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Networks in labor markets: Wage and employment dynamics and inequality☆

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Abstract

We present a model of labor markets that accounts for the social network through which agents hear about jobs. We show that both wages and employment are positively associated (a strong form of correlation) across time and agents. We also analyze the decisions of agents regarding staying in the labor market or dropping out. If there are costs to staying in the labor market, then networks of agents that start with a worse wage status will have higher drop-out rates and there will be a persistent differences in wages between groups according to the starting states of their networks.

JEL classification: D85; A14; J64; J31; J70; L14

Keywords: Networks; Labor markets; Employment; Unemployment; Wages; Wage inequality; Drop-out rates

1. Introduction

One of the most extensively studied issues in labor economics is the persistent inequality in wages between whites and blacks. [1] Even if one believes any inequality in wages between social

☆ This paper was formerly part of Calvó-Armengol and Jackson (2004). That paper was split into two parts, with the part under the former title looking at a special case of the networks outlined here and focusing on employment dynamics, and this part looking at a more general set of networks and exploring both wage and employment dynamics.

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[1] For instance, see [13,4,5,11]. See [8] for data on other racial-ethnic groups in the US.

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groups to be entirely explainable by differences in factors such as education, skills, and drop-out rates; one is still left to explain why those should differ. [2]

The purpose of this paper is to develop a model of how social networks operate in the transmission of job information, and to show that such a model can account for the observed patterns of wages and employment as well as differences in drop-out patterns and their roles in sustaining inequality. An analysis of social networks provides a basis for observing both higher drop-out rates in one race versus another and sustained inequality in wages and employment rates even among those remaining in the labor force. [3]

Our model builds upon a well-established stylized fact: a significant fraction of all jobs are found through contacts. While estimates of the percentage of jobs found through social contacts vary across location and profession, they consistently range between 25% and 80% of jobs in a given profession. [4] We model the transmission of job information among individuals by a function that keeps track of who first heard about a job and who (if anyone) eventually ended up getting an offer for that job. The key condition that we impose on this function is that the expected number of offers that a given agent ends up with is nondecreasing in the wage status of other agents. Allowing agents also to randomly lose jobs, wages can be shown to follow a Markov process, with state transitions depending on the information transmission network. We prove that the resulting stationary distribution is strongly associated; that is, the wages of any path-connected agents are positively correlated under the steady-state distribution. The proof is not as easy as one might expect, as there is a countervailing effect that path-connected agents are sometimes in competition for information about certain jobs. This entails some within period negative correlation among the status of certain agents. So we have to prove that the long-run benefits of improved status of friends-of-friends outweighs the short-run competition that they might represent. Next, to establish persistent inequality between wages of different types of agents, we analyze drop-out decisions where agents decide whether to enter the labor market or to drop out. We model the drop-out decision as a simultaneous-move game, where agents compare the discounted expected flow of future wages stemming from entering the labor force with the corresponding discounted costs (such as education costs, opportunity costs, skills maintenance, etc.). Because individual wages are positively associated across agents, entry decisions in this entry/drop-out game turn out to be strategic complements. Applying the theory of supermodular games, we deduce that two different social groups with identical job information networks but differing in their starting wage and employment profile will have different drop-outs rates that can be strictly ranked. These differences in drop-out patterns in turn breed persistent differences in wages between the two groups. This theory thus highlights the role of collective employment history in persistent wage inequality across social groups. [5]

This paper has a companion paper Calvó-Armengol and Jackson [3], which examines a specific case of the model considered here. The main contributions here are twofold. First, we consider a much more general model both in the passing of job information and in the structure of wages

[2] The extent to which inequality is explainable by such factors is still a point of some debate. See for instance Darity and Mason [6] and Heckman [10].

[3] A social network model of inequality complementary to other theories. For discussion of some other theories and the relation of social networks approach, see Calvó-Armengol and Jackson [3].

[4] See Ioannides and Loury [12] for an excellent and extensive survey on the role of social networks in labor markets.

[5] This complements a large body of theoretical work built on models of discrimination (e.g., Becker [18]; Arrow [17]), imperfect capital markets (Loury [22]), and local public goods (Bénabou [19, 20]; Durlauf [21]), among others. See Calvó-Armengol and Jackson [3] for additional discussion.