At the same time, we also need more explanatory variables which affect shot rate or mortality. For example, hortative measure for vaccination may be much different among local governments and it may affect the shot rate. Even in this case, if such a measure did not change in an area in the two seasons, this effect can be controlled out by the area dummies completely and it does not affect the estimated coefficient.

On the other hand, there are many implicit assumptions in BCR. First of all, since we limit the effect of vaccination to the prevention of the mortality and, thus, it is certainly finer measurement than the prevention of the severe conditions like hospitalization as emphasized. Since it is difficult to obtain the data of the number of patients and the hospitalized, these numbers would be based on the similar estimation. Hence, these are far less precise than the number of death. In other words, we choose preciseness than broadness in the definition of effectiveness. Obviously, this limitation lower BCR. If we take the effects of vaccination on the number of patients and the hospitalized into consideration, BCR definitely become higher than that in this paper. It strengthens our conclusion in favor of the subsidy and has never change it.

Conversely, the ignorance of opportunity cost for vaccination or side effects certainly rise BCR. However, almost all of them are retired and suffered from chronic disease and, thus, they usually visit a doctor, their additional opportunity cost for vaccination seems to be small. Concerning side effects, on 28 August 2003, Ministry of health and welfare reported only 2 fatal cases and 18 severe side effects from 1998 to 2003. Therefore, we can safely ignore these costs and the obtained conclusion is probably not affected by the introduction of these costs.

Finally, we can extend the effectiveness of vaccination to the number of patients or the medical cost. The data limitation of these variables are already mentioned. Moreover, since the primary purpose of vaccination is the prevention of severe cases, if we extend to these aspects, the results may not be clear and BCR may decline. In extreme case, the fatal case may use less medical resources compared with the severe but survival case. In this sense, the limitation of effectiveness on the number of death seems to be more appropriate for considering the vaccination policy. Nevertheless, the research of the number of patients and medical cost are unambiguously important and we need to overcome the data limitation.

6. Conclusion

We find subsidy of influenza vaccination for the elderly greatly reduce mortality rate due to pneumonia and influenza. Since BCR is more than 20, we can conclude that there is strong evidence, in a sense of cost–benefit analysis, supporting the subsidy for influenza vaccination among the elderly.

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