Reply to Referee Report 2:

We are grateful for the very painstaking report in providing us with very valuable suggestions and comments. These have enabled us to think of some fundamental issues which can help us extend the current research into the future. We will take into account the suggestions and comments in a revised version of this paper. We replicate the second referees’ points using ordinary font, and show our responses in italics.

1. As far as the Introduction in concerned, the literature review could be improved, for instance see Hamada (2012), "Uncertainty and Horizontal mergers", Journal of Institutional and Theoretical Economics, 168, 252-265 and compare your results with it. This paper considers a homogeneous good Cournot oligopoly and argues that even if there is neither an expected efficiency gain nor an informational advantage under private information, the increased uncertainty itself can urge firms to merge. This is due to the fact that the ex post ability of the merged firm to adjust its production level raises its expected profit. Also, as uncertainty grows, the post-merger expected consumer surplus and social welfare exceed their pre merger values.

   We agree with the referee and we must introduce in the paper a comparison of our results with those of Hamada (2012). Hamada considers a Cournot oligopoly model with homogeneous in a context of cost uncertainty but he does not introduce the role of the distribution of roles in the industry between leaders and followers. He shows that increased uncertainty itself can urge firms to merge. Our model can be viewed as a reassessment of the model developed by Hamada (2012) by investigating to what extent the introduction of asymmetric information among followers may alter the effect of uncertainty on the incentive to merge. Similarly Hamada (2012) shows that the post-merger expected consumer surplus and social welfare exceed their premerger values. Our model shows that this positive effect of increased uncertainty on consumer surplus and on social welfare depends on the merger scenario (two-leaders merger, two-followers merger or leader-follower merger).

   Our results should also be compared to those of Cuna, Sarmento and Vasconcelos (2014). They consider the role of uncertainty in horizontal merger games where leaders compete with followers. But in contrast to our model, they consider that the uncertainty on the production cost of the merged entity affects all players in the game, including insiders which remain uniformed on the true value of the production cost in the post merger game. Consequently, their model does not capture the impact of information asymmetries between firms. This last point is the main characteristic of our model.

2. At page 3, end of third paragraph, the description of the results about the private profitability of merger should be improved, I find them not very clear.
3. In the model, the second paragraph at page 6 is the same as the one at page 3. I would drop the comparison with Amir et al. and clearly describe the four scenarios you are going to analyse. Also you should motivate case C and case D: why, for instance, two merging followers should result in a leader?

Thank you for pointing out the problem of improper organization of the paragraph. In addition to actions considered above, we will try to better explain the foundations of the four scenarios mergers considered, in particular, case C and case D. The case C is also considered by Daughety (1990) who shows that in a deterministic environment, leader-generating mergers can be both privately and socially desirable.

4. You consider an industry with at least three leaders and three followers, why? For instance, what if \( m = 2 \)?

We exclude from the analysis the case \( m = 2 \) because we want to keep the presence of at least one outsider among leaders in a scenario where two leaders decide to merge. This condition necessarily implies that \( m \geq 3 \).

5. In Section 2.2 you analyse in turn the different merger scenarios A, B, C and D. The notation is quite intuitive, however, you should mention, at least in the first scenario, that superscript A refers to case A (and accordingly for the other cases). For instance at page 7 when you first introduce \( q_{l}^{1A} \).

The following sentence will be put into the revised version.

"Let \( q_{ij}^{j} \) represent firm’s output, the superscript \( j = [l, f] \) stands for the firm’s role (leader or follower), and the superscript \( i = [A, B, C, D] \) corresponds to one of the four possible cases; the subscript \( t = [I, O] \) signifies the firm’s status (Insider or Outsider). For instance, consider \( q_{l}^{1A} \) as the merged firm’s quantity and \( q_{O}^{1A} \) as outsider-leader firm’s output in the case A."

6. In the merger analysis (Section 3) I find confusing the subsections’ titles. In particular, subsection 3.2 is named "Profitability of merger" that at first glance seems to mean the same as "Private incentive to merge" (title of Subsection 3.1). For instance, you could name subsection 3.2 "Ex-post profitability of merger".

You are right that "Ex-post profitability of merger" is better than the previous name
of subsection 3.2. We agree to modify the title of the subsection 3 which is not currently chosen correctly. In the text, when we evaluate the profitability of mergers on the basis of the actual production cost of the merged entity, we refer to the ex-post profitability of merger.

7. I would like the relevant thresholds to be defined in the text rather than in the Tables. E.g., \( \sigma^2_{\pi_A}, \sigma^2_{\pi_B} \) in Table 4.

   In a revised version of the paper, we will define in the text the expressions of \( \sigma^2_{\pi_A} \) and \( \sigma^2_{\pi_B} \).

8. You study the private profitability of the merger for the insiders, can you say something about the profitability of the outsiders?

   The ex ante profitability of mergers for the outsiders is expressed in the following table.

<table>
<thead>
<tr>
<th>Merger Scenario</th>
<th>Outsider-Leaders</th>
<th>Outsider-Followers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A</td>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td>Case B</td>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td></td>
<td>if ((a-c)) sufficiently large(^a)</td>
<td>if ((a-c)) sufficiently large</td>
</tr>
<tr>
<td>Case C</td>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td></td>
<td>under some conditions(^b)</td>
<td>under some conditions(^c)</td>
</tr>
<tr>
<td>Case D</td>
<td>Increase</td>
<td>Increase</td>
</tr>
</tbody>
</table>

\(^a\) \((a-c) > (n-m)(n-m+1)(m+1)\)
\(^b\) \((n = 6 \land m = 3) \lor (6 < n < \frac{68}{9} \land 3 \leq m \leq n-3) \lor (n \geq \frac{68}{9} \land \frac{1}{3} \sqrt{4n^2 + 12n + 1} + \frac{1}{3}(2n-9) < m \leq n-3)\)
\(^c\) \((n = 6 \land m = 3) \lor (6 < n < 12 \land 3 \leq m \leq n-3) \lor (n \geq 12 \land \frac{n-3}{3} < m \leq n-3)\)

Table 1: Ex ante profitability of mergers for the outsiders

In general, the outsiders benefit more from the merger because of free-ride effect, compared to the insider. This result can be changed because of the uncertainty cost effect, in particular, in the cases where two followers take part in the merger.

9. Propositions and Lemmas should be written in a better way and be consistent with each other. For instance Proposition 3, in the first part you refer to mergers between leaders and in the second part you refer to case B. Either you refer to the cases or you explicitly describe the type of merger you talk about (this comment holds for all
For the statements to be more readable and self-contained I would opt for explicitly describing the type of merger.

Following your comment, we will improve the Propositions and Lemmas one by one.

**Proposition 1**

i). When there is role redistribution, the merging firms always have incentives to merge, irrespective of cost uncertainty. ii). The merger without role redistribution can be accepted by merging parties, if the cost uncertainty is sufficiently large, i.e., if \( \sigma^2 \geq \min(\sigma^2_{A}, \sigma^2_{B}) \).

iii). In the absence of role redistribution, if there are more leaders in the pre-merger market, the merger between followers occurs more likely.

**Proposition 2**

Within the range of \( \delta^i \in (\delta^i_{inf}, \delta^i_{sup}) \) where the superscript \( i \) stands for the merger case, i). the merged firm’s profit will be greater under complete information than under incomplete information, when there is no role redistribution. ii). the merged firm’s profit will be greater under incomplete information, when there exists the role redistribution.

**Lemma 1**

i). In the absence of role redistribution, the merger is ex post profitable, iff the merging firms generate efficiency gains . Moreover, the ceiling of this potential efficiency gains under incomplete information \( \delta^i_{sup} \) (with \( i = A, B \)) is lower than that under complete information. ii). In the presence of role redistribution (cases C and D), even though the merger leads to efficiency losses, this merger can be ex post profitable.

**Proposition 3**

i). Ex ante profitable mergers between leaders always constitute a welfare-enhancing merger. ii). Without role redistribution, whether the two-follower merger generates the welfare enhancement depends on the market configuration and the market size. iii). In the presence of role redistribution, when uncertainty is sufficiently large, ex ante profitable mergers are welfare-enhancing.

**Proposition 4**

i). Ex ante profitable merger between leaders enhances the ex ante total welfare, but it can hurt ex ante consumer surplus.

ii). In the absence of role redistribution, all mergers between followers that improve expected consumer surplus, are welfare-enhancing and profitable without ambiguity.

iii). In the presence of role redistribution, when there are few active firms in the market \( (n \leq 12) \), or the large market \( (n > 12) \) contains a great deal of follower, a merger between followers which improves the consumer surplus is absolutely welfare-enhancing and profitable.

iii). When the merger is composed of one leader and one follower, the consumer-surplus-improving merger will be unambiguously welfare-enhancing and profitable.
**Proposition 5** i). If the merger is composed of two leaders, a welfare-enhancing merger is not always profitable, but a profitable merger improves social welfare without ambiguity. ii). When two followers take part in the merger and the newly merged entity behaves as a leader, a welfare-enhancing merger is always profitable, however, a profitable merger can damage the aggregate surplus. iii). If the merger stems from firms of different types, a welfare-enhancing merger is always profitable.

**Proposition 6** If merger regulation occurs after a merger consummation, the consumer welfare standard is more lenient than the total welfare standard.

10. The English should be improved. See for instance the following sentences:

- page 16, second paragraph is not very clear the meaning of "the resulting leader is less restrictive..., the resulting leader can be profitable..."

- page 18, close to the end: "a merger is approved whenever the expected change is positive", expected change of what?

- beginning of page 21, the discussion about the precision of CS is not very clear;

- page 22, Proposition 5 (b), "... when there is sufficiently less leader firms in the market.....";

- page 22, second to last paragraph, "Prop 5 shows that when intervening ex-post, Competition Authorities are aware of the merged firm’s cost". This is not shown in Prop 5, this is the definition of ex-post, isn’t it?

We will modify the above-mentioned errors, and we will make a careful examination in a revised version of the paper.


*Thank you for pointing this error. We will correct it.*

12. I would change the title of Table 6 in "private vs social incentives to merge" or something similar.

*The title "private vs social incentives to merge" will be taken into account.*

13. There are many typos.

*Thank you for pointing out the problem of improper spelling for us. We will correct it in a revised version.*
Supplement:
We agree with the interpretation given by the referee to the main feature of our model: we construct a Stackelberg game of bilateral horizontal mergers with uncertainty about the exact value of the cost of the merged firms. The true value of this cost is assumed to be known by the insider while outsiders are a priori uniformed on this value. The key feature of the model is to consider a mechanism of information revelation through the timing of the merger game. More precisely, if the merged entity behaves as a follower, then all outsiders remain uninformed about the exact value of the production cost of the merged entity since they must decide their production strategy either simultaneously or at an earlier stage to that of the insider. Consequently, in the sub-group of outsiders, the information is incomplete but symmetric. Nevertheless, if the merged firm behaves as a leader, then followers (outsider) perfectly observe the production strategy chosen at equilibrium by the insider and may infer its production cost. Outsiders adopting a leader role remain uninformed about the cost of the merged entity since they play a simultaneous game with the merged firm. The production strategy of a merged firm which behaves as a leader creates an asymmetry of information between outsider-leaders and outsider-followers. This principle of production cost revelation to outsider followers only exists in the scenario where the merged firm adopts a leader role.

References


