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Match effects ☆

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ABSTRACT

We present direct evidence of the importance of matching in wage determination. It is based on an empirical specification that estimates the returns to person-, firm-, and match-specific determinants of match productivity. We call these person, firm, and match effects. The distinction between these components is important, because they have different implications for the persistence of individual earnings and the returns to employment mobility. We find that match effects, which have been ignored in previous work, are an important determinant of earnings dispersion. They explain 16 percent of variation in earnings, and much of the change in earnings when workers change employer. Specifications that omit match effects substantially over-estimate the returns to experience, attribute too much variation to personal heterogeneity, and underestimate the extent to which good workers sort into employment at good firms.

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1. Introduction

A primary function of the labor market is to allocate workers to jobs. However, which workers match with which firms, and the consequences of matching for wage determination, remains poorly understood. Intuition suggests that "good" workers will match with "good" firms. Theory supports this intuition (in the presence of complementarity), but recent evidence based on wage data does not.[1] The idea that there are "good" matches and "bad" matches is well-established, but quantifying this in wages is hampered by a lack of direct measures of match quality, and the potentially confounding effects of unobserved worker and firm heterogeneity.

We present direct evidence of the importance of matching in wage determination. It is based on an empirical model that controls for observable and unobservable characteristics of workers and firms (person and firm effects), and an interaction effect between the worker and the firm. We call this the match effect. In a simple model of wage determination, person effects measure the value of worker-specific determinants of match productivity; firm effects reflect firm-specific

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[1] See Abowd et al. (2004) in particular.

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determinants of productivity, product market conditions, and the firm's compensation policy; and match effects measure the value of match quality.

The primary contribution of the match effects model is to measure the relative importance of worker-, firm-, and match-specific heterogeneity in labor earnings. The relative magnitude of these components is of substantive economic interest. If wage variation primarily reflects workers' measured and unmeasured productive characteristics, then individual wages will be highly persistent, largely invariant to where individuals work, and the potential returns to employment mobility will be small. On the other hand, if firm- and match-specific heterogeneity are important, then the cost of involuntary displacement from high-paying firms and good matches will be large, but so will the potential returns to search.

We estimate the match effects model on the US Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) database. Match effects explain 16 percent of observed variation in log earnings. Personal heterogeneity accounts for more than half of observed variation, and firm-level heterogeneity in compensation explains another 22 percent. Our results imply considerable persistence in individual earnings, coupled with substantial potential returns to search.

We use the match effects model to decompose earnings growth when individuals change employer. It is well known that a large portion of lifetime earnings growth occurs when individuals change job (e.g., Bartel and Borjas, 1981; Altonji and Shakotko, 1987; Topel and Ward, 1992, and others). This could reflect moving from lower-paying firms to higher-paying firms or sorting into better matches. We find that the relative importance of these two factors depends on whether there is an intervening period of non-employment between jobs. Workers who transit directly from one employer to another experience year-over-year earnings growth nearly 3 times larger than job stayers. About 60 percent of the excess growth is due to sorting into higher-paying firms, and nearly 30 percent to sorting into better matches. In contrast, individuals who experience an intervening period of non-employment have much lower wage growth than individuals who do not change jobs, and the difference is almost entirely due to sorting into worse matches.

We find direct evidence that matching is positively assortative. That is, we find a positive correlation between person- and firm-specific components of log earnings, which indicates that “good” workers match with “good” firms on average. This finding is in contrast to previous work that ignores match effects. Abowd et al. (2004), for example, find a near-zero correlation between person and firm effects in the US, and a negative correlation in France. The difference between our finding and previous work is attributable to bias from omitted match effects. In fact, estimated person and firm effects are unbiased only if all excluded match effects are zero. We easily reject this hypothesis.

Omitted match effects also bias the estimated returns to observable characteristics that are correlated with match quality. This matters if workers with certain characteristics are more successful at generating good matches than others. We find evidence of this bias in the estimated returns to experience. A specification that omits match effects over-estimates the returns to 25 years of experience by 26 percent for men and 23 percent for women. This is evidence that some of the returns traditionally attributed to the accumulation of general human capital are actually attributable matching, and that workers sort into better matches over the course of a career.

The remainder of the paper is organized as follows. In Section 2, we present the match effects model, develop our estimators, and derive the bias due to omitted match effects. Section 3 describes the data used in the empirical application, and Section 4 presents the estimation results. We conclude in Section 5.

2. The match effects model

A simple model of match productivity and wage determination helps fix ideas. Suppose that worker i has productive characteristics (e.g., ability, human capital, and other “portable” determinants of productivity) indexed by $L_i > 0$. Firm j has productive characteristics (e.g., technology, capital intensity, and organizational capital) represented by an index $K_j > 0$. When worker i is employed at firm j in period t, match productivity Q_{ijt} is given by the Cobb–Douglas function:

$$Q_{ijt} = \mu L_i^{\theta} K_j^{\psi} M_{ij}^{\phi} e_{ijt} \tag{1}$$

where μ is a scale factor; θ, ψ, and ϕ are parameters; $M_{ij} > 0$ is the match-specific productivity shifter; and e_{ijt} is an idiosyncratic productivity shock with geometric mean one. We call M_{ij} match quality; it can be interpreted as an index of complementarity between the worker's and firm's productive attributes. Good matches are those that are more productive (i.e., M_{ij} is larger) for given values of L_i and K_j.

In the production function (1), an individual who consistently generates good matches (i.e., for whom expected match quality is above average) is indistinguishable from an individual whose productivity index L_i is above average. In both cases, the worker has above-average expected productivity at any firm. The same is true of firms that consistently generate good matches. Hence we assume that all workers and firms face the same distribution of match quality, and we normalize its geometric mean to one.[2] This is intuitive: consistently generating good matches is a skill that increases an agent's expected productivity in any match, and is consequently no different than other productive attributes embodied in L_i and K_j. We similarly normalize the geometric means of L_i and K_j to one, because we cannot distinguish an economy with high average worker productivity from one with high average firm productivity.

[2] That is, without loss of generality, we normalize $E[\ln M_{ij}] = 0$.