



# Workforce location and equilibrium unemployment in a duocentric economy with matching frictions<sup>☆</sup>



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## ABSTRACT

This article examines unemployment disparities and efficiency in a duocentric city where workers are non-uniformly distributed between the two job centers. We introduce commuting costs and search-matching frictions to deal with the spatial mismatch between workers and firms. In a decentralized economy job-seekers do not internalize a composition externality they impose on all the unemployed. With symmetric job centers, a change in the distribution of the workforce can lead to asymmetric equilibrium outcomes. We calibrate the model for Los Angeles and Chicago Metropolitan Statistical Areas. Simulations suggest that changes in the workforce distribution have non-negligible effects on unemployment rates, wages, and net output, but cannot be the unique explanation of a substantial mismatch problem.

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## 1. Introduction

Does the spatial structure of a city affect labor markets outcomes? How do job-seekers organize their search activity along the spatial dimension? What are the implications of this activity on equilibrium unemployment rates and efficiency? These questions have already been studied in monocentric cities (see [Zenou, 2009](#), for an overview) or in the case of uniformly distributed agents and jobs around the circle (see [Marimon and Zilibotti, 1999](#); [Hamilton et al., 2000](#); [Decreuse, 2008](#)). To the best of our knowledge, these questions have never been addressed in a duocentric city in which job-search decisions and firms' and job-seekers' locations are endogenous. The view that U.S. cities are monocentric is outdated as "America changed from

a nation of distinct cities separated by farmland, to a place where employment and population density is far more continuous", according to [Glaeser \(2007\)](#). There is evidence that the distribution of the workforce varies among cities and can be far from uniform. [Fig. 1](#) displays the spatial population distribution of a number of major cities.<sup>1</sup> While London and Moscow appear to have an approximately uniform population distribution, this is clearly not the case of Berlin, Paris, New York, Jakarta and Shanghai. Our objective is to build a tractable dynamic framework with endogenous unemployment in the case of a duocentric city where the population is distributed along the segment between two job centers. This is a first step towards considering more complex city structures.

Each job center is a distinct labor market characterized by search-matching frictions. Initially, individuals freely choose once and for all where to reside. Next, the unemployed use their time endowment to look for vacant jobs. Firms freely decide in which job center they open a vacancy. Each vacant position is generic in the sense of being accessible to any job-seeker wherever she lives. Employed workers

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<sup>1</sup> [Fig. 1](#) presents a three dimensional perspective where the boundaries of a city are the result of overlaying population density and built-up areas. For instance, London is limited to its 52 boroughs, Shanghai to "the city proper" and Paris to the municipal area and "la petite couronne." Jakarta is represented by the Jabotabek area which is Jakarta municipality plus Tangerang, Bekasi, and Bogor. Moscow is limited to the area within its municipal boundary.

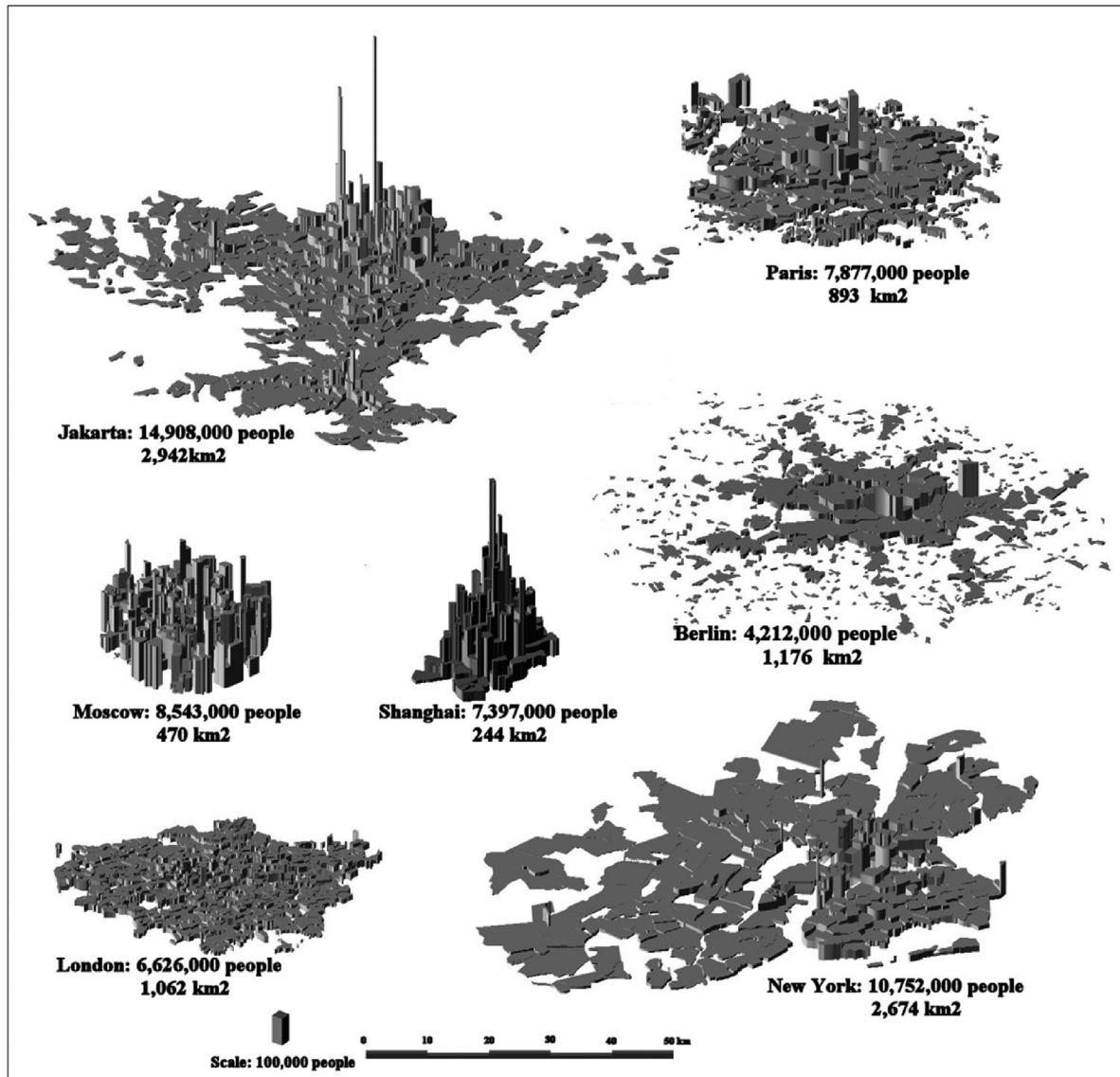


Fig. 1. Spatial distribution of population in seven major metropolises, represented at the same scale Source: Bertaud (2008).

commute to the job center where they have been recruited until the match is exogenously destroyed.

In equilibrium, unemployed workers specialize their search in only one job center. The closer a job-seeker resides to a job center, the lower are the commuting costs, so the higher is the total surplus created if a firm located in this job center matches with this job-seeker. As we assume individual Nash bargaining over the wage, commuting costs are shared between the employer and the employee. The expected profit from creating a job in one business district is thus higher when those seeking a job in this job center live closer to it. When an additional individual joins the queue of job-seekers in a job center, she ignores the consequences of this decision on expected profits and hence on vacancy creation. This generates an externality. If agents were choosing where they search in an efficient way (i.e. so as to maximize net output), the so-called Hosios condition would be sufficient to internalize standard search-matching externalities. This condition which is familiar in the search-matching literature expresses that agents' shares of the total surplus created by a match equal respectively the elasticities of the matching function with respect to the stocks of buyers (vacant jobs) and sellers (job-seekers) in

the labor market. However, we show that the decisions on where to search for a job are generically inefficient. Therefore, the decentralized economy is typically not efficient even if the Hosios condition is met.

We conduct numerical analyses to provide orders of magnitude of the impacts of changes in the shape of the workforce distribution on unemployment rates and on efficiency. A first exercise considers a uniformly distributed workforce of mass lower than one and a complementary mass of workers located in one of the job centers. Letting this mass rise lowers the unemployment rate everywhere. Yet, the decentralized economy is almost efficient. Next, we consider Los Angeles and Chicago MSAs. We calibrate the model in both MSAs with census data for the year 2000. Then, we develop several counterfactual exercises either interchanging the two workforce distributions or replacing the actual ones by some standard parametric distributions. The counterfactual assumptions we consider can cause changes in unemployment rates up to about half a percentage point and in net output up to 5% when the workforce is more concentrated far from the job centers. These are non-negligible effects.

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