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Breaking the Links: Natural Resource Booms and Intergenerational Mobility

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Breaking the Links: Natural Resource Booms and Intergenerational Mobility*

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Abstract

Do large economic shocks increase intergenerational earnings mobility through creating new economic opportunities? Alternatively, do they reduce mobility by reinforcing the links between generations? In this paper, we estimate how the Norwegian oil boom starting in the 1970s affected intergenerational mobility. We find that this resource shock increased intergenerational mobility for cohorts entering the labor market at the beginning of the oil boom in those labor markets most affected by the growing oil industry. In particular, we show that individuals born to poor families in oil-affected regions were more likely to move to the top of their cohort's earnings distribution. Importantly, we reveal that preexisting local differences in intergenerational mobility did not drive these findings. Instead, we show that changes in the returns to education offer the best explanation for geographic differences in intergenerational mobility following the oil boom. In addition, we find that intergenerational mobility was significantly higher in oil-affected labor markets across three generations and that the oil boom broke the earnings link between grandfathers and their grandsons.

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1 Introduction

What economic factors can alter social mobility and thereby break the link between parents and their children's economic status? While the literature shows well-documented differences in intergenerational mobility across regions within countries and changes in intergenerational mobility over time (Corak, Lindquist, and Mazumder, 2014; Chetty, Hendren, Kline, Saez, and Turner, 2014; Nybom and Stuhler, 2013; Pekkarinen, Salvanes, and Sarvimäki, 2017), the factors that determine changes and regional differences in intergenerational mobility are not yet well understood. In particular, how major economic shocks or turbulence affect intergenerational mobility and whether these changes persist across generations remain open questions. From a theoretical perspective, the direction of the effect of an economic shock on intergenerational mobility is unclear.

On the one hand, if new industries with new job opportunities demanding new skills are established, this may decouple the ties between parents and their children's outcomes. Consequently, parental income and existing social networks become less accurate predictors of children's economic outcomes. On the other hand, poorer families may be less able to benefit from new opportunities, leading to lower social mobility. Moreover, different types of economic shocks, including economic downturns or upturns, natural resource booms, and technological changes, may well reinforce or break the transmission of economic status, and the resulting changes may persist for one or more generations.

In this paper, we focus on the effect of a specific major and long-lasting resource boom on social mobility. In particular, we exploit the geographic variation across local labor markets in the impact of the Norwegian oil boom, which transformed the Norwegian economy from being one largely based on shipping, logging, fishing, and food production into a globally successful resource-based economy. Previous literature has shown that resource booms substantially increase local economic activity and average wages despite substantial population migration (Black, McKinnish, and Sanders, 2005a; Allcott and Keniston, forthcoming; Basso, 2016). We therefore believe the Norwegian oil boom of the 1970s presents an ideal natural experiment for considering the effects of a natural resource shock on intergenerational mobility for three main reasons. First, most indications suggest that oil has been a blessing for Norway, judging by Norway's resultant high per capita GDP, relatively low unemployment rate, and sizeable government pension fund. Since oil production commenced in 1971, the expansion of oil activities has had far-reaching effects on both Norwegian workers and firms.

By 2014, the Norwegian oil sector (including oil-related suppliers) provided about 60 percent of Norway's exports and directly or indirectly provided some 9 percent of total employment. Accordingly, if natural resource shocks do alter the transmission of economic status, the Norwegian oil boom should be large enough for us to measure any possible impact. Second, Norwegian registry data permit us to directly link the earnings and education of Norwegian parents to those of their children. While we can observe parental earnings prior to the discovery of oil, the passage of time also allows us to observe the earnings of their children exposed to the oil shock as adults, and likewise the educational outcomes and early career earnings of their grandchildren. Finally, there are significant differences across Norwegian local labor markets in the importance of the oil sector, which creates geographic variation. This enables us to compare the transmission of economic status across local labor markets affected unevenly by the oil boom.

To analyze the impact of the resource shock on intergenerational income mobility, we use rank–rank regression models (Chetty, Hendren, Kline, and Saez, 2014). In addition, we measure upward rank mobility using transition matrices to analyze nonlinear patterns in intergenerational mobility, and this enables us to understand whether individuals growing up in poor or moderately well off families benefited most from the natural resource shock. We examine the effect of this natural resource boom on intergenerational mobility using a local labor market strategy, which exploits variation across local labor markets in their exposure to the resource shock. New employment opportunities in petroleum-relevant occupations may have increased earnings for some individuals entering oil boom-affected labor markets in the 1970s (Brunstad and Dyrstad, 1997), and changed the intergenerational earnings persistence.

In our main analysis, we therefore focus on cohorts (and the parents of these cohorts) that entered the labor market during the 1970s, which marks the first decade of oil extraction in Norway. To evaluate whether our result is causal and not driven by preexisting differences in intergenerational mobility across local labor markets, we also consider the intergenerational mobility of placebo cohorts (and their parents) that were about 40 years of age at the beginning of the oil boom, and thereby less affected in their career decisions by the growing oil sector. In particular, we examine cohorts born in the 1930s and their parents born around the turn of the century, and measure their income before the commencement of oil production in 1972.

Several mechanisms may explain why resource booms alter intergenerational earnings persistence. First, a resource shock may alter educational attainment and the returns to education. In particular, the existing literature has shown that resource booms change the opportunity costs of attending high school or college, as more high-paying low-skill jobs become available (Black, McKinnish, and Sanders, 2005b; Cascio and Narayan, 2015; Morissette, Chan, and Lu, 2015). Second, changes in cross-sectional inequality could drive changes in intergenerational earnings persistence. Lastly, resource boom-related wage increases in low-skill jobs may reflect compensation for greater health risk. Our data allow us to distinguish between these three mechanisms. In addition, we analyze whether the changes in the intergenerational transmission of economic status persist over multiple generations. Generally, periods of structural change may reduce the transmission of social status in the generation most directly affected. However, this decrease in intergenerational earnings persistence does not necessarily remain in place for the next generation, because family ties may again tighten and the society could enter a new steady state with lower intergenerational mobility (Nybom and Stuhler, 2013).

Overall, we find that the Norwegian oil boom increased intergenerational earnings mobility, with sons born in local labor markets that benefited the most from the oil boom of the 1970s experiencing more intergenerational earnings mobility than elsewhere. In particular, the intergenerational persistence in earnings rank was roughly 9 percent lower in oil-affected local labor markets. In addition, we find that individuals born to poor families in oil-affected regions were significantly less likely to remain poor, and much more likely to move all the way to the top of their cohort in terms of earnings. Through examining the placebo cohorts, we find that preexisting locational differences in intergenerational earnings mobility did not drive these effects. Instead, we find that changes in the returns to education offer the best explanation for the geographic differences in intergenerational mobility following the oil boom. As we focus on cohorts who had completed their secondary education prior to the oil shock, we can abstract from the influence of any oil shock-biased human capital investment decisions. We also show that our findings do not mechanically result from a shift in the earnings distribution in the oil-affected regions or from adverse health effects.

Moreover, the results are not sensitive to selective migration, to the definition of oil-affected labor markets, or the age at which fathers' earnings were measured. In addition, we find that intergenerational mobility was significantly higher in oil-affected labor markets across all three generations. In particular, we find that the earnings rank of the second generation (the main cohorts entering the labor market in the 1970s) was less predictive of the earnings rank of the third generation in oil-affected regions. Interestingly, the first generation's earnings rank was not significantly predictive of the third generation's rank in the oil-affected regions. That is, the oil boom broke the earnings link between grandfathers and their grandsons. For third-generation women, the ranks of both the first and the second generation of men were predictive of their earnings rank. However, regional differences only arose in the relationship between the second and third generations of women.

Our findings contribute greatly to the scarce literature establishing a link between macroeconomic conditions and the transmission of economic status. Feigenbaum (2015) shows that a very different type of economic turbulence in the form of the Great Depression lowered intergenerational mobility in the US for sons growing up in the cities hardest hit by the economic downturn. Unlike Feigenbaum (2015), we consider a boom not a bust, followed by an extended period of economic growth, which began in the early 1970s and lasted for more than four decades. In addition, we contribute to the literature on the dynamics of intergenerational mobility across cohorts (Nybom and Stuhler, 2013), along with the growing literature documenting the substantial geographic variation in intergenerational mobility (Chetty, Hendren, Kline, and Saez, 2014; Chetty and Hendren, 2017; Connolly, Corak, and Haeck, 2017).

The remainder of the paper is structured as follows. Section 2 provides some historical background on the Norwegian oil boom. Section 3 outlines the empirical strategy and Section 4 discusses the data and provides descriptive statistics. Section 5 details the results and robustness tests and Section 6 provides empirical evidence on the underlying mechanisms. Section 7 discusses the persistence across multiple generations and Section 8 analyzes whether there are similar resource boom-related geographic patterns in intergenerational mobility in other countries. Section 9 concludes.

2 Norwegian Oil Exploration and Industry

In the late 1950s, few believed that the Norwegian continental shelf concealed rich oil and gas deposits. Fifty years later, the oil and gas industry is now the country's most important industry in terms of both treasury revenue and investment (Ekeland, 2015). While early geological opinions were largely negative concerning the presence of oil and gas deposits in the Norwegian parts of the North Sea, the discovery of gas at Groningen in the Netherlands in 1959 revised expectations (Cooper and Gaskell, 1976). In 1963, the Norwegian government proclaimed sovereignty over the Norwegian continental shelf and began issuing licenses to oil companies to carry out preparatory exploration and to perform seismic surveys. But drilling only commenced in 1965 following an agreement on how to divide the continental shelf between Norway, Denmark, and the United Kingdom (see, e.g., Noreng, 1980).

In 1965, the Norwegian state issued 22 production licenses for 78 blocks around the southwestern tip of Norway (see, e.g., Helle, 1984). These production licenses provided exclusive rights for exploring, drilling, and production in the license area (see Figure A1 in the Appendix). However, as Norway lacked essential knowledge of platform construction in the 1960s, the first oil rig was towed from New Orleans to Norway in 1966 to drill the first well, about 180 kilometers southwest of the Norwegian city of Stavanger. The first few attempts failed to find any trace of oil or gas. The discovery of Ekofisk, one of the largest offshore oil fields ever found, on December 23, 1969, was the first of a number of major discoveries on the Norwegian continental shelf (for the location of the Ekofisk field, see Figure A2 in the Appendix). Production from Ekofisk commenced in 1971 (see, e.g., Helle, 1984).

In 1972, the Norwegian parliament voted to increase regulations for oil exploration and to develop new knowledge and industries based on petroleum (Finansdepartementet, 1974). Statoil, a state-owned oil company, was funded to look after the government's commercial interests and to pursue appropriate collaborations with domestic and foreign oil interests. In addition, the newly established Norwegian Petroleum Directorate was made responsible for recommending which licenses the government should award and ensuring that companies complied with safety regulations for offshore drilling and production. Hence, the year 1972 marks a turning point in Norway's petroleum industry: before 1972, the industry was dominated by foreign oil companies, but the government declared its interest in building up domestic oil expertise in that same year (see, e.g., Noreng, 1980). As there were no large refineries or other high-capacity infrastructure to land oil on the Norwegian shore, oil was initially landed abroad. However, the government decided that petroleum from the Norwegian continental shelf must only be landed in Norway (NOU, 1972).[1]

These new laws and the establishment of Statoil's headquarters in Stavanger in 1972 transformed what was once a small canning industry town to the 'oil capital' of Norway. Figure A2 in the Appendix shows that Stavanger was the closest to the oil fields among the three main Norwegian cities in the south of Norway (Oslo, Bergen, and Stavanger). Moreover, international oil companies had already constructed supply bases close to Stavanger in both Tananger and Dusavik before the enactment of the new laws. As one outcome, individuals residing in southwestern Norway around Stavanger were more affected by the growing oil industry in the 1970s (see, e.g., Løken, 2010). As the oil boom created a substantial labor demand shock, mostly for skilled and semiskilled craftsmen (Brunstad and Dyrstad, 1997), labor markets with large ship- or machine-building industries also benefited from the oil boom in the 1970s.

Following a series of large oil and gas discoveries on the Norwegian continental shelf in the North Sea (southwest of Norway), new oil and gas fields were discovered in the Norwegian Sea (off mid-Norway) in 1981 and the Barents Sea (northern Norway) in 1984 (see, e.g., Lerøen, 1990). Figure A2 in the Appendix displays all oil discoveries up until 2015. Given the steady increase in new discoveries, the oil shock in Norway was not short lived. It entailed a semi-permanent income shock, as it lasted for more than four

[1] Several of the early offshore oil fields were only marginally closer to Norway than to the United Kingdom, whose oil fields had been discovered in 1964 and whose refineries and transport hubs had been established before the first Norwegian oil discoveries. For example, the Ekofisk field is 320 km southwest of Stavanger in Norway but only 350 km northeast of the refinery in Teesside in the UK.

decades, until the most recent decline in oil prices in 2014. Further, while the initial boom was mainly concentrated in southwestern Norway, today many areas along the western and northern coasts of Norway also benefit from nearby oil and gas deposits. Consequently, the strong geographic differences in oil-related economic growth were most pronounced in the 1970s.

3 Empirical Strategy

In this paper, we analyze how a large resource shock affects intergenerational mobility. Intergenerational mobility is the relationship between the outcomes, such as the earnings or level of education, of one generation and the outcomes of the offspring generation. In this section, we first describe our empirical strategy to measure intergenerational mobility. We then detail how we identify the effect of the oil boom on intergenerational mobility.

3.1 Measuring Intergenerational Mobility

The most commonly used measure of intergenerational mobility is intergenerational elasticity. This measure computes the percentage change in the income of a son given a 1 percent change in the income of the father, and is estimated by regressing the log earnings of the son s on the log earnings of the father f:

$$log(earnings_i^s) = \alpha + \beta \cdot log(earnings_i^f) + \epsilon_i. \tag{1}$$

The slope coefficient β is the intergenerational persistence parameter, with larger values of β indicating a stronger link between fathers and their sons and thus less mobility. In a society with no intergenerational mobility, we would observe a persistence parameter of $\beta = 1$; in a society with no relationship between the father's and the son's earnings, we would observe a persistence parameter of $\beta = 0$. Intergenerational mobility is measured by $1 - \beta$, which represents a measure of regression to the mean in percentage terms. Importantly, if this elasticity is constant across generations, it is a measure of how many generations it takes for a family living in poverty to attain the average level of income.

However, intergenerational earnings elasticity is not well-suited for a comparison between subgroups (Mazumder, 2016). In our case, by computing the intergenerational elasticity at the labor market level, we would compute the regression to the mean within each labor market region. This does not necessarily allow for meaningful comparisons. Suppose that we aim to compare intergenerational mobility in two labor market regions A and B. Now suppose that the income distribution of the parents' generation is the same in the two regions, while the income distribution of children in labor market B shifts to the right, such that all individuals in B are better off. In this case, it is possible that the regression to the mean is identical in both labor market regions A and B, even though the offspring generation in labor market region B is much better off.

Furthermore, the slope coefficient β may differ across regions not only if the correlation in income between generations differs, but also if there is a difference in the ratio of the standard deviation of the income distribution of fathers to the standard deviation of the income distribution of sons (Solon, 1999).[2] Estimates of the intergenerational elasticity do not distinguish between these two effects. As a result, intergenerational earnings elasticity is not a good measure for comparisons between regions when earnings distributions differ in different regions, and therefore it is not useful for our purpose.

To compute a measure of intergenerational mobility that allows for a better comparison across labor markets, we need to standardize the earnings distribution at the national level. A possible solution is to use the rank of individuals in the national income distribution (Mazumder, 2016). We employ two different measures of intergenerational mobility: rank persistence and upward rank mobility. These two related measures provide answers to different questions. Rank persistence measures the average difference in outcomes between children from higher versus lower socioeconomic backgrounds. Upward rank mobility shows the outcomes of children from a specific (fixed) family background.

To measure rank persistence, we regress the rank of a son in his own earnings distribution on the rank of the father in his own earnings distribution:

$$rank_i^s = \omega + \delta \cdot rank_i^f + \epsilon_i. \tag{2}$$

Assuming that the rank–rank relationship is linear, the estimated parameter δ represents the intergenerational persistence of the rank in the earnings distribution. More precisely, δ is a measure of the relationship between the positions of sons and their fathers in the national earnings distributions of their respective cohorts. A major advantage of measuring intergenerational mobility using rank–rank regression is that the measure is not sensitive to zero incomes and is less sensitive to the ages at which the incomes of both fathers and sons are measured (Chetty, Hendren, Kline, and Saez, 2014; Nybom and Stuhler, 2016). The intercept ω measures the expected rank of sons whose fathers were at the bottom of the income distribution.

Measures of upward rank mobility indicate the outcomes of sons from a specific family background. The most commonly used measure of upward rank mobility is the 'transition matrix,' which maps the probabilities of a son being in each quintile of the earnings distribution, given his father is in a specific quintile. For example, this measure yields the likelihood that a son who grew up in a household in the lowest earnings quintile will reach the top earnings quintile in his generation. In particular, it allows us to investigate specifically whether mobility is nonlinear and differs across the income distribution; that is, whether more children of poorer families are able to move to higher earnings quintiles, or more children from middle-income families are able to move to the top of the income distribution.

[2] This is because the coefficient β can be rewritten as

$$\beta = \frac{Cov(earnings_i^s, earnings_i^f)}{Var(earnings_i^f)} = \frac{Cov(earnings_i^s, earnings_i^f)}{\sigma_f \sigma_s} \frac{\sigma_s}{\sigma_f} = Corr(earnings_i^s, earnings_i^f) \frac{\sigma_s}{\sigma_f},$$

where σ_f is the standard deviation of the fathers' earnings distribution and σ_s is the standard deviation of the sons' earnings distribution.

3.2 The Resource Shock and Intergenerational Mobility

Most consider the discovery of oil to have been a blessing for Norway, and the expansion of oil activities has had far-reaching effects on both Norwegian workers and firms. However, did this resource shock break the economic link between fathers and their sons and increase the intergenerational mobility in labor markets most affected by the oil discovery? Alternatively, did the oil discovery reinforce earnings differences for children in different parts of the income distribution, thereby increasing intergenerational persistence? To determine the effect of the oil boom on intergenerational mobility, we use a similar estimation strategy as Feigenbaum (2015) and regress the rank of the son on the rank of the father, along with an interaction term between the rank of the father and a dummy variable indicating whether the son was born in a local labor market affected by the oil boom:

$$rank_i^s = \theta_0 + \theta_1 \cdot rank_i^f + \theta_2 \cdot rank_i^f \times Oil_{llm} + X_i'\theta_3 + \gamma_{llm} + \epsilon_i, \tag{3}$$

where $rank_i^s$ is the son's rank in his cohort's income distribution and $rank_i^f$ is the father's rank in the income distribution of fathers. Oil_{llm} is an indicator of whether the son was born in a local labor market affected by the oil boom. γ_{llm} are local labor market fixed effects. X_i is a set of individual characteristics, including the father's age at childbirth and fixed effects for the son's birth cohort. We cluster standard errors at the municipality of the son's birth to control for common municipality-level shocks. Therefore, θ_1 is the persistence parameter in local labor markets little affected by the oil boom. However, the key variable of interest is θ_2, which measures the increase or decrease in intergenerational persistence in local labor markets affected by the oil boom.

3.3 Treated and Control Cohorts

To assess the effects of the Norwegian oil boom on intergenerational mobility, we require variation in the importance of the oil sector across local labor markets. Local labor markets are aggregations of municipalities (the lowest administrative level in Norway) based on commuting patterns, but they are still typically smaller than counties (the middle administrative level in Norway). The 46 local labor markets in Norway cover the entire country, including urban and rural areas, and include the area in which people mostly live and work (Bhuller, 2009). A local labor market consists on average of nine municipalities and has an average population of 68,000 individuals.

To measure the local importance of the oil boom, we specify the share of employment in the oil and oil supply industries in each local labor market using 1980 census data. To identify the oil supply industries, we follow Brunstad and Dyrstad (1997), who show using recruiting survey data from 1975, 1977, and 1980 that supply industries such as the manufacturing of metal products, machinery and equipment, and construction should be included in the definition of oil-related industries. This is because these industries are important suppliers to the oil industry and likewise experienced a large demand shock due to the oil boom in the 1970s. Using three-digit industry codes, we define oil sector employment as comprising jobs in crude petroleum and natural gas production, petroleum refining, the manufacturing of petroleum and coal products, the manufacturing of machinery (including oil and gas well machinery and tools), the manufacturing of transport equipment (including ships and boats), and construction other than building construction (including oil well drilling).[3]

Figure 3 plots the proportion of workers employed in the oil industry in 1980 in each labor market. Generally, the areas with most employment in the oil sector are in southwestern Norway, which is closest to the first oil field discovered in 1969 (see Section 2). We classified local labor markets into one of three regional groups. We defined a local labor market as a low-oil region if employment in the oil industry accounted for less than 7.5 percent of total employment, which corresponds to the median oil employment level across all local labor markets. We defined local labor markets with more than 10 percent of employment in the oil industry (the top quartile of oil employment) as high-oil regions. Among the high-oil regions, the average share of oil employment was 14 percent and the highest share was 26 percent. Consequently, the oil boom clearly affected these regions, whereas the low-oil regions were hardly affected. We therefore focus on comparing low- and high-oil regions in our main analysis. In some of the robustness tests, we include middle-oil regions with between 7.5 and 10 percent of employment in the oil industry.

In our main analysis, we focus on the cohorts of sons that entered the labor market during the first decades of oil extraction in Norway. For this reason, we consider the six cohorts born in the 1950s (birth cohorts 1952–1957). These cohorts (hereafter called the 'main cohorts') entered the labor market in the 1970s. Therefore, they were the first cohorts with the potential to benefit from the expansion of the oil industry in Norway throughout their entire working lives. In addition, these cohorts were largely finished with high school education (or at least made the decision whether to enrolled in vocational or academic high school education) when oil extraction began. Therefore, we can abstract from the influence of the effect of the oil shock on human capital investment.[4] This is also supported by Figure 2, which shows that the proportion of individuals born in the 1950s who finished academic or vocational high school was stable and similar in both high- and low-oil regions.

To argue that θ_2 represents the effect of the oil boom on the intergenerational links between fathers and sons, we need to establish that intergenerational mobility and exposure to the oil boom by local labor market were unrelated in those generations prior to the oil shock. There is much randomness in whether one actually makes an oil discovery, and the exact location of the oil and gas deposits and the timing of their discovery are exogenous (Cust and Harding, 2014). Although the decisions about where to land the offshore oil and where to locate the headquarters of the Norwegian oil company Statoil were political, and therefore nonrandom, the trends in income per capita in the low- and high-oil regions were nearly parallel from 1950 to 1970 (see Figure 1). Per capita income in the high- and low-oil regions began to diverge only after the first oil discoveries in 1970.[5]

Nevertheless, the increase in oil-related employment was larger in areas with preexisting machine and shipping industries that could potentially supply products to the nascent oil industry. Therefore, we turn to two additional placebo cohorts born in the 1930s to show that the exposure to the oil boom did not predict intergenerational mobility for the generation entering the labor market long before the oil journey

[3]Our definition of oil sector employment is similar to the definition suggested by Allcott and Keniston (forthcoming), who used four-digit industry codes.

[4]As existing research shows that men tend to drop out of high school in areas affected by resource booms, this distinction is important (Black, McKinnish, and Sanders, 2005b; Cascio and Narayan, 2015; Morissette, Chan, and Lu, 2015).

[5]Note that coastal areas were not more economically developed prior to the discovery of oil. There are also large industrial areas in central Norway among the low-oil regions.

began in Norway (hereafter called the 'placebo cohorts'). Of course, while individuals born in the early 1930s would eventually benefit from the oil boom, by measuring their earnings before the discovery of oil we can reveal any geographic variation in intergenerational mobility unrelated to the resource shock. If the intergenerational mobility of sons born in the 1930s was significantly related to the oil shocks, it would suggest that θ_2 does not actually reveal the effect of the oil boom on intergenerational mobility, but rather reflects existing geographic differences in intergenerational mobility. However, if there were no geographic differences in intergenerational mobility for sons born in the 1930s, θ_2 identifies our effect of interest.

4 Data

We compile the data from several sources. Our primary source is Norwegian Registry Data, a linked administrative dataset that covers the whole population resident in Norway up to 2010. These data combine different administrative registers, including the central population register, the education register, and the tax and earnings register. These data follow individuals over time in a longitudinal design and provide information about place of birth, place of residence, educational attainment, labor market status, occupations, earnings, and a set of additional demographic variables. Information on employment, earnings, and place of residence is collected for each individual for every year. In addition, a multigenerational register matches Norwegian children to their parents. As a result, we can link earnings and education data over several generations. In what follows, we briefly summarize the sample definitions and describe the variables and summary statistics for our sample.

As discussed in Section 3.3, our analysis focuses on different groups of cohorts and their fathers. Men born from 1952 to 1957, who entered the labor market during the first decades of oil extraction in Norway, constitute the cohorts of primary interest. The sample of their fathers includes individuals born from 1917 to 1935.[6] This sample consists of 85,927 father–son pairs in either low- or high-oil regions for whom we have data on lifetime earnings. Note that we do not consider father–son pairs in 'middle-oil' regions in our main analysis. The total sample across all three types of regions consists of 107,854 father–son pairs for whom we have data on earnings. In addition, we analyzed intergenerational mobility across a third generation. That is, we studied the children of the 1952 to 1957 cohorts. The third generation was born from 1968 to 2009 and consisted of 116,994 father–son and 111,175 father–daughter pairs in low- and high-oil regions. In addition, we studied Norwegian-born sons born between 1932 and 1933 (placebo cohorts). This sample consists of 6,894 father–son pairs in which the fathers were born around the turn of the century.[7]

The central population register records the municipality of birth, which we used to assign an individual to a local labor market. The cohorts we analyzed were born before the first oil discoveries. Assigning oil boom affectedness by place of birth allows us to abstract from the influence of any parental moving decisions, possibly also affected by oil-related employment opportunities. In a robustness analysis, we also assigned individuals to a local labor market based on their place of residence at an age of 36 years. The

[6] About 21 percent of men born between 1952 and 1957 had fathers born before 1917, for whom we lack data on earnings over their working lives.

[7] As discussed below, we are able to link the two cohorts born in the 1930s to their fathers using data from the two years of military service they completed, which are not available for other cohorts born before 1950.

only cohorts born during the oil boom were the children of the 1952 to 1957 cohorts. We assigned these individuals to a local labor market based on the municipality of birth of their father.

The earnings measure is not top-coded and includes labor earnings expressed in constant 1998 Norwegian Kroners (i.e., adjusted for inflation), taxable sickness benefits, unemployment benefits, parental leave payments, and pensions since 1967. As lifetime earnings are less affected by transitory fluctuations than earnings in a single year, we proxied the fathers' lifetime earnings by averaging their earnings between the ages of 50 and 55 years. Therefore, the age of a son when his father's earnings were measured differs by cohort. As in Chetty and Hendren (2017), we aimed to measure the economic resources of parents while the sons were growing up. However, as our yearly earnings data only start in 1967, the oldest cohorts in our sample were 15 years old when parental earnings were measured. We defined the lifetime earnings of sons similarly. However, we measured sons' earnings at ages 36 to 41 years.[8] Earnings between ages 35 and 40 years should provide us with a reasonable proxy for lifetime earnings (Bhuller, Mogstad, and Salvanes, 2016). By this age, most men had completed their education and entered the labor market. The children of the main cohorts are born between 1968 and 2011. As we have data on earnings until 2014, we focus on children born before 1984 and measured the earnings of the children of the main cohorts at age 30 years. This allows is to measure for 46 percent of the children of the main cohorts.

The lifetime earnings of sons born in 1932 and 1933 were also measured at ages 36 to 41 years. That is, the earnings measures were from 1968 to 1974—largely prior to the oil boom. As we only have data on earnings in 1967 and after, the share of sons born in 1932 and 1933 for whom we have data on their fathers' earnings in the registry is small. Therefore, we follow Pekkarinen, Salvanes, and Sarvimäki (2017) and construct an alternative measure of fathers' earnings using military conscription records. In Norway, military enlistment was mandatory for all men. For this reason, our enlistment data include all males born in 1932 and 1933, and we can link this to the population registry using a personal identification number. In addition, the military recorded information on the occupation and municipality of residence of the fathers of each conscript for both these cohorts. We used the information on fathers' occupations and municipalities of residence to impute earnings for fathers based on average salaries by occupation in 735 Norwegian municipalities from the 1948 tax records. This allowed us to construct imputed earnings for almost 80 percent of the fathers of men born in 1932 and 1933.

Educational attainment data are from the educational database provided by Statistics Norway. Since 1974, educational institutions have reported educational attainment annually directly to Statistics Norway, thereby minimizing any measurement error. For individuals who had completed their education before 1974, we used self-reported information from the 1970 census, which is considered to be very accurate (see, e.g., Black, Devereux, and Salvanes, 2005). On average, the 1952 to 1957 cohorts had 12.4 years of education, while the fathers' cohorts had 10.3 years. We have data on educational outcomes for 83 percent of the third generation. On average, 61 and 38 percent of sons and 75 and 25 percent of daughters born before

[8] As pointed out by (Solon, 1999; Haider and Solon, 2006), individuals with higher lifetime earnings may have steeper earnings profiles at younger ages. Problematically, measuring the earnings of the sons when young may understate the intergenerational earnings persistence estimates. Chetty, Hendren, Kline, and Saez (2014) and Nybom and Stuhler (2016) show that such a lifecycle bias is small for rank–rank correlations if we measure the sons' earnings after age 30 years.

1991 completed academic and vocational high school, respectively.

We can link men to their spouses using couple-identifiers in the population registry. The Social Security Administration reports disability pension data. These data include information on the date when disability insurance benefits began and the level of benefits received. We defined an individual as enrolled in a disability insurance program if he or she had received benefits at least once between 1991 and 2008. For the third-generation sons, we also employed IQ measures reported by the military. The IQ score is reported in stanine (Standard Nine) units, a method of standardizing raw scores into a nine-point standard scale, which has a discrete approximation to a normal distribution, a mean of five, and a standard deviation of two (Sundet, Barlaug, and Torjussen, 2004; Thrane, 1977).

We focus our analysis on father–son pairs for three main reasons. First, we can only link male recruits in the 1930s to their fathers. Second, only 1.2 percent of the individuals working in the oil sector in our sample were women. Third, women in the main cohorts of interest (1952–1957) were much less attached to the labor market than men. However, in the third generation we include both men and women. Table 1 provides summary statistics of our sample's demographic and socioeconomic characteristics for the different local labor markets. Altogether, the data we gathered provide a unique opportunity to examine how natural resource booms affect intergenerational mobility.

5 Empirical Results

5.1 Rank Persistence

We focus first on the six cohorts that entered the labor market at the beginning of the Norwegian oil boom (1952–1957) and begin by measuring intergenerational mobility using the rank–rank specification (see Chetty, Hendren, Kline, and Saez, 2014). We rank each son based on his earnings aged 36 to 41 years relative to others in his birth cohort, and rank fathers using their earnings aged 50 to 55 years relative to other men with sons born in the same cohort. Panel (a) of Figure 4 presents the binned scatterplot of the mean percentile ranks of sons against their fathers' percentile ranks in the high- and low-oil regions. Note that these binned scatterplots present the raw earnings data, without controlling for the fixed effects in local labor markets. The conditional expectation of a son's rank given his father's rank is nearly linear in the lowest four quintiles of the fathers' earnings distribution. In the top quintile of the fathers' earnings distribution, the relationship increases sharply. Comparing high- and low-oil regions, the figure shows that the relationship between a father's rank and the son's rank is less steep in high-oil regions. A less-steep curve implies a weaker link between ranks and less intergenerational persistence. That is, the sons that grew up in the local labor markets that benefited most from the oil boom experienced greater intergenerational mobility. Moreover, the estimated intercept for the high-oil regions is larger. That is, the expected rank for sons from fathers at the bottom of the earnings distribution is higher in high-oil regions. This suggests that the sons' earnings distribution shifted to the right. Section 6.2 provides a detailed discussion of the earnings distributions.

To appraise whether the effect of the oil boom on intergenerational mobility was driven by preexisting local-level differences, we plot the mean percentile ranks of the placebo cohorts versus their fathers' percentile ranks in Panel (b) of Figure 4. Other than the top and bottom of the fathers' earnings distribution, the conditional expectation of a son's rank given his father's rank is nearly linear. Unlike Panel (a), the two plots of rank–rank relationships are overlapping and equally steep in the low- and high-oil regions. Thus, there were no obvious preexisting differences in intergenerational mobility between the two types of regions.

The graphical results in Figure 4 are only illustrative and do not control for local labor market fixed effects. Table 2 presents the regression results for Equation 3 and thereby the effect of the oil boom on intergenerational mobility after controlling for local labor market fixed effects, the age of the fathers at childbirth, and fixed effects for the son's birth year.[9,10] The estimated rank–rank correlation is 0.234 for the placebo cohorts born in 1932 and 1933 (Column (i)) and 0.235 for the main cohorts born in 1952–1957 (Column (ii)).[11]

For the placebo cohorts, the coefficient of the interaction term is negative, but not significant. That is, intergenerational mobility was somewhat higher in the high-oil regions prior to the oil shock. However, the estimated effect is not significant, suggesting that there was no significant preexisting difference in intergenerational mobility between low- and high-oil regions. This finding is in line with the patterns plotted in Panel (b) of Figure 4. Conversely, the intergenerational persistence is significantly lower for the main cohorts in the local labor markets that benefited most from the oil boom. In particular, men born in the high-oil regions have an estimated persistence parameter of 0.213 (0.235 – 0.033 + 0.011) after considering preexisting regional differences. Comparing the effect of the oil boom with the overall persistence parameter illustrates the magnitude of the impact: the intergenerational persistence in earnings rank is roughly 9 percent lower in high-oil regions.

Note that we control for the father's age at the birth of his son in the rank–rank regressions, as we rank fathers based on their earnings relative to other men with sons born in the same cohort. When dropping the father's age at childbirth as a control variable, the intergenerational persistence of the earnings rank is found to be roughly 11 percent lower in high-oil regions than in low-oil regions (see Table 6, Column (ii)). Thus, controlling for the father's age at the birth of his son does not alter our main result much.

To put our main result in perspective, a 9 percent change is about a third of the decrease in intergenerational persistence from the 1930s to the 1950s in Norway and Sweden (Pekkarinen, Salvanes, and Sarvimäki, 2017; Björklund, Jäntti, and Lindquist, 2009). Moreover, the main result that large economic fluctuations can change intergenerational mobility corresponds well with Feigenbaum (2015), who shows that the Great Depression lowered intergenerational mobility in the US for sons that grew up in the cities hardest hit

[9] Note that we estimate a linear rank–rank regression, although Panel (a) in Figure 4 and the literature suggests that there is some nonlinearity in the relationship between fathers' earnings ranks and sons' earnings ranks in the top part of the fathers' earnings distribution (see, e.g., Bratberg, Davis, Mazumder, Nybom, Schnitzlein, and Vaage, 2017; Pekkarinen, Salvanes, and Sarvimäki, 2017). In Section 5.2, we analyze upward rank mobility and discuss nonlinearities in the relationship between fathers' earnings ranks and sons' earnings ranks in detail.

[10] Table A1 in the Appendix shows that our main cohorts of interest (1952–1957) are not an especially selected sample. In fact, the table shows that the estimated intergenerational persistence is similar to that of the other groups of cohorts born in the 1950s and early 1960s.

[11] Note that the imputed earnings for the fathers of the cohorts born in 1932–1933 could bias the estimated rank–rank correlation downward and thereby overstate any estimates of intergenerational mobility. However, as this paper focuses on regional differences in the rank–rank correlation, these differences should be unaffected by the imputed earnings unless there are large regional differences in how earnings are imputed. As discussed in Section 4, the earnings imputation was based on occupation. There were, however, no significant differences in occupation types between high- and low-oil regions during the relevant years, and the average earnings of the fathers of the 1932–1933 cohorts did not differ significantly across regions (see Table 1).

by the economic downturn.

5.2 Upward Rank Mobility

Rank persistence may be driven by movements both from the bottom to the middle of the income distribution and from the middle to the top of the income distribution (Chetty, Hendren, Kline, and Saez, 2014). Therefore, measuring upward rank mobility is valuable. This is because it will help us understand whether individuals that grew up in poor or moderately well-off families benefited most from the natural resource shock, and whether the relationship between the ranks of the earnings of fathers and sons is nonlinear.

Table 3 presents the intergenerational transition matrices, which detail the probabilities of sons being in each quintile of the earnings distribution given a father in a specific quintile if his earnings distribution, in low- and high-oil regions. The figures in italics indicate that the difference between low- and high-oil regions is significantly different from zero at the 5 percent level. In low-oil regions, the likelihood of sons that grew up in a household in the lowest earnings quintile remaining in the lowest quintile in their own earnings distribution was 29 percent, whereas 12 percent reached the top earnings quintile. On the other hand, the probability of the sons of the poorest 20 percent of families in high-oil regions remaining in their own lowest earnings quintile was 23 percent, and their probability of reaching the top earnings quintile was 17 percent. These differences in upward rank mobility across regions are significant at the 1 percent level. They show that individuals born to poor families in those regions that benefited early from the oil boom were significantly less likely to remain poor and more likely to move all the way to the top of their cohort's earnings distribution.

To ensure these findings were not driven by preexisting local differences, Table 4 presents the intergenerational transition matrices for the placebo cohorts born in 1932 and 1933. Corresponding with the findings from the rank–rank regression (see Section 5.1), the differences between the low- and high-oil labor markets here are less pronounced. The percentage of bottom-to-top upward mobility (i.e., the percentage of sons with fathers in the bottom 20 percent of their earnings distribution that attained the top 20 percent of their own earnings distribution) was 12 percent in the high-oil regions and 10 percent in the low-oil regions. As for the measure of rank persistence, there was somewhat more upward mobility prior to the oil shock in the oil-affected regions, but the regional differences increased substantially following the resource shock. Moreover, the differences in upward rank mobility across regions are not significant at the 5 percent level for the placebo cohorts.

5.3 Oil Sector Employment

Notably, intergenerational mobility has been higher in high-oil regions, and the oil boom made it less likely that sons would remain in the lower half of the earnings distribution. A question remains, however, concerning the link between these mobility patterns and oil sector employment.

Table A2 in the Appendix shows the rank persistence results from a rank–rank regression where we allow the interaction term of the father's earnings rank and the indicator for high-oil regions to differ for oil-sector and non-oil-sector employees. We find that for both oil- and non-oil-sector employees, mobility was significantly higher in the high-oil regions. However, there is a significance difference in the estimated mobility coefficients between the two types of employees.

In Section 5.2, we showed that the oil boom increased bottom-to-top mobility. The question is whether these upward-moving individuals found employment directly in the oil sector. In the high-oil regions, 29.7 percent of sons who reached the top earnings quintile irrespective of their fathers' earnings quintile worked in the oil industry. The corresponding figure was only 9.8 percent in low-oil labor markets. Overall, the percentage of workers employed in the oil sector was about 15 percent in the high-oil regions and 6 percent in the low-oil regions. Therefore, in all labor markets, upward-movers displayed a greater likelihood of working in oil-related industries, and slightly more so in the high-oil regions. Accordingly, while there is some evidence that at least part of the observed increase in intergenerational mobility was directly because of oil sector employment, there is also evidence of employment spillovers for non-oil sectors, at least in high-oil regions.

5.4 Robustness Analysis

In this section, we present the results of a variety of sensitivity tests. First, we analyze whether selective migration biases our results. Second, we drop the Oslo labor market from the analysis. Third, we consider the middle-oil regions. Finally, we analyze whether the age at which a father's earnings were measured influences our main findings. Our results are robust to all of these sensitivity tests.

5.4.1 Regional Migration

There is evidence elsewhere that local economic booms affect migration (Dinkelman, 2011; Basso, 2016). As discussed in Section 4, we assigned each individual to a local labor market based on their municipality of birth to avoid the possibility that oil-shock-related selection for migration would bias our results. Nonetheless, there could still be bias through selective migration. For example, if a large share of men from a poor family background moved from a low-oil region to a high-oil region where they earned more than in their region of birth, and thereby moved up in the national earnings distribution, the regional differences in intergenerational earnings persistence would be underestimated. We would also underestimate the regional differences in the intergenerational earnings persistence if the sons of richer fathers migrated out of a high-oil region and remained in the top part of the national earnings distribution. However, we would overestimate the regional differences in intergenerational earnings persistence if men from a poor family background migrated from a high-oil to a low-oil region and earned more. To analyze how selective migration could affect our estimates of intergenerational mobility, we proceed in three steps. First, we document the number and characteristics of migrants that moved from the low- to high-oil regions and vice versa. Second, we re-estimate our main analysis based on the sample of sons that remained in their region of birth throughout their working lives. Third, we assign each individual to a local labor market based on their place of residence at age 36 years and re-estimate our main analysis.

We defined an individual as a 'mover' if he was registered as a resident in a different region from the region of his birth for at least a year between the ages of 18 and 41 years. Table A3 in the Appendix provides descriptive statistics for movers and stayers by the type of region. Note that the proportions do not sum to one because we do not consider individuals that moved to or from middle-oil regions (see Section 3.3). Overall, our figures suggest that regional mobility has been relatively low, but that men born in the 1950s were more likely to move than men born in the 1930s. In addition, movers were more likely to be from a richer and better-educated family background, and they themselves were better educated. The number of stayers was substantially higher in the low-oil regions for both the main and placebo cohorts. Men born in the 1950s in high-oil regions were substantially more likely to move to low-oil regions than those born in low-oil regions were to move to high-oil regions. Thus, we do not observe a large stream of migrants moving toward the regions where the oil sector was booming. We can conceive of several reasons why relatively few individuals born in low-oil regions moved to high-oil regions. For example, Bartik (2017) shows that in the context of hydraulic fracturing (fracking) in the US, workers did not respond to a local resource boom as predicted by a model with no moving costs. He concludes that the type of workers who would benefit from a resource shock have positive moving costs. Moreover, redistribution policies by the Norwegian government, which distributed the windfall oil revenue across all regions, could be another explanation why low-skilled individuals did not always move to high-oil regions.

Overall, focusing on stayers and changing the allocation of individuals to local labor markets do not alter our results. Table 5 presents the regression results of Equation 3 for three different samples. Column (i) is our baseline specification, where we assigned an individual to a local labor market based on the municipality of birth. In Column (ii), movers were excluded. In Column (iii), we assigned an individual to a local labor market based on the municipality of residence at age 36 years. In the regressions, we controlled for local labor market fixed effects, the age of the father at childbirth, and fixed effects for the son's birth year. Excluding all migrants increases the difference between the estimated intergenerational persistence parameters in the high- and low-oil regions (see Column (ii)). Table A4 in the Appendix presents the transition matrices for the sample excluding all movers.

When excluding movers, the likelihood of sons that grew up in a household in the lowest earnings quintile remaining in the lowest earnings quintile is similar to the estimates in Table 3 for both types of regions. In high-oil regions, the likelihood of sons that grew up in a household in the lowest earnings quintile reaching the top earnings quintile is slightly lower when excluding movers than in our baseline sample. The greatest difference arises when excluding movers who were the sons of rich families. That is, the likelihood of sons that grew up in a household in the highest earnings quintile remaining there is substantially lower when excluding movers than in our baseline sample in the high-oil regions. That is, some of the movers born to rich families in high-oil regions did exceptionally well in low-oil regions. When we assigned individuals to local labor markets based on their place of residence instead of their place of birth, the estimated rank–rank correlations became slightly lower than in our baseline specification (see Table 5, Column (iii)).

However, the difference between the coefficient of the interaction term θ_2 is not significant when comparing Columns (i) and (iii), and the estimated intergenerational persistence parameter in high-oil regions shifts only from 0.213 to 0.207 when reassigning the local labor market. Comparing the transition matrices in Table A5 in the Appendix (assignment based on residency) with our baseline results in Table 3 (assignment based on place of birth), the differences are small. Hence, we find some indication that the actual difference between the intergenerational persistence parameters in the high- and low-oil regions could be either somewhat smaller or larger, but the biases are not large, and the significant differences found earlier between the two types of regions remain. These findings differ from Feigenbaum (2015), who finds that migration is a key mechanism for his result, in that the sons of richer fathers migrated to locations that suffered less-severe effects from the Great Depression. However, this difference in the relative importance of different drivers of intergenerational transmission is not surprising because Feigenbaum (2015) analyzes a bust instead of a boom period.

5.4.2 Excluding the Oslo Labor Market Region

Compared with other local labor markets in Norway, the capital city, Oslo, is substantially larger in terms of both population and economic power. However, with an oil employment share of only 4.7 percent in 1980, Oslo is among the low-oil regions. To ensure that Oslo did not drive our results, Column (iv) in Table 5 presents the regression results of Equation 3 after excluding all men born in Oslo. Both the estimated intergenerational earnings persistence and the coefficient of the interaction term are slightly smaller when excluding Oslo. However, the regional difference in intergenerational persistence is not significantly different from the baseline results in Column (i) in Table 5.

5.4.3 Middle-Oil Regions

In our main analysis, we ignored individuals born in middle-oil regions and only compared individuals that grew up in high- and low-oil regions. In our earlier analysis, we found that the oil boom clearly affected the high-oil regions, unlike the low-oil regions. The treatment intensity in the middle-oil regions is less obvious. In Table 6, Column (iii) shows how intergenerational mobility differed between the low-oil and middle-oil regions. We find that intergenerational mobility was higher for individuals that grew up in middle-oil regions than in low-oil regions. But the difference in intergenerational mobility between the high- and middle-oil regions was not significant.

As an alternative, we could analyze how the oil industry affected intergenerational mobility using a continuous treatment variable (see Table 6, Column (iv)). Using the proportion of workers employed in the oil industry in 1980 as a continuous measure, we still find a significant and negative coefficient for the interaction term. Therefore, the higher the proportion of oil sector employees, the greater the intergenerational mobility for cohorts that benefited from the oil boom. There were, however, large differences in the number of individuals employed in the oil industry in 1980 across regions, and there are relatively sharp changes at the cutoffs we use to allocate local labor markets to different oil regions. Because of these nonlinearities, the specification using indicator variables for high-oil regions is preferred.

5.4.4 The Father's Age When Measuring Earnings

In most previous studies of intergenerational income mobility, the incomes of fathers were measured when they were in their 40s Haider and Solon (2006). Here, we measured fathers' earnings between the ages of 50 and 55 years, as our earnings data commence in 1967. For 26 percent of our sample of sons, we could compute the earnings of their fathers between the ages of 40 and 45 years; this being the subsample of fathers who were relatively young when their sons were born. The estimated coefficients of the intergenerational persistence parameter θ_1 and of the interaction term θ_2 are very similar to the baseline estimates (see Table 6, Column (v)). This indicates that our results are relatively robust to changing the age at which parental earnings were measured.

6 Mechanisms

We found that the Norwegian oil boom increased intergenerational mobility—mostly bottom-up mobility—in the affected regions. In this section, we explore several possible mechanisms explaining why. First, we examine whether the oil boom changed educational attainment and returns to education. Second, we analyze whether cross-sectional inequality is the main explanation for our findings. Lastly, we evaluate whether the increase in mobility arose from a risk premium on the earnings of sons, given the increased danger of work in the oil industry, and whether these men were therefore more likely to be enrolled in disability insurance programs later in life. Ultimately, we find that the changes in the returns to education offer the best explanation for geographic differences in intergenerational mobility following the oil boom.

6.1 Educational Attainment and Returns to Education

A resource boom may affect educational attainment through different channels. For example, an increase in the demand for vocationally trained workers in the resource extraction sector may lower the returns to academic education and increase the opportunity cost of schooling. In the context of a standard human capital model (Becker, 1964), both a decrease in the returns to academic education as well as an increase in opportunity cost lower educational investment. By contrast, if a resource shock increases family income, the schooling of children may be prolonged, and thus their educational attainment may increase (see, e.g., Cascio and Narayan, 2015).

In our main analysis, we focus on the cohorts of sons that entered the labor market during the first decades of oil extraction in Norway. As discussed in Section 3.3, these cohorts were largely finished with education (or at least enrolled in either vocational or academic high school education) when oil extraction began. Moreover, Panels (a) and (b) of Figure 2 present some empirical evidence that the proportion of individuals that finished either academic or vocational high school was stable across the cohorts of interest and similar in high- and low-oil regions. Therefore, we abstract from the influence of the effect of the oil shock on educational attainment through oil boom-related changes in opportunity costs.

Focusing on cohorts that were largely finished with education when oil extraction commenced also enables us to abstract from the influence of changes in educational attainment through oil boom-related increases in family income. However, the question remains as to whether the oil boom altered the investment in human capital accumulation contingent on parental background. First, we provide some descriptive evidence documenting the relationship between family background, as proxied by the father's earnings, and the son's educational attainment.

Panel (a) of Figure 5 presents a binned scatterplot of the probability that sons born between 1952 and 1957 would attain an academic high school (or higher) education against their fathers' earnings percentile ranks. We find that in both types of labor markets, the sons of richer fathers were more likely to complete an academic high school education. The differences between low- and high-oil regions are small. Therefore, the education gap between sons growing up in poor or rich households was little affected by the oil boom in our main sample. Panel (b) of Figure 5 presents a binned scatterplot of the probability that sons in the placebo cohort would attain an academic high school education versus their fathers' percentile ranks, by type of labor market. Again, for the placebo cohorts, the differences between low- and high-oil regions in the probability of sons completing academic high school (or higher) conditional on their fathers' earnings percentiles are small.

Second, we use a similar specification to Equation 3 to examine whether the earnings rank of fathers is less correlated with their sons' probability of completing academic high school in high-oil regions. We regress an indicator variable for whether the son completed academic high school on the father's rank in the earnings distribution, and include an interaction term with the father's rank and another for being born in a high-oil region. We include controls for local fixed effects, the age of the father at childbirth, and fixed effects for the son's birth year. Figure 5 suggests that the relationship between the rank of fathers and the probability of their sons finishing academic high school is not linear. For this reason, we augment this specification with a quadratic function of the father's rank, and the interaction between the father's squared rank and the high-oil region dummy (see Table 7).

The coefficient for the quadratic function of the father's rank is positive and significant in all specifications, implying that the relationship between education and the earnings of fathers is flatter at the bottom of the earnings distribution and steeper for richer fathers. The parameter for the interaction term between the rank of fathers (and the quadratic form of this rank) and the dummy for being born in a high-oil region is not significant for either the main or the placebo cohort. Consequently, we find no regional differences in human capital investment conditional on fathers' earnings. These results provide empirical evidence that the oil boom did not lead to changes in human capital investment conditional on fathers' earnings, which could explain the change in intergenerational mobility observed for the cohorts born in the 1950s.

Finally, the increase in earnings and intergenerational mobility could result from changes in the returns to human capital endowment. Table 8 presents the results from a regression of log average earnings at ages 36 to 41 years on a dummy variable for completing academic high school or college before age 36 years, and interaction terms for the academic education indicator and dummy variables for being born in a high-oil region, cohorts, and local labor market fixed effects. As shown, the average earnings were 35 percent (cohorts 1932–1933) and 45 percent (cohorts 1952–1957) higher for individuals with an academic education compared with those with a vocational high school degree or without a high school degree.

However, for the main cohorts, there were significant geographical differences in the returns to an academic education. For men born in the high-oil regions in 1952–1957, the returns to an academic education were on average 6 percentage points (0.082 – 0.019) lower. Notably, the interaction term between the academic education indicator and the high-oil region indicator is not significant for the placebo cohorts. As the exploitation of natural resources mostly creates jobs for skilled and semiskilled craftsmen and low-skilled workers, the lower returns to academic education are not surprising. Higher demand for vocationally trained workers increases their price and thus reduces the returns to higher education. This result corresponds with findings from other countries showing that different types of natural resource shocks to local labor markets lowered educational attainment partly through lowering the returns to education (see, e.g., Cascio and Narayan, 2015; Emery, Ferrer, and Green, 2012).

As discussed by Becker and Tomes (1976) and as depicted in Figure 5, individuals from less affluent backgrounds have a lower probability of finishing an academic education. Accordingly, the fact that the sons of poorer fathers disproportionately benefited from the increasing returns to vocational training in the high-oil regions led to greater upward mobility in these regions. The hypothesis that changes in the returns to human capital were the main driver of earnings mobility has been pointed out by Aaronson and Mazumder (2008), who show that the increase in the intergenerational elasticity observed in the US during the 1980s and 1990s corresponds with the period of increased returns to tertiary education. Likewise, in a cross-country comparison, Corak (2013) finds that there is less intergenerational mobility in countries with larger college wage premiums.

6.2 Cross-Sectional Inequality and Earnings Distributions

There is both a conceptual and empirical link between intergenerational mobility and inequality. We have already shown that the Norwegian oil boom decreased intergenerational earnings persistence, but did it also change the relative economic distribution? First, we consider whether any change in inequality accompanied the change in intergenerational mobility. Second, we analyze how the oil boom changed the income distribution in high- and low-oil regions, and for which educational and occupational categories the shift was greatest. This allows us to evaluate whether cross-sectional inequality is a key explanation for our findings.

Mobile societies are often less unequal. However, Hassler, Mora, and Zeira (2007) suggest that changes in inequality are not necessarily negatively associated with changes in intergenerational mobility. In particular, an increase in inequality may also increase the incentive to undertake more education and thereby account for greater mobility. However, in the case of a resource shock, the decrease in the returns to educational attainment raises relative earnings for low-skilled workers and may lead to a decrease in inequality and an increase in mobility. Table A6 in the Appendix illustrates different dispersion indexes across regions. For the placebo cohorts, there are no substantial differences in earnings inequality between the two regions. This suggests that there was no significant difference in intergenerational earnings persistence and inequality prior to the oil boom. For the main cohorts, the ratio of the 90th and 50th percentiles—measuring inequality in the upper part of the earnings distribution—does not differ by region.

However, the ratio of the 10th and 50th percentiles—measuring inequality in the lower part of the earnings distribution—is higher in the high-oil regions. This decreased dispersion in the left-hand side of the earnings distribution translates to a lower Gini index in the high-oil regions (0.27 compared with 0.30 in the low-oil regions). As a result, in areas where low earners pushed upward and inequality decreased, intergenerational mobility increased. This shift in the lower part of the earnings distribution in the high-oil regions reflects the findings from the analyses of both rank persistence (Section 5.1) and upward rank mobility (Section 5.2). First, it is consistent with the larger estimated intercept in the rank–rank regressions for the high-oil regions, implying that the expected rank for sons from fathers at the bottom of the earnings distribution is higher in those regions. Second, it reflects the substantial increase in bottom-to-top mobility in the high-oil regions.

As discussed in Section 5.1, the increased intergenerational mobility for cohorts born between 1952 and 1957 in the high-oil regions could imply that the earnings distribution in these regions shifted to the right when oil production in Norway began. Panel (a) in Figure 6 plots the estimated earnings distribution by region for the cohorts born in 1932 and 1933 along with the cohorts born from 1952 to 1957. The earnings distributions in the high- and low-oil regions mainly overlap for the placebo cohort, and the two distributions are not significantly different from each other (p-value of 0.266 for the Kolmogorov–Smirnov test). However, the earnings distribution for the main cohorts is shifted significantly to the right in the lower and middle of the earnings distribution (p-value of ¡0.001 for the Kolmogorov–Smirnov test). Only for high earnings do the two distributions overlap.

To analyze whether our main findings in Section 5.1 mechanically result from this shift in the earnings distribution in the high-oil regions, and the fact that we rank individuals at the national level, we employ an alternative specification. As Mazumder (2016) argues that we need to standardize the earnings distribution at the national level to compare intergenerational mobility across local labor markets, we cannot rank individuals on local levels. Therefore, we instead adjust the earnings distributions of the sons born in the high- and low-oil regions identical. In particular, we compute the difference in earnings between high- and low-oil regions within each percentile rank and then add this computed earnings difference to the earnings of individuals born in the low-oil regions in each percentile rank. We then rank individuals at the new national level and estimate Equation 3. Column (vi) in Table 6 shows that the coefficient of the interaction term θ_2 remains significant (at the 5 percent level), but slightly smaller in magnitude. This suggests that the shift in the earnings distribution explains about 21 percent of the effect of the oil boom on intergenerational mobility. Clearly, this shift by itself does not fully explain our main result.

The decreased returns to academic education suggest that the earnings distribution in the high-oil regions for vocationally educated individuals shifted, especially to the right, when oil production began. Panel (b) of Figure 6 shows that almost the entire earnings distribution for vocationally trained individuals in the high-oil regions shifted to the right. Only at the very top does the distribution overlap with the earnings distribution for vocationally trained individuals in the low-oil regions. The earnings distribution of academically educated workers in the high-oil regions also shifted slightly to the right, implying that highly educated workers also earned more in the areas most affected by the oil boom. Moreover, among vocationally trained individuals, the differences in the earnings distributions by region were greatest for individuals working in the oil industry (see Panel (a) of Figure 7).

However, the earnings distribution for vocationally trained individuals working in non-oil industries also shifted to the right in the high-oil regions. This suggests the presence of earnings spillovers from the oil to non-oil sectors. That is, individuals working in industries supplying goods and services to oil industry workers (e.g., hairdressers, restaurant employees, cleaners, car dealers, etc.) also benefited from the higher earnings in the resource sector. Nonetheless, among individuals with an academic education, only those working in the oil sector experienced a shift in the earnings distribution (see Panel (b) of Figure 7). That many academically trained individuals in the non-oil sector work in the public sector (e.g., teachers, medical doctors, etc.) and are paid according to a nationwide pay scale may explain this.

6.3 Adverse Health Effects

Moving up the income ladder as a less-skilled worker may come at a risk to health. If the values of all job characteristics are embedded in the wage rate, employers need to compensate employees for job-related risk (Thaler and Rosen, 1976). For this reason, the increases in earnings among less-skilled workers in the oil industry could partly result from compensation for hard physical work and job-related risk. In addition, most oil sector employees working offshore work shifts, and this represents an additional adverse health risk (Kate, Cary, Yitzhak, and Arie, 1997). Further, bottom-to-top movers in high-oil regions may have been more likely to eventually receive disability insurance payments. Table 9 shows the probability of receiving disability insurance payments at least once between 1991 and 2008 conditional on both the son's and the father's earnings quintiles. On average, the percentage of individuals that ever received a disability insurance payment was higher in the high-oil regions for sons in the first and second quintiles of the earnings distribution. However, sons in the two highest quintiles of their earnings distribution in the high-oil regions were less likely to receive disability insurance payments.

This also holds for bottom-to-top movers in the high-oil regions, who were significantly less likely to ever enroll in a disability insurance program, compared with the bottom-to-top movers in the low-oil regions. Consequently, we do not find any evidence that bottom-to-top movers in the high-oil regions gained their earnings at ages 36 to 41 years predominantly through employment exposing them to increased health risks later in life.[12]

7 Multigenerational Persistence

We presented empirical evidence that the Norwegian natural resource shock increased intergenerational mobility for cohorts directly affected early in their working life. However, the question remains as to whether this natural resource shock was sufficiently strong to also have an impact upon the children of the affected cohorts. Lindahl, Palme, Massih, and Sjögren (2015) and Clark (2014) argue that evaluating intergenerational persistence using data from just two generations severely underestimates long-run intergenerational persistence. That is, if there are generation-specific deviations from the long-run social position of a family, only considering two generations could overestimate the convergence toward mean earnings in the population. Conversely, grandparent outcomes could exert an independent effect when these outcomes are a better representation of the long-run social position of the family. Moreover, Nybom and Stuhler (2013) argue that periods of structural change may reduce the transmission of social status in the generation directly affected. However, this decrease in intergenerational persistence does not necessarily persist for the next generation, because family ties may again tighten, and the society could enter a new steady state with lower intergenerational mobility.

[12] An alternative measure of occupational health risk could be fatal accidents or death from occupational health hazards (e.g., exposure to certain chemicals). However, the number of fatal accidents in the oil industry is not much larger than for other industries with predominantly skilled and semiskilled craftsmen (e.g., construction, transport, machinery, etc.). The individuals in the 1952–1957 cohorts were still too young in 2014 to observe an overall lower life expectancy from occupational health hazards. This is why we focus on disability insurance payments instead of accidental deaths.

7.1 Rank Persistence

Panel (a) of Figure 8 presents some descriptive evidence of the intergenerational mobility across multiple generations. In particular, the plots present binned scatterplots of the mean percentile ranks of the third generation versus those of the first generation (the fathers of the main cohorts) and the second generation (the main cohorts) in the high- and low-oil regions. The third generation is ranked based on their earnings at age 30 years relative to other men with fathers born in the same cohort.[13] The conditional expectation of a third-generation man's rank given the first generation's rank is nearly linear in the lowest four quintiles of the first generation's earnings distribution. In the top quintile of the first generation's earnings distribution, the relationship decreases sharply. In the low-oil regions, there is a positive relationship between the first and third generations' ranks.

This indicates that men with higher-earning grandfathers in low-oil regions were receiving higher earnings at age 30 years on average than men with lower-earning grandfathers. In the high-oil regions, the relationship between the first and third generations' ranks is nearly flat. That is, we find no intergenerational persistence between the first and the third generation in local labor markets affected by the oil boom. In addition, the estimated intercept for the high-oil regions is higher, indicating that the expected rank is higher for men whose grandfathers were at the bottom of the earnings distribution. Panel (b) of Figure 8 plots the mean percentile ranks of third-generation men versus their fathers' (i.e., the second generation) percentile ranks. Besides the top and bottom part of the second generation's earnings distribution, the conditional expectation of an individual's rank given his father's rank is nearly linear. Unlike Panel (a), the relationship between the second and third generations' ranks has a positive gradient in both types of regions. However, the relationship between the second and third generations' ranks is less steep in the high-oil regions, implying a weaker earnings link and less intergenerational persistence. This indicates that the higher intergenerational mobility caused by the oil boom in the high-oil regions persisted over multiple generations.

As Figure 8 is only illustrative and does not control for local labor market fixed effects, Table 10 presents the regression results of Equation 3. These regressions control for local labor market fixed effects, the age of second-generation men at the time of the birth of the third generation, and fixed effects for the second generation's birth year. The estimated rank–rank correlation is 0.053 for the first and third generation comparison (Column (i)) and 0.166 for the second and third generation comparison (Column (ii)). In the high-oil regions, the estimated persistence parameter for the second and third generation comparison is on average 32 percent (5.4 percentage points) lower. For the first and third generation comparison, we identify zero persistence in the high-oil regions. This indicates that the oil boom broke the earnings link between grandfathers and their grandsons in the oil boom-affected regions. These results correspond with the findings in the graphical analysis and show that the oil boom affected intergenerational mobility across multiple generations.

Controlling for the ranks of both the first and second generations, we find that there are significant

[13] As we can only observe earnings until 2014, we measure the earnings of the third generation at age 30 years. As discussed earlier, earnings between ages 36 and 40 years would be a better measure of lifetime earnings, as individuals with a college education have much less experience at age 30 years than vocationally trained individuals, but display steeper earnings profiles in their early 30s.

geographic differences in intergenerational mobility, and that both the first and second generations' ranks significantly explain the third generation's rank (see Table 10, Columun (iii)). In particular, controlling for the first generation's rank, the estimated persistence parameter for the second and third generations is 0.161 in the low-oil regions. Controlling for the second generation's rank, the estimated persistence parameter for the first and third generations is 0.019 in the low-oil regions. In contrast to the persistence between the second and third generations being 27 percent lower in the high-oil regions compared with the low-oil regions, the estimated rank–rank correlation between the first and third generations conditional on the second generation's rank is significantly negative in the high-oil regions. That is, holding the second generation's rank constant, a lower first-generation rank predicts a higher third-generation rank. In other words, the greater the change in percentile rank between the first and second generations, the higher the predicted rank of the third generation. This pattern is also reflected in Figure 10 below.

7.2 Upward Rank Mobility

Next, we analyze third-generation men's upward rank mobility. Figures 9 and 10 plot the mean rank of the third generation conditional on the first and second generations' ranks in the high- and low-oil regions.[14] The average ranks for third-generation men whose grandfathers (the first generation) were poor and whose fathers (the second generation) moved to the top of the earnings distribution are substantially higher in the high-oil regions. However, there are no regional differences in average ranks for third-generation men whose grandfathers (the first generation) were very rich and whose fathers (the second generation) remained in the top earnings percentile. Interestingly, the regional differences in early career earnings caused by the natural resource shock are largest among the sons of the bottom-to-top movers.

Note that because of data limitations we only measure the earnings of the third generation at age 30 years. As discussed, earnings between the ages of 36 and 40 years would be a better measure. Figures A4–A6 and Tables A11–A12 in the Appendix provide the above results when the earnings of the third generation are adjusted for experience. That is, we predict earnings at age 30 years based on a second-order polynomial function of experience. The results scarcely deviate from those above.

In summary, we find that persistence decreased over the generations in both the high- and low-oil regions, and that intergenerational mobility across the three generations was significantly higher in the high-oil regions. Importantly, we find that the oil boom broke the link between men born in the 1920s and 1930s and their grandsons born in the 1970s and 1980s. Thus, a large economic shock can not just mitigate but even dissolve the strong intergenerational persistence described by Lindahl, Palme, Massih, and Sjögren (2015) and Clark (2014). Our results also differ from the findings of Nybom and Stuhler (2013), who show that educational reform in Sweden increased intergenerational mobility in income and education from parents to their offspring in the directly affected generation, but increased intergenerational persistence in the following generation.

A possible explanation for this difference is the longer duration of the oil boom in Norway studied in our analysis compared with the limited implementation period of the educational reform studied in Nybom and Stuhler (2013). That is, the oil boom affected not only the cohorts born in the 1950s but also

[14]The transition matrices corresponding to Figures 9 and 10 are presented in Table A7 in the Appendix.

their offspring. In our analysis, the structural change that reduced the transmission of social status lasted more than 40 years, and society may not yet have entered a new steady state with lower intergenerational mobility.[15] However, the oil price dramatically fell in the second half of 2014. From 2014 to 2015, direct and indirect employment in the oil sector fell by 35,000 workers, corresponding to an 18 percent decrease in the workforce in the oil sector, and a large share of the laid-off workers were skilled and semiskilled craftsmen. Depending on the development of the oil price and productivity in the oil sector, the impacts on the third generation's earnings could differ in the future.

7.3 Multigenerational Educational Persistence

To obtain a better understanding of how vulnerable the sons of second-generation bottom-to-top movers are with respect to employment prospects in the oil sector, we plot the probability of the third generation having an academic education conditional on the first and second generations' ranks in high- and low-oil regions in Figures 11 and 12.[16] On average, men whose grandfathers (the first generation) were poor and whose fathers (the second generation) remained in a low earnings percentile have similar education levels across the high- and low-oil regions. There are also small regional differences in the average education levels for men whose grandfathers were very rich and whose fathers remained in the top earnings percentile. However, men whose grandfathers were relatively poor and whose fathers moved to the top of the earnings distribution have on average a significantly higher education level in the low-oil regions. That is, second-generation bottom-to-top movers in the high-oil regions invested less in the education of their offspring than did bottom-to-top movers in the low-oil regions. Note that for the same comparison in Figures 9 and 10, sons in the high-oil regions earned substantially more. That is, while the sons of bottom-to-top movers have benefited most in terms of early career earnings, their level of education is lower.

One possibility is that the sons of bottom-to-top movers could still achieve high earnings despite lower educational investment through higher returns to vocational training in high-oil regions. In Column (iii) of Table 8, we show that the returns to academic education are 33 percent lower in high-oil regions for the third generation. The geographical difference in the returns to academic education is significant at the 5 percent level. Potentially, the recent fall in oil prices and the mass layoffs in the oil sector could lower the returns to vocational training in the future, and the sons of the second-generation bottom-to-top movers may experience earnings losses in such a scenario.

There are several possible reasons why second-generation bottom-to-top movers in the high-oil regions invested less in the education of their offspring. First, bottom-to-top movers in the low-oil regions were better educated (see Table A9 in the Appendix). That is, bottom-to-top movers in the low-oil regions were more likely to be better off than their fathers because of their education. Consequently, their own experience could have motivated them to invest in the education of their own sons, or their sons may have had their fathers as role models and so been more likely to aspire to an academic education. Second, family formation could be important. Figure A3 in the Appendix shows that second-generation men in the high-oil regions

[15] Note that our latest earnings measures for the third generation are from 2014 (see Section 4).

[16] The transition matrices corresponding to Figures 11 and 12 are in Table A8 in the Appendix.

were on average slightly younger when they had their first child (Panel (a)), and that they had more children on average (Panel (b)). Table A10 in the Appendix shows that the spouses of bottom-to-top movers in the high-oil regions were less likely to have had an academic education.[17] Thus, the mothers of the bottom-to-top movers' sons in low-oil regions may also have been more inclined to encourage their sons to pursue an academic education than mothers in the high-oil regions. Third, the difference in education could also reflect differences in ability. Figures A7 and A8 plot the third-generation's IQ conditional on the first and second generations' percentile ranks in high- and low-oil regions.[18] Men whose grandfathers (the first generation) were poor scored substantially lower in IQ tests at age 19 in the high-oil regions compared with the low-oil regions. Moreover, having a father (the second generation) in the highest earnings percentile was less predictive of IQ score in the high-oil regions, independent of the grandfather's rank. As IQ scores reflect not only genetic traits but also early parental investments, this suggests that the sons of bottom-to-top movers could have either lower genetic ability or lower ability acquired during early childhood. Finally, we could rationalize the lower education investment by the lower returns to academic education in the high-oil regions, as discussed earlier.

7.4 Female Offspring

As noted earlier, most individuals working in the oil or related industries are men. The education and career decisions of men and women conditional on their family background may be substantially different. For this reason, we also analyze the intergenerational earnings mobility and educational outcomes for third-generation daughters. For children of the 1952–1957 cohorts, the likelihood of being in the labor force was about equal for male and female offspring. Table A14 in the Appendix presents the estimated rank–rank correlations between the first- and second-generation men's earnings ranks and the third-generation women's earnings ranks. For the second and third generation comparison (Column (ii)), the results are not significantly different from the results for male offspring (see Table 10). For women (men), the estimated rank–rank correlation is 0.168 (0.166), and the estimated persistence parameter is on average significantly lower in the high-oil regions. For the first and third generation comparison, we find greater intergenerational persistence for women than for men (Column (i)). However, there is no significant regional difference. When controlling for both first and second generations' ranks in Column (iii), the result that there are regional differences for the fathers' ranks but not the grandfathers' ranks remains. Thus, the oil boom did not break the earnings link between the first and third generations for women in oil boom-affected regions.

These findings are supported by the analysis of upward rank mobility: Figures A10 and A11 in the Appendix plot the average earnings percentile rank of third-generation women conditional on the earnings percentile ranks of the first and second generations. Compared with the patterns for the third-generation men (see Figures 9 and 10), the first generation's earnings percentile—particularly when the first generation is in the highest percentile—seems to be a more important determinant of the third-generation women's earnings percentile than for men in both high- and low-oil regions. Moreover, the average earnings percentile

[17] If intergenerational persistence differs by birth order, the geographical differences in intergenerational mobility could be driven by the geographical differences in family size. However, the results presented in Table 10 are unaltered when focusing only on first-born sons.

[18] The transition matrices corresponding to Figures A7 and A8 are presented in Table A13 in the Appendix.

of the daughters of second-generation bottom-to-top movers did not differ significantly between the two types of regions (see Table A15 in the Appendix).

Focusing on educational achievement, we find that the pattern for third-generation women's education conditional on the ranks of the first and second generations is similar to the pattern for third-generation men (see Figures A12 and A13 and Table A16 in the Appendix). This suggests that the daughters of second-generation bottom-to-top movers acquired less academic education in the high-oil regions. While the lower investment in academic education among third-generation men in high-oil regions can be rationalized by the lower returns to an academic education, Column (iv) in Table 8 shows that regional differences in the returns to education cannot explain lower investments in education for third-generation women. This suggests that the families of second-generation bottom-to-top movers in the high-oil regions were less encouraging toward education than those of bottom-to-top movers in the low-oil regions, regardless of the returns to education.

8 External Validity

We have shown that a resource boom can increase intergenerational earnings mobility. Is this result unique to Norway or are there similar geographic patterns in intergenerational mobility in other countries? Connolly, Corak, and Haeck (2017) show that areas with high intergenerational mobility in Canada include significant parts of the provinces of Alberta, Saskatchewan, Newfoundland, and Labrador, which experienced booms from oil, potash, and other commodities during a period when child income was measured. Moreover, Chetty, Hendren, Kline, and Saez (2014) suggest that part of the geographic variation in upward mobility could be driven by local shocks such as the discovery of a natural resource and subsequent boom periods.

To further investigate whether there is a significant correlation between intergenerational mobility and oil extraction in the US, we link the county-level mobility measures derived by Chetty, Hendren, Kline, and Saez (2014) with information on oil well openings collected by Feyrer, Mansur, and Sacerdote (2017). Between 2004 and 2012, at least one oil well opened in 724 of 2,766 US counties. As Chetty, Hendren, Kline, and Saez (2014) measure the income of the second generation in 2012, we can investigate whether income mobility was higher in counties where the second generation was affected by the oil boom early in their working career. We find that while rank–rank mobility does not differ between counties with and without oil well openings, upward rank mobility is significantly higher in counties where oil wells were opened between 2004 and 2012 (see Table A17). In particular, the expected rank of a child whose father was in the 25th percentile of the income distribution was on average 43.1 in counties without oil well openings, and 44.4 in counties with oil well openings, and thereby significantly higher on a 5 percent significance level. This provides descriptive evidence that resource shocks are also drivers of upward rank mobility in the US.

9 Conclusion

In this paper, we analyzed the impact of a large economic shock on intergenerational mobility. In particular, we examined how the Norwegian oil boom starting in the 1970s affected the transmission of economic status from fathers to sons who entered the labor market around the start of the oil boom. Our results indicate that the oil boom increased intergenerational earnings mobility: sons born in high-oil regions experienced more intergenerational earnings mobility than sons born in low-oil regions. We revealed that these effects were not driven by preexisting location-specific differences in intergenerational earnings mobility. In addition, while the new economic opportunities were beneficial for men from all socioeconomic backgrounds, they mostly increased bottom-up mobility.

Turning to the underpinning mechanisms, we found that changes in the returns to education offer the best explanation for the geographic differences in intergenerational mobility following the oil boom. As we focused on cohorts who had completed their secondary education prior to the oil shock, educational attainment did not differ by region. This is an important difference from the existing literature, which has largely focused on the changes in educational choices after resource booms (Black, McKinnish, and Sanders, 2005b; Cascio and Narayan, 2015; Morissette, Chan, and Lu, 2015). Although we found that earnings distributions in high-oil regions shifted to the right, we also showed that these shifts explained only a small share of the overall effect of the oil boom on intergenerational mobility. The results were not sensitive to selective migration, to the definition of high- and low-oil regions, or the age at which fathers' earnings were measured. In addition, we found that intergenerational mobility was significantly higher in oil-affected labor markets across three generations, in that the earnings rank of the second generation was less predictive of the earnings rank of the third generation, and that the oil boom broke the earnings link between the first and third generations in high-oil regions. For third-generation women, the ranks of both the first and second generations of men was predictive of their earnings rank. There was, however, no regional variation in the relationship between the first and third generations.

Putting our results in perspective, our main finding that large economic fluctuations can change intergenerational mobility corresponds well with Feigenbaum (2015), who shows that the Great Depression lowered intergenerational mobility in the US for sons who grew up in the cities hit hardest by the economic downturn. However, whereas Feigenbaum (2015) finds that migration is a key mechanism, because the sons of richer fathers migrated to locations that suffered less-severe effects from the Great Depression, our analysis indicates that changes in the returns to education are the primary mechanism. However, this difference in the relative importance of different drivers of intergenerational transmission is not surprising, as we consider different types of economic shocks. Moreover, our main findings are potentially relevant to other resource-rich countries. For example, Chetty, Hendren, Kline, and Saez (2014) and Connolly, Corak, and Haeck (2017) provide some descriptive evidence that intergenerational mobility is higher in resource-rich counties in the US and Canada. In addition, the oil shock persistently broke the earnings link between generations. As the oil boom lasted for more than 40 years and potentially also affected the third generation's earnings, it is not surprising that our results differ from Nybom and Stuhler (2013). In particular, they show that educational reform in Sweden increased intergenerational mobility in earnings and education from parents to their offspring in the directly affected generation, but increased intergenerational persistence in the next generation.

When analyzing persistence across multiple generations, we find that the sons of bottom-to-top movers in the high-oil regions had on average the highest early-career earnings. However, their level of education is significantly lower, and they are therefore more vulnerable to negative oil shocks and decreasing returns to vocational education. One qualification regarding our findings is that as oil prices fell dramatically in the second half of 2014 and the workforce—particularly the less skilled—in the Norwegian oil sector declined substantially, the third generation's earnings, and thereby also intergenerational earnings persistence, could change again over the coming decade. Therefore, future research should seek to analyze how consecutive economic shocks affect intergenerational mobility across multiple generations and whether the effects of booms and busts are symmetric.

References

Aaronson, D., and B. Mazumder (2008): "Intergenerational Economic Mobility in the United States, 1940 to 2000," *Journal of Human Resources*, 43(1), 139–172.

Allcott, H., and D. Keniston (forthcoming): "Dutch Disease or Agglomeration? The Local Economic Effects of Natural Resource Booms in Modern America," *Review of Economic Studies*.

Bartik, A. (2017): "Worker Adjustment to Changes in Labor Demand: Evidence from Longitudinal Census Data," Working paper.

Basso, G. (2016): "Local Labor Markets Adjustments to Oil Booms and Busts," Working paper.

Becker, G. S. (1964): *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press, Chicago.

Becker, G. S., and N. Tomes (1976): "Child Endowments and the Quantity and Quality of Children," *Journal of Political Economy*, 84(4, Part 2), S143–S162.

Bhuller, M. (2009): "Inndeling av Norge i arbeidsmarkedsregioner," Notater 2009/24, Statistics Norway.

Bhuller, M., M. Mogstad, and K. G. Salvanes (2017): "Life Cycle Earnings, Education Premiums and Internal Rates of Return," *Journal of Labor Economics*, 35(4).

Björklund, A., M. Jäntti, and M. J. Lindquist (2009): "Family Background and Income During the Rise of the Welfare State: Brother Correlations in Income for Swedish Men Born 1932–1968," *Journal of Public Economics*, 93(5), 671–680.

Black, D. A., T. McKinnish, and S. Sanders (2005a): "The Economic Impact Of The Coal Boom And Bust," *The Economic Journal*, 115(503), 449–476.

Black, D. A., T. G. McKinnish, and S. G. Sanders (2005b): "Tight Labor Markets and the Demand for Education: Evidence from the Coal Boom and Bust," *Industrial and Labor Relations Review*, 59(1), 3–16.

Black, S. E., P. J. Devereux, and K. G. Salvanes (2005): "The More the Merrier? The Effect of Family Size and Birth Order on Children's Education," *The Quarterly Journal of Economics*, 120(2), 669–700.

Bratberg, E., J. Davis, B. Mazumder, M. Nybom, D. D. Schnitzlein, and K. Vaage (2017): "A Comparison of Intergenerational Mobility Curves in Germany, Norway, Sweden, and the US," *The Scandinavian Journal of Economics*, 119(1), 72–101.

Brunstad, R. J., and J. M. Dyrstad (1997): "Booming Sector and Wage Effects: An Empirical Analysis on Norwegian Data," *Oxford Economic Papers*, 49(1), 89–103.

Cascio, E. U., and A. Narayan (2015): "Who Needs a Fracking Education? The Educational Response to Low-Skill Biased Technological Change," Working Paper 21359, National Bureau of Economic Research.

Chetty, R., and N. Hendren (2017): "The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects," Working Paper 23001, National Bureau of Economic Research.

Chetty, R., N. Hendren, P. Kline, and E. Saez (2014): "Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States," *The Quarterly Journal of Economics*, 129(4).

Chetty, R., N. Hendren, P. Kline, E. Saez, and N. Turner (2014): "Is the United States still a Land of Opportunity? Recent Trends in Intergenerational Mobility," *The American Economic Review*, 104(5), 141–147.

Clark, G. (2014): *The Son Also Rises: Surnames and the History of Social Mobility*. Princeton University Press, Princeton.

Connolly, M., M. Corak, and C. Haeck (2017): "Intergenerational Mobility between and within Canada and the United States," mimeo.

Cooper, B., and T. Gaskell (1976): *Adventure of North Sea Oil, Hardcover*. William Heinemann Ltd, London, 1 edn.

Corak, M. (2013): "Income Inequality, Equality of Opportunity, and Intergenerational Mobility," *The Journal of Economic Perspectives*, 27(3), 79–102.

Corak, M., M. J. Lindquist, and B. Mazumder (2014): "A comparison of Upward and Downward Intergenerational Mobility in Canada, Sweden and the United States," *Labour Economics*, 30, 185–200.

Cust, J., and T. Harding (2014): "Institutions and the Location of Oil Exploration," Working Paper 127, University of Oxford.

Dinkelman, T. (2011): "The Effects of Rural Electrification on Employment: New Evidence from South Africa," *The American Economic Review*, 101(7), 3078–3108.

Ekeland, A. (2015): "Sysselsatte i petroleumsnæringene og relaterte næringer 2014," Reports 2015/48, Statistics Norway.

Emery, H., A. Ferrer, and D. Green (2012): "Long Term Consequences of Natural Resource Booms for Human Capital Accumulation," *Industrial and Labor Relations Review*, 65(3), 708–734.

Feigenbaum, J. (2015): "Intergenerational Mobility during the Great Depression," Working paper.

Feyrer, J., E. T. Mansur, and B. Sacerdote (2017): "Geographic Dispersion of Economic Shocks: Evidence from the Fracking Revolution," *American Economic Review*, 107(4), 1313–34.

Finansdepartementet (1974): *Petroleumsvirksomhetens plass i det norske samfunn.* Norwegian Government, Oslo.

Haider, S., and G. Solon (2006): "Life-Cycle Variation in the Association between Current and Lifetime Earnings," *American Economic Review*, 96(4), 1308–1320.

Hassler, J., J. V. R. Mora, and J. Zeira (2007): "Inequality and Mobility," *Journal of Economic Growth*, 12(3), 235–259.

Helle, E. (1984): *Norges Olje de frste 20 årene.* Tiden, Oslo.

Kate, S., C. Cary, F. Yitzhak, and S. Arie (1997): "The Effects of Hours of Work on Health: A Meta-Analytic Review," *Journal of Occupational and Organizational Psychology*, 70(4), 391–408.

Lerøen, B. V. (1990): *Fra Groningen til Troll: Norske Shell - 25 år på norsk sokkel.* Norske Shell, Stavanger.

Lindahl, M., M. Palme, S. S. Massih, and A. Sjögren (2015): "Long-Term Intergenerational Persistence of Human Capital: An Empirical Analysis of Four Generations," *Journal of Human Resources*, 50(1), 1–33.

Løken, K. V. (2010): "Family Income and Children's Education: Using the Norwegian Oil Boom as a Natural Experiment," *Labour Economics*, 17(1), 118 – 129.

Mazumder, B. (2016): "Estimating the Intergenerational Elasticity and Rank Association in the United States: Overcoming the Current Limitations of Tax Data," in *Inequality: Causes and Consequences*, vol. 43 of *Research in Labor Economics*, pp. 83–129. Emerald Publishing Ltd.

Morissette, R., P. C. W. Chan, and Y. Lu (2015): "Wages, Youth Employment, and School Enrollment: Recent Evidence from Increases in World Oil Prices," *Journal of Human Resources*, 50(1), 222–253.

Noreng, O. (1980): *The Economics and Politics of Oil and Gas.* Routledge Library Editions, London.

NOU (1972): "Tilleggsberegninger Ajourførte pris-og inntektsprognoser for 1972 og 1973 fra Det tekniske beregningsutvalg," Rapport 1972/2, Regjeringen Korvald.

Nybom, M., and J. Stuhler (2013): "Interpreting Trends in Intergenerational Income Mobility," IZA Discussion Papers 7514, Institute for the Study of Labor (IZA).

——— (2016): "Biases in Standard Measures of Intergenerational Income Dependence," *Journal of Human Resources.*

Pekkarinen, T., K. Salvanes, and M. Sarvimäki (2017): "The Evolution of Social Mobility: Norway over the 20th Century," *Scandinavian Journal of Economics*, 119(1), 5–33.

Solon, G. (1999): "Intergenerational Mobility in the Labor Market," in *Handbook of Labor Economics*, ed. by O. Ashenfelter, and D. Card, vol. 3 of *Handbook of Labor Economics*, chap. 29, pp. 1761–1800. Elsevier.

Sundet, J. M., D. G. Barlaug, and T. M. Torjussen (2004): "The End of the Flynn Effect? A Study of Secular Trends in Mean Intelligence Test Scores of Norwegian Conscripts During Half a Century," *Intelligence*, XXXII, 349–362.

Thaler, R. H., and S. Rosen (1976): "The Value of Saving a Life: Evidence from the Labor Market," in *Household Production and Consumption*, ed. by N. E. Terleckyj, no. 40 in Studies in Income and Wealth. Columbia University Press.

Thrane, V. (1977): "Evneprøing av Utskrivingspliktige i Norge 1950-53," Arbeidsrapport 26, INAS.

10 Tables and Figures

Table 1: Descriptive Statistics

	Cohorts 1952–1957		Cohorts 1932–1933	
	Low-oil regions	High-oil regions	Low-oil regions	High-oil regions
1st generation				
Age at son's birth	29.8	30.2		
	(4.6)	(4.6)		
Earnings at ages 50–55	212,686	210,799	63,821	59,092
	(114,985)	(109,003)	(34,908)	(28,456)
Years of education	9.73	9.65		
	(2.97)	(2.75)		
% academic high school	24.1	21.5		
2nd generation				
Earnings at age 36–41	262,768	281,024	205,334	203,469
	(173,421)	(153,302)	(83,349)	(82,931)
Years of education	12.07	12.14	9.96	10.15
	(2.85)	(2.72)	(3.13)	(3.07)
% academic high school	37.3	37.3	27.9	29.3
% employed in oil sector	7.5	18.4	8.2	14.4
% received disability insurance	12.3	10.9		
3rd generation				
Earnings at age 30	322,395	356,749		
	(168,680)	(175,810)		
% academic high school	44.0	44.2		
IQ measure	5.15	5.15		
Number of father–son pairs				
1st and 2nd generations	70,239	15,688	13,176	3,054
2nd and 3rd generations	92,784	24,210		

Note: Means and standard deviations are in parentheses. Individuals were classified as employed in the oil sector if they worked in crude petroleum and natural gas production, petroleum refining, manufacturing of products of petroleum and coal, manufacturing of machinery, manufacturing of transport equipment, or construction other than building construction, including oil well drilling. For birth cohorts 1932–1933, we use industry codes from 1986; for birth cohorts 1952–1957, we define a worker as employed in the oil sector if his main occupation between ages 36 and 41 was in an oil-related industry. The earnings of fathers of birth cohorts 1932–1933 are imputed following Pekkarinen, Salvanes, and Sarvimäki (2016) (see Section 4 for a detailed discussion). For the third generation, we measure earnings at age 30 only for individuals born before 1985 (46% of all sons born to birth cohorts 1952–1957), and we observe whether individuals completed an academic education for those born before 1991 (83% of all sons born to birth cohorts 1952–1957).

Table 2: Rank–Rank Regressions

	Cohorts 1932–1933 (i)	Cohorts 1952-1957 (ii)
Fathers' rank	0.228***	0.235***
	(0.013)	(0.004)
High oil × fathers' rank	–0.011	–0.033***
	(0.023)	(0.011)
Number of observations	16,230	85,927
R-squared	0.125	0.076

Note: Each column is from a separate regression of the rank of the son in his own birth cohort's earnings distribution on the father's rank in the earnings distribution of fathers with sons born in the same year, and an interaction term for the father's rank and a dummy variable indicating whether the son was born in a high-oil region. Robust standard errors adjusted for clustering at the municipality level are shown in parentheses. We include birth cohorts from 1932 to 1933 in Column (i) and birth cohorts from 1952 to 1957 in Column (ii). All specifications include a full set of cohort and local labor market fixed effects. In Column (ii), we also control for the father's age at childbirth. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Probabilities of Sons Being in Different Earnings Quintiles Given the Earnings Quintile of the Father, Main Cohorts (1952–1957)

	Panel A: Low-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*28.6*	*24.6*	18.9	*15.9*	*11.7*
Fathers in 2nd quintile	*21.2*	*26.2*	21.0	*19.0*	*12.6*
Fathers in 3rd quintile	*17.7*	*22.6*	22.6	20.9	*16.1*
Fathers in 4th quintile	*15.6*	*18.1*	21.2	*23.5*	*21.5*
Fathers in 5th quintile	*13.5*	12.0	15.6	21.8	37.0
	Panel B: High-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*23.0*	*21.9*	19.3	*19.2*	*16.6*
Fathers in 2nd quintile	*16.7*	*21.1*	22.5	*22.2*	*17.5*
Fathers in 3rd quintile	*12.7*	*19.6*	24.0	22.0	*21.6*
Fathers in 4th quintile	*11.3*	*14.8*	20.7	*26.8*	*26.1*
Fathers in 5th quintile	*10.6*	11.5	17.1	22.8	38.0

Note: Each cell indicates the percentage of sons that grew up in a given earnings quintile in their father's earnings distribution who ended up in a specific earnings quintile in their own cohort's earnings distribution. The son's earnings are ranked in his own birth cohort's earnings distribution. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. We include birth cohorts from 1952 to 1957. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table 4: Probabilities of Sons Being in Different Earnings Quintiles Given the Earnings Quintile of the Father, Placebo Cohorts (1932–1933)

	Panel A: Low-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	25.4	26.7	21.1	16.9	9.8
Fathers in 2nd quintile	21.2	25.3	21.6	19.0	12.8
Fathers in 3rd quintile	15.4	23.3	23.1	21.3	16.9
Fathers in 4th quintile	10.1	18.4	21.7	23.7	*26.0*
Fathers in 5th quintile	7.8	11.6	17.3	25.4	37.9
	Panel B: High-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	22.0	23.3	23.9	18.4	12.4
Fathers in 2nd quintile	23.5	24.7	21.0	17.9	12.9
Fathers in 3rd quintile	12.7	21.1	24.1	22.3	19.6
Fathers in 4th quintile	10.4	18.9	24.3	24.3	*22.0*
Fathers in 5th quintile	7.7	13.0	16.7	21.2	41.3

Note: Each cell indicates the percentage of sons that grew up in a given earnings quintile in their father's earnings distribution who ended up in a specific earnings quintile in their own cohort's earnings distribution. The son's earnings are ranked in his own birth cohort's earnings distribution. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. We include birth cohorts from 1932 to 1933. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table 5: Selective Migration and Oslo

	Place of birth (i)	Excluding migrants (ii)	Place of residence (iii)	Excluding Oslo (iv)
Fathers' rank	0.235***	0.230***	0.222***	0.229***
	(0.004)	(0.005)	(0.005)	(0.000)
High oil × fathers' rank	–0.033***	–0.050***	–0.026**	–0.027**
	(0.011)	(0.013)	(0.010)	(0.010)
Number of observations	85,927	67,426	85,819	69,812
R-squared	0.076	0.078	0.102	0.072

Notes: Each column is from a separate regression of the rank of the son in his birth cohort's earnings distribution on the father's rank in the earnings distribution of fathers with sons born in the same year, and an interaction term of the father's rank and a dummy variable indicating whether the son was born in a high-oil region. Robust standard errors adjusted for clustering at the municipality level are in parentheses. All specifications include a full set of cohort and local labor market fixed effects and the father's age at childbirth. We include birth cohorts 1952–1957. In Column (i), we assign individuals to a region based on their place of birth. In Column (ii), we exclude individuals that migrated across oil regions. In Column (iii), we assign individuals to a region based on their place of residence at age 36. Note that the number of observations is not the same in Column (i) and Column (iii) because the numbers of individuals born and residing in middle-oil regions, excluded from the regression, differ. Column (iv) excludes all individuals born in Oslo. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Sensitivity Analysis

	Baseline (i)	Father's age (ii)	Middle-oil (iii)	Continuous oil (iv)	Earnings age 40–45 (v)	Adjusted rank (vi)
Fathers' rank	0.235***	0.235***	0.235***	0.235***	0.223***	0.238***
	(0.004)	(0.006)	(0.004)	(0.011)	(0.010)	(0.004)
High oil ×	–0.033***	–0.036***	–0.033***		–0.039*	–0.026*
fathers' rank	(0.011)	(0.012)	(0.003)		(0.022)	(0.011)
Middle oil ×			–0.030***			
fathers' rank			(0.006)			
Oil 1980 ×				–0.004***		
fathers' rank				(0.001)		
Number of observations	85,927	85,927	107,854	107,854	30,732	85,927
R-squared	0.076	0.074	0.073	0.073	0.070	0.072

Note: Each column is from a separate regression of the rank of the son in his birth cohort's earnings distribution on the father's rank in the earnings distribution of fathers with sons born in the same year, and an interaction term of the father's rank and a dummy variable indicating whether the son was born in a high-oil region. Robust standard errors adjusted for clustering at the municipality level are in parentheses. We include birth cohorts from 1952 to 1957. All specifications include a full set of cohort and local labor market fixed effects. In all columns except for Column (ii), we also control for the father's age at childbirth. In Column (ii), we do not control for father's age at childbirth. In Columns (iii) and (iv), we also include individuals born in middle-oil regions. In Column (iii), the father's rank is interacted with a dummy variable indicating that an individual was born in a middle-oil region and a dummy variable indicating that an individual was born in a high-oil region. In Column (iv), we use the proportion of workers employed in the oil industry in 1980 as a continuous measure of how much local labor markets were affected by the oil boom. In Column (v), we measure fathers' earnings at ages 40–45 and in Column (vi) we adjust the sons' earnings distributions to be identical in the low- and high-oil regions. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Rank–Education Regressions

	Cohorts 1932–1933 (i)	Cohorts 1952–1957 (ii)
Fathers' rank	–0.00100	–0.00377***
	(0.00064)	(0.00066)
Fathers' rank^2	0.00005***	0.00008***
	(0.00001)	(0.00001)
High oil $\times$ fathers' rank	–0.00190	0.00038
	(0.00132)	(0.00111)
High oil $\times$ fathers' rank^2	0.00002	–0.00001
	(0.00001)	(0.00001)
Number of observations	16,226	85,997
R-squared	0.078	0.094

Note: Each column is from a separate regression of an indicator variable for whether the son completed academic high school before turning 30, on a quadratic function of the father's rank in the earnings distribution of fathers, and interaction terms of the quadratic function of the father's rank and a dummy variable indicating whether the son was born in a high-oil region. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. Robust standard errors adjusted for clustering at the municipality level are in parentheses. We include birth cohorts from 1932 to 1933 in Column (i) and birth cohorts from 1952 to 1957 in Column (ii). All specifications include a full set of cohort and local labor market fixed effects. In Column (ii), we control for the father's age at childbirth. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Returns to Academic Education

	Cohorts 1932–1933 (i)	Cohorts 1952–1957 (ii)	Sons of cohorts 1952–1957 (iii)	Daughters of cohorts 1952–1957 (iv)
Academic high school	0.349***	0.447***	0.144***	0.304***
	(0.011)	(0.010)	(0.013)	(0.017)
Academic high school	–0.019	–0.082***	–0.046**	0.017
$\times$ high oil	(0.032)	(0.018)	(0.022)	(0.037)
Number of observations	16,092	82,986	12,989	12,513
R-squared	0.127	0.069	0.023	0.047

Note: Each column is from a separate regression of the log average earnings at ages 36–41 (30–40 in Columns (iii) and (iv)) on dummies for educational attainment at age 36 (30). The regression equation includes an indicator variable for having completed academic education, i.e., either an academic high school and/or a college degree, and an interaction term of the academic education indicator and an indicator for being born in a high-oil region (fathers born in high-oil regions). Robust standard errors clustered at the municipality level are in parentheses. We include birth cohorts from 1932 to 1933 in Column (i), birth cohorts from 1952 to 1957 in Column (ii), the sons of birth cohorts 1952–1957 in Column (iii), and the daughters of birth cohorts 1952–1957 in Column (iv). All specifications include a full set of cohort and local labor market fixed effects. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Probability of a Son Receiving Disability Insurance Payments Conditional on His and His Father's Earnings Quintiles, Cohorts 1952–1957

	Panel A: Low-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*0.410*	0.133	*0.086*	0.056	0.039
Fathers in 2nd quintile	0.379	0.105	0.059	0.044	0.027
Fathers in 3rd quintile	0.377	0.102	0.070	0.030	0.034
Fathers in 4th quintile	0.367	0.107	0.057	0.041	0.024
Fathers in 5th quintile	0.310	0.092	0.049	0.037	0.018
	Panel B: High-Oil Regions				
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*0.453*	0.138	*0.057*	0.047	0.036
Fathers in 2nd quintile	0.405	0.094	0.052	0.046	0.037
Fathers in 3rd quintile	0.415	0.120	0.057	0.043	0.027
Fathers in 4th quintile	0.363	0.114	0.074	0.039	0.021
Fathers in 5th quintile	0.349	0.071	0.061	0.028	0.026

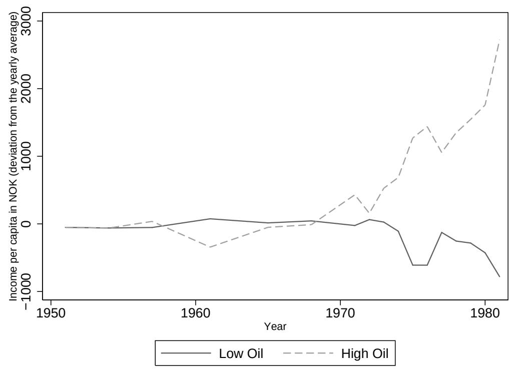
Note: Each cell indicates the percentage of sons enrolled in disability insurance programs given their earnings quintile and the earnings quintile of their father. The son's earnings are ranked in his own birth cohort's earnings distribution. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. We include birth cohorts from 1952 to 1957. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table 10: Rank–Rank Regressions Across Three Generations

	3rd and 1st generation (i)	3rd and 2nd generation (ii)	3rd, 1st, and 2nd generation (iii)
1st generation rank	0.053***		0.019***
	(0.006)		(0.005)
High oil ×	–0.063***		–0.051***
1st generation rank	(0.014)		(0.015)
2nd generation rank		0.166***	0.161***
		(0.007)	(0.006)
High oil×		–0.054***	–0.043***
2nd generation rank		(0.014)	(0.004)
Number of observations	39,684	39,684	39,684
R-squared	0.053	0.072	0.072

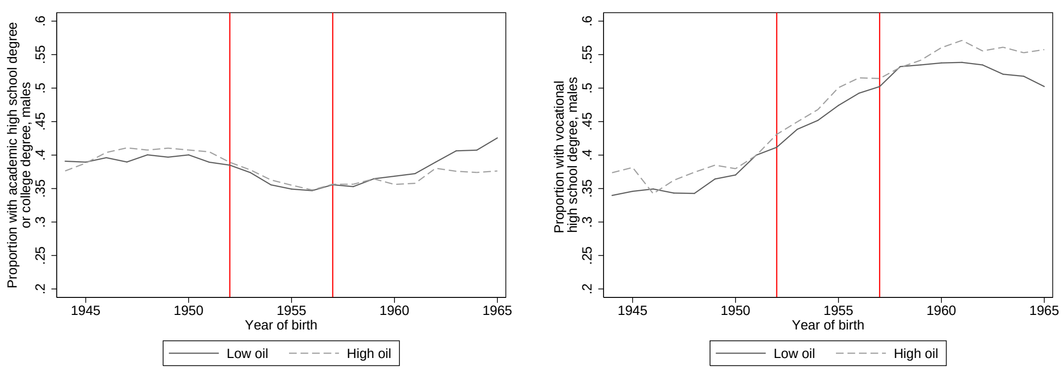
Note: Each column is from a separate regression of the earnings pecentile rank of the third generation (sons of the main cohorts) on the first generation's rank (fathers of the main cohorts) in Column (i), on the second generation's rank (main cohorts) in Column (ii), and on both the first and second generations' ranks in Column (iii). The third generation's earnings are ranked in the earnings distribution of other men with fathers born in the same year; the first generation's earnings are ranked in the earnings distribution of men with sons born in the same year; and the second generation's earnings are ranked in the earnings distribution of other men born in the same year. Robust standard errors adjusted for clustering at the municipality level are in parentheses. All specifications include a full set of the second generation's cohort and local labor market fixed effects and the second generation's age at childbirth.

Figure 1: Trends in Earnings per Capita, by Oil Regions, 1951–1981



Notes: The figure plots the yearly regional deviation from the average national earnings per capita in the high- and low-oil regions. Data source: own calculations based on tax data available for the years 1951, 1954, 1957, 1961, 1965, 1968, and 1971–1981.

Figure 2: Proportion of Individuals Finishing Academic or Vocational High School by Birth Cohort and Region

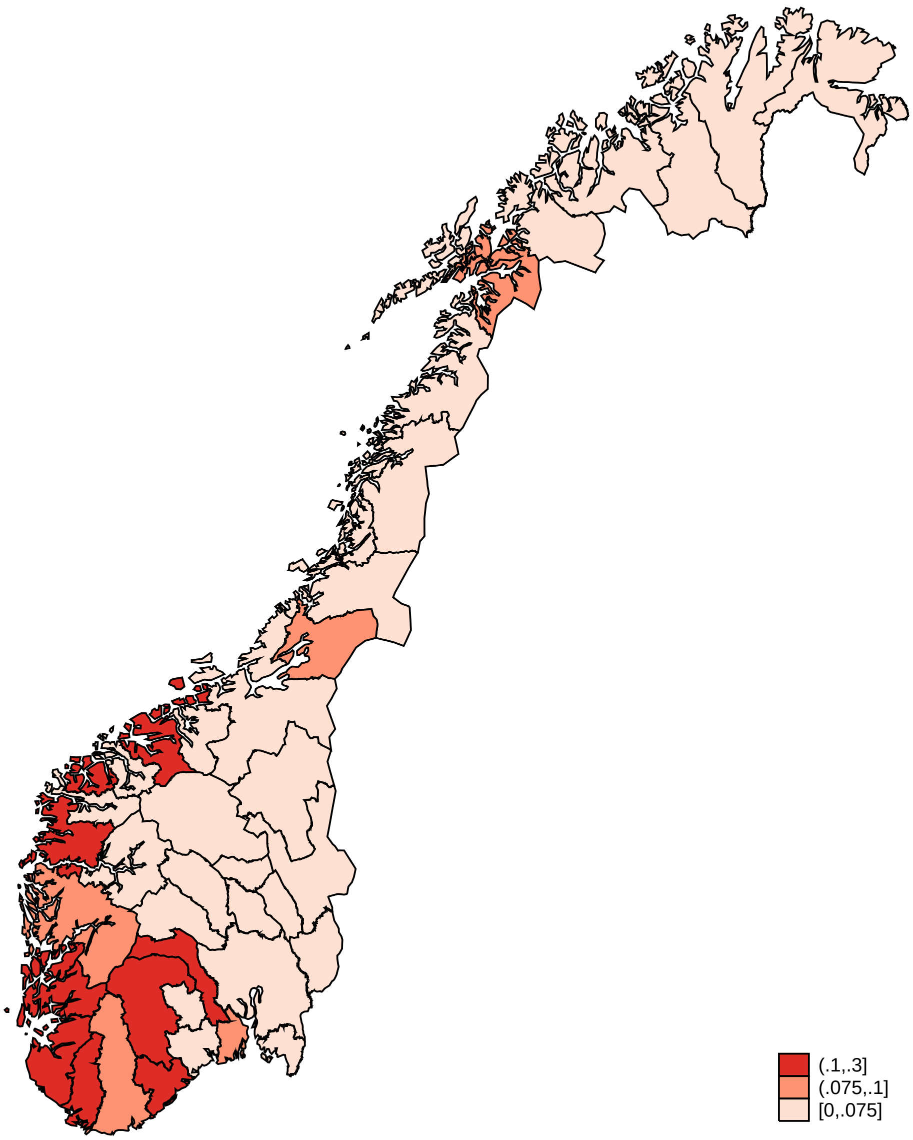


(a) Academic High School

(b) Vocational High School

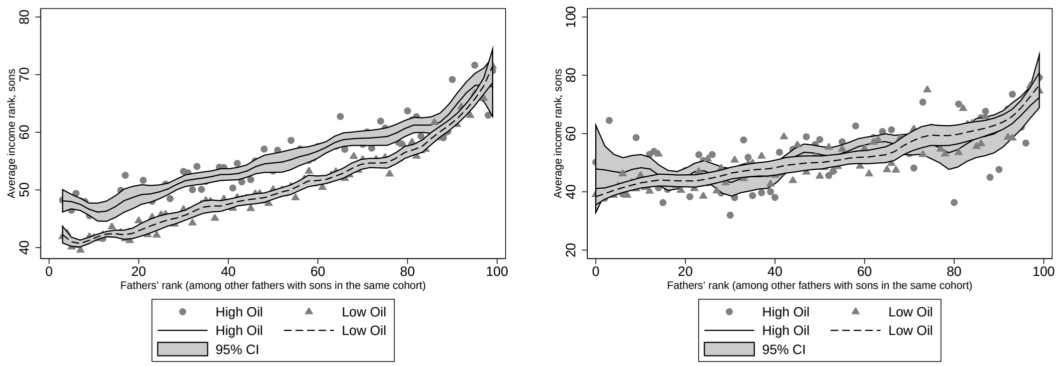
Notes: Panel (a) plots the proportion of men in each birth cohort who finished academic high school. Academic high school completion is required to enroll in university or college. Panel (b) plots the proportion of men in each birth cohort who finished vocational high school. The vertical lines mark the first and last birth cohorts in our main cohort sample (1952–1957).

Figure 3: Employment in the Oil Industry in 1980 by Local Labor Market



Notes: The figure plots the proportion of workers employed in the oil industry in 1980 in each of the 46 local labor markets. Local labor markets are aggregations of municipalities based on commuting patterns (Bhuller, 2009). Local labor markets with an oil employment share of less than 7.5 percent were defined as low-oil regions. Local labor markets with an oil employment share of 10–30 percent were defined as high-oil regions. Data source: 1980 census.

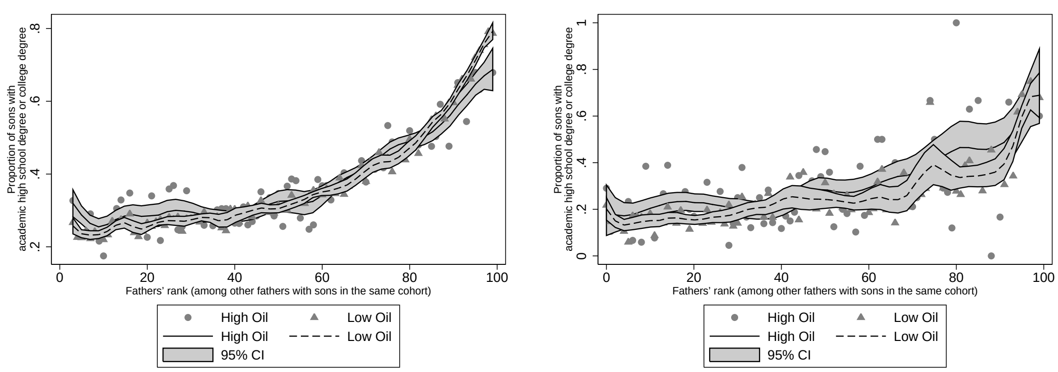
Figure 4: Association between Sons' and Fathers' Earnings Ranks by Region



(a) Main Cohorts (1952–1957) (b) Placebo Cohorts (1932–1933)

Notes: The plots present nonparametric binned scatterplots of the relationship between sons' earnings percentile ranks and their fathers' earnings ranks in high- and low-oil regions. In Panel (a), we include birth cohorts 1952–1957 and their fathers. In Panel (b), we include birth cohorts 1932–1933 and their fathers. Sons' earnings are ranked in their birth cohort's earnings distribution. Fathers' earnings are ranked in the earnings distribution of fathers with sons born in the same year.

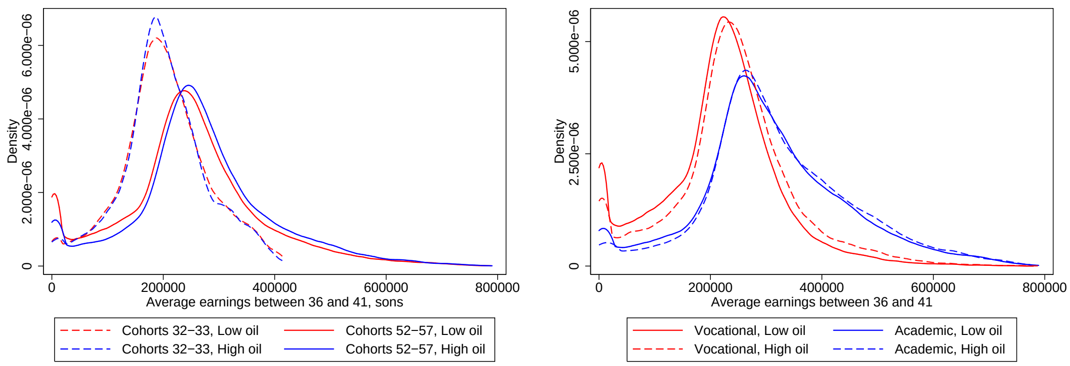
Figure 5: Association Between Fathers' Earnings Ranks and Their Sons' Education by Region



(a) Main Cohorts (1952–1957) (b) Placebo Cohorts (1932–1933)

Notes: The plots present nonparametric binned scatterplots of the relationship between sons' likelihood of finishing an academic high school education with their fathers' earnings ranks in high- and low-oil regions. In Panel (a), we include birth cohorts 1952–1957 and their fathers. In Panel (b), we include birth cohorts 1932–1933 and their fathers. The fathers' earnings are ranked in the earnings distribution of fathers with sons born in the same year.

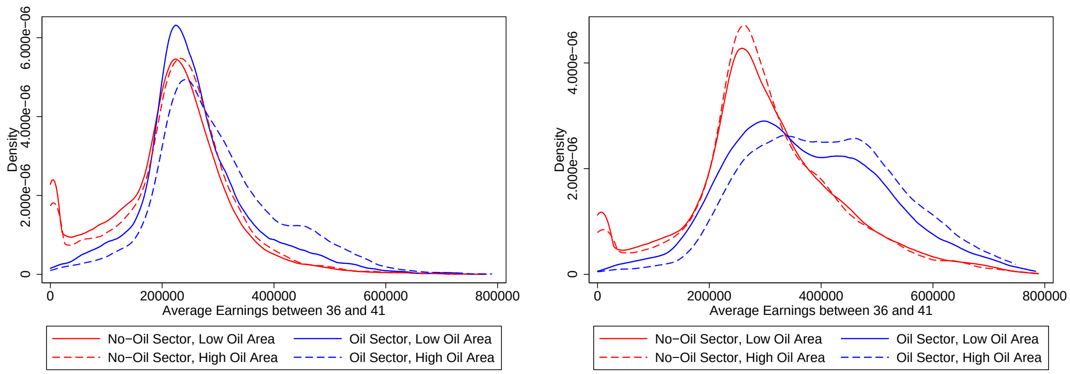
Figure 6: Earnings Distribution by Cohorts, Regions, and Education



(a) Region and Cohorts (b) Region and Education

Notes: The figures present kernel density plots of men's average earnings at ages 36–41. Panel (a) plots the density separately for the main (1952–1957) and the placebo (1932–1933) cohorts in high- and low-oil regions. Panel (b) plots the density separately for the main cohorts for men with academic or vocational education in the high- and low-oil regions.

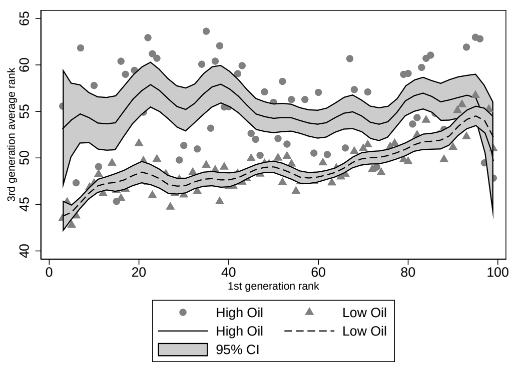
Figure 7: Earnings Distribution by Industry, Region, and Education

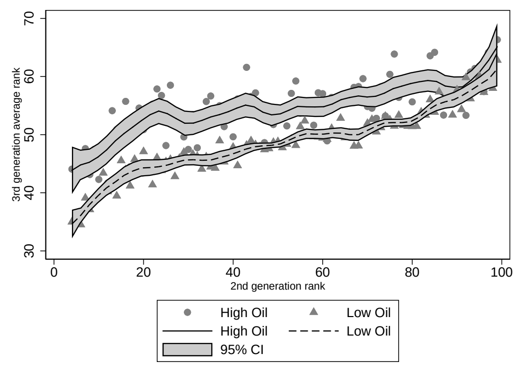


(a) Vocational Education (b) Region and Education

Notes: This figure presents kernel density plots of men's average earnings at ages 36–41 separately for men employed in oil- or non-oil-related industries and for high- and low-oil regions. The figure is based on the earnings of the 1952–1957 birth cohorts. Panel (a) includes vocationally educated men. Panel (b) includes academically educated men.

Figure 8: Associations Between First, Second, and Third Generations' Earnings Ranks by Region



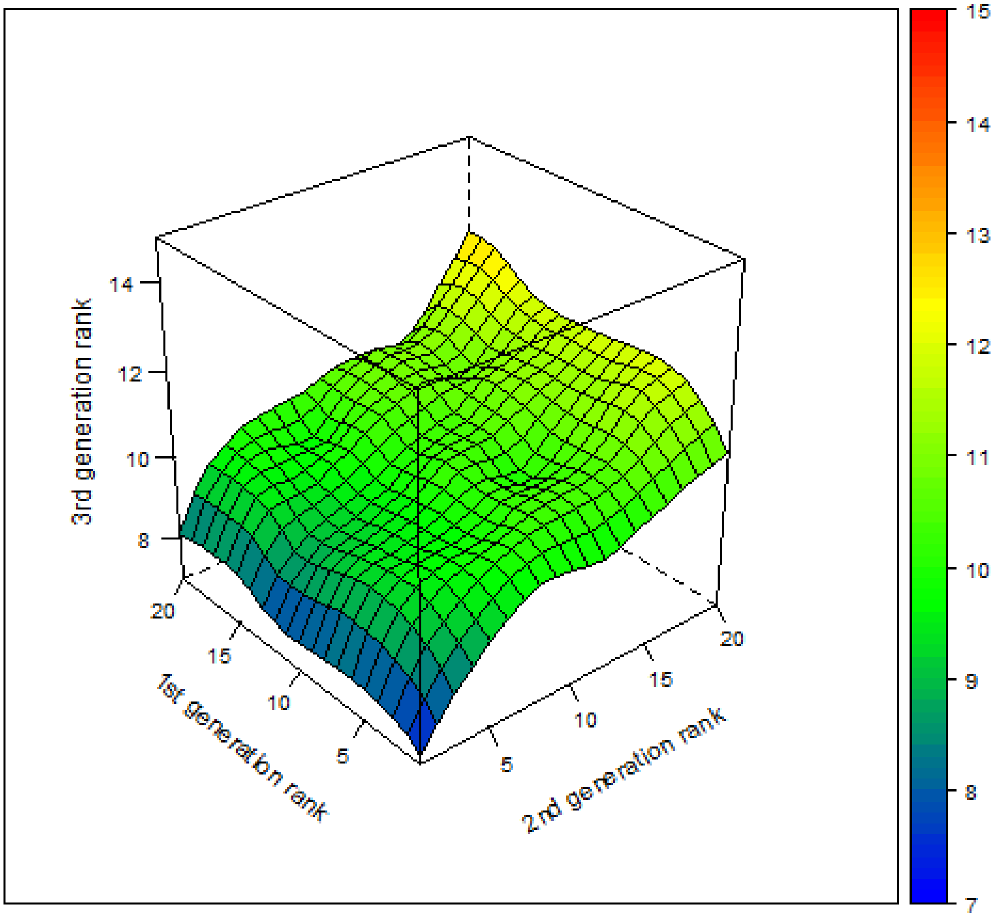


(a) First and Third Generation

(b) Second and Third Generation

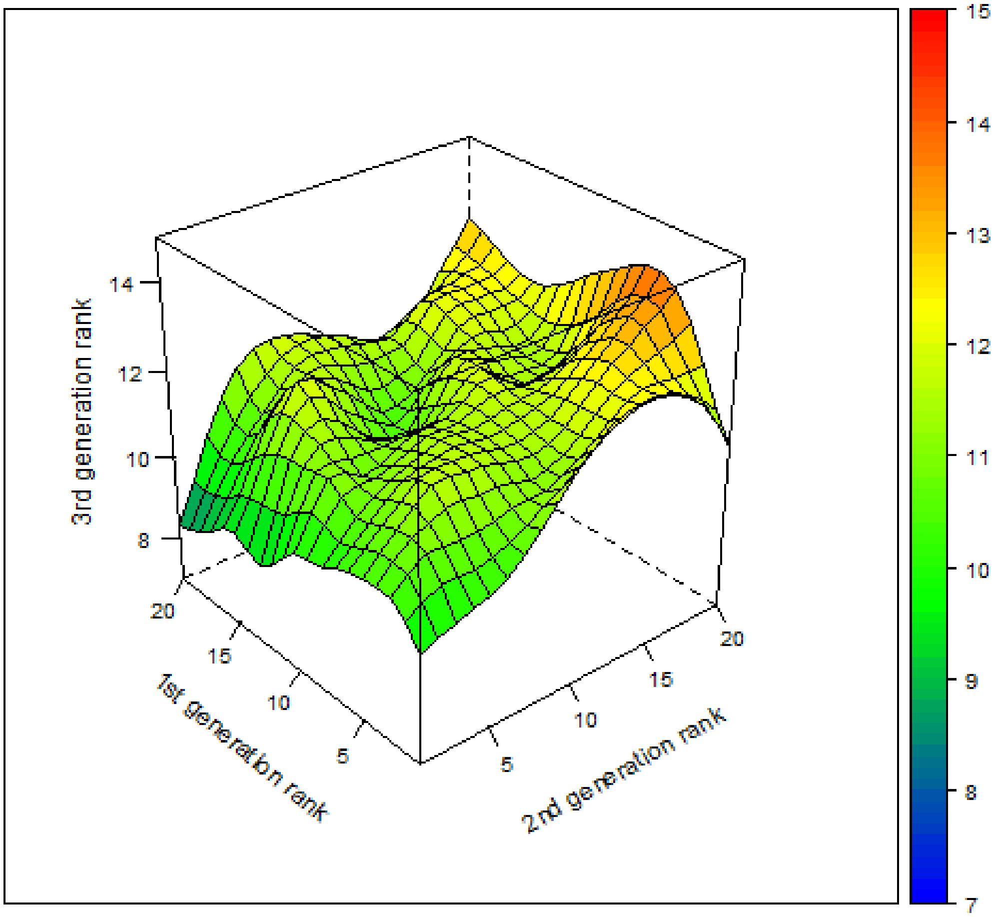
Notes: The plots present nonparametric binned scatterplots of the relationship between the third generation's earnings percentile ranks and the first and second generations' earnings ranks in the high- and low-oil regions. The plots are based on the sons of the 1952–1957 birth cohorts (the third generation). The third generation's earnings are observed at age 30. The third generation's earnings are ranked in the earnings distribution of other men with fathers (the second generation) born in the same year. In Panel (a), we plot the relationship between the first and third generations. The first generation consists of fathers of the 1952–1957 birth cohorts. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. Panel (b), we plot the relationship between the second and third generations. The second generation consists of the main cohorts (1952–1957). Second-generation men's earnings are ranked in the earnings distribution of their birth cohort.

Figure 9: Association Between the Third Generation's Earnings Rank and the Ranks of the First and Second Generations, Low-Oil Regions



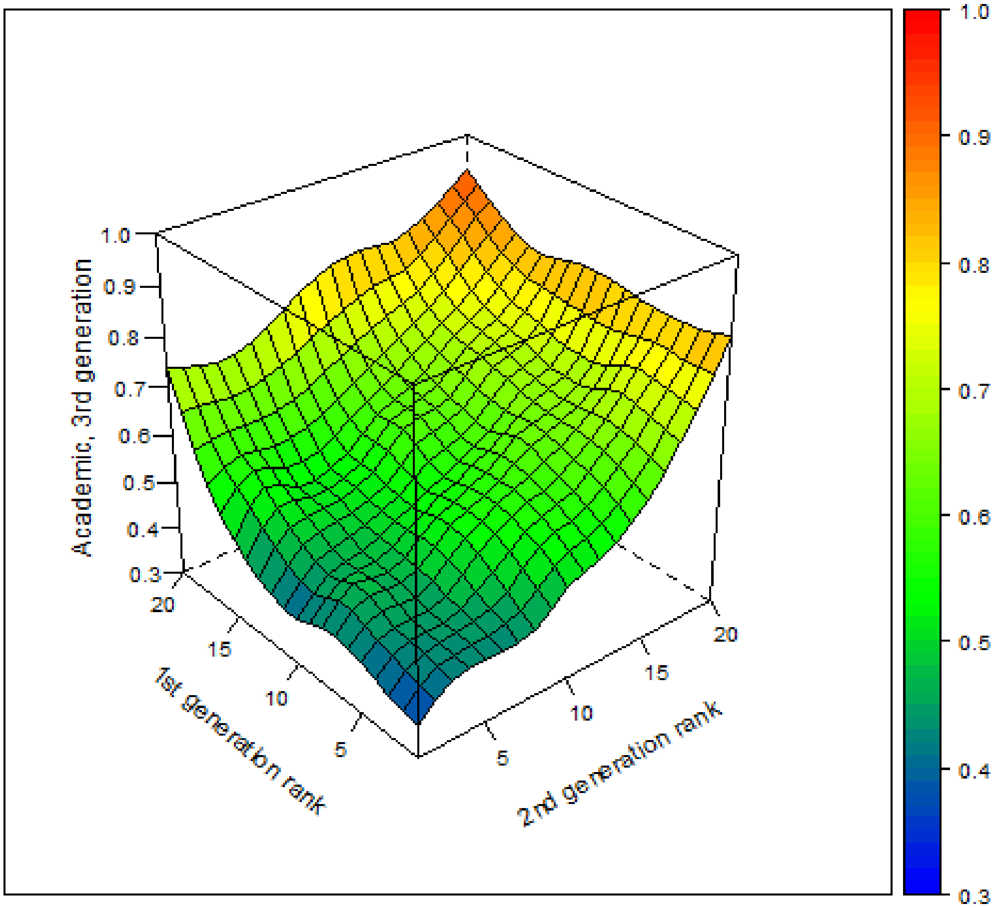
Notes: This figure plots the average earnings percentile rank (expressed in 20 percentiles) for the sons of the 1952–1957 cohorts in low-oil regions as a function of the first and second generations' earnings ranks. The sample includes third-generation men born before 1985.

Figure 10: Association Between the Third Generation's Earnings Rank and the Ranks of the First and Second Generations, High-Oil Regions



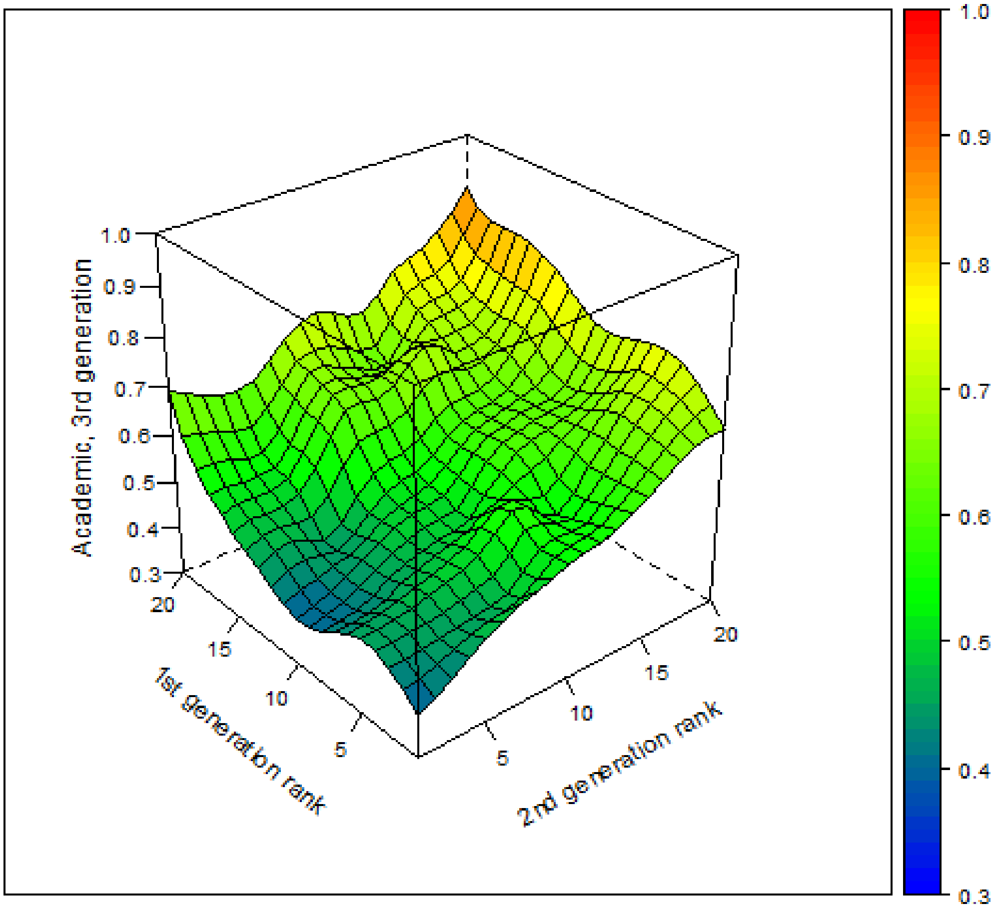
Notes: This figure plots the average earnings rank (expressed in 20 percentiles) for the sons of the 1952–1957 cohorts in high-oil regions as a function of the first and second generations' earnings ranks. The sample includes third-generation men born before 1985.

Figure 11: Association Between the Third Generation's Probability of Attending Academic High School and the Earnings Ranks of the First and Second Generations, Low-Oil Regions



Notes: This figure plots the probability of enrolling in academic high school or college for the sons of the 1952–1957 cohorts in low-oil regions as a function of the first and second generations' earnings ranks. The sample includes third-generation men born before 1991.

Figure 12: Association Between the Third Generation's Probability of Attending Academic High School and the Earnings Ranks of the First and Second Generations, High-Oil Regions



Notes: This figure plots the probability of enrolling in academic high school or college for the sons of the 1952–1957 cohorts in high-oil regions as a function of the first and second generations' earnings ranks. The sample includes third-generation men born before 1991.

A Appendix

Table A1: Rank–Rank Regressions for Different Cohorts

Cohorts	1952–1957	1954–1959	1956–1961	1958–1963	1960–1965	1962–1967	1964–1969
Cohorts	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Father's rank	0.235***	0.233***	0.234***	0.234***	0.230***	0.223***	0.221***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Father's rank ×	–0.033***	–0.037***	–0.040***	–0.044***	–0.042***	–0.035***	–0.030***
High oil	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.008)	(0.006)
Number of observations	85,922	96,486	103,271	108,541	120,940	134,716	148,277
R-squared	0.076	0.075	0.075	0.072	0.068	0.063	0.061

Note: Each column is from a separate regression of the rank of the son in his own birth cohort's earnings distribution on the father's rank in the earnings distribution of fathers with sons born in the same year, and an interaction term of the father's rank and a dummy variable indicating whether the son was born in a high-oil region. Robust standard errors adjusted for clustering at the municipality level are in parentheses. We include birth cohorts 1952–1969. Column (i) includes birth cohorts 1952–1957, Column (ii) includes birth cohorts 1954–1959, Column (iii) includes birth cohorts 1956–1961, Column (iv) includes birth cohorts 1958–1963, Column (v) includes birth cohorts 1960–1965, Column (vi) includes birth cohorts 1962–1967, and Column (vii) includes birth cohorts 1964–1969. All specifications include a full set of cohort and local labor market fixed effects and the father's age at birth. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Rank–Rank Regressions for Oil- and Non-Oil-Sector Employees

	Cohorts 1952-1957 (i)
Fathers' rank	0.235***
	(0.004)
High oil × oil sector × fathers' rank	–0.028***
	(0.016)
High oil × Non-oil sector × fathers' rank	–0.026***
	(0.012)
Number of observations	85,927
R-squared	0.084

Note: The results are from a regression of the rank of the son in his own birth cohort's earnings distribution on the father's rank in the earnings distribution of fathers with sons born in the same year, and a full set of interaction terms between the indicator variable for high-oil regions, the indicator variable for oil-sector employment, and the father's rank. Robust standard errors adjusted for clustering at the municipality level are in parentheses. We include birth cohorts from 1952 to 1957. All specifications include a full set of cohort and labor market fixed effects and the father's age at childbirth. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Number and Characteristics of Movers Across Low- and High-Oil Regions

		Low-to-high movers	Low stayers	High-to-low movers	High stayers
Cohort 1932–1933	Fraction of population	0.010	0.908	0.035	0.694
	Fathers' earnings	256,537	224,352	260,525	220,251
	Fathers' years of education	-	-	-	-
	Earnings	232,054	204,560	227,584	193,827
	Proportion, academic high school	0.549	0.266	0.507	0.213
	Age at moving	26.9	-	25.9	-
Cohort 1952–1957	Fraction of population	0.065	0.826	0.238	0.607
	Fathers' earnings	224,482	209,243	223,293	201,449
	Fathers' years of education	10.4	9.5	10.2	9.1
	Earnings	293,451	252,359	301.074	263,276
	Proportion, academic high school	0.527	0.338	0.611	0.250
	Age at moving	26.9	-	25.9	-

Notes: The average earnings of the main and placebo cohorts were measured at ages 36–41. The average earnings of the fathers were measured at ages 50–55. A person was considered to have moved across regions if he had been registered as living in a region other than the region of his birth at least once between 18 and 41 years of age. Proportions are reported with respect to the total population born in a specific area. That is, the proportion of movers who migrated from a given low-oil region to a high-oil region is the share of those who migrated to a high-oil region among all those born in the low-oil region.

Table A4: Probability of Sons Being in Different Earnings Quintiles Given the Earnings Quintile of the Father, Main Cohorts (1952–1957), Excluding Movers

	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
			Panel A: Low-Oil Regions		
Fathers in 1st quintile	*28.7*	25.9	*19.2*	*15.3*	*10.7*
Fathers in 2nd quintile	*21.3*	*27.3*	*21.7*	*18.3*	*11.3*
Fathers in 3rd quintile	*17.8*	*23.1*	*22.8*	21.0	*15.1*
Fathers in 4th quintile	*15.6*	18.8	21.8	*23.4*	*20.3*
Fathers in 5th quintile	*13.7*	12.4	*15.6*	22.0	*36.2*
			Panel B: High-Oil Regions		
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*22.1*	23.9	*21.5*	*18.6*	*13.8*
Fathers in 2nd quintile	*16.3*	*23.6*	*23.8*	*22.1*	*14.2*
Fathers in 3rd quintile	*12.2*	*20.5*	*26.4*	21.3	*19.5*
Fathers in 4th quintile	*10.3*	17.3	22.1	*26.5*	*23.6*
Fathers in 5th quintile	*10.5*	13.8	*19.0*	23.3	*33.4*

Note: Each cell indicates the percentage of sons that grew up in a given earnings quintile in their fathers' earnings distribution who ended up in a specific earnings quintile in their own cohort's earnings distribution. The son's earnings are ranked in his own birth cohort's earnings distribution. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. We include birth cohorts 1952–1957. Individuals who moved across oil regions were excluded. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A5: Probability of Sons Being in Different Earnings Quintiles Given the Earnings Quintile of the Father, Main Cohorts (1952–1957), Place of Residence at Age 36

	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Panel A: Low-Oil Regions					
Fathers in 1st quintile	*27.9*	*24.9*	19.1	*16.0*	*11.9*
Fathers in 2nd quintile	*20.4*	*25.9*	21.2	*19.4*	*12.9*
Fathers in 3rd quintile	*17.0*	*22.4*	22.8	21.2	*16.4*
Fathers in 4th quintile	*14.5*	*18.0*	21.4	*24.0*	*22.0*
Fathers in 5th quintile	*12.2*	11.6	15.7	22.1	38.1
Panel B: High-Oil Regions					
	Sons in 1st quintile	Sons in 2nd quintile	Sons in 3rd quintile	Sons in 4th quintile	Sons in 5th quintile
Fathers in 1st quintile	*22.3*	*23.1*	19.6	*19.1*	*15.9*
Fathers in 2nd quintile	*15.7*	*22.2*	22.0	*22.6*	*17.5*
Fathers in 3rd quintile	*12.2*	*19.8*	24.0	21.8	*22.1*
Fathers in 4th quintile	*10.2*	*15.8*	20.2	*26.3*	*27.4*
Fathers in 5th quintile	*09.7*	11.7	16.5	23.2	38.7

Note: Each cell indicates the percentage of sons that grew up in a given earnings quintile in their fathers' earnings distribution who ended up in a specific earnings quintile in their cohort's own earnings distribution. The son's earnings are ranked in his own birth cohort's earnings distribution. The father's earnings are ranked in the earnings distribution of fathers with sons born in the same year. We include birth cohorts 1952–1957. We assigned individuals to an oil region based on their place of residence at age 36. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A6: Inequality Measures for the Earnings Distribution for Different Male Cohorts in Different Oil Regions

Cohort	Region	p90/p10 (i)	p90/p50 (ii)	p10/p50 (iii)	p75/p25 (iv)	Gini (v)
1932–1933	Low oil	3.113	1.598	0.513	1.603	0.227
	High oil	3.066	1.596	0.521	1.553	0.225
1952–1957	Low oil	5.321	1.713	0.322	1.697	0.299
	High oil	3.957	1.719	0.435	1.624	0.273

Note: Each row displays different indexes of earnings inequality for different cohorts in low- and high-oil regions. We include the earnings of all male workers who are in our main analysis. Columns (i) to (iv) present the ratio between different percentiles of the earnings distribution. Columns (i) and (iv) are measures of the overall dispersion (the ratio of the 90th to the 10th percentile, and the ratio of the 75th to the 25th percentile, respectively). Column (ii) is a measure of dispersion in the top part of the earnings distribution (the ratio of the 90th to the 50th percentile). Column (iii) is a measure of dispersion in the bottom part (the ratio of the 50th to the 10th percentile). Column (v) reports the Gini indexes of the earnings distributions. Earnings are defined as the average annual earnings of a person between ages 36 and 41.

Table A7: Average Earnings Quintile of the Third Generation Given the Earnings Quintiles of the First and Second Generations

	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
Panel A: Low-Oil Regions					
1st generation in 1st quintile	*2.441*	*2.742*	*2.898*	*2.994*	*3.147*
1st generation in 2nd quintile	*2.578*	*2.767*	*2.886*	*2.970*	*3.215*
1st generation in 3rd quintile	*2.561*	*2.710*	*2.919*	*3.013*	3.247
1st generation in 4th quintile	*2.577*	*2.761*	2.924	*3.075*	3.251
1st generation in 5th quintile	2.627	*2.870*	*2.946*	3.097	3.423
Panel B: High-Oil Regions					
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	*2.983*	*2.997*	*3.149*	*3.374*	*3.386*
1st generation in 2nd quintile	*2.937*	*3.108*	*3.267*	*3.367*	*3.724*
1st generation in 3rd quintile	*2.826*	*3.109*	*3.230*	*3.304*	3.253
1st generation in 4th quintile	*2.901*	*3.200*	3.026	*3.256*	3.384
1st generation in 5th quintile	2.646	*3.164*	*3.315*	3.212	3.460

Note: Each cell indicates the average earnings quintile of the third generation (sons of birth cohorts 1952–1957) given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. The third generation's earnings (measured at age 30) are ranked in the earnings distribution of men with fathers in the same birth cohort. We include third-generation sons born before 1985. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A8: Proportion of Third-Generation Men with an Academic Education Given the Earnings Quintiles of the First and Second Generations

			Panel A: Low-Oil Regions		
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	0.247	0.290	0.353	0.414	*0.562*
1st generation in 2nd quintile	0.291	0.325	0.406	0.459	0.565
1st generation in 3rd quintile	0.280	0.327	0.397	0.461	*0.561*
1st generation in 4th quintile	0.327	0.336	0.428	0.495	0.603
1st generation in 5th quintile	0.455	0.452	0.514	0.559	*0.710*
			Panel B: High-Oil Regions		
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	0.269	0.323	0.381	0.411	*0.504*
1st generation in 2nd quintile	0.295	0.317	0.399	0.429	0.524
1st generation in 3rd quintile	0.260	0.317	0.385	0.450	*0.498*
1st generation in 4th quintile	0.309	0.366	0.449	0.514	0.584
1st generation in 5th quintile	0.425	0.406	0.496	0.524	*0.656*

Note: Each cell indicates the percentage of men in the third generation that completed academic high school or obtained a college degree given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons (the second generation) born in the same year. We include third-generation men whose fathers were born between 1952 and 1957 and who themselves were born before 1991. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A9: Proportion of Second-Generation Men with an Academic Education Given their Earnings Quintile and the Earnings Quintile of the First Generation, Main Cohorts (1952–1957)

	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
Panel A: Low-Oil Regions					
1st generation in 1st quintile	*0.127*	0.125	0.217	0.305	0.540
1st generation in 2nd quintile	0.150	0.138	0.242	*0.350*	0.564
1st generation in 3rd quintile	0.148	0.161	0.254	0.371	*0.556*
1st generation in 4th quintile	*0.207*	0.209	0.328	0.417	0.642
1st generation in 5th quintile	0.389	*0.387*	0.499	*0.582*	*0.806*
Panel B: High-Oil Regions					
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	*0.167*	0.118	0.245	0.277	0.501
1st generation in 2nd quintile	0.172	0.137	0.251	*0.286*	0.549
1st generation in 3rd quintile	0.127	0.190	0.246	0.346	*0.472*
1st generation in 4th quintile	*0.264*	0.209	0.358	0.425	0.626
1st generation in 5th quintile	0.331	*0.319*	0.482	*0.525*	*0.715*

Note: Each cell indicates the percentage of fathers that completed academic high school or obtained a college degree given their earnings quintile and the earnings quintile of their grandfather. The father's earnings are ranked in his own birth cohort's earnings distribution. The grandfather's earnings are ranked in the earnings distribution of grandfathers with sons born in the same year. We include birth cohorts 1952–1957. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A10: Proportion of Second-Generation Men's Spouses with an Academic Education Given the Earnings Quintiles of the First and Second Generations

	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
Panel A: Low-Oil Regions					
1st generation in 1st quintile	0.274	0.261	0.305	*0.357*	*0.443*
1st generation in 2nd quintile	*0.289*	0.278	0.314	*0.376*	*0.484*
1st generation in 3rd quintile	0.293	0.267	*0.312*	0.370	0.487
1st generation in 4th quintile	0.356	0.314	0.391	0.426	0.549
1st generation in 5th quintile	0.508	*0.477*	*0.555*	*0.558*	*0.675*
Panel B: High-Oil Regions					
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	0.281	0.250	0.320	*0.281*	*0.383*
1st generation in 2nd quintile	*0.353*	0.285	0.354	*0.309*	*0.424*
1st generation in 3rd quintile	0.291	0.285	*0.359*	0.352	0.464
1st generation in 4th quintile	0.347	0.326	0.402	0.439	0.523
1st generation in 5th quintile	0.467	*0.385*	*0.467*	*0.494*	*0.616*

Note: Each cell indicates the percentage of wives that completed academic high school or obtained a college degree given the earnings quintiles of their husbands (the fathers) and their husbands' fathers (the grandfathers). The father's earnings are ranked in his own birth cohort's earnings distribution. Grandfathers' earnings are ranked in the earnings distribution of grandfathers with sons born in the same year. We include the wives of birth cohorts 1952–1957. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A11: Rank–Rank Regressions Across Three Generations, Experience-Adjusted Earnings

	3rd and 1st generation (i)	3rd and 2nd generation (ii)	3rd, 1st, and 2nd generation (iii)
1st generation rank	0.048***		0.017***
	(0.006)		(0.005)
High oil ×	–0.059***		–0.047***
1st generation rank	(0.015)		(0.016)
2nd generation rank		0.151***	0.147***
		(0.006)	(0.006)
High oil ×		–0.055***	–0.045***
2nd generation rank		(0.014)	(0.156)
Number of observations	39,683	39,683	39,683
R-squared	0.045	0.060	0.060

Note: Each column is from a separate regression of the earnings rank of the third generation (the sons of the main cohorts) on the first generation's rank (the fathers of the main cohorts) in Column (i), on the second generation's rank (the main cohorts) in Column (ii), and on both the first and the second generations' ranks in Column (iii). The third generation's earnings are ranked in the earnings distribution of men with fathers born in the same year; the first generation's earnings are ranked in the earnings distribution of men with sons born in the same year; and the second generation's earnings are ranked in the earnings distribution of other men born in the same year. Robust standard errors adjusted for clustering at the municipality level are in parentheses. All specifications include a full set of the second generation's cohort and local labor market fixed effects and the second generation's age at childbirth. We predict experience-adjusted earnings at age 30 using a second-order polynomial function of experience. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Average Earnings Quintile of the Third Generation Given the Earnings Quintiles of the First and Second Generations, Experience-Adjusted Earnings

	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
Panel A: Low-Oil Regions					
1st generation in 1st quintile	*2.499*	*2.759*	*2.881*	*2.980*	3.161
1st generation in 2nd quintile	*2.629*	*2.767*	*2.898*	*2.984*	*3.168*
1st generation in 3rd quintile	*2.604*	*2.728*	*2.941*	*3.013*	3.237
1st generation in 4th quintile	*2.650*	*2.764*	2.929	3.049	3.232
1st generation in 5th quintile	2.627	2.892	*2.934*	3.068	3.402
Panel B: High-Oil Regions					
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	*2.941*	*3.052*	*3.155*	*3.357*	3.345
1st generation in 2nd quintile	*2.978*	*3.159*	*3.267*	*3.324*	*3.659*
1st generation in 3rd quintile	*2.916*	*3.123*	*3.200*	*3.237*	3.222
1st generation in 4th quintile	*2.942*	*3.196*	3.049	3.168	3.367
1st generation in 5th quintile	2.697	3.091	*3.319*	3.216	3.426

Note: Each cell indicates the average earnings quintile of the third generation (the sons of birth cohorts 1952–1957) given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. The third generation's earnings (measured at age 30) are ranked in the earnings distribution of men with fathers in the same birth cohort. We predict experience-adjusted earnings at age 30 using a second-order polynomial function of experience. We include third-generation sons born before 1985. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A13: Average IQ of the Third Generation Given the Earnings Quintiles of the First and Second Generations

			Panel A: Low-Oil Regions		
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	4.582	4.622	4.878	5.014	5.420
1st generation in 2nd quintile	4.678	4.770	4.990	5.241	*5.587*
1st generation in 3rd quintile	4.721	4.742	4.933	5.216	5.479
1st generation in 4th quintile	4.915	4.869	*5.089*	5.323	5.679
1st generation in 5th quintile	5.259	5.276	5.458	5.616	*5.988*
			Panel B: High-Oil Regions		
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	4.663	4.534	4.910	4.928	5.307
1st generation in 2nd quintile	4.833	4.884	4.934	5.104	*5.369*
1st generation in 3rd quintile	4.785	4.871	4.914	5.136	5.366
1st generation in 4th quintile	4.830	4.944	*5.302*	5.402	5.594
1st generation in 5th quintile	5.325	5.165	5.277	5.595	*5.739*

Note: Each cell indicates the IQ scores of the first generation given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. We include the IQ scores of men born before 1989. IQ scores were taken at age 19 for all males (via military conscription) and are measures on a stanine scale (between 1 and 9). The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A14: Rank–Rank Regressions Across Three Generations, Women

	3rd and 1st generation	3rd and 2nd generation	3rd, 1st, and 2nd generation
1st generation rank	0.083***		0.048***
	(0.007)		(0.007)
High oil ×	–0.015		0.000
1st generation rank	(0.012)		(0.012)
2nd generation rank		0.168***	0.157***
		(0.007)	(0.006)
High oil ×		–0.039***	–0.037***
2nd generation rank		(0.014)	(0.014)
Number of observations	37,752	37,752	37,752
R-squared	0.081	0.098	0.100

Note: Each column is from a separate regression of the rank of the third-generation women (the daughters of the main cohorts) on the first generation's (the fathers of the main cohorts) percentile rank (Column (i)), on the second generation's (the main cohorts) rank (Column (ii)), and on both the first and second generations' ranks (Column (iii)). The third generation's earnings are ranked in the earnings distribution of women with fathers born in the same year. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. The third generation's earnings are ranked in the earnings distribution of other men born in the same year. Robust standard errors adjusted for clustering at the municipality level are in parentheses. All specifications include a full set of the second generation's cohort and local labor market fixed effects and second-generation men's age at the time of the daughter's birth. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A15: Average Earnings Quintile of Third-Generation Women Given the Earnings Quintiles of the First and Second Generations

	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
Panel A: Low-Oil Regions					
1st generation in 1st quintile	2.517	2.815	2.886	3.040	3.271
1st generation in 2nd quintile	2.635	2.754	2.984	*3.150*	3.260
1st generation in 3rd quintile	2.622	2.820	*3.003*	3.157	*3.305*
1st generation in 4th quintile	2.721	2.885	3.032	3.125	3.417
1st generation in 5th quintile	2.925	2.979	3.133	*3.367*	3.587
Panel B: High-Oil Regions					
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	2.500	2.716	2.834	2.952	3.184
1st generation in 2nd quintile	2.750	2.881	2.937	*2.962*	3.232
1st generation in 3rd quintile	2.751	2.918	*2.819*	3.063	*3.078*
1st generation in 4th quintile	2.473	2.944	2.923	3.023	3.326
1st generation in 5th quintile	3.052	2.994	3.201	*3.107*	3.468

Note: Each cell indicates the average earnings quintile of third-generation women (the daughters of birth cohorts 1952–1957) given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. The third generation's earnings (measured at age 30) are ranked in the earnings distribution of women with fathers in the same birth cohort. We include third-generation sons born before 1985. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A16: Proportion of Third-Generation Women with an Academic Education Given the Earnings Quintiles of the First and Second Generations

	Panel A: Low-Oil Regions				
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	0.597	0.636	0.679	0.754	*0.825*
1st generation in 2nd quintile	*0.629*	0.668	0.726	*0.785*	*0.850*
1st generation in 3rd quintile	0.624	0.647	0.712	0.758	*0.853*
1st generation in 4th quintile	0.665	0.710	0.746	0.793	0.868
1st generation in 5th quintile	0.757	*0.786*	*0.831*	*0.853*	*0.914*
	Panel B: High-Oil Regions				
	2nd generation in 1st quintile	2nd generation in 2nd quintile	2nd generation in 3rd quintile	2nd generation in 4th quintile	2nd generation in 5th quintile
1st generation in 1st quintile	0.568	0.621	0.698	0.732	*0.759*
1st generation in 2nd quintile	*0.685*	0.702	0.734	*0.729*	*0.799*
1st generation in 3rd quintile	0.624	0.664	0.707	0.757	*0.790*
1st generation in 4th quintile	0.653	0.749	0.740	0.781	0.861
1st generation in 5th quintile	0.759	*0.700*	*0.787*	*0.817*	*0.887*

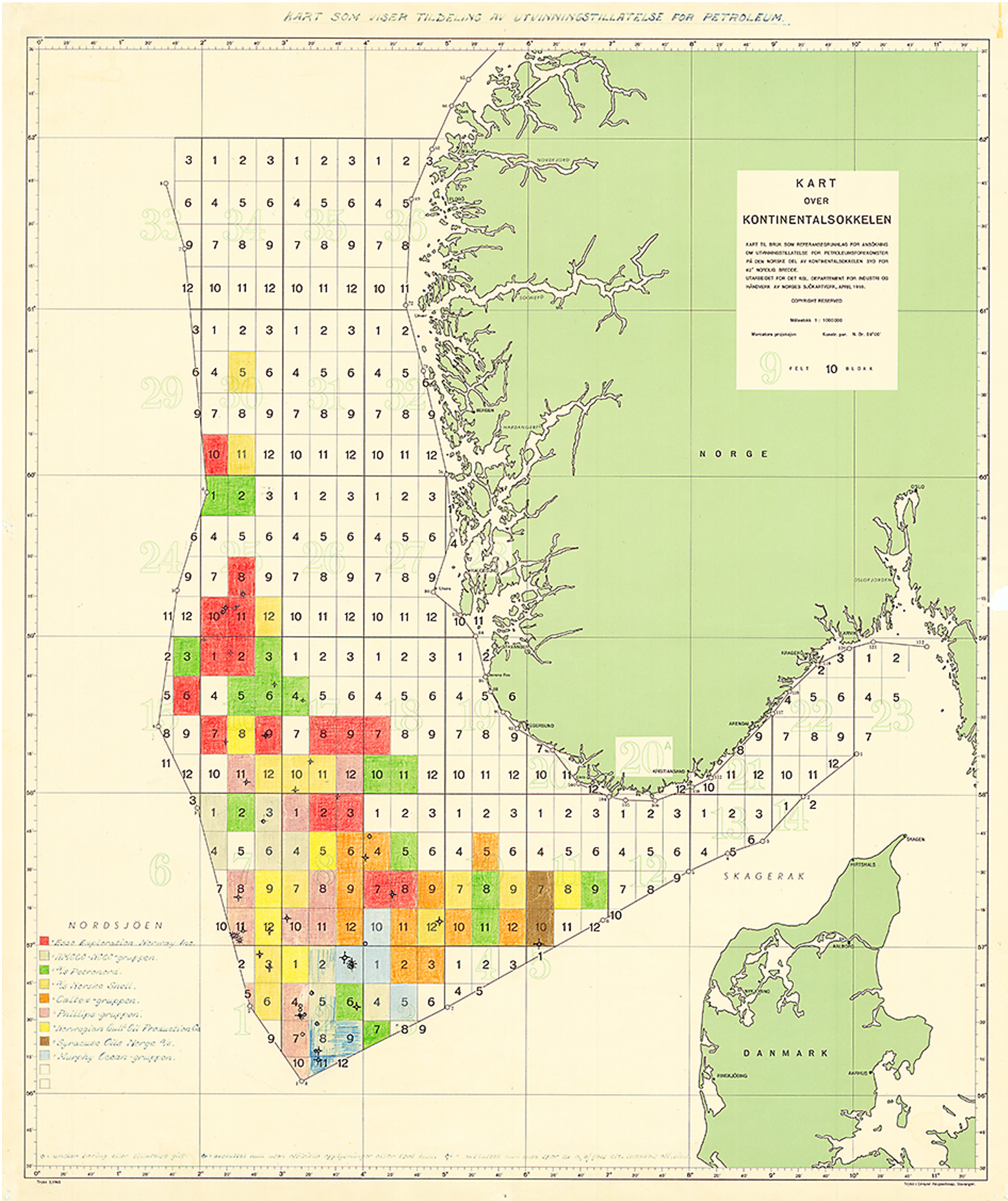
Note: Each cell indicates the percentage of women in the third generation that completed academic high school or obtained a college degree given the earnings quintiles of the first and second generations. The second generation's earnings are ranked in their birth cohort's earnings distribution. The first generation's earnings are ranked in the earnings distribution of men with sons (the second generation) born in the same year. We include third-generation women whose fathers were born between 1952–1957 and who themselves were born before 1991. The figures in italics indicate that the difference between the low- and high-oil regions is significantly different from zero at the 5% level.

Table A17: Differences Between Oil and Non-Oil Counties in the US

		Children's generation
Rank–rank slope	Non-oil	0.330
	Oil	0.334
	Difference	–0.005
Expected rank for parents in 25th pctile	Non-oil	43.1
	Oil	44.4
	Difference	–1.3***

Note: The table shows the difference in intergenerational mobility measures between oil and non-oil counties. Data on intergenerational measures at the county level are from Chetty, Hendren, Kline, and Saez (2014). A county is defined as an 'oil county' if a new well was opened in it in the period 2004–2012. Data on oil well openings are from Feyrer, Mansur, and Sacerdote (2017). There are 2,042 non-oil counties and 724 oil counties. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A1: Licensed Blocks on the Norwegian Continental Shelf

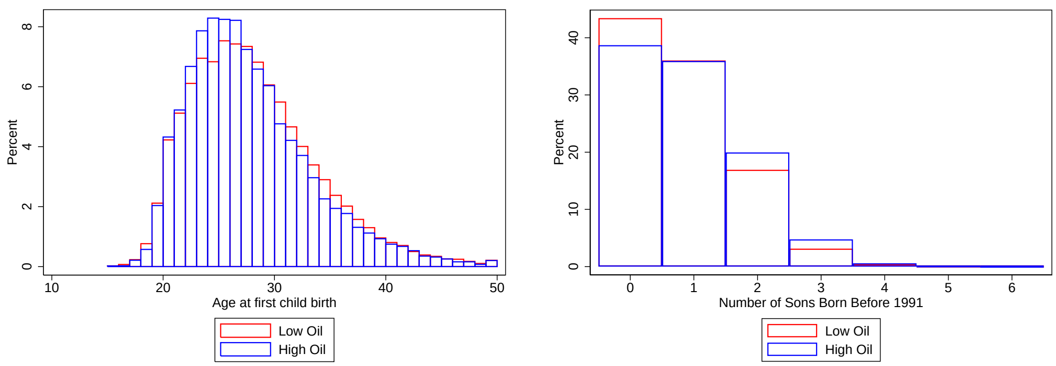


Notes: The map depicts the geographic licensing position from the first round of licenses issued by the Norwegian state in 1965. Source: Norwegian Petroleum Directorate.

Figure A2: Oil and Gas Discoveries Until 2015

Notes: The map shows all offshore oil and gas discoveries until 2015 (in blue). The three largest Norwegian cities—Oslo, Bergen, and Stavanger—are marked in red. The map also displays the location of the Ekofisk oil field, which was the first oil discovery on the Norwegian continental shelf. Source: Norwegian Petroleum Directorate.

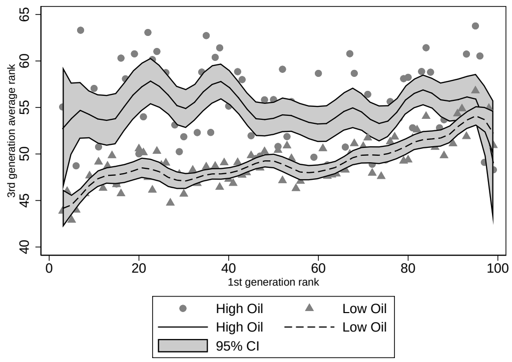
Figure A3: Age at Childbirth and Number of Sons, Main Cohorts (1952–1957)



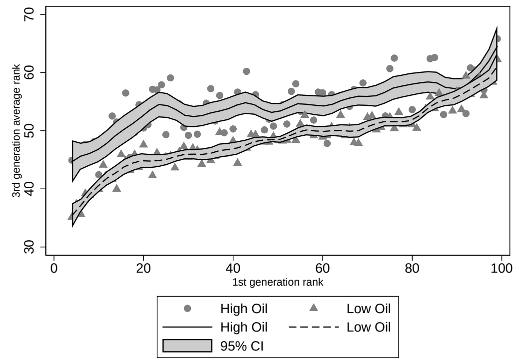
(a) Age at Birth of First Child (b) Number of Sons

Notes: Panel (a) plots the distribution of the main cohorts' ages at the birth of their first child by region. Panel (b) plots the number of sons born to the main cohorts before 1991 by region.

Figure A4: Association Between First, Second, and Third Generations' Ranks by Regions, Experience-Adjusted Earnings



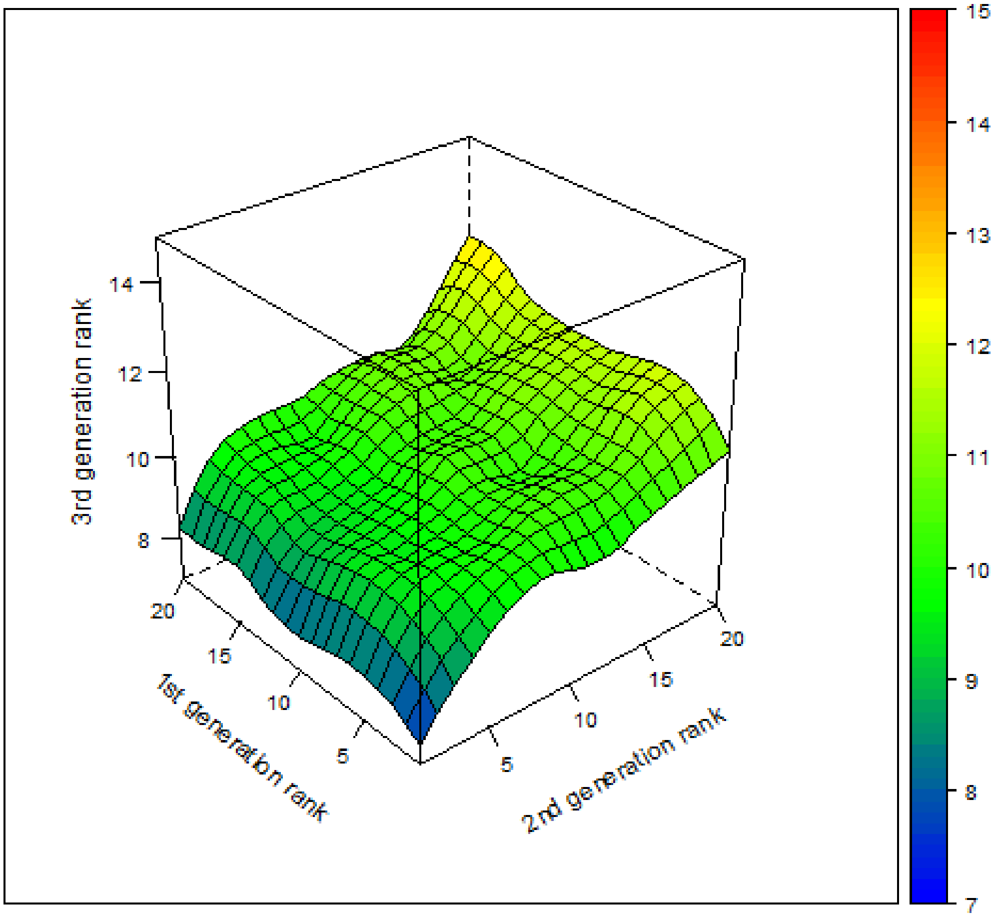
(a) First and Third Generations



(b) Second and Third Generations

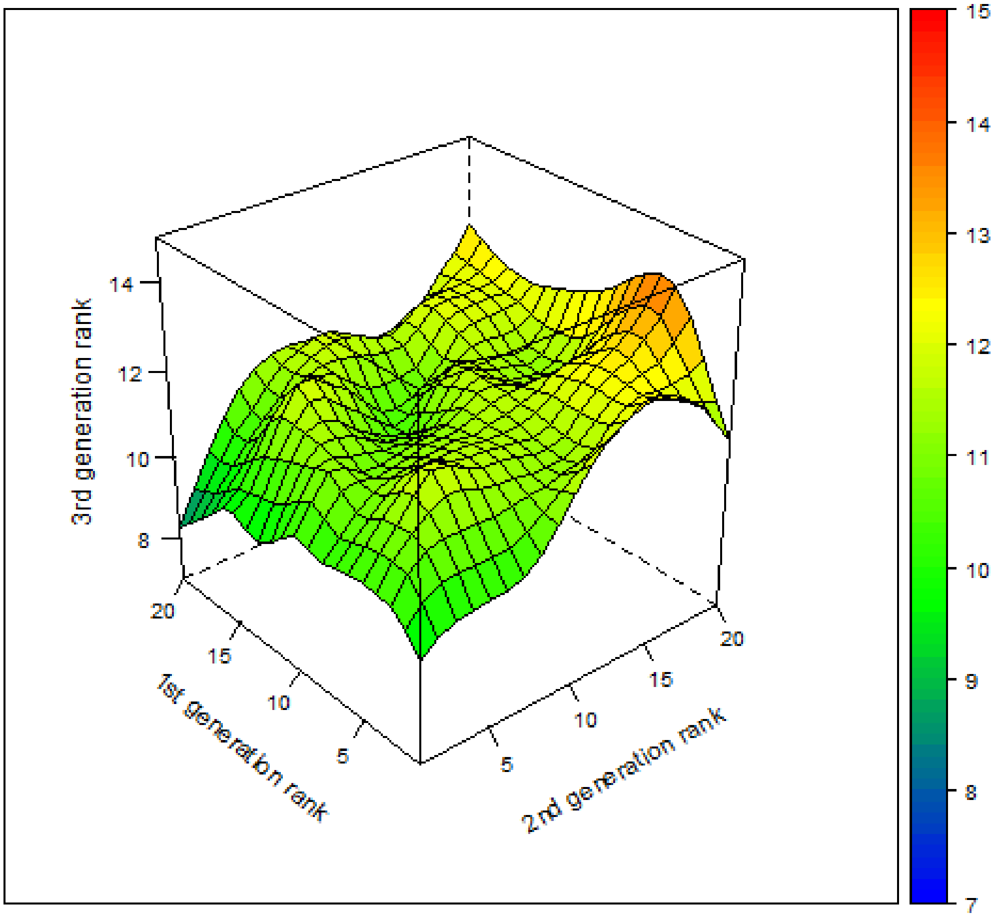
Notes: The plots present nonparametric binned scatterplots of the relationship between the third generation's earnings ranks and the first and second generation's earnings ranks in high- and low-oil regions. Plots are based on the sons of the 1952–1957 birth cohorts (the third generation). The third generation's earnings were measured at age 30. We predicted experience-adjusted earnings at age 30 using a second-order polynomial function of experience. The third generation's earnings are ranked in the earnings distribution of men with fathers (the second generation) born in the same year. In Panel (a), we plot the relationship between the first and third generations. The first generation comprises the fathers of the 1952–1957 birth cohorts. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. In Panel (b), we plot the relationship between the second and third generations. The second generation consists of the main cohorts (1952–1957). The second generation's earnings are ranked in the earnings distribution of their birth cohort.

Figure A5: Association Between the Third Generation's Earnings Rank and the Ranks of the First and Second Generations, Low-Oil Regions, Experience-Adjusted Earnings



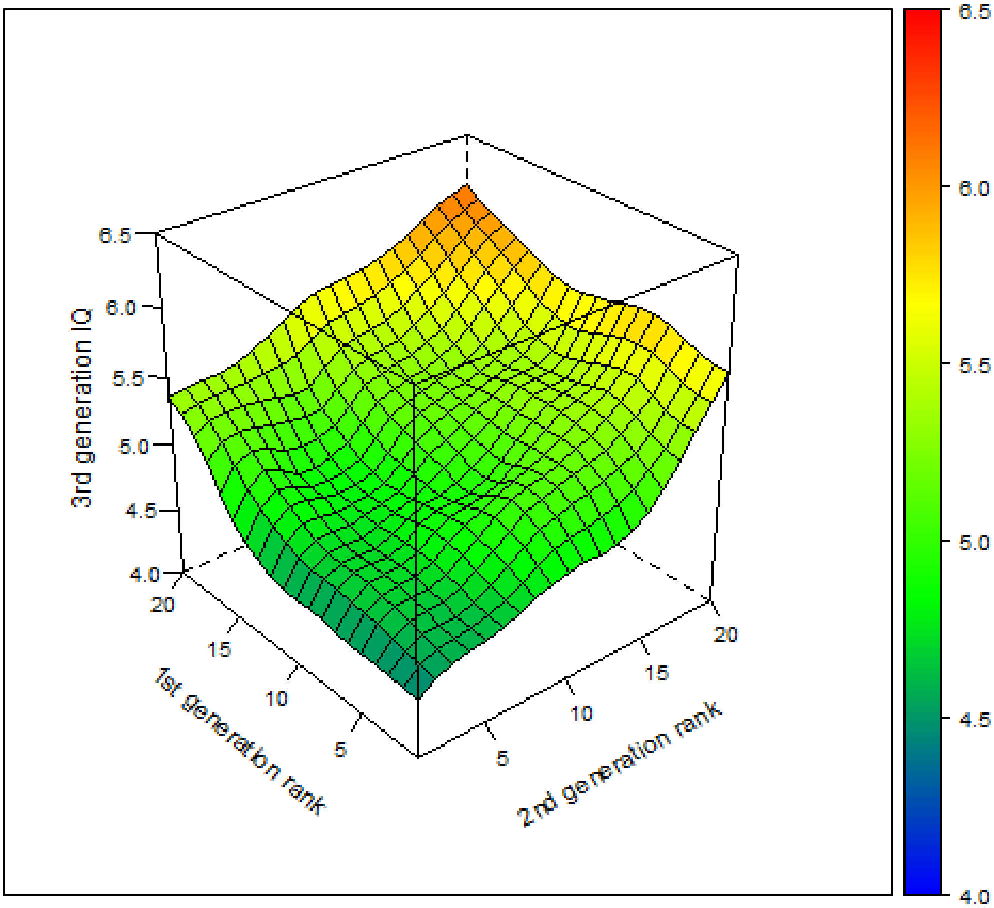
Notes: This figure plots the average experience-adjusted earnings rank (expressed in 20 percentiles) for the first generation in low-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation men born before 1985, and their earnings were measured at age 30. We predict experience-adjusted earnings at age 30 using a second-order polynomial function of experience.

Figure A6: Association Between the Third Generation's Earnings Rank and the Rank of the First and Second Generations, High-Oil Regions, Experience-Adjusted Earnings



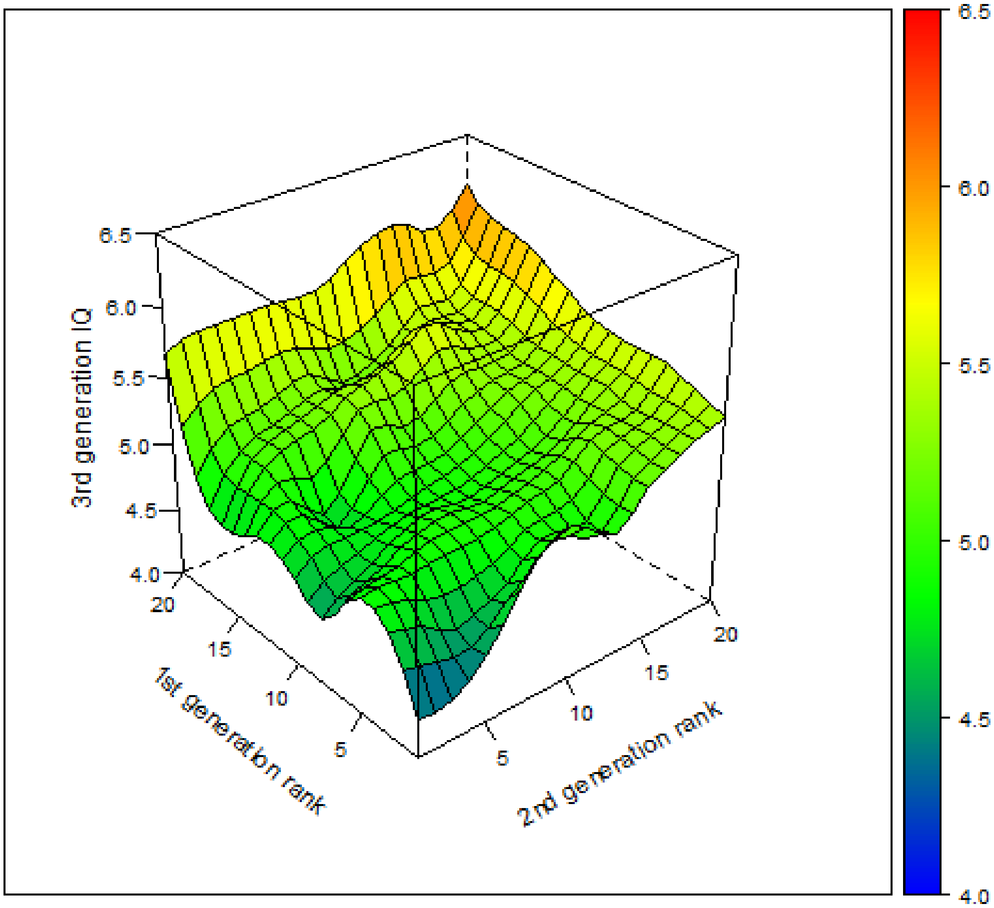
Notes: This figure plots the average experience-adjusted earnings rank (expressed in 20 percentiles) for the first generation in high-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation men born before 1985, and their earnings were measured at age 30. We predict experience-adjusted earnings at age 30 using a second-order polynomial function of experience.

Figure A7: Association Between the Third Generation's IQ and the Ranks of the First and Second Generations, Low-Oil Regions



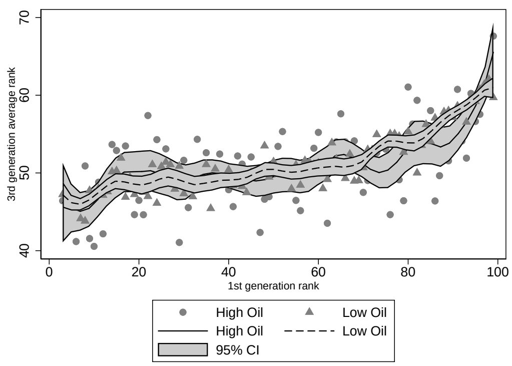
Notes: This figure plots the average IQ score for the third generation as a function of the earnings ranks of the first and second generations in low-oil regions. We include third-generation men born before 1989. IQ scores were measured at age 19 for all males (via military conscription) on a stanine scale (between 1 and 9).

Figure A8: Association Between the Third Generation's IQ and the Ranks of the First and Second Generations, High-Oil Regions

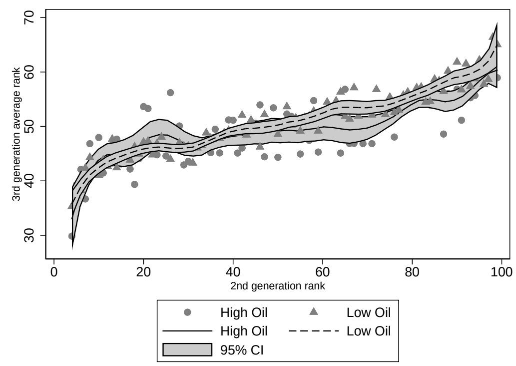


Notes: This figure plots the average IQ score for the third generation as a function of the earnings ranks of the first and second generations in high-oil regions. We include third-generation men born before 1989. IQ scores were measured at age 19 for all males (via military conscription) on a stanine scale (between 1 and 9).

Figure A9: Association Between First-Generation Women's and Second- and Third-Generation Men's Ranks by Regions



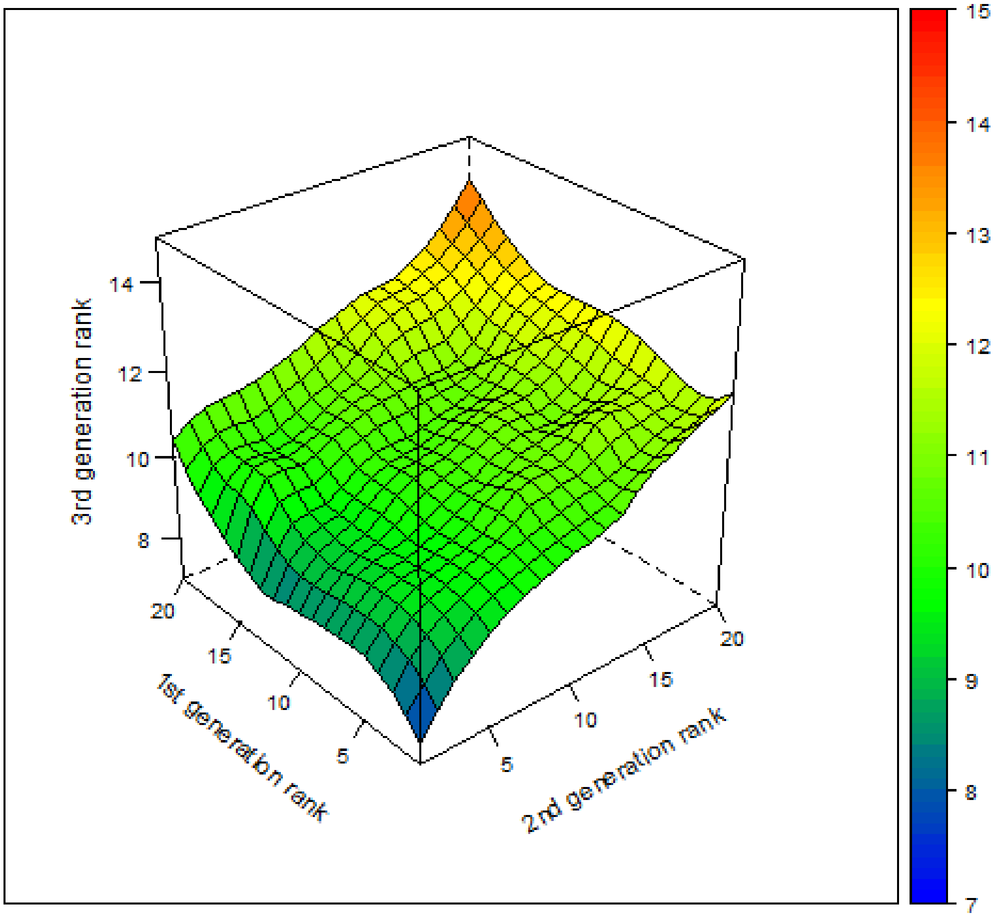
(a) First and Third Generations



(b) Second and Third Generations

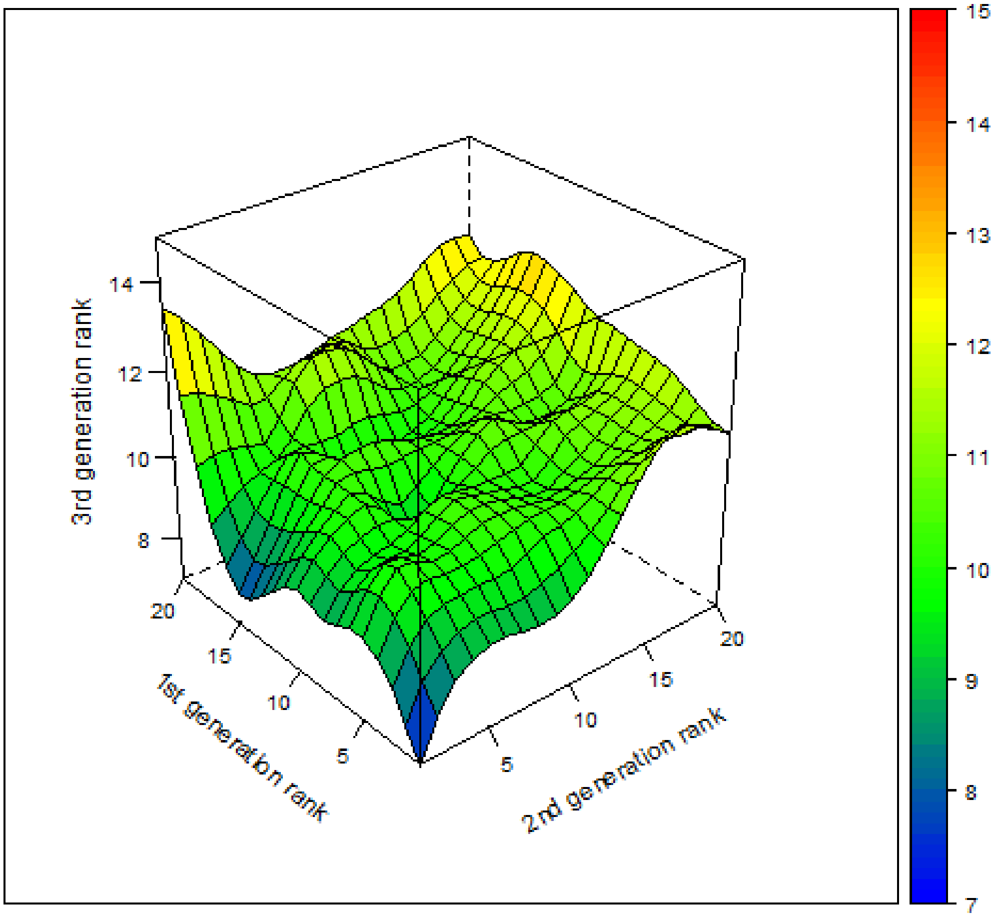
Notes: The plots present nonparametric binned scatterplots of the relationship between third-generation women's earnings ranks and the first- and second-generation men's earnings ranks in high- and low-oil regions. The plots are based on the daughters of the 1952–1957 birth cohorts (the third generation). The third generation's earnings were observed at age 30. The third generation's earnings are ranked in the earnings distribution of women with fathers (the second generation) born in the same year. In Panel (a), we plot the relationship between the first and third generations. The first generation consists of fathers of the 1952–1957 birth cohorts. The first generation's earnings are ranked in the earnings distribution of men with sons born in the same year. In Panel (b), we plot the relationship between the second and third generations. The second generation consists of the main cohorts (1952–1957). The second generation's earnings are ranked in the earnings distribution of their birth cohort.

Figure A10: Association Between the Third-Generation Women's Earnings Rank and the Ranks of the First and Second Generations, Low-Oil Regions



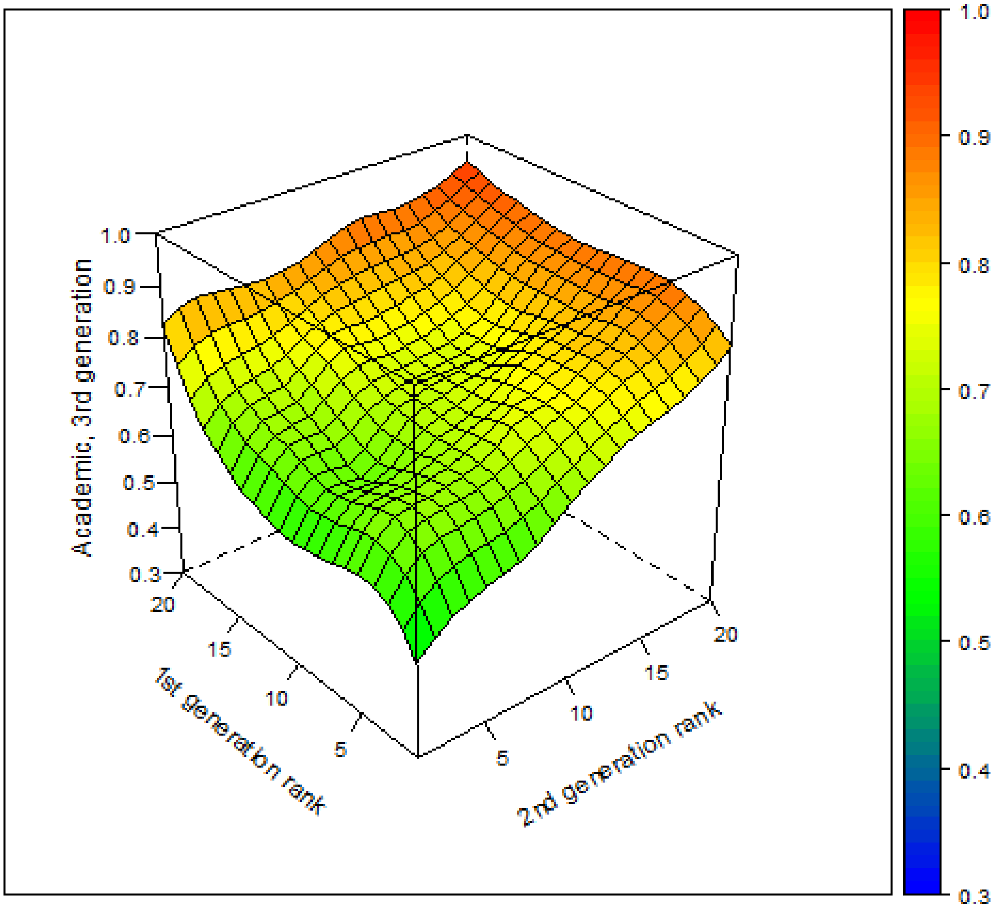
Notes: This figure plots the average earnings rank (expressed in 20 percentiles) for third-generation women in low-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation women born before 1985.

Figure A11: Association Between the Third-Generation Women's Earnings Rank and the Ranks of the First and Second Generations, High-Oil Regions



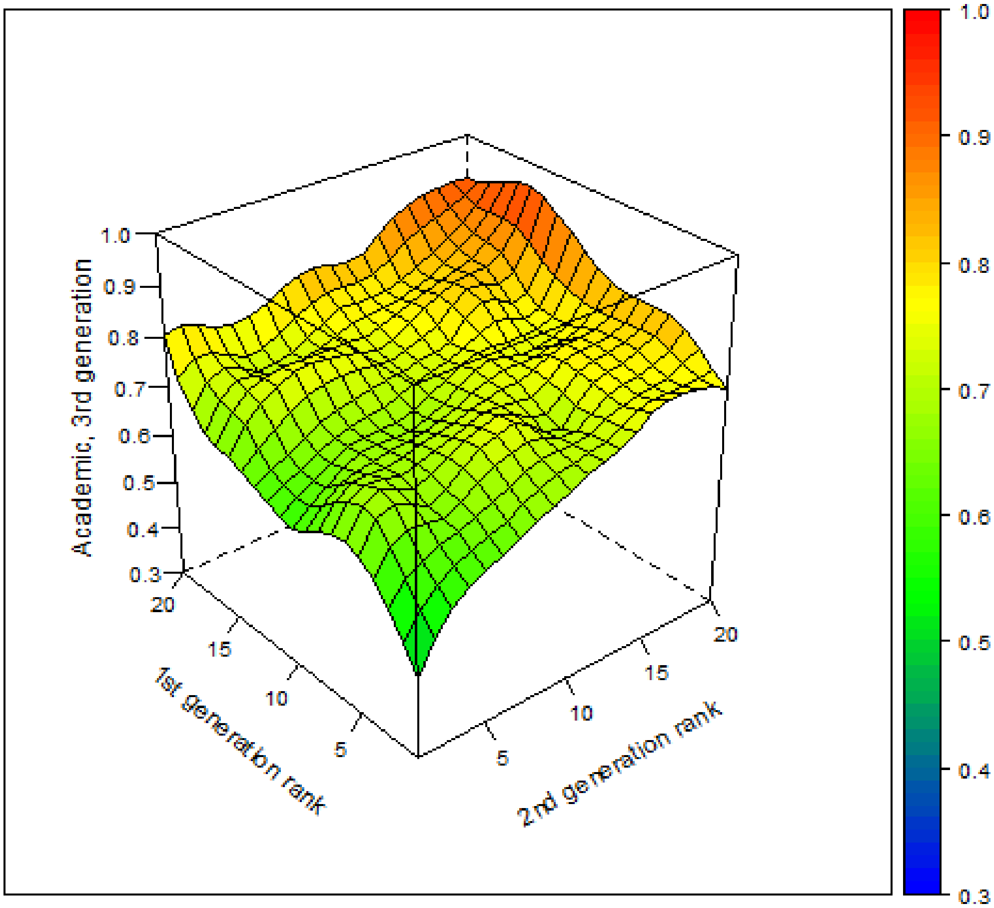
Notes: This figure plots the average earnings rank (expressed in 20 percentiles) for third-generation women in high-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation women born before 1985.

Figure A12: Probability of Attending Academic High School, Third-Generation Women, Low-Oil Regions



Notes: This figure plots the probability of completing academic high school or college for third-generation women in low-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation women born before 1991.

Figure A13: Probability of Attending Academic High School, Third-Generation Women, High-Oil Regions



Notes: This figure plots the probability of completing academic high school or college for third-generation women in high-oil regions as a function of the earnings ranks of the first and second generations. The sample includes third-generation women born before 1991.

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