

Winner-takes-all job markets: A network approach

Keywords: networks, labor economics, occupational mobility, winner-takes-all markets, gender wage gap

Extended Abstract

Winner-takes-all job markets are those where the relative rank of workers, rather than their productivity or other absolute traits, determines their job outcomes. Such markets tend to be competitive, and individuals with marginal differences in ability may be rewarded very differently. The income distribution is often highly skewed, such that a few individuals earn well and enjoy job security, while the median participant earns substantially less [1]. Some winner-takes-all job markets that have been investigated are those for professional athletes such as football or tennis players, or artists [2, 3, 4]. To the best of our knowledge, however, most examinations of winner-takes-all markets begin *a priori* with a definition of one or several career paths that follow the winner-takes-all pattern, including the examples cited above. We attempt to remedy this by quantitatively investigating which career paths follow a winner-takes-all pattern.

We postulate that risk of failure in pursuing a career is expressed over a longer career trajectory, rather than during an individual job. It is therefore of importance to consider occupational mobility and job training over time. We thus require a way of representing career trajectories. With fine-grained data, individual trajectories are likely to be heterogeneous, so we furthermore need to average out over career movements, while maintaining the individual perspective.

It is with these considerations in mind that we take a network approach to representing the labor market, similar to [5]. Here, each node in the network represents a job title, while edges represent transitions between jobs. The network is thus directed, with edges weighted by transition frequencies.

After creating the network, we apply the infomap community detection algorithm for flows in weighted directed networks to find clusters of careers with common within-cluster career transitions [6]. As the baseline infomap algorithm implicitly assumes a memoryless first-order Markov chain, which is unrealistic in this case, we implement a modified version which allows for state memory [7].

This sets the groundwork for investigating winner-takes-all career paths. While the winner-takes-all property is qualitatively defined, such job markets have quantitative indicators: a skewed income distribution, higher degree of unemployment, and failure at pursuing the career (as observed by shifts in career, or higher likelihood of several simultaneous income streams). The relationship between the indicators is also investigated, as empirically higher income is positively correlated with job security, rather than trading off against it as some theoretical accounts predict [8].

We use data from the Danish labor market in the years 2008-2019, which is available with monthly resolution. This data set covers the entire Danish population over these years. Each person is assigned a tag representing whether they are employed, and if not, whether they are outside the labor market and why (e.g. if they are on sick leave or retirement.) Each employed person is furthermore tagged with the industry of their employer, as well as an occupation code. There are 781 possible occupation codes. Self-employed people and co-working spouses are

also tagged as such, and the industry of their workplace is available. Monthly hours worked are also available for all working individuals.

An advantage of using this data set, other than the fine-grained resolution and good data integrity, is that for individuals who work in several simultaneous jobs, each job is included along with the monthly hours worked in that job. Another advantage is that individual records are tagged with demographic information such as sex, age and country of origin, and there is the possibility of supplementing with other records.

In particular, we examine the expected career trajectories following different educational paths, as well as likelihood of pursuing a winner-takes-all career by sex and country of origin, building on literature that suggests gender-divergent behavior in winner-takes-all job markets [9, 3]. In relation to this, we also examine the effects of assortative mating, and how this may either amplify or hedge risks of pursuing winner-takes-all career strategies.

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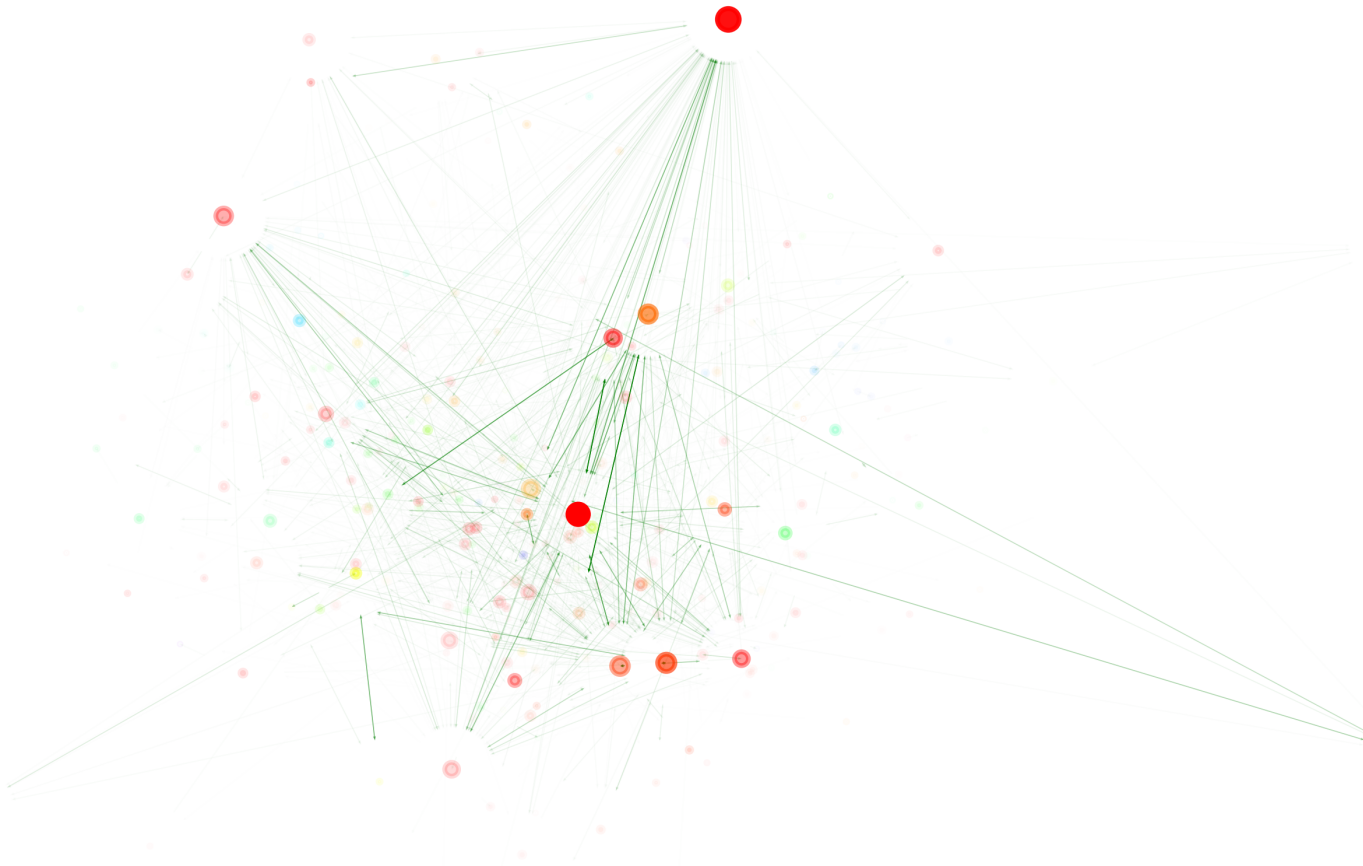


Figure 1: The network of job transitions in the Danish labor market. Each node represents one of 781 possible occupations, and edges between nodes represent transitions between occupations. Nodes are sized according to their out-degree, colored according to their infomap module, and have opacity according to the weight of their self-directed edge. Edges have opacity according to the edge weight.