

Reply to Referee Report 3

First of all, I would like to thank the Referee for pointing many important details that can improve the overall quality of the paper. I answer each of the comments below in a chronological order. The Referee's remarks are written in italics and smaller fonts.

Comment:

1. 1st paragraph, page 1: "Although there has been a heated debate regarding unemployment and an active labor market policy, the LTU problem has been much less emphasized". I strongly disagree. The empirical labor economics literature has extensively studied for decades the issue of negative unemployment duration dependence. See, among many others, Machin and Manning (1999), Cockx and Dejemeppe (2005) and Kroft et al. (2013) and references within.

Response:

In the cited sentence, I tried to point to the fact (maybe not precisely enough) that the LTU problem is not sufficiently stressed in the literature concerning ALMP evaluation directly. I am aware that there are several papers in a way dealing with LTU. However, the studies which evaluate labor market programs for LTU, with the search models in particular, are rare. To my knowledge, Acemoglu (1995) was the first who investigated LTU and public policy connections in equilibrium search model. Ljungqvist and Sargent (1998) or Birk (2001) brought to light the issue of the European environment in a search model with technical change. Among the more recent works I could only mention the partial equilibrium search model by Tatsiramos and van Ours (2012). However, they raise the LTU problem briefly by the way of unemployment insurance design. Papers joining ABM approach with LTU and ALMP evaluation within the search theory framework do not exist (to my knowledge).

Comment:

2. 2nd paragraph, page 1. The author could do a better work in explaining why there could be negative duration dependence and in mentioning the many empirical studies that tried to explain it in terms of bad signaling, human capital depreciation, and financial constraints. With regards to the latter, financial constraints might play a big role in determining job search intensity and, thereby, the job finding rate: when financial constraints become binding, the unemployed could increase search effort. This issue is related to institutions and to the expiration of unemployment benefits. It is often found that at the expiration of the unemployment benefits, the unemployment exit rate shows a spike and that a reduction in the generosity and in the extension of unemployment benefits increases the job finding a rate (see. e.g. van Ours and Vodopivec, 2006).

Response:

Thank you for emphasizing an important aspect of the labor market policy. As it has been noticed, the paper could include a broader explanation of the issue of the negative duration dependence. In fact, expiration of unemployment benefits may result in a spike in unemployment exit rate. It is probably a result of less selective search behavior of unemployed who face the loss of income (Caliendo et al. (2009)). One of the consequences may be the reduction of match quality e.g. the job-seeker starts a less paid job or agrees to work on worse position which in turn might imply a decrease in employment duration. Nevertheless, the main objective of the discussed paper is an evaluation of labor market programs with

the agent-based search model. I mention here the results obtained with agent-based search model regarding unemployment benefits. The model proves that unemployment benefits may induce the unemployment duration among non-LTU job seekers but may reduce the LTU unemployment duration. It extends the results obtained by Caliendo et al. (2009) (with different methodology).

Comment:

3. 2nd paragraph, page 2. When introducing the issue of ALPMs and unemployment persistence, the author should include a couple of sentences on the main findings in the empirical literature, for instance by referring to Card et al. (2010) and Kluge (2010).

Response:

Although the paragraph already features some key findings, the considerations may be extended with no less vital issues. Even the fact that effectiveness of ALMP depends on time: some programs seem to have negative employment effect in short time, but in a longer perspective, the effect may be considered positive, as reported in Card et al. (2015).

Comment:

4. 2nd paragraph, page 2: "The paper presented here tries [...] was developed based on Agent-Based Modeling (ABM)." The authors should do a better job in clarifying the contribution of his approach to the understanding of the effectiveness of ALPMs on job finding rates. He should briefly discuss what the advantages, and eventually, disadvantages, are of this study compared to the existing literature. In particular, he should establish a comparison to the empirical program evaluation literature that so far has tried to identify the causal impact of different programs on the performance in the labour market of the unemployed. Then, in Section 2, the author should discuss this issue more in detail, clarifying why and when an approach based on an ABM could be useful and more reliable than empirical evaluation studies.

Response:

The similar issue was raised by the first Referee and I addressed it in the first reply to the Referee's Report 1 as follows: 'developed agent-based model includes jobs from various sectors of the economy and of different skill demands. I model three sectors and five skill levels, which implies 15 categories of job vacancies. Each vacancy is characterized by different wage, production level, and cost. I also model unemployed who differ in the duration of unemployment, job preferences, skill levels as well as productivity, wage requirements, and benefits. We can then observe the impact of the parameters not only within the sectors of the economy but also within the skill levels. The spatial aspect of the simulation is also important. Agents plan moves on the grid according to their resources as well as information gathered from the local labor market. Then they move and update the information for the next turn. Finally, agents have memory, for instance, they make lists of firms they have visited, remember the wage they earned in the previous jobs, agents adapt to the labor market situation and can change their preferences. Their memory influences their future decisions and shapes the local labor market as a whole. The described system is, for obvious reasons, beyond reach of the classic models.'

It is worth mentioning that the paper joins labor market policies, strong agents' heterogeneity and on-the-job search in an artificial society, where the direct influence and policy side-effects are diagnosed and measured.

I am aware of the necessity of establishing the clear link between existing literature and the paper. I placed the paper among the studies it relies on the most (table 1, p.5). Nevertheless, taking into account Readers' and Referees' comments, a reformulation in the introduction and literature review section is needed.

Comment:

5. 4th paragraph, page 3: "It is easy to notice [...] in the field of labor economics. I cannot see it so easily. The author should explain in detail the advantages of an ABM evaluation of the policy over other methods. For instance, why your evaluation approach should provide advantages over reduced form estimates exploiting natural or quasi-natural experiments?"

Response:

The comment was mostly answered in the previous response – I agree that putting more stress on the advantages of ABM is vital. With regards to the last issue raised in the comment, the natural experiment is a well-founded and proven way of evaluation. However, agent-based approach has some significant strengths as well: 1) ABM possibly reduces the budget of the experiment; 2) much less time is needed to obtain the results; 3) the experiments can be repeated as many times as we want to; 4) experimental framework can be simply and easily modified; 5) the system is completely isolated from other potential causes of change; 6) different values for the parameters can be tested if needed (Duffy 2006).

Comment:

6. 2nd paragraph, page 5. Author's job placement agencies seem share some features with those of temporary help agencies. As a matter of fact, the business of temporary help agencies consists in matching workers with vacancies and, in order to do it, they provide the unemployed with counselling and human capital, sometimes also general human capital by paying college tuition fees (Autor, 2001). A difference is that temporary help agencies are paid for their services partly by the worker and partly by the firm. I wonder to what extent this study and its findings can be also discussed in light of the role played by temporary help agencies.

Response:

In the comment, the Referee raised the wider issue, namely the institutional structure of employment services. In fact, job placement agencies share some features with temporary help agencies. However, my focus was on Public Employment Service. Commercial agencies also use job-sharing and counseling methods, but the financial aspect plays an important role in the matching process. In that case, the commercial agencies should have their own value functions because, similarly to job-seekers and firms, they must profit from a match (see Baudy, Cords 2016). Summing up, I would be careful in making generalizations to commercial institutions in that case.

Comment:

7. 3rd paragraph, page 7. I cannot understand the reason of imposing a sudden worsening of the job finding rate for workers who turn LTU. This is arbitrary and going to generate a sudden decrease in the job finding rate at 12 months of unemployment duration that might not exist in reality. Actually, in many countries at the end of the 12th month of unemployment, unemployment benefits expire, generating an increase in the job finding rate.

Response:

The workers who are considered long-term unemployed draw search units from a distribution with lower upper boundary, but the **productive** worker-job match depends also on the value functions. It is the reason why the individual probability of an effective (productive) match decreases gradually every period, not suddenly after 12 months of unemployment.

It must be reminded that the match is consumed only if job seeker meets the proper vacancy **and if the matching surplus is positive for the firm and worker** (Eq. 8 and 9). Consequently, surplus depends directly on the value functions and individual productivity of the worker. That is why the surplus of the firm from employing representative agent decreases every period as the individual productivity of the agent also decreases. Thus we can say about a regression rather than the sudden decrease in the number of the effective matches. Another point is the job-seekers draw search units at random and it is possible that non-LTU draw fewer search units than LTU. However, on average, LTU should dispose fewer search units, which is consistent with the labor market search theory.

Comment:

8. Last paragraph of page 7. Why is the number of randomly vacant jobs always strictly positive (1, 2, or 3) and never 0. In reality, firms could decide not to open any vacancy. Can your model be modified to incorporate also 0 vacancies?

Response:

During the first period of simulation, each company randomly chooses the number of vacancies from a strictly positive vector [1,2,3]. Then the number of vacancies becomes endogenous. Companies can create or destroy vacancies according to the eq. 12 and shock frequency λ . If it is not profitable to hire a worker, a company can dispose of all the vacancies and do not open any vacant jobs. As a result the model incorporates 0 vacancies.

Comment:

9. Middle of page 8: "I assume, conventionally, that the matching [...] degree 1." If it is conventionally assumed, then supporting citations are needed here.

Response:

The supporting citations will be added. The referred assumptions are made in several significant papers (e.g. Petrolongo, Pissardiess 2001; Mortensen, Nagypal 2007).

Comment:

10. Beginning of page 9, second item of the bullet point. This is the main problem of mine with this paper. This paper is aimed at evaluating the effect of ALPMs on job finding rates. However, the author imposes that ALPMs are effective ("he or she receives a few extra search units"). Why should I expect a negative or null effect of ALPMs on outcome variables if the author imposes a positive effect. Moreover, in real life, it is not so obvious that all the ALMPs generate an increase in "search units".

Response:

I agree that it is not so obvious that in real life ALMPs generate an increase in the search effort. However, I point to three main issues which support the derivations included in the paper.

First of all, the model is based on search theory, which assumes the connection between the programs for unemployed and search intensity – however the model is very flexible in that case. Notice the total search units of job-seeker consist of two values: some random number + potential ALMP bonus (if ALMP participants). As the former is drawn randomly **not always ALMP participants have more search units than nonparticipants**. We can imagine the situation that nonparticipant draws 10 search units, while participant draws 1 search unit + 3 bonus units = 4 search units. However, on average, ALMP participants own more search units.

What is more, I will quote a part of the reply to the Referee Report 1: 'Although ALMP may provide extra search units, the positive total effect is not so obvious. Consider the paper by Cahuc and Barbanchon (2008), who assume constant search advantage of counseled job seekers in their search model. They prove that enhances search intensity **may indeed induce unemployment**. In chapter V Pissarides (2000) suggests that if search intensity increases, the vacancies/unemployment ratio increases but the probability of vacancy – worker match decreases. As a result, there are two potential compensating effects of the policies that improve search intensity. The impact of such policy depends on model specification and calibration. It should also be kept in mind that search intensity is only one of 16 parameters that influence the economy and positive/negative interactions or compensating effects must be taken into account. In fact, as shown in figure 11, cross effects are the majority of the total impact of ALMP parameters'.

Moreover, **the side-effects of the active labor market policies** are also studied in the paper. Based on the simulation results, we can state that ALMPs enhancing search effectiveness may prolong the duration of unemployment of nonparticipating job-seekers. I have also discovered that ALMPs affect skills demand distribution, boost worker turnover and induce wage growth. Thus, **the overall model response is much more complicated than a simple increase in match probability** of ALMPs participants.

Comment:

11. Equations (2) and (3). The author is implicitly assuming that the agents do not discount the future. See Equation (2) in Rogerson, Shimer and Wright (2005) and the presence of the discount factor β . Why does the author impose this assumption that is never present in the job search and matching literature. Is it supported by empirical evidence?

Response:

The remark is equivalent to the second comment of the first Referee. I emphasize the fact that the Bellman equations in the paper were written for a given time t and we do not need to discount them with an additional variable (e.g. Smith and Zenou 2003). The value function is computed at a given period t on the basis of present and future gain probabilities according to implemented behavioral routine. Nevertheless, as the Referee has pointed that formula may be unclear. I consider rewriting the Bellman equations into more common continuous-time form as presented in e.g. Dolado and Jansen (2009).

Comment:

12. The author should be much more careful in spelling correctly the authors of the cited references (e.g. it is Shimer and not Shimmer), in reporting all the references in alphabetical order, and in reporting all the cited references in the References section (many cited papers are not reported in the References section).

Response:

All mistakes in the references are mine. I will put much more attention to the citations in the potential revised version of the paper.

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