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Explaining cross-cohort differences in life-cycle earnings☆

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ABSTRACT

College-educated workers entering the labor market in 1940 experienced a 4-fold increase in their labor earnings between the ages of 25 and 55; in contrast, the increase was 2.6-fold for those entering the market in 1980. For workers without a college education these figures are 3.6-fold and 1.5-fold, respectively. Why are earnings profiles flatter for recent cohorts? We build a parsimonious model of schooling and human capital accumulation on the job, and calibrate it to earnings statistics of workers from the 1940 cohort. The model accounts for 99% of the flattening of earnings profiles for workers with a college education between the 1940 and the 1980 cohorts (52% for workers without a college education). The flattening in our model results from a single exogenous factor: the increasing price of skills. The higher skill price induces (i) higher college enrollment for recent cohorts and thus a change in the educational composition of workers and (ii) higher human capital at the start of work life for college-educated workers in the recent cohorts, which implies lower earnings growth over the life cycle.

1. Introduction

The labor earnings of college-educated workers reaching their 25th birthday in 1940 grew by a factor of 4 by the time they reached age 55. In contrast, the earnings of college-educated workers reaching their 25th birthday in 1980 grew by a factor of only 2.6. Fig. 1 illustrates that the decline in life-cycle earnings growth was systematic across cohorts and was also experienced by high-school-educated workers. We use the term "flattening" to refer to this phenomenon. We measure flattening by the reduction in the 55–25 earnings ratio between two cohorts. In the case of college-educated workers, for instance, the ratio declined from 4 to 2.6, or the flattening was 34% between the 1940 and 1980 cohorts.

The data we use in Fig. 1 are described in Appendix A. We illustrate a few additional points about the data in several figures in Appendix A. First, even though Fig. 1 is about white men, we show that similar patterns emerge from the data for black men and for white and black women. Second, *earnings per hour* display similar flattening as earnings and this is true across race and gender cells. Third, distinguishing workers with 1–4 years of college from those with 5+ years of college does not alter the message that the life-cycle profiles of earnings and earnings per hour have flattened across cohorts. Given these observations, we focus the remainder of this paper on the flattening of the earnings profile of white men.

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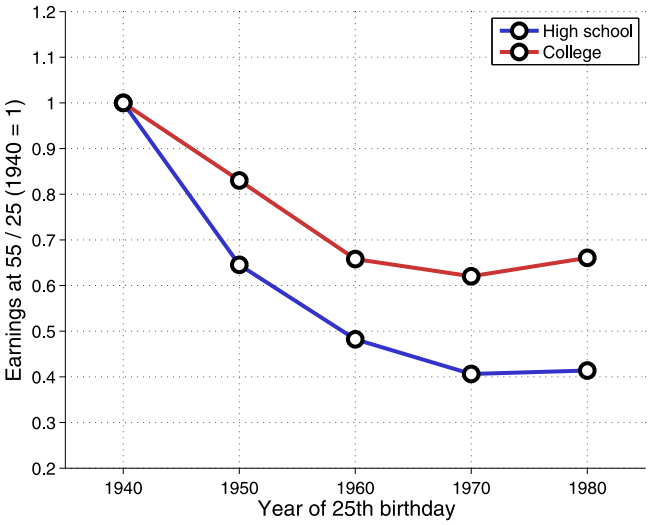

Fig. 1. Growth in labor earnings from age 25–55 by cohort and educational attainment.
Source: IPUMS.
Note: The data are for employed white men working for a wage. The earnings growth figures are normalized to 1 for the 1940 cohort.

The flattening of earnings profiles has important implications for the evolution of cross-sectional inequality over time. In 1970, the ratio of the average 55-year-old worker's earnings to the average 25-year-old worker's earnings is slightly less than 2. This inequality ratio increases to about 2.5 in 2010. However, had there been no flattening in the earnings profiles, the inequality would have more than doubled: from 1970 to 2010, the inequality would have increased to 4.5.

We develop a parsimonious model based on Ben-Porath (1967), which is the workhorse framework in the life-cycle earnings literature (see, for example, Heckman et al., 1998; Huggett et al., 2011). The main addition in our model is that we have endogenous college enrollment. Each period a worker can allocate two inputs—his time and his stock of human capital—between work and accumulation of human capital on the job. The latter activity is subject to diminishing returns. We assume that workers differ in their ability to accumulate human capital, both in college and on the job, and that the distribution of ability is identical across cohorts. All workers are endowed with a high school education at the start of their lives; they have an initial stock of human capital that is increasing in ability. To model college enrollment we assume that a worker's human capital after college depends on ability, time spent in college, and goods spending. The goods spending represents a "quality" component of college that can be chosen. We show that, in each cohort, there is a threshold level of ability such that workers with higher ability choose a college education, while the others do not.

In our model, there is *only one* exogenous variable responsible for both the flattening of earnings profiles and the increase in college enrollment across cohorts: the skill price level, which we assume to be a deterministic and increasing function of time. A key aspect of our analysis, therefore, is the optimal response of college enrollment and human capital accumulation in each cohort to increases in the skill price. We calibrate the model to match some key statistics on the life-cycle earnings of the 1940 cohort and the time series of college enrollment in the United States. We then compare the profiles of life-cycle earnings of the post-1940 cohorts with the data. The calibrated model accounts for 52% of the flattening for high-school-educated workers between the 1940 and 1980 cohorts and for 99% of the flattening for college-educated workers. Between the 1940 and 1970 cohorts, the corresponding numbers are 41% and 73%.

To understand how the growth of the skill price flattens the earnings profiles across cohorts, suppose that the growth rate of the skill price is constant over time. The recent cohorts then start their lives facing a higher level of the skill price than older cohorts, but the same growth rate. This generates two key *endogenous differences* between the recent and the older cohorts: an intensive margin effect and a composition effect.[1]

College intensive margin effect. A higher skill price implies that the marginal return to human capital is higher. Consider a worker with a level of ability such that it is optimal to attend college at both low skill price (old cohort) and high skill price (recent cohort). Such a worker in the recent cohort acquires more college human capital relative to the worker in the old cohort. Higher college human capital implies lower subsequent human capital accumulation on the job and lower earnings growth over the life cycle. This implication is due to: (i) human capital accumulation on the job is a function of only time and the stock of human capital and (ii) human capital accumulation is subject to diminishing returns.

[1] Since neither human capital nor skill price is observable, one can imagine constructing a skill price time series that accounts for all of the flattening under the assumption that all cohorts are identical and that human capital accumulation does not respond to skill price changes. Such an approach, however, contradicts a large literature that uses Ben-Porath (1967) as a model of human capital accumulation and life-cycle earnings (e.g., Heckman et al., 1998), where changes in skill price over the life cycle have first-order effects on human capital accumulation.