Reviewer's report

Title: The Effect of Performance-Related Pay of Hospital Doctors on Hospital Behaviour: A Case-Study from Shandong, China

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Reviewer: Qingyue Meng

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General

Application of bonus incentive system starting from early 1980s in China, firstly used in production section and then in public utility section including hospitals, is one of the most important keys for policy makers and administrators in improving efficiency, productivity, and quality of products and services. As the biggest component in health sector, hospitals' behaviors that are influenced by a number of factors would largely determine the overall performance of the health care system. What is the role of bonus system in influencing hospitals' behaviors has been a crucial research question that was not appropriately answered for a long time. This work fills in the knowledge gap through presentation of a carefully designed and implemented study. Findings from this study are informative for reforming hospital remuneration and payment systems, not only for China but also for the similar developing countries.

1. Major Compulsory Revisions

1) Relationship between the key indicators. Given the assumption in the study that official prices (P) used for charging patients were followed by the hospitals (this assumption should be cautious), the direct question becomes how relationship between changes in bonus systems and changes in quantities (Q) of health care/drugs can be examined. Q centers the performance indicators (Revenue=Q*P; Cost recovery=Q*P/Cost; Productivity (Unidimensional ratio)=Q/number of staff; and unnecessary care=Unnecessary Q*P/Total Q*P). Obviously, those four indicators would have different intensity in relation to Q. While indicators of revenue and unnecessary health care could have more direct relation with Q, the other two could be more influenced by costs and number of staff. For example, rapid expansion of hospital sector in terms of capital investment and staff recruitment during the study period would mask the effect of increase of Q that was stimulated by bonus arrangements. This consideration could be reflected in justifying selection of the indicators in the method section and in explaining findings in the discussion selection.

2) The method. What are the variables of input and output used in DEA and how they are weighted were not presented in details. Those are important for readers to judge what would be the exact implications of the DEA scores. In the discussion section, justifications for not to adjust quality and case-mix in measuring productivity were presented. However, it seems this should be extended for making the justifications more convincing. For making organization of method and result sections more logic, it is better to move the methods of correlation and regression analyses from the result section to method section.

2. Minor Essential Revisions

1) In the third paragraph on page 14, negative relationship between productivity and unnecessary
care was reported. In the second paragraph on page 15, the result shows a positive relation between those two indicators. How can they be explained?

2) In discussion section in the second paragraph on 19, what is the measurement of drug market for imported drug, is it value of drugs or types of drugs? If it is monetary value, the percentage of 30-55% for imported drugs should be checked.

3. Discretionary Revisions

1) Hypotheses presented in the background section are important for predicting the effect of various bonus arrangements on hospitals’ behaviors and explaining the results (for example, the first sub-section in the result section). Those hypotheses could be more developed by considering other factors, besides bonus system. The period from 1978 to 1997 in which the study was conducted, has seen many significant changes in hospital sector in relation to changes in the major indicators the study measured. Both hospital financial policy reform as external changes and implementation of General Responsibility Contract Method within hospitals would be among the determinants for hospital behaviors. This means besides bonus, arrangements and pressures from the hospital and department administrative bodies are also crucial, in influencing efforts made by the individual doctors. In addition, intensity of incentives perceived by individual doctors would closely relate to status of wealth of those individuals. When they were less wealthy, say at early stage in 1980s, they might be more sensitive to increase in incomes even though flat bonus was used. Those dimensions could be strengthened in the background section.

2) In second paragraph on page 18, is it unidimensional ratio productivity or DEA or both?

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.