Regional equilibrium unemployment theory at the age of the Internet☆

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ABSTRACT

This paper studies equilibrium unemployment in a two-region economy with matching frictions, where workers and jobs are free to move and wages are bargained over. Job-seekers choose between searching locally and searching in both regions. Search-matching externalities are amplified by the latter possibility and by the fact that some workers can simultaneously receive a job offer from each region. The rest of the framework builds upon Moretti (2011). Increasing the matching effectiveness out of the region of residence has an ambiguous impact on unemployment rates. While it reduces the probability of remaining unemployed, it also decreases labor demand because of a lower acceptance rate. We characterize the optimal allocation and conclude that the Hosios condition is not sufficient to restore efficiency. A numerical exercise indicates that the loss in net output is non-negligible and rising in the matching effectiveness in the other region.

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1. Introduction

While an abundant literature in urban economics addresses unemployment issues within cities (see Zenou (2009), for a detailed coverage), less effort has been devoted to analyze the causes of unemployment at the regional level. "Given the large geographical differences in the prevalence of unemployment observed in the real world, understanding spatial equilibrium when the labor market does not instantly clear would appear to be of primary importance." (Kline and Moretti, 2013, p. 239). The main purpose of this paper is to contribute to this understanding.

The Internet allows both sides of the labor market to find more easily potential partners, even faraway, thanks to job boards and meta-search engines.[1] Moreover, the recruitment process can now also be conducted online through virtual recruiting tools.[2] Marinescu and Rathelot (2014) provide evidence that the distance between the job-seeker and the job vacancy exceeds 100 km (63 miles) in about 10% of the online applications on CareerBuilder.com. This suggests that a non-negligible share of US job-seekers ramp up their job search by expanding it over long distances.[3]

While most of the literature dealing with regional unemployment assumes that people need to migrate before they can start searching locally, we relax the assumption of segmented regional labor markets. Our

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[1] In 2010, 25% of the interviewed Americans who use the Internet declared to do so to find a position (U.S. Census Bureau, 2012, Survey of Income and Program Participation, 2008 Panel). In Europe, in 2005, among the unemployed workers, 25% used the Internet to search for a job. This share has increased to 50% in 2013 (Eurostat, 2014, see http://ec.europa.eu/eurostat/data/database?node_code=isoc_ci_ac_i).

[2] See e.g. http://variousthingslive.com/virtual-open-house/ and the links on http://hiring.monster.com/hr/hr-best-practices/recruiting-hiring-advice/acquiring-job-candidates/virtual-recruitment-strategies.aspx.

[3] The evidence is more mixed for the UK (see Manning and Petrongolo (2011)).

main contribution consists of developing a general equilibrium search-matching framework where job-seekers choose whether they search in their region of residence only or all over the country. To the best of our knowledge, this has not been done yet. In this setting, regions are strongly interdependent and several sources of inefficiency explained later are present. A numerical exercise suggests a non-negligible gap between the efficient and the equilibrium allocations.

As a secondary contribution, our analysis also sheds some light on a puzzle. Expectations that the Internet would improve the functioning of the labor market by reducing search-matching frictions were great (see e.g. Autor (2001)). A decade later, the evidence is mixed. Some microeconometric evaluations find that online job search shortens unemployment duration in the US (Kuhn and Mansour, 2014; Choi, 2011). For graduate students in Italy, Bagues and Labini (2009) conclude that the use of an online platform reduces the probability of unemployment and raises geographical mobility. However, via a difference-in-differences approach, Kroft and Pope (2014) find no evidence that the rapid expansion of a major online job board (during the years 2005–2007) has affected city-level unemployment rates in the US. So, the reasons why improvements at the individual level disappear at a more aggregate level need to be understood. This paper proposes an explanation in a spatial economy.

We build upon the synthesis of Moretti (2011) who develops a two-region static spatial equilibrium model à la Rosen (1979)–Roback (1982). Contrary to these authors, Moretti (2011) assumes that the supply of labor is not perfectly elastic. This property is obtained by assuming that economic agents have heterogeneous idiosyncratic preferences for regions. The aim of Moretti (2011) is to analyze how local shocks propagate in the long run to the rest of the economy, with a focus on the labor market. He discusses the case where agents have different skills, while we keep labor homogeneous. However, regional unemployment disparities are not studied by Moretti. We introduce search-matching frictions and wage bargaining within this framework (Pissarides, 2000) but we abstract from the housing market.

Contrary to most of the search and matching literature, the spatial heterogeneity is explicit in our framework. In each region, imperfect information and lack of coordination among agents create frictions summarized by a constant-returns-to-scale regional-specific matching function in which the number of job-seekers is a weighted sum of the residents and of the non-residents who decide to search all over the country, both numbers being endogenous. We characterize the equilibrium. We show how regional unemployment differentials are affected by the partition of the population between the two regions and between the statuses of national and regional job-seekers. We also conclude that a rise in search effectiveness out of the region of residence has an ambiguous effect on the unemployment rates. It decreases the probability of remaining unemployed but it also reduces labor demand through a lower acceptance rate of job offers. This ambiguity echoes the main conclusion of Kroft and Pope (2014).

In the standard search-matching literature, frictions generate congestion externalities which are not internalized by decentralized agents unless the Hosios (1990) condition is met. As soon as some workers search all over the country, new sources of inefficiency arise. First, when decentralized agents decide whether to search nationally, they look at their private interest and ignore the consequences of their choices on job creation in all regions. Second, when opening vacancies in a region, firms do not internalize the changes in the matching probability and hence in net output in the rest of the economy. We show that the Hosios condition is never sufficient to decentralize the constrained efficient allocation.

We develop a numerical exercise for a very stylized US economy made of two regions that are initially symmetric and where the Hosios condition prevails. The decentralized economy appears to be far from efficient. For a very wide range of parameters, efficiency requires that nobody searches in the whole country while 10% of the workforce does it in the decentralized economy. Furthermore, the efficient

unemployment rate level is lower than the decentralized one. As this exercise assumes symmetric regions, this conclusion is not in contradiction with the recent evidence that geographical mismatch is negligible in the US (see e.g. Sahin et al. (2014); Marinescu and Rathelot (2014); Nenov (2014)).

Although a spatial equilibrium model with genuine unemployment has for long been missing, some papers have recently partly filled the gap. Leaving aside the literature where regions are so close that commuting is an alternative to relocation, the literature about regional unemployment differentials can be divided in two groups according to the type of search: either one needs to move before starting to seek a job in the region of residence or one can search all over the country and then move if needed.

In the first case, some papers extend the island model of Lucas and Prescott (1974) whose economy is populated by a large number of segmented perfectly competitive labor markets where only labor is mobile (workers being allowed to visit only one island per period). Lkhagvasuren (2012) adds search-matching frictions as well as match-location specific productivity shocks in an otherwise standard islands model to reproduce the volatility of unemployment rates in the US. Focusing also on one (small) region out of many, Wrede (forthcoming) studies the relationships between wages, rents, unemployment and the quality of life in a dynamic framework. He assumes a standard search-matching framework and analyzes how regional amenities affect unemployment and the quality of life. Beaudry et al. (2014) introduce search-matching frictions in a spatial equilibrium setting with wage bargaining, free mobility of jobs, a very stylized housing market, and amenities with congestion externalities. In their paper, with some exogenous probability, the jobless population gets the opportunity to move to another city in order to seek jobs, while we let agents choose between two strategies: regional and national search. Furthermore, Beaudry et al. (2014) do not look at efficiency while we do. Kline and Moretti (2013) develop a matching model to characterize the optimal (fixed) hiring cost and to look at the rationale for place-based hiring subsidies. Finally, Kline and Moretti (2014) provide a two-region model in which workers have idiosyncratic preferences for a region and are mobile. They use the model for policy purposes, namely to show that place-based policies are not always welfare improving for the whole country. This is due to the fact that taxes generate a deadweight loss.

Second, some recent papers assume that workers can seek a job in the whole country. In a setting with many regions, Amior (2012) studies wages' responses to a housing shock in the presence of skill heterogeneity. He assumes national search in a search-matching framework as well as a random migration cost. Domingues Dos Santos (2011) builds a search-matching dynamic framework with two regions that are each considered as a line. She finds that increasing search effectiveness is beneficial for unemployment rates in both regions. However, she keeps wages exogenous. Using a search-matching dynamic framework with national search and endogenous wages, Antoun (2010) assumes two types of agents who differ in their preference for a region. He finds that a positive productivity shock in one region decreases unemployment locally but raises it in the other region. We extend these models by endogenizing the choice between regional and national search under wage bargaining.[4] Contrary to these papers, we also develop a normative analysis by looking at efficiency. However, we keep our framework static while they all assume a dynamic setting.

In the new economic geography literature, Epifani and Gancia (2005) analyze the simultaneous emergence of both agglomeration economies and unemployment rate differentials. For this purpose, they build a dynamic two-sector two-region model with transport costs and search-

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[4] Molho (2001) develops a partial equilibrium job-search framework with both types of search. Manning and Petrongolo (2011) build a partial equilibrium framework where job-seekers choose their search field. See also Marinescu and Rathelot (2014). We share a common interest with these papers in a general equilibrium model with endogenous wages and vacancies.