 193 724)		(463 928)		(353 004)		(347 845)		(354 426)

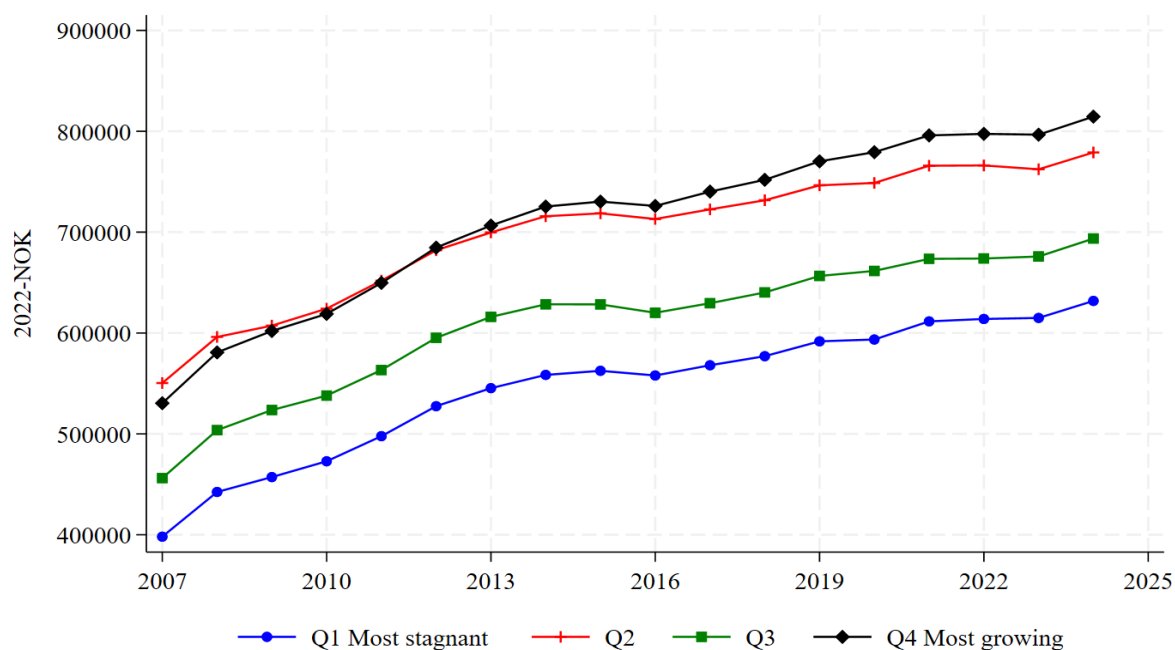
Notes: See Table 2 and Appendix Table A3. This table reports regressions with cumulative earnings during 2007–24 as the outcome variable. Earnings are expressed in constant 2022 Norwegian Kroner and winsorized at 0.1% and 99.9% levels.

Appendix Table A5: Individual-level regressions of cumulative years employed 2007–2024

	Base analysis without controls	Col. 1 plus demographic controls	Col. 2 plus industry fixed effects	Col. 3 plus centrality of municipality	Col. 4 plus size and growth controls for establishment and firms and private sector dummy
	(1)	(2)	(3)	(4)	(5)
A. Models with occupation decline as single indicator variable for declines exceeding 25%					
(0/1) declining occupation	-0.430	-0.027	0.058	0.054	0.046
	(0.189)	(0.104)	(0.127)	(0.136)	(0.132)
B. Models with occupation decline/growth as quartile indicators relative to the top two quartiles					
(0/1) most stagnant	-0.537	-0.036	0.040	0.033	0.045
	(0.214)	(0.121)	(0.107)	(0.112)	(0.105)
(0/1) second-most stagnant	0.180	0.029	0.005	0.011	0.008
	(0.329)	(0.122)	(0.072)	(0.074)	(0.072)

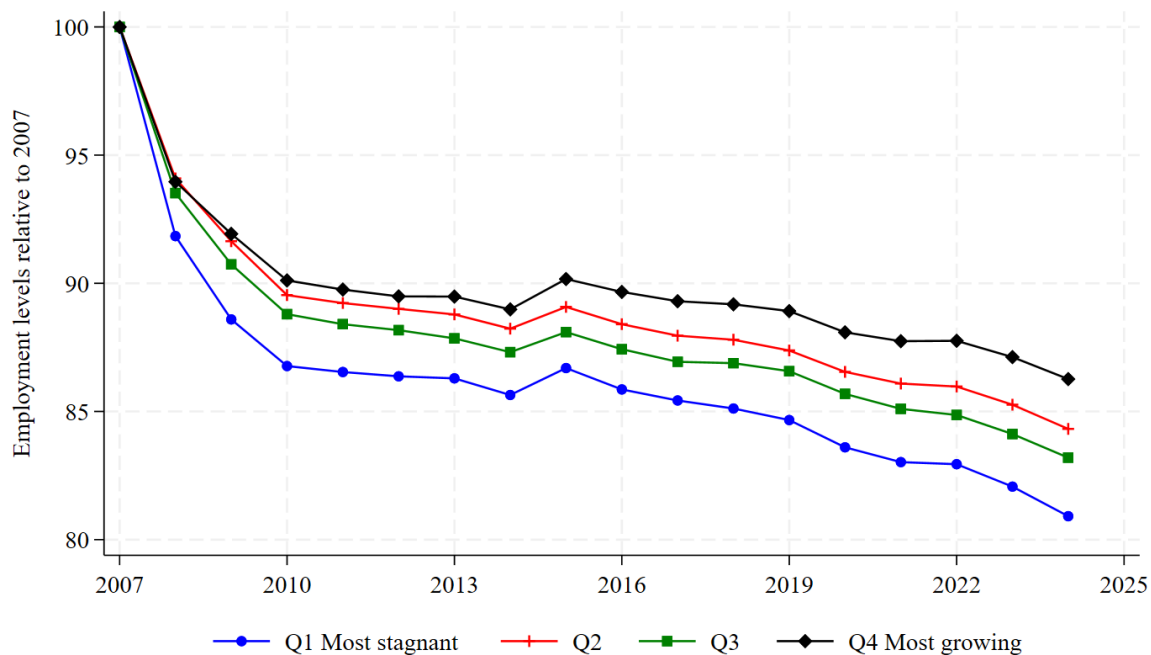
Notes: See Table 2 and Appendix Table A3. This table reports regressions with cumulative years employed 2007–2024 as the outcome variables.

Appendix Figure A1: Earnings Levels (NOK) by Occupational Growth Rate of Workers Initial Occupation, 2007–2024. All workers



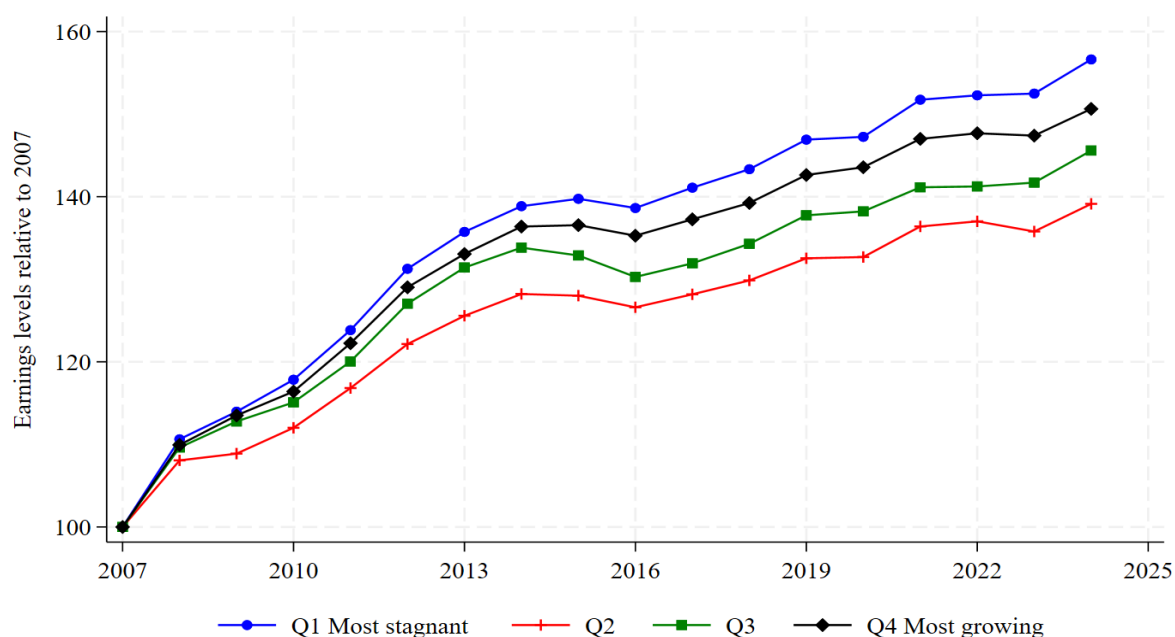
Notes: See Figure 2. This figure provides the base levels for earnings.

Appendix Figure A2: Employment levels by occupational growth rate of worker's initial occupation. Private sector workers



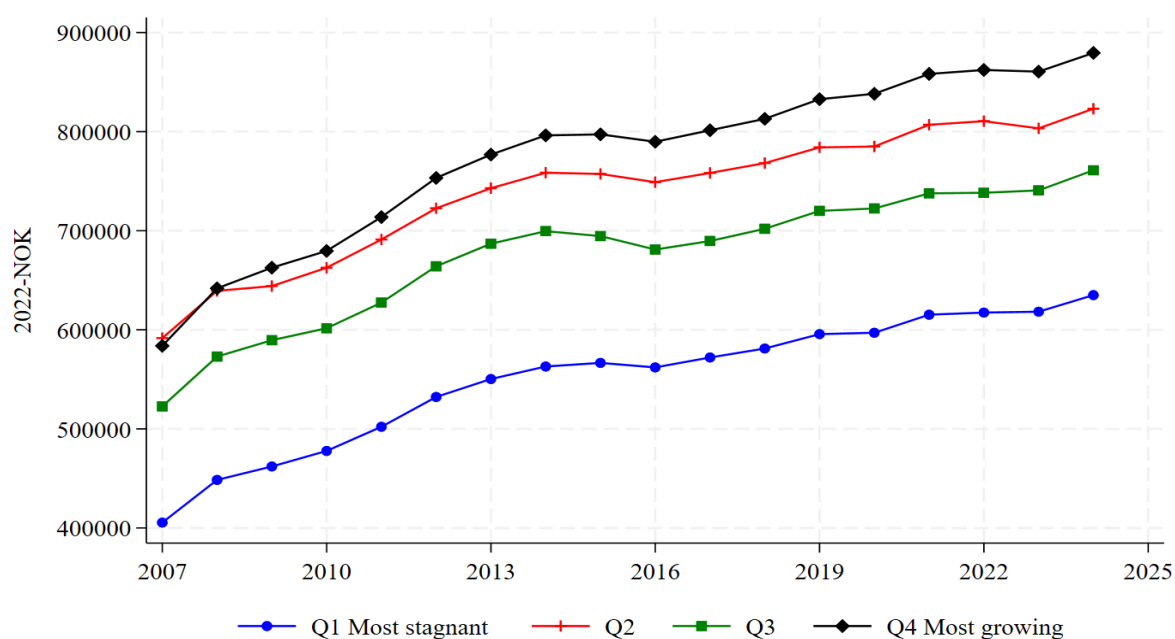
Notes: See Figure 1.

Appendix Figure A3: Earnings levels by occupational growth rate of worker's initial occupation. Private sector workers



Notes: See Figure 2.

Appendix Figure A4: Earnings Levels (NOK) by Occupational Growth Rate of Workers Initial Occupation, 2007–2024. Private sector workers



Notes: See Figure 2. This figure provides the base levels for earnings for workers in the private sector in 2007.