Reply to Referee 2 report on "When unionisation is profitable for firms in network industries" MS number 2103

We thank the referee for comments, remarks and suggestions to the Discussion Paper version of our work. In what follows, we present our purposes to improve the points the referee has raised (in italics).

1) I found the paper relatively hard to read. It was not made sufficiently clear what the objective of the analysis is and how the authors proceed to establish their main findings. More specifically, Section 2 shows that collective bargaining may be beneficial for firms. Section 3 then considers the question of whether a monopolist deters entry by accepting collective negotiations or not. The link between the two topics should be developed much more succinctly. Moreover, the figures are not easily understandable and the derivation of Result 5 is rather tedious to follow. All in all, I found the analysis too technical. The reader would like to learn more about the economic intuition underlying the results. Please also note that the manuscript is full of awkward or incorrect expressions. Therefore, it urgently needs to be edited in terms of language.

We thank the referee for highlighting the point. We are ready to revise the overall exposition of the paper to make it more reader-friendly. The link between Section 2, that shows the benefits of collective bargaining for firms and Section 3 that considers the question of whether a monopolist deters entry by accepting collective negotiations can be shortened. We acknowledge that the proof of Result 5 is rather mechanical. This is due to the fact that it describes in detail the application of an algorithm; however, an effort could be done to avoid unnecessary repetitions. We can also provide more economic intuitions to our (technical) results.

2) The authors solve the models for the case of efficient bargaining. Why don't they also consider wage bargaining? Can such a model not be solved? Are results different?

Besides some empirical evidence for the adoption of the Efficient Bargaining, our suspicion is that the combined effect of employment negotiations and network effects on output and price can drive a large part of the paper findings while, in a wage bargaining model, lower output levels may not guarantee identical results. However, a check is definitely call for. We thank the Referee for suggestion.

3) The main modelling features of the framework which distinguish the analysis from other contributions are that the weights of wages and employment in the union's utility function differ and that there are network effects on the output market. When providing intuition for the results, these two aspects only play a minor role. More generally, one would like to learn more about the mechanisms which determine the findings.

We thank the referee for just observation. In particular, we acknowledge that more emphasis should be put on the role of network externalities to clarify our main results.

4) On page 11 it is stated:

"Rather paradoxical it is the result that an incumbent may strategically recognize the presence of a union in the company to ensure a monopoly industry."

I find this assertion somewhat puzzling because unionisation appears to be tantamount to raising rivals costs in order to deter entry, given the assumption of 'committed bargaining'. Such an argument appears to be well established in the literature. Moreover, the literature on raising rivals costs is not referred to.

We thank the Referee for signalling this gap. In an eventual revision, we are ready to integrate the literature review with a digression on the main contributions on the raising rivals costs.

5) The description of the entry game in Section 3 is relatively hard to follow. Furthermore, Figure 2 does not seem to match the verbal descriptions since it does not depict 'committed bargaining'. In addition, I was not sure what the relevance of Section 2.2 is, given that its results do not appear to be utilised for the analysis conducted in Section 3.

We recognize that that there is a discrepancy between the description of the timing of the game in the main text and Figure 2. It is our intention 1) to provide the main text with a more detailed and precise description of the structure of the entry game and 2) to replace Figure 2 with a proper one which perfectly match the description in the text.
Section 2.2 is relevant only for the analysis of the equilibria when duopoly is the given market structure in which firms simultaneously decide whether to be unionized, without considering the situation (described in Section 3) where a firm is incumbent, therefore acting first.

6) A central modelling assumption is that the firm can decide whether to be unionised or not. Given that workers benefit from unionisation, this assumption is tantamount to the idea that the firm can avoid unionisation. This appears to be costless in the present set-up. How can this feature be rationalised?

This point that requires a better justification which will be provided in an eventual revision However, following Vannini-Bughin, we analyse the decision by firms under Cournot oligopoly to recognize unions or, in other words, if firms have incentives to accept to negotiate with unions as a way to increase market power (in the limit, studying the case in which, if a firm-specific union does not exists, it will be convenient for the firm to decide to create unilaterally a “ghost” one). Therefore, if not to recognize or refuse negotiations have some costs such as strikes, sabotage etc. (as the referee points out), then, even more so, the key-result that we stress arises, that it is profit enhancing to bargain with the union. We are grateful to the Referee for suggesting an extended model with cost related to strikes, sabotage etc.

7) The first and second paragraph in the introduction do not really introduce the topic and seem to be almost superfluous.

The Referee is right. Definitely, it can be shortened in a couple of lines.

8) Some of the findings in the present submission are similar to or at least related to the results contained in the 2016 paper of the authors in Italian Economic Journal. It would be desirable to relate the current submission more thoroughly to the earlier paper.

We thank the Referee for the observation. A discussion of the current results with those in the “companion” paper is required.

9) In Section 2.1 the outcome for the case of bilateral efficient bargaining is developed. I was wondering why the employment outcome is not strongly efficient in the sense of Layard and Nickell (QJE 1990), given a linear production technology. It does not appear to be solely due to network effects. It could help to understand the findings if a relationship (or distinction) could be established.

We are ready to carried out a deeper investigation on this point. We thank the Referee for suggestion.

10) Result 5: Why is there a statement about unionisation but not about non-unionisation in the absence of network externalities, while this is different for strong network effects?

We may provide the result with a better exposition of Result 5. We can also provide an intuition of this finding in the main text. We are grateful to the Referee for pointing out this issue.

11) On page 2 it says: "... it is also the Pareto-efficient outcome from the firms standpoint." What is meant by this statement? How can an outcome be Pareto-efficient from the vantage point of one (type of) agent?

We thank the Referee for signaling the point. We are going to revise and amend the above-mentioned sentence.

12) Figure 1: Are the red and blue lines the same in part c)? I do not understand the last sentence below the figure stating that EB > PM.

The red and blue lines are the same in all parts of Figure 1. However, we have found some typo mistakes in the legend of Figure 1 that lead to a misleading interpretation of the different boxes. We are ready to amend all typos.

Minor comments

● *I believe that PM is not defined prior to its first use on page 4.*

We thank the Referee for signaling the point. We are going to amend it.

● *The notation in Section 2.4 (profits) is not consistent with the notation of the other (sub-) sections.*

This problem has been recognized also by another Referee. We are going to use an uniform notation all over the paper in a revision.

● *Page 8, top: The description suggests that collective bargaining does not take place simultaneously in the two firms. However, the calculations are not consistent with this.*

The description in Section 3.1 needs a clarification because, as written right now, is misleading. We are grateful to the Referee for pointing out the issue.

● *Result 3 seems to follow directly from Result 2, or to be almost the same.*

Also the claim of Result 3 needs a better exposition and to be clarified in the context. An explanation of the difference with respect to Result 2 to be mentioned in the main text is required.

● *It may be obvious, but I was wondering whether monopoly profits without collective bargaining are always higher than duopoly profits, given the network externality and assuming the same manner of wage and employment determination. Only if this is the case Lemma 2 seems to be sufficient to establish Result 4.*

In an eventual revision, we are going to change Result 4 in a (more proper) Lemma, given that the current Result 4 simply ranks the firms' payoffs in each area of the relevant parameter set. Nonetheless, a full picture of the payoff structure is rather useful for analytical purposes (at least, from the authors' standpoint).

We conclude this note with our best regards to the Referee, thanking her/him once again for her/his valuable comments and suggestions that, included in an eventual revision, will significantly improve the quality of this work.