Response to Reviewer 5

1. The manuscript integrates the introduction and literature review into a single part, which reduces clarity, and it is difficult to distinguish the background and determine the research gaps. The literature review would benefit from a more structured and coherent format, clearly clarifying the gaps in research and solutions.

   Reply:

   Thank you for the suggestions from the reviewers. The author fully agrees with their opinions. We will separate the introduction and literature review of this article, and treat the literature review as an independent part to clarify the research shortcomings and deficiencies of existing literature, and further highlight the innovation of this article.

2. This paper adopts a complex empirical method. Although the theoretical framework is reasonable, the mathematical model lacks transparency, which destroys the replicability. Specific issues include

   Reply:

   Thank you for the suggestions from the reviewers. The author fully agrees with their opinions. The model calculation in this article is somewhat complex. If the entire calculation process is included in the article, it will affect the structural framework of the article. Therefore, the author has stated in the article that if you need to understand the specific calculation process of the model, you can contact the author for further information.

3. 1) The paper uses CES and Cobb-Douglas production functions interchangeably without specifically defining their respective levels of application. It seems that Cobb-Douglas is used in the micro-level modeling, while CES is used in the macro-level aggregation. This distinction should be clearly clarified in order to avoid conceptual confusion.

   Reply:

Thank you for the suggestions from the reviewers. The author fully agrees with their opinions. We have provided a detailed explanation on why the CES function was chosen to characterize the input-output relationship between the overall output of the manufacturing industry and the output of its segmented industries, as follows:

At the same time, it is assumed that the overall output of the manufacturing industry at the national level is the CES production function of the output of each sub-sector: $Y = (\sum_{i=1}^{N} Y_i^{\sigma})^{\frac{1}{\sigma}}$, which can characterize the output of manufacturing sub sectors as intermediate inputs to produce the overall output of the manufacturing industry.

4. 2) Equations 4 and 5 are mathematically correct but not well explained. A step-by-step deduction and intuitive explanation would help readers understand the realization of logic and experience.

Reply:

Thank you for the suggestions from the reviewers. The author fully agrees with their opinions. The model calculation in this article is somewhat complex. If the entire calculation process is included in the article, it will affect the structural framework of the article. Therefore, the author has stated in the article that if you need to understand the specific calculation process of the model, you can contact the author for further information.

5. 3) The critical parameters (e.g., α=2/3, σ=1/3) are borrowed from the literature (e.g., Brandt et al., Yang), yet there is no sensitivity analysis or robustness checks provided. Considering their importance in deciding the result, this omission is very important.

Reply:

Thank you for the expert review's comments. Based on the expert opinions, the author has provided an explanation of the limitations in the research section of this article, as follows:

Due to factors such as the timeliness and availability of data, the limitations of this study mainly lie in the following aspects: (1) Due to the selection of double-digit industry panel data from China's manufacturing industry for empirical testing, there

are relatively few endogeneity processing methods available. And the data year is relatively outdated, mainly due to the fact that the WIOD database data is only up to 2014. In future research, the author will strive to collect data on manufacturing industry segmentation in various provinces of China. If the frequency of publishing input-output table data between industries in China is increased to once a year, it is expected to use updated years and richer "provincial industry" data for empirical research. (2) In the quantitative evaluation model of factor allocation efficiency used in this article, sensitivity and robustness tests were not conducted on the selection of parameters such as the output elasticity coefficients of capital and labor, as well as the output substitution elasticity between industries. This is mainly due to the fact that the model is already a very mature mathematical model, and a large number of existing literature have been applied, which confirms that the model has strong reliability, scientificity, and robustness. However, in the future, the parameter selection and model setting of the model can still be modified and improved based on the research question and the selection of empirical objectives.

6. 4) The paper would be enhanced by a comprehensive variable definition table in the methodology chapter so that readers can keep up with the abundant mathematical content.

Reply:

Thank you for the opinions of the reviewing experts. The author fully agrees with the opinions of the reviewing experts. The author checked the calculation part of the mathematical model and provided additional explanations for the parameters calculated by the model to ensure that all parameters appearing in the model have corresponding explanations.

"Y represents the total output, Y_i represents the output of the ith sector. $\sum_{i=1}^{N} \theta_i = 1$, θ_i is the weight of the output of sector i in the production process of total output, and its specific value can be obtained endogenously through the derivation of the later model."

7. The data sources span different time ranges. For example, WIOD data through 2014 are employed to calculate digitalization indicators, whereas the remaining variables extend to 2020. The paper must explicitly mention this mismatch, discuss its implication, and justify why the coverage remains adequate to investigate current-day trends.

Reply:

Thank you for the opinions of the reviewing experts. The author fully agrees with the opinions of the reviewing experts. Based on the opinions of the review experts, we have provided relevant explanations：

As shown in Figure 2, the digitalization level of various sub sectors in China's manufacturing industry has been increasing year by year. Therefore, even though the digital transformation data of the manufacturing industry used in this article is only up to 2014, it can fully demonstrate the accelerating trend of digital transformation in China's manufacturing industry. Therefore, using this data for empirical testing, the results still have important implications for China's present and future.

8. The manuscript employs inconsistent terminology. The terms factor mismatch, allocation efficiency, distribution coefficients, efficiency loss, and deviation are used without being defined consistently. The variables mis, misi, misk, and Rmis are also employed inconsistently, sometimes interchangeably, which is confusing. It is highly advisable that the authors provide a terminology guide or glossary that consistently defines all the required terms and variables.

Reply:

Thank you for the opinions of the reviewing experts. The author fully agrees with the opinions of the reviewing experts. The author has already explained the meaning and symbols of each variable in Table 2 of the article, as follows. In the author's opinion, this is sufficient for readers to understand the meaning of each variable in the empirical testing process.

Variable Meaning	Variable symbol
Digital direct consumption factor	$digi_1$
Digital total consumption factor	$digi_2$
Total misallication of production factors	*mis*
Capital misallication	*misk*
Labor misallication	*misl*
Total misallication of R&D factors	*Rmis*
R&D capital misallication	*Rmisk*
R&D labor misallication	*Rmisl*