Revision Report on "Can Reducing Carbon Emissions Improve Economic Performance? Evidence from China"

Dear reviewer:

Thank you for time and effort to read this paper named "Can Reducing Carbon Emissions Improve Economic Performance? Evidence from China". And thank you very much for valuable review suggestions. Your constructive review comments are very important for us to further revise and improve it. After revision, the quality of this paper has been further improved, and once again thank you for painstaking review.

The revision report is presented below one by one, please review, criticize and advise.

Thank you very much again.

Question 1: *The paper uses some well established methods and cites much of the standard literature. The authors also provide a significant number of 'robustness checks' and overall contribute a well-rounded paper from the technical point of view. What I am doubtful about, however, is whether the pilot they focus on lends itself to the methods being deployed and to the consequence causal interpretation of the results.*

Fundamentally, I would like to have a much deeper discussion of the CLCP, its aims, and the details of the implementation. There seems to be a very broad policy drive and a large number of initiatives taking place. Causal identification in this context is a challenge. The main question that I would like the authors to address is how the selection of the provinces and cities for the pilot took place. It is obviously not random, and this fact alone needs discussing. Anything that makes these pilot cities/provinces 'special' and which correlates to the outcome variables, potentially invalidates the identification strategy.

Modify reply 1:

Thanks for attention to LCP policy. We do not give a detailed introduction and description of LCP policy implementation in the manuscript, which make it difficult for readers to understand LCP policy, therefore, resulting in doubts about the method used to evaluate policy. In addition, cities selection is also ignored in the manuscript.

The endogenous problems caused by the non-randomness of cities selection lead to bias of the evaluation results. We believe existence of these problems is directly related to concrete effect of this study. Therefore, the questions can be described as a hit. Of course, because we does not discuss the results of LCP policy implementation in the manuscript, which causes reviewer's doubts, we are deeply sorry for this, and hope that you can forgive us through this revision.

In order to comprehensively solve the above problems, the revision process is carried out from the following three aspects. First, we introduce details of policy implementation. It includes main tasks and specific contents of implementation process, which can provide readers with a clearer understanding of LCP policy. Second, we analyze the specific effects of implementation. This is to illustrate effect of LCP policy implementation, so as to ensure effectiveness of LCP policy as a representative of environmental regulation. Last, we choose instrumental variables to deal with endogenous problems caused by non-random selection of cities, so as to provide guarantee for accurate evaluation of LCP policy. The details are as follows:

First, in order to make up for shortcomings that do not elaborate on the specific implementation and effects of LCP policy in the manuscript, we focus on the specific policies adopted by local governments and the effects of this series of policies implementation to explain local governments' behavior and whether they comply with the requirements of the central government in this revision. We have sorted out the specific measures that the central government has required local governments to implement. These measures stipulate specific behaviors of local governments, so it is very necessary to sort out them. The results are shown in Table 1. It can be seen that local governments are required to prepare low-carbon development plans, establish industrial systems characterized by low-carbon emissions, establish greenhouse gas emission data statistics and management systems, formulate supporting policies of low-carbon and green development, and actively advocate low-carbon green lifestyles and consumption patterns to achieve carbon emissions reduction from all aspects. The above requirements and specific implementation contents are also the behaviors prescribed by local governments in reducing carbon emissions.

Table1 Specific Measures of Local Government in Pilot Areas

Main Tasks	Specific Contents
Prepare low-carbon development plans	Carry out investigations and studies, clarify the pilot ideas, play a comprehensive guiding role in planning, combine the work of adjusting industrial structure, optimizing energy structure, energy efficiency and increasing carbon sinks, and clearly propose the action targets, key tasks and specific measures for controlling greenhouse gas emissions in the region, reduce the intensity of carbon emissions, and actively explore the low-carbon and green development model.

Formulate supporting policies to support low-carbon and green development	play a synergistic effect in climate change, energy conservation and environmental protection, new energy development, and ecological construction, actively explore institutional mechanisms conducive to energy conservation and emission reduction and low-carbon industry development, implement a responsibility system for controlling greenhouse gas emissions, and explore effective government guidance and Economic incentives, research and use of market mechanisms to promote the implementation of the goal of controlling greenhouse gas emissions.
Establish industrial systems characterized by low-carbon emissions	Combine local industry characteristics and development strategies, accelerate low-carbon technology innovation, promote low-carbon technology research and development, demonstration and industrialization, actively use low-carbon technology to transform and upgrade traditional industries, accelerate the development of low-carbon buildings, low-carbon transportation, Cultivate strategic emerging industries such as energy conservation, environmental protection and new energy. At the same time, we must closely follow the latest progress in technological progress in the low-carbon field, and actively promote the introduction of technology, digestion and absorption, and innovation or joint research and development with foreign countries.
Establish greenhouse gas emission data statistics and management systems	Strengthen the statistics of greenhouse gas emissions, establish a complete data collection and accounting system, strengthen capacity building, and provide institutional and personnel support.
Advocate low-carbon green lifestyles and consumption patterns	Organize training activities for leading cadres at all levels and departments to improve the emphasis and understanding of climate change issues in decision-making and implementation. Vigorously carry out educational popularization activities, encourage low-carbon lifestyles and behaviors, promote the use of low-carbon products, promote the concept of low-carbon life, and promote broad participation of all

Second, considering that formulation and implementation of LCP policy belong to central government and local government respectively, the separation between maker and implementer is bound to affect policies effects. Although local government has been supervised by central government, has the local government really implemented a series of strict measures? It is not sufficient to interpret local government's behavior only from the perspective of government documents and policy formulation. In view of this, we measure carbon emissions at provincial level to illustrate changes in carbon emissions in pilot areas, thus directly demonstrating effectiveness of LCP policy, and indirectly indicating degree to which local governments have implemented various measures. It should be noted that carbon emission calculation here is calculated according to the standard calculation formula, that is, carbon emission =

coal consumption×0.7329 + oil consumption×0.5574 + natural gas energy consumption×0.4226, where the emission factors of various energy sources are the average of the carbon emission factors published by the DOE, the Japan Energy Economic Research Institute, the China National Science and Technology Commission Climate Change Project, and the National Development and Reform Commission Energy Research Institute. In order to better compare the carbon emissions between pilot areas and non-pilot areas, we compare total carbon emissions and carbon emissions per capital in each region. The specific results are shown in Figure 1. It can be seen that compared with non-pilot areas, carbon emissions of pilot areas after LCP policy implementation have been significantly reduced. Although there is a time lag in the reduction, it is undeniable that LCP policy implementation has effectively reduced carbon emissions in the pilot areas and achieved expected environmental benefits. Therefore, from this perspective, local government has followed the policies formulated by central government, actively implemented measures, and achieved regional carbon emissions reduction.

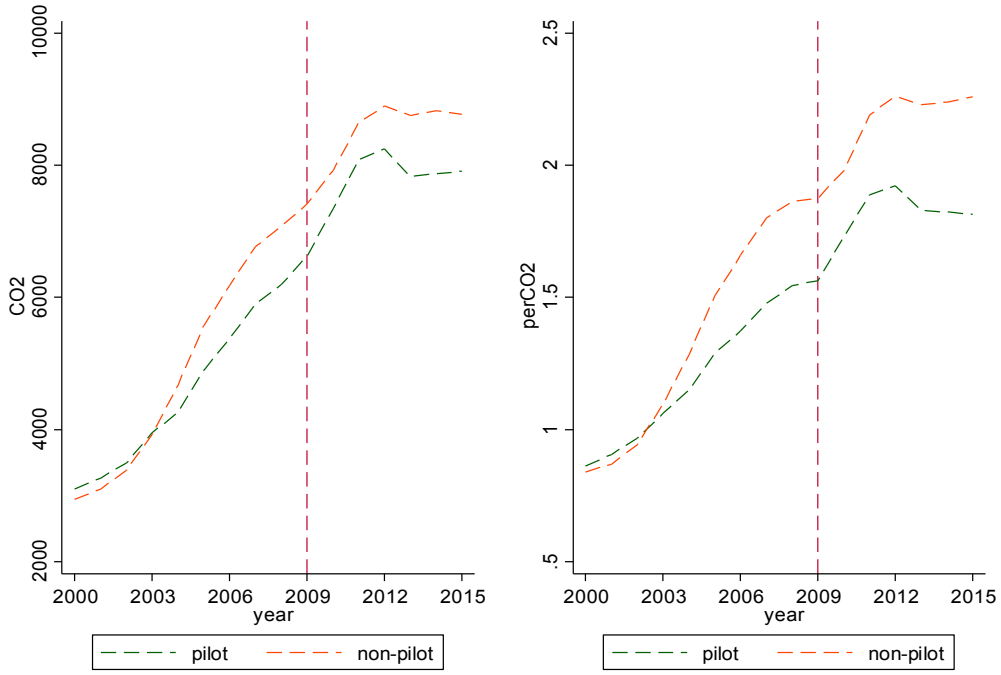

Figure 1 Trend Changes of Carbon Emission in Pilot and Non-pilot Areas

Third, as suggested by reviewer, LCP cities selection may not be random, and potential factors may affect selection, such as, economic development level. It inevitably leads to inherent problems in model, and eventually lead to evaluation bias. Thanks for reviewers' doubts on comparability of sample cities in treatment group and control group. It makes us realize that there are obvious differences between samples in treatment group and control group, which will inevitably affect results of this study. We are very grateful for the important question raised by reviewer, thus making the analysis of this study more perfect through a new round of revision. In order to make

assessment results more accurate, we deal with the above problems from the perspective of excluding city samples with large differences and adopting instrumental variables. More details are as follows:

We consider that there are large differences between samples, which is an important reason for sample cities selection. In view of this, we excluded economically developed cities, namely Shenzhen, Xiamen and Hangzhou, from the pilot cities, so as to compare other cities. In addition, we excluded some cities with higher political influence and better institutions than other cities, such as Beijing, Shanghai and so on. The specific regression results are shown in Table 2. Among them, the columns (1) - (4) are mainly the regression results after removing Shenzhen, Xiamen and Hangzhou, while the columns (5) - (8) are the regression results after excluding Beijing, Shanghai, Tianjin, Chongqing, Shenzhen, Hangzhou and Xiamen. It can be seen that sample exclusion has not changed the promotion effect of LCP policy on economic growth, which further consolidated and strengthened research conclusions of this study.

Table 2 Evaluation Results after Excluding Sample Differences

	gdp		*pergdp*		*gdp*		*pergdp*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pilot×Time	0.028***	0.020***	0.043***	0.039***	0.027***	0.020***	0.042***	0.040***
	(0.006)	(0.005)	(0.007)	(0.007)	(0.006)	(0.005)	(0.008)	(0.007)
investment		0.081***		0.071***		0.081***		0.071***
		(0.005)		(0.007)		(0.005)		(0.007)
labor		-0.006		-0.047***		-0.009		-0.051***
		(0.006)		(0.009)		(0.007)		(0.009)
government		-0.006***		-0.005***		-0.006***		-0.005***
		(0.000)		(0.000)		(0.000)		(0.000)
open		-0.001**		0.001		-0.001**		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
industry		0.004***		0.004***		0.004***		0.004***
		(0.000)		(0.000)		(0.000)		(0.000)
education		0.004***		0.005***		0.004***		0.005***
		(0.000)		(0.001)		(0.000)		(0.001)
save		-0.032***		-0.018**		-0.032***		-0.017**
		(0.005)		(0.007)		(0.005)		(0.007)
Individual fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
_cons	14.296***	13.139***	8.501***	7.562***	14.280***	13.137***	8.497***	7.573***
	(0.004)	(0.068)	(0.005)	(0.094)	(0.004)	(0.068)	(0.006)	(0.095)
N	3315	3179	3304	3179	3289	3153	3278	3153
F	12174.301	11506.871	6570.508	5190.973	12019.508	11339.358	6473.836	5109.906
r2	0.981	0.988	0.966	0.973	0.981	0.987	0.965	0.973

Note: (1) The values in brackets are standard errors; (2) *, **, and *** indicate significance at the confidence levels of 10%, 5%, and 1%, respectively.

Although the above removal of samples with large differences can alleviate the differences between cities to a certain extent and avoid bias of policy implementation caused by urban differences. Unfortunately, not all difference factors can be well eliminated, such as institutional and legal factors, which are almost difficult to measure, so the above approach is only a local treatment. In order to further thoroughly solve endogenous problem brought by the non-randomness of LCP cities selection, we adopt instrumental variables method here. Considering important criteria for LCP cities selection, that is, region's existing carbon emission, we take the rainfall, sunshine time and wind speed of each region as the instrumental variables of whether the region becomes a LCP city or not. The reasons are as follows: the above factors are closely related to the early agricultural economic development of each region. The more developed the agricultural economy is, the earlier it enters the industrialization era. The higher the industrialization level can lead to higher carbon emissions in region, the higher the probability that this region is selected as a LCP city, and vice versa. However, these factors have had little impact on modern economic growth. Therefore, these variables meet the basic requirements of instrumental variables. The specific regression results are shown in Table 3. It can be seen that after using instrumental variables to deal with endogenous problems, LCP policies still significantly promote regional economic growth. Moreover, It can also be seen from the regression results of the first stage that instrumental variables constructed in terms of rainfall, sunshine time and wind speed are significantly positively correlated with the LCP cities selection, which is also in line with the expectations of instrumental variable selection.

Therefore, through above revisions, readers can have a deeper understanding of background, specific content and implementation effect of LCP policy implemented by Chinese government. In addition, endogenous of model caused by the non-randomness of LCP cities selection is dealt with, so as to ensure accuracy of the evaluation effect of LCP policies.

Table 3 The Impact of LCP Policy on Regional Economic Growth：Instrumental Variable

	gdp		*pergdp*	
	(1)	(2)	(3)	(4)
Pilot×Time	0.256**	0.523**	0.379***	0.770**
	(0.109)	(0.253)	(0.145)	(0.361)
investment		0.084***		0.059**
		(0.018)		(0.026)
labor		-0.048		-0.133***
		(0.031)		(0.043)
government		-0.004***		-0.002

		(0.001)		(0.002)
open		-0.002		-0.001
		(0.003)		(0.004)
industry		0.005***		0.006***
		(0.001)		(0.002)
education		0.000		-0.006**
		(0.002)		(0.003)
save		-0.011		0.001
		(0.013)		(0.019)
Individual fixed effects	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES
N	1742	1655	1738	1655
F	4240.389	1381.933	2090.773	596.347
r2_a	0.969	0.941	0.938	0.865
		Fist Stage		
iv	0.002***	0.001***	0.002***	0.001***
	(0.000)	(0.001)	(0.000)	(0.001)
Cragg-Donald Wald F	15.11***	5.21**	15***	5.21**

Note: (1) The values in brackets are standard errors; (2) *, **, and *** indicate significance at the confidence levels of 10%, 5%, and 1%, respectively.

Question 2: *Despite the large number of tests and the effort put into convincing the reader of the robustness of the results, I remain unconvinced, mostly because there is very little discussion of the economics mechanisms at play. Why, for example, would economic growth be boosted by stringent environmental regulation even in such a short period of time? It makes very little sense tome. Unless the authors make a convincing case for the irresults,my default response is that this statistical results are a figmen to fapoorly designed policy evaluation framework and are spurious.*

Modify reply 2:

Thanks for reviewer's doubts on how environmental regulation affects economic growth. It relates to the logical basis of conclusions and mechanism of this study. In order to make analysis of the influence of environmental regulation on economic growth and mechanism test more perfect, in this revision process, we explore the research thread of influence of environmental regulation on economic growth from perspective of research literature, and conduct necessary empirical analysis on this basis, so as to ensure the necessary support in both theoretical and empirical aspects.

First, in order to clarify theoretically mechanism of environmental regulation affecting economic growth, we carefully comb literature on this subject. Environmental regulation and economic growth have always been the focus of research. What is the relationship between environmental regulation and economic

growth? Must we develop our economy at the expense of the environment? Whether improving effectiveness of environmental regulation will certainly inhibit region' economic growth? Although many scholars have tried to answer these questions, there is still no consensus so far. The main ideas can be divided into "following the cost hypothesis" and "productivity improvement hypothesis".

According to "following the cost hypothesis", environmental regulation increases enterprises' production cost, and thus does not have a promoting effect on manufacturing performance and economic growth, but even has a suppressing effect (Siegel, 1979; Chrisstainsen and Haveman, 1981; Gollop and Roberts, 1983；Löfgren et al., 2013). Siegel (1979) believed that regulation would inhibit output growth; Chrisstainsen and Haveman (1981) found that environmental regulation could explain 0.27% of labor efficiency, inhibit 0.5% of production level, and the inhibitory effect also has time heterogeneity. Gollop and Roberts (1983) found through the study of power industry that sulfur dioxide emission regulation policy significantly increased enterprises' production cost, thereby reducing the economic growth rate of the power industry by 0.59%. The survey on Swedish companies by Löfgren et al. (2013) found that carbon dioxide emissions regulation did not have a significant impact on corporates' productive behaviors and economic profits. "The productivity improvement hypothesis" suggests that environmental regulation can stimulate innovation behaviors and improve productivity to some extent, offset the constraints of increasing cost, and thus promote economic growth (Porter, 1991; Brunnermeier and Cohen, 2003; Johnstone et al., 2010; Tu and Shen, 2015; Feng et al., 2017). Hicks proposed the "induced innovation hypothesis" and believed that with relative price increase of production factors, the constraints on economic growth caused by the resources scarcity of this factor would be offset by productivity improvement caused by substitution of other factors. Based on this view, Porter (1991) then put forward the "porter hypothesis" and believed that the relative factor price increase caused by environmental regulation will be replaced by productivity increase and economic growth brought by environmental regulation. For example, Gray and Shadbegian (1998) found through census data that strict environmental regulation could promote enterprises' productive investment, while Mazzanti and Zoboli (2009) conducted a study on environmental regulation efficiency and labor productivity in Italy and found that environmental regulation policies can improve enterprises' productivity and thus improve economic benefits.The study by Feng et al. (2017) also found that environmental regulation could improve enterprises' green innovation capabilities.

From the above brief literature review, it can be seen that there are two opposite views on the impact of environmental regulation on economic growth, namely, "following the cost hypothesis" and "productivity improvement hypothesis". As far as China is concerned, whether environmental regulation hinders or promotes economic growth is an important question, which is also the main task of this study. And this study will provide new evidence for this important proposition to test the relationship between the two with China's development practice.

Second, after sorting out relevant literature, we have a good understanding of impact mechanism of environmental regulation on economic growth, which is more concerned with impact of environmental regulation on enterprise cost, productivity and innovation. Therefore, it is necessary to investigate these factors in empirical research. In addition, we also consider the influence of environmental regulation on enterprise transfer and enterprise internal management efficiency, and try to explain the reasons why environmental regulation affects economic growth at the enterprise level by investigating these factors. In general, similar to most of the literature, the findings of this study support "productivity improvement hypothesis" and “porter hypothesis”. The above factors are empirically tested in the mechanism test section, specific as follows: enterprise cost (Table 12), enterprise transfer (Table 13), enterprise management (Table 14), and enterprise innovation (Table 15). An in-depth investigation of these factors will undoubtedly consolidate the conclusions of this study. It needs to be noted that we do not investigate enterprises productivity, only to test enterprise management efficiency in the manuscript, which is indeed a defect. Investigating productivity is an important evidence of testing “the productivity improvement hypothesis”, so we consider enterprise productivity in revision process.

On the premise of data availability, in order to comprehensively measure enterprises productivity, we respectively use methods of OLS and LP. Specific results are shown in Table 2. Columns (1) - (3) show the results of using OLS method to estimate enterprise productivity, while columns (4) - (6) show the results of using LP method. Among them, column (3) and column (6) are mainly regression results of sample enterprises after 2005. As can be seen from Table 2, LCP policy has significantly improved enterprises productivity. The result shows that environmental regulation can improve enterprises productivity, which fully supports "productivity improvement hypothesis". In addition, from perspective of enterprise innovation, LCP policy also supports “porter hypothesis”.

To sum up, on the premise of production cost increase brought by environmental regulation, enterprises do not adopt passive transfer to deal with external pressure, but get rid of the trouble caused by environmental regulation by strengthening their own management level, improving enterprise efficiency and adopting innovative development strategies. It can be seen that the root of LCP policy in promoting economic growth is that it improves enterprises output level, although it also increase the production cost. Moreover, in order to cope with cost increase caused by environmental regulation, enterprises increase income by strengthening management, improving internal efficiency and innovation, so as to offset the negative impact of cost increase on income. The change of the above factors can not only offset cost increase, but also improve enterprises efficiency and further improve economic growth of LCP areas.

Table 4 Impact of LCP Policy on Enterprise Productivity

	TFP_OLS	*TFP_LP*

	(1)	(2)	(3)	(4)	(5)	(6)
Pilot×Time	0.327***	0.130***	0.089***	74.192***	43.602***	18.657***
	(0.004)	(0.003)	(0.003)	(2.853)	(2.130)	(2.356)
size		-0.579***	-0.628***		-86.922***	-126.119***
		(0.002)	(0.002)		(1.262)	(1.503)
age		0.483***	0.538***		157.895***	227.153***
		(0.005)	(0.007)		(3.028)	(5.006)
labor		-0.045***	-0.114***		-15.153***	-54.250***
		(0.001)	(0.002)		(0.873)	(1.148)
debt		0.093***	0.114***		60.257***	76.125***
		(0.001)	(0.001)		(0.709)	(0.970)
right		0.144***	0.161***		94.590***	105.284***
		(0.001)	(0.002)		(0.837)	(1.135)
subsidy		0.053***	0.045***		18.307***	14.703***
		(0.002)	(0.002)		(1.324)	(1.742)
Individual fixed effects	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES
_cons	-0.099***	3.027***	3.535***	239.502***	-483.163***	-208.781***
	(0.003)	(0.016)	(0.023)	(2.534)	(10.069)	(16.200)
N	623544	600147	391015	623544	600147	391015
F	11531.352	15408.612	21264.791	3067.573	5285.405	3813.523
r2	0.209	0.362	0.485	0.066	0.163	0.144

Note: (1) The values in brackets are standard errors; (2) *, **, and *** indicate significance at the confidence levels of 10%, 5%, and 1%, respectively.

Question 3: *The authors have a tendency to proceed in a rather mechanical fashion. They seem to be aware of the keying redients they need to add to their DiD-type paper,and they do all the 'right' things, but often without much thought. The authors interpret their pre-trends analysis in a very positive way, writing*
While this is technically correct, on closer examination Figures 2 and 3 seem to indicated that both gdp and per-capita gdp have been diverging for some time between treated and non treated groups, with trends starting around 2005. A discussion of this evidence is fundamental to trust the results in Table 2.

Modify reply 3:
Thanks for raising this key question about parallel trends, we fully agree with your opinion, which helps us further test applicability of causal inference method. In the manuscript, we only use regression method to test parallel trend, as shown in Figures 2 and 3 in the manuscript. In order to solve doubts raised by reviewers more rigorously, we further improve it from perspective of drawing trend graph and policy test respectively. The details are as follows:

First, we visually show the changes in GDP between treatment group and control

group, which will further consolidate and strengthen empirical results. Therefore, we respectively draws temporal variation graphs of GDP and GDP per capital, and details are shown in Figure 2.

It can be seen that before LCP policy implementation there is no significant difference between treatment group and control group, and they maintain long-term parallel growth. On the contrary, after policy implementation, there is a big difference in economic growth between regions. Treatment group's economic growth is gradually higher than that of control group, the change of GDP per capital also shows the same trend, and growth rate of GDP per capital is even more obvious(the slope of the curve). The results in the Figure 2 preliminary indicate that LCP policy is conducive to economic growth in pilot areas, laying foundation for subsequent empirical analysis.

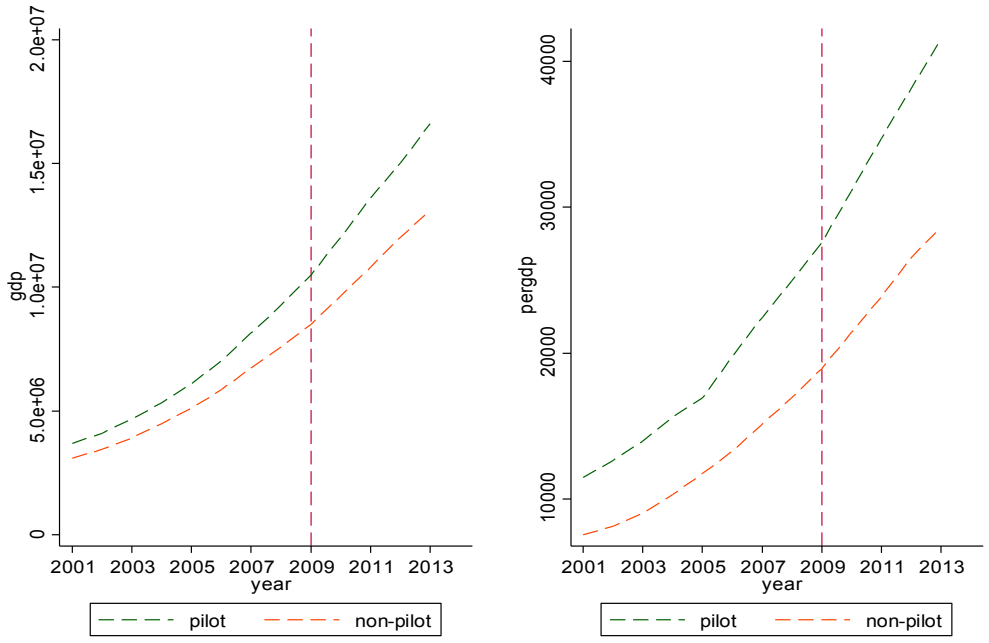

Figure 2 Trend Changes of Economic Growth in Pilot and Non-pilot Areas

Second, we fully follow reviewers' suggestions and demonstrated in detail that the difference in urban economic growth between treatment group and control group in 2005. Potential policies during investigate period are examined in order to eliminate their interference in 2005. After policies examining during investigate period, it is found that government did not implement the corresponding environmental policy in 2005, but an important institutional change occurred that deeply affected China's economic growth, that is, the reform of China's exchange rate system. It was because of the system reform that China's economic growth began to fluctuate greatly in 2005, just as reviewers doubted. But considering the reform is a widespread impact on China's economic growth, that is, all the sample cities are affected by it, therefore, this study first excludes samples before 2006, only compare economic growth of treatment

group and control group after 2005, so as to effectively avoid its interference. In addition, we also delete investigation period, only analyze samples of two years before and after LCP policy implementation, so as to minimize external shocks interference on assessment and ensure accuracy of policy assessment. The use of above methods still does not change results, which further proves accuracy of policy assessment.

Question 4: *In Tables 2-8 the values of the R2 are eye-catching large, in excess of 0.97 almost everywhere. The authors should discuss this aspect of their results and reflect on their modelling strategy.*

Modify reply 4:

Thanks for reviewers' detailed and careful reading and suggestions on high R2 value. In this revision process, we carefully check empirical model construction and variables selection in this study in accordance with revision direction given by reviewers. After a detailed review, we find that empirical model construction and variables selection are highly consistent with a large number of existing literature on China's economic growth, especially when selecting control variables fully considering factors affecting China's rapid economic development in the past 40 years, such as investment, industrialization level, degree of opening to the outside world, urbanization level, and so on. These factors has important contribution for China's past economic growth, thus explanatory power of the model is very high. In addition, in order to further ensure evaluation results, we also refer to a large number of literatures on Chinese economic growth, in which the R2 is also very high, so as to ensure the correctness of model construction and variables selection.

References:

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Question 5: *The micro part of the analysis is much weaker in many ways than the macro part. There is little in the way of a motivation for the selection of the outcome variables, no discussion of the goal of the analysis, and virtually no attempt to explain the results or to investigate the mechanisms that might be driving them. I would strongly advice the authors to focus on fewer outcomes, while providing better discussions of the events, possibly testing alternative explanations that potentially give raise to the same outcomes.*

Modify reply 5:

Thanks for reviewer's attention to the micro part of the analysis, which is further deepening analysis of conclusions of the macro part of the analysis. The micro mechanism test, which is used to improve analysis logic of LCP policy promoting economic growth, is an indispensable part of this study. But, as reviewer points out, the micro part of analysis is weaker than that of the macro part of analysis. Discussion target is not clear, and indicators selection is not explicitly stated. More importantly, the micro part of the analysis does not give a fully clear logic, so readers can not clearly understand authors' real intention of this part, which is an defect in the manuscript. Therefore, we are particularly grateful to reviewers for valuable suggestions. The improvement of this part will greatly improve the quality of this paper.

First, we strengthen weak points in the micro part of the analysis, and provide a lot of literature support for indicators selection to increase scientific of indicators selection. At the same time, in order to make analysis of important factors affecting enterprises more comprehensive, we also specially adds impact of LCP policies on enterprise productivity, which is measured by different methods. Specific test results are shown in Table 4 above. Its analysis has been described in detail above and is not repeated here.

Of course, the above revisions undoubtedly strengthen the micro part of analysis, but there is no denying that it is only a marginal supplement to existing defects, logic lack, loose structure of micro analysis part has not been completely solved. In view of this,

our revision here focuses on solving the problem of imperfect analysis logic. In order to make analysis in this part more rigorous, we carefully sort out influence mechanism of LCP policy as an important environmental regulation policy, and draw the following Figure 3. It can be seen that LCP policy implementation increases enterprises' production cost in LCP areas, which makes them unable to bear, especially for those pollution-intensive enterprises. The loss of production advantage forces enterprises to transfer, so as to avoid the profit loss caused by external cost increase. However, transfer also can produce the huge additional cost. Therefore, more and more enterprises choose to improve productivity, strengthen enterprise management and technology innovation to overcome production cost increase, so as to offset the negative impact of LCP policies on enterprise output, and thus achieve output expansion and economic growth. This internal mechanism is the logic chain of the micro part of the analysis.

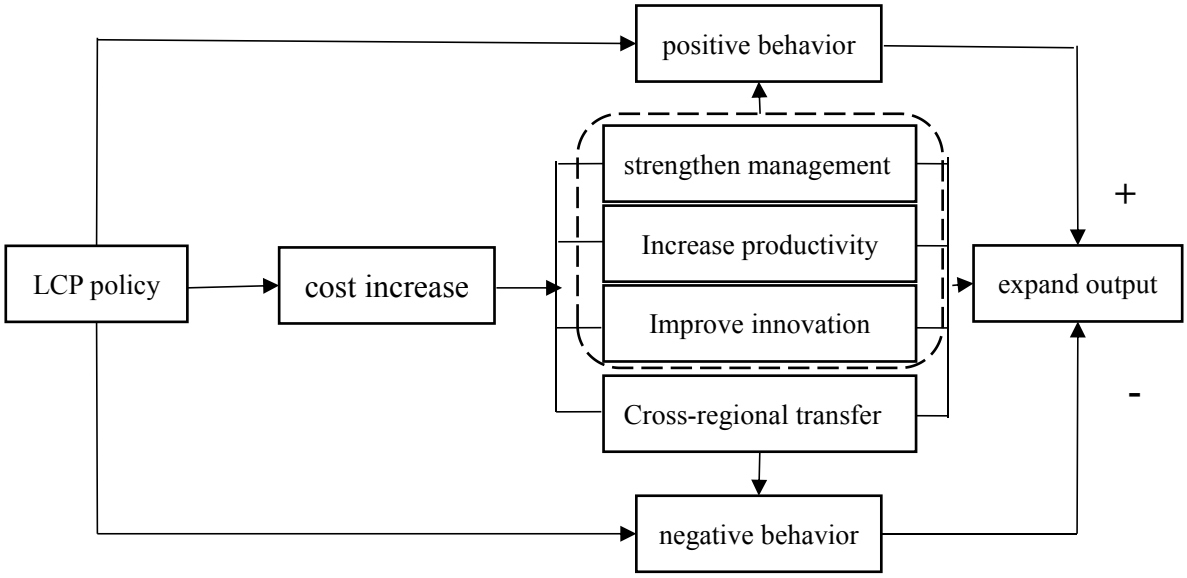

Figure 3 The mechanism of LCP policy affecting economic growth

Question 6: *The paper is hard to read, and should be thoroughly proof-read. There are odd mistakes in the text that detract from the paper and should have been easy to avoid. 'Ecological economics' vs 'environmental economics', 'pollution paradise', really!? But also 'micro-enterprises' for 'firms', etc.*

Modify reply 6:

Thanks to reviewers for careful reading. Please forgive us for the inconvenience caused by our carelessness. Your correction of the professional terms, your serious and rigorous attitude has benefited us and played a leading role in ours academic research. In order to further improve language expression, in revision process, we replace the term "safety haven hypothesis" with "pollution paradise hypothesis". In addition, more nouns are standardized to make the full text more standardized and

rigorous, so as to enhance consistency with existing literature research, avoid misunderstanding caused by improper expression, and ensure the comparability of conclusions based on China's development reality and that of other countries.