Responses to Referee Report 1 on "(In)Determinacy, Bargaining, and R&D Policies in an Economy with Endogenous Technological Change"

Thank you for your insightful comments and suggestions. Based on them, we have revised the paper as follows.

(1) The paper is far from meeting the required standards in terms of grammar, syntax and sentence construction.

(a) Thank you very much for your valuable advices. The paper was been edited again by a native speaker to improve the grammar, especially for those parts of Introduction, Conclusion and some sentences you have reminded (for example, on page 14, the third sentence of the main paragraph in early version. Please see the last sentence of revised edition on page 15.)

(b) Thank you for your suggestion. We have deleted "the overall level of consumption *C*" in Eq. (14) and just remain the part of presentation as "the overall level production *Y*". Please see page 8 in revision.

(c) Thank you for your valuable reminding. Following your suggestion, we express "p_A is the value of the blueprint" in line 3 of second paragraph on page 6. And we move the footnote 6 of early version into the main text in section 3.4 on pages 12-13 in revision. It would be helpful to present the standard R&D sector more clearly. In addition, we tried to divide "Section 3 The market solution" into 6 parts: 3.1 Households, 3.2 The final goods firms, 3.3 Nash bargaining solution, 3.4 R&D, 3.5 The government, 3.6 Labor market equilibrium.

(d) Thank you very much for your suggestion. We has rewritten the R&D sector in Section 3.4 on pages 12-13 as follows:

3.4 R&D

Due to the property of perfect competition in the R&D sector ($\pi_A = 0$), we can substitute the production function, Eq. (1), into Eq. (2) and derive the blueprint's cost as

$$p_A = \frac{v(1-s)w}{n} \tag{28}$$

Eq. (28) indicates that the value of the blueprint is equal to its cost. The

result is different from the standard free entry condition as presented in the canonical Romer model. Also it is shown that the subsidy policy implemented by the government will decrease the cost of the innovation. Furthermore, the government R&D spending will also decrease the cost of the innovation. On the other hand, the private-firm's investment that is engaged in R&D will increase the value of the innovation.

As long as the R&D cost secures the net present value of the profit in intermediate goods, that means

$$p_A = \int_t^{\infty} \pi(\omega) e^{-\bar{r}(t,\omega)\cdot(\omega-t)} d\omega \tag{29}$$

then it is free to entry into the business of being an inventor. $\bar{r}(t,\omega) \equiv [1/(\omega - t)] \cdot \int_t^{\omega} r(\upsilon) d\upsilon$ in Eq.(29) represents the average interest rate between t and ω. By differentiating the free entry condition, Eq. (29), with respect to time, we obtain

$$r = \frac{\pi}{p_A} + \frac{\dot{p}_A}{p_A} \tag{30}$$

Eq. (30) shows a non-arbitrage condition and states that the rate of return on bond, r, equals the rate of return on investing in R&D which includes the profit rate, π / p_A, and the rate of capital gain or loss, $\dot{p}_A / p_A$.

We focus the bargaining process between firms of the final goods and the intermediate goods and it is not relevant to the R&D sector. However, we changed the standard presentation among the literature of R&D-driven growth which assumed there is the negatively-slopping demand function in intermediate goods market into a horizontal slope demand function in intermediate goods market. Please see Eq. (23), the sentence in lines 28-30, and footnote 6 on page 11. Thank you very much for your reminding.

On the other hand, the government's subsidy policy and the government R&D spending indeed change the standard free-entry condition presented in the canonical Romer model. We have emphasized the key point in lines 5-10 in first paragraph in Section 3.4 on page 12. And explain here again:

$$p_A = \frac{v(1-s)w}{n} \tag{28}$$

Eq. (28) indicates that the value of the blueprint is equal to its cost. The result is different from the standard free entry condition as presented in the canonical Romer model. Also it is shown that the subsidy policy

implemented by the government will decrease the cost of the innovation. Furthermore, the government R&D spending will also decrease the cost of the innovation. On the other hand, the private-firm's investment that is engaged in R&D will increase the value of the innovation.

(2) To clear regarding the economic intuitions pertaining to its mathematical results.

(a) Thank you for your suggestion. We have provided the economic implication of parametric conditions which yield indeterminacy result in final paragraph in lines 8-16 on page15, and in lines 1-5 on page 16.

(b) The intuitions of comparative statics have been extended and improved. Please see the first paragraph on pages 20 and 21. Thank you very much for your suggestion.

(3) The contribution of the paper needs to more clearly stated.

(a) Thank you for your comments. We rearranged the Introduction in revised version to clarify the justification for the motivation of the paper, please review Introduction on pages 2-5 in revision.

(b) The "smaller R&D nations" means, those nations with relatively lower ratio of R&D spending to GDP, such as Greece, Iceland, New Zealand, etc. Please see Park (1998, Fig. 1). We further clarified the main point of view and motivation of the paper in Introduction, please check the second paragraph in line 12 on page 2, and lines 20-21 on page 21. Thanks for your suggestion.

(c) There are few empirical justifications among literature, but we still try to provide some raw data and information in Introduction in lines 10-14 on page 3, and Footnotes 10 and 11 on pages 20 and 21. Thank you for your valuable reminding.

Further small remarks

- Thank you for your valuable suggestion. We have modified the model referring to "an expanding-variety growth model (Romer lab-equipment model)" in Section 2 in lines 1-2 on page 5.

- Thank you for your reminding. We simplified the Introduction and deleted a lot of references which are not directly relevant for this paper. Please review pages 25-26.