Theories of Job Loss, Job Finding and Vacancies in the Cross-Section of Locations: A Response to Kuhn et al. (2021)

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Abstract

This note clarifies which theories of unemployment, job loss, job finding and vacancy creation are consistent with recently documented empirical patterns in the cross-section of locations. This note compares models of firm sorting to traditional approaches that abstract from firms' location decisions. In doing so, this note also addresses some misconceptions that appear in recent literature.

Introduction

A well-documented empirical regularity is the prevalence of large unemployment rate differences across locations (Kline and Moretti, 2013). Understanding their causes and consequences is critical to shed light on their possible welfare implications and potential policy responses. Bilal (2021) proposes three additions to the literature. First, Bilal (2021) documents that the unemployment rate is high in some cities because workers repeatedly lose their jobs there, rather than because they struggle to find a job. Second, Bilal (2021) demonstrates that job loss differences across locations primarily reflect firm heterogeneity rather than worker heterogeneity. Third, Bilal (2021) provides a spatial search model with endogenous separations nested inside a firm location model to (a) account for observed differences in job losing rates and flat job finding rates across locations, and (b) examine the welfare implications of place-based policies.

In subsequent work, Kuhn et al. (2021) have argued in favor of a different model to rationalize cross-sectional patterns of vacancies. The main argument in Kuhn et al. (2021) is that the model in Bilal (2021) is inconsistent with a new fact they document: locations with higher unemployment have slacker labor markets and high vacancy-filling rates. This note discusses the concerns in Kuhn et al. (2021) and argues that they are unwarranted, for two reasons. First, the model in Bilal (2021) is in fact consistent with cross-sectional vacancy patterns. Second, the main model used in Kuhn et al. (2021) turns out to be nested by the model in Bilal (2021).

The model in Bilal (2021)

At the heart of the model in Bilal (2021) is a version of the canonical Diamond Mortensen Pissarides search model—henceforth DMP. Within every location, workers and firms meet in a frictional labor market as in the DMP model. The textbook DMP model is augmented with idiosyncratic productivity shocks as in Mortensen and Pissarides (1994) so as to generate endogenous separations.[1] This DMP structure with endogenous separations is further nested into a spatial context as in Rosen (1979) and Roback (1982). The resulting environment is then similar to Kline and Moretti (2013), but with endogenous separations.

Bilal (2021) enriches this environment with an additional block. In line with the observation that firms are responsible for most of local job loss differences in the data, the paper introduces a location decision for heterogeneous firms. Local productivity then splits into a truly local and exogenous component (e.g. strong institutions or a particularly well-connected location on historical trade routes) and into an endogenous component that depends on the location decision of firms.[2]

There are then two separate questions testing whether this theory speaks to spatial unemployment differentials. First, *given* combined productivity differentials (exogenous and endogenous), does the model rationalize large job losing rate differences across places while maintaining a flat job finding rate? This question can be answered without thinking about sorting and simply taking combined productivity differentials as given. Focusing on this question is interesting, but it remains silent regarding the economic forces behind the emergence of the productivity differentials necessary to cross-sectional unemployment patterns.

The second part asks what economic forces generate *equilibrium sorting patterns* that are consistent with the combined productivity differentials that it takes to rationalize cross-sectional unemployment patterns? This question is specifically about the sorting block.

The model in Bilal (2021) proposes answers to both questions. First, to rationalize large job losing rate differences across cities, one needs non-trivial combined productivity differences across locations. Through the lens of the DMP model with endogenous separations, productivity differences translate into job losing rate differences. Second, the basic economic forces driving sorting in this model deliver equilibrium sorting patterns that rationalize combined productivity differences necessary to generate enough variation in job losing rates. Quantitatively, the model closely accounts for the large variation in unemployment and job losing rates and the much smaller variation in job finding rates (Figure 8 p. 38).

Second, what forces drive the sorting of firms in the model to generate these combined productivity differentials? When firms contemplate opening jobs in a particular location, they face three basic forces. The first force is a standard production complementarity between firms and locations.[3] *All else equal*, more productive firms prefer locating in productive places because of this basic production complementarity.

The second force is unique to the setup with labor market frictions. Labor market frictions imply

[1] Relative to Mortensen and Pissarides (1994), Bilal (2021) also introduces persistent rather than i.i.d. productivity shocks to match the tenure profile of separations.

[2] In the quantitative version of the model, a large fraction of exogenous local productivity differences are then microfounded through the human capital of local residents. From the perspective of firms, human capital is taken as given.

[3] The model is set up following a large literature that studies the location decision of firms (see e.g. Gaubert, 2018).

that firms must wait before filling open positions ("vacancies") and start production. More productive firms generate more output and higher profits on average. Thus, they have more to lose from waiting a longer time until they match with a worker and start producing. *All else equal*, more productive firms prefer locating in places with faster vacancy filling rates, i.e. places with slacker labor markets. This *labor market pooling complementarity* does not arise by assumption. Rather, it simply comes out of a standard location decision formulation.

The third force is simply the cost the cost of labor conditional on hiring a worker. All firms prefer places where labor is cheap. The productive and labor market pooling complementarities act a single-crossing conditions to drive the sorting, and wages adjust to sustain the sorting.

This theory has sharp predictions for the sorting of firms by exogenous local productivity. More productive firms locate in high-productivity locations (Proposition 1 p. 16), leading to large job losing rate differences across locations (Proposition 2 p. 19). However, implications for job finding rates and vacancies are ambiguous in general.

On its own, the labor market pooling complementarity has subtle and perhaps surprising implications for cross-sectional patterns of unemployment and vacancies. Consider the very special case *without any exogenous local productivity differences*. In this special case, the pooling complementarity is the only force driving sorting. The economy enters a coordination equilibrium in which productive firms locate in high vacancy-filling rate locations where the wage is high. Thus, the job losing rate is high where there are many vacancies per unemployed job seeker (Corollary 1 p. 20). This prediction *in this special case* of the model suggests that locations with high unemployment rates can have relatively more vacancies, low labor market tightness, high job finding rates, low vacancy filling rates.

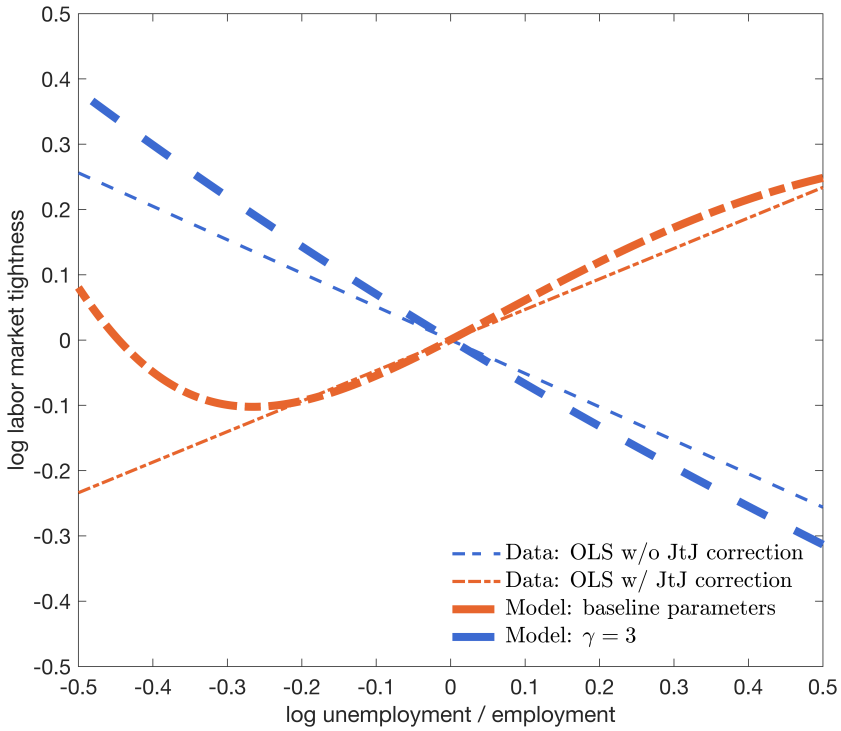
Discussion of the concerns in Kuhn et al. (2021)

Kuhn et al. (2021) use this conclusion from this special case of the model in Bilal (2021) to build their main criticism. They argue that, in the data, high unemployment locations have few vacancies per unemployed worker and high vacancy filling rates. Thus, they claim that the model in Bilal (2021) is inconsistent with the cross-sectional vacancy patterns in the data.

This conclusion does not hold up to close scrutiny, however. This conclusion arises only a very special case of the model in Bilal (2021). This special case assumes away *any exogenous local productivity differences*.

However, the main model in Bilal (2021) covered under Propositions 1, 2, 3, 4, 5, 6 and 7 pp. 16, 19, 20, 26, 27, 31, 34 features exogenous local productivity differences that drive the sorting of firms. *Once exogenous local productivity differences are brought back*, the sorting patterns are more complex and there is no clear predictions for vacancies. Even with exogenous local productivity differences, the pooling complementarity pulls productive firms towards high vacancy-filling rate locations *conditional on local productivity*. But *unconditionally*, any cross-sectional pattern for vacancies can arise. Depending on parameter values, the model can generate any correlation between vacancies, labor market tightness,

Figure 1: Labor market tightness against unemployment-to-employment ratios in the model in Bilal (2021) and in the data.



Note: Figure 1 plots the log of labor market tightnessat baseline parameters and when setting $\gamma = 3$ in the model in Bilal (2021). It also plots regression lines from regressing labor market tightness onto the log unemployment-to-employment rate in French data, consistely with Figure 6 in Bilal (2021). Figure 1 reports the regression lines with and without the job-to-job correction in the data.

vacancy filling rates, and unemployment. These observations are discussed in detail in Section 2.6. in Bilal (2021). To add empirical ambiguity to theoretical ambiguity, Bilal (2021) shows in Figure 6 that the sign of the correlation between tightness and unemployment crucially depends on adjusting for job-to-job moves in the data.

Consistently with this ambiguity, Figure 1 displays the co-movement between labor market tightness and unemployment in the model in Bilal (2021). Figure 1 reveals that the co-movement between labor market tightness and unemployment can indeed take any sign depending on parameter values. At baseline estimates, this co-movement is positive and consistent with the correlation between unemployment and tightness after adjusting for job-to-job search. When making recruiting costs more elastic and setting $\gamma = 3$, the co-movement is negative and consistent with the correlation between unemployment and tightness without the job-to-job adjustment.

Thus, Figure 1 confirms that the model in Bilal (2021) can indeed generate any correlation between vacancies, labor market tightness, vacancy filling rates, and unemployment. Hence, the main criticism in Kuhn et al. (2021) is not warranted.

There is an additional difficulty with the arguments in Kuhn et al. (2021). Kuhn et al. (2021) suggest that they propose an alternative theory to Bilal (2021) to rationalize the data. Yet, a close comparison

of both models reveals that their model is essentially nested by Bilal (2021). Just as Bilal (2021), they propose a DMP model with endogenous separations nested into a Rosen-Roback spatial setting. The main difference is that they assume fully exogenous productivity differences across locations, while Bilal (2021) microfounds them through firm sorting.[4] But *conditional on combined local productivity*, both models should generate close predictions for cross-sectional unemployment and vacancy patterns.

Thus, the arguments in Kuhn et al. (2021) suggest that they dismiss Bilal (2021)'s model on the basis of a model that turns out to be a subset of Bilal (2021)'s model. Such a criticism does not hold up to close scrutiny.

Beyond the discussion around cross-sectional vacancy patterns however, the second part of Kuhn et al. (2021) proposes a novel addition to the basic model in Bilal (2021). Kuhn et al. (2021) add job-to-job search to match both cross-sectional patterns and business cycle dynamics. This extension opens up promising avenues for future research to study how aggregate shocks transmit to local labor markets.

References

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[4] Kuhn et al. (2021) abstract from land prices, endogenous cost of living, amenities, human capital, migration frictions. Bilal (2021) shows that these features are important to match the joint distribution of wages, population, unemployment, job losing and job finding rates and generate empirically plausible migration responses to policy counterfactuals. In the second part of Kuhn et al. (2021), they incorporate job-to-job search to also match business cycle dynamics, not in relation to cross-sectional vacancy patterns.