

# Worker Sorting, Industry Sorting, and Agglomeration Effects\*

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## Abstract

The urban wage premium is a well-known and understood fact. Significant spatial wage disparities can be observed in virtually all countries with free market economies. In particular, larger cities offer higher wages compared to more rural areas. There are at least two major explanations for this observation. The first is that people with characteristics that are related to higher wages prefer to live in larger cities. The other explanation is that the same worker becomes more productive if she or he is located in a larger rather than a smaller city.

In this paper, we use a full sample of all workers subject to social security in Germany for the years 2011-19. We shed light on the relative importance of those explanations and demonstrate that, after controlling for worker and plant sorting, there is still a significant agglomeration effect that makes wages increase with the size of local population. We adapt a novel decomposition of the sources of spatial wage disparities for the German labor market. Our empirical approach uses the decomposition proposed by Card, Rothstein, and Yi (2024, henceforth CRY). This decomposition stems from the seminal work by Abowd, Kramarz, and Margolis (1999, henceforth AKM) that additively decomposes individual log wages into a worker-specific component and a firm-specific component. CRY modify this approach to the spatial setting by decomposing log wages into a worker component and an industry component. Furthermore, CRY establish the so-called “hierarchy effect”, i.e. the systematic asymmetry in the pattern of workers’ mobility. Typically, workers move from relatively higher-paying firms in the origin industry to relatively lower-paying firms in the destination industry, if the latter industry is superiorly ranked in the wage ladder compared to the former industry.

We add two additional insights: First, we refer to CRY and demonstrate that mobility between German cities of different sizes is usually not between representative firms, the above-mentioned “hierarchy effect”. This implies that we may underestimate the actual effect of mobility between small and large cities. In a further step, we estimate the unconditional urban wage premium getting the result of 6.5 % in the unweighted case and 7.9 % in the case of weighting by employment size. Moreover, all estimated fixed effects (by person, region, firm and hierarchy) are positively correlated with the population size of the local labor market region. Second, we adapt the approach of CRY (2024, 2025) by decomposing the AKM plant effects into an industry-mix effect and a region-specific effect. This allows us to analyze if bigger cities offer a more favorable industry mix and to identify the true urban wage premium. We show that the local plant-specific wage is more or less fully absorbed by the regional component, which in turn increases with the size of the local population by both a statistically and economically significant extent. This provides strong evidence for the presence of so-called Marshall-Arrow-Romer-type agglomeration effects.

**JEL classification:** J31, R12, R23, R38

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