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研究課題名(和文) Cost, Length of Stay, and Health Outcome: A Comprehensive Evaluation of Prospective Payment System in Japan

研究課題名(英文) Cost, Length of Stay, and Health Outcome: A Comprehensive Evaluation of Prospective Payment System in Japan

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交付決定額(研究期間全体)：(直接経費) 2,600,000円

研究成果の概要(和文)：This project aims to assess the impacts of the 2003 adoption of Diagnostic Procedure Combination Per-Diem Payment System on medical costs, hospital operational efficiency, and healthcare quality. This project provides practical implications for policy-makers to refine the medical system.

研究成果の学術的意義や社会的意義

This project would provide concrete and practical implications for policy-makers to refine the medical reimbursement system further as well as to formulate health policies for cost containment in a long-run perspective.

研究成果の概要(英文)：This project aims to assess the impacts of the 2003 adoption of Diagnostic Procedure Combination Per-Diem Payment System (DPC/PDPS) on medical costs, hospital operational efficiency, and healthcare quality. Focusing on before-after changes of the 82 special functioning hospitals enrolled mandatorily into the program in 2003, we aim to (1) examine whether hospitals allocate more resources to procedures paid outside of DPC/PDPS, and derive a monetary gain/loss for such reallocation; (2) assess a possible improvement of operational efficiency in terms of decline in length of stay (LOS), and how the improvement may vary as LOS extends; (3) clarify a potential change in healthcare quality in terms of change in health outcome at discharge.

研究分野：Health Economics

キーワード：Hospital Payment

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1. 研究開始当初の背景

Japan is renowned for its public healthcare system, distinguished by universal coverage, free access to healthcare, and a fee-for-service (FFS) model. Despite the inherently inflationary features of this system, Japan has successfully managed to maintain control over health spending over recent decades (as demonstrated in Figure 1). When compared to Germany, which also offers public healthcare, or to the United States, which predominantly relies on the private sector for healthcare provision, Japan continues to exhibit lower per capita spending and a smaller ratio of spending-to-GDP. However, due to limited economic growth and stagnant tax revenue, the expansion of the health budget in Japan has been, and will continue to be, exceptionally sluggish. Moreover, Japan bears the distinction of having the highest proportion of adults aged over 65 in the world, resulting in a tremendous demand for healthcare services among the elderly. Adding to the challenge is the fact that medical institutions have a financial incentive to generate unnecessary demand for healthcare under the FFS model, as the provision of more services leads to increased revenue. In light of these difficulties, a novel approach is necessary to further contain health spending.

As a result, Japan has targeted healthcare utilization in the hospital sector, which represents the largest component of health spending. To counter hospitals' incentive to induce unnecessary healthcare services, a prospective payment system (PPS) was introduced for acute inpatient care in April 2003. This system, known as the Diagnostic Procedure Combination Per-Diem Payment System (DPC/PDPS), operates differently from the FFS model, where services are unbundled and billed separately. The DPC/PDPS approach involves announcing a flat per-diem rate for acute inpatient care based on a combination of the principal diagnosis and medical procedure, with the rate gradually decreasing as patients' length of stay (LOS) increases. As a result, hospitals no longer receive marginal reimbursement under the FFS for providing additional procedures. In theory, the DPC/PDPS system should mitigate the inducement of demand for healthcare services. However, in practice, hospitals can still easily respond to DPC/PDPS because it essentially functions as a mixed system of FFS and PPS.

Under the FFS system, thousands of medical procedures are categorized into 15 classifications. Payments for medical procedures that reflect the skill and expertise of physicians (such as surgery and anesthesia) are referred to as "doctoral fees." Payments that reflect operating costs, such as bed usage and diagnostic testing, are referred to as "hospital fees." As shown in Table 1, DPC/PDPS is only implemented for hospital-fee procedures for inpatient care, while doctoral-fee procedures remain under the FFS system. This decision stems from a concern about the possible decline in quality of doctoral-fee procedures if physicians were paid uniformly. Furthermore, all procedures for outpatient care continue to be governed by the FFS system. Consequently, DPC hospitals may be incentivized to allocate more resources to FFS procedures following the adoption of DPC/PDPS. This reallocation can occur within the inpatient care framework by reducing the volume of hospital-fee procedures and, in turn, boosting doctoral-fee procedures. Alternatively, hospitals can reassign hospital-fee procedures from inpatient to outpatient care without interfering with the volume. In either scenario, the cost containment effectiveness of DPC/PDPS becomes ambiguous.

Additionally, the implementation of DPC/PDPS may have effects on the efficiency of hospital operations and the quality of healthcare. The relevant literature has evaluated these two side-effects in terms of changes in length of stay (LOS) and health outcomes at discharge, respectively. However, the findings have been inconclusive [2-4]. Some studies suggest that DPC/PDPS leads to a persisting decline in LOS, indicating an improved operational efficiency among hospitals that have adopted DPC/PDPS. Conversely, other studies find that the LOS is not shortened because the DPC/PDPS rate is assigned per diem, rather than per episode. Regarding healthcare quality, some studies suggest that the mortality rate is unaffected by DPC/PDPS. However, others reveal a decline in the number of patients who are cured at discharge after risk adjustments.

Considering the partially adopted program, three questions naturally arise regarding the adoption of DPC/PDPS: (1) Will hospitals allocate more resources to procedures paid outside of DPC/PDPS? (2) With the per-diem rate, are hospitals genuinely motivated to reduce the LOS? (3) Would the reallocation of resources (if any) lead to deteriorations in healthcare quality and negatively affect patients' health?

## 2. 研究の目的

This research project aims to provide a rigorous and comprehensive evaluation of the adoption of the DPC/PDPS program in Japan by answering three key questions related to resource allocation, length of stay, and healthcare quality. The study will focus on the 82 special functioning hospitals, which were mandated to adopt the program in 2003, and will use a natural experiment approach to minimize bias due to selection. The research will extend the evaluation from inpatient care to hospital-level analysis, encompassing both inpatient and outpatient care, and will expand the estimation scope from specific diagnoses to all-cause datasets. Finally, the study will estimate the short-, mid-, and long-run impacts of the DPC/PDPS program, providing practical implications for policy-makers to refine the medical reimbursement system and formulate other health policies for cost containment in the long run.

## 3. 研究の方法

In 2019, the research emphasis was on the construction of datasets and investigation I of DPC/PDPS effects on medical costs. Datasets were appropriately extracted and collated by no later than Q2. During the process, we also summarized basic statistics for I-III investigations on medical costs, LOS, and healthcare quality, respectively. After that, we kicked off the investigation I, and major estimations were finalized in Q4. Meanwhile, we presented the results on international conferences and drafted the manuscript for publication.

In 2020, our first emphasis was to submit the manuscript of investigation I to target journals (*Journal of Health Economics*), which was completed by Q2. During the process, we also started the investigation II of the DPC/PDPS effects on LOS. After the submission, we were dedicated to the investigation II, and major results were achieved no later than Q4. Meanwhile, we sought to present the findings of investigation II on various conferences for comments. We also kicked off the investigation III of the effects on healthcare quality during Q4.

In 2021, we aimed first to submit the manuscript of investigation II to target journal (*social science & medicine*), which was done no later than Q1. We then sought to finalize the investigation III in Q2 and presented the findings at workshops or international conferences. After refining the results based on comments, we expected to submit the manuscript of investigation III to target journals by the end of Q4 in 2021. Finally, in Q1 of 2022, we planned to summarize the overall project with comprehensive reports.

## 4. 研究成果

### Publication

Fu, R., Shen, Y., & Noguchi, H. (2021). The best of both worlds? The economic effects of a hybrid fee - for - service and prospective payment reimbursement system. *Health Economics*, 30(3), 505-524.

### Presentations

- Irdes-Dauphine AHEPE 6th Workshop, "The Best of Both Worlds? The Economic Effects of a Hybrid Fee-For-Service and Prospective Payment Reimbursement System," June 2020, Online.
- International Health Economics Association 13th World Congress, "Hospital Responses to Prospective Payment under the Japanese Universal Healthcare System," July 2019, Basel University, Basel, Switzerland.
- The 1st meeting of Asian Workshop on Econometrics and Health Economics, "Hospital Responses to Prospective Payment under the Japanese Universal Healthcare System," Dec 2018, Kyoto.
- 日本経済学会 2019 年度春季大会, "Hospital Responses to Prospective Payment under the Japanese Universal Healthcare System," 2019 年 6 月, 武蔵大学
- 第 13 回応用計量経済学コンファレンス, "Hospital Responses to Prospective Payment under the Japanese Universal Healthcare System," 2018 年 11 月, 東京大学

## 5. 主な発表論文等

〔雑誌論文〕 計4件（うち査読付論文 3件/うち国際共著 1件/うちオープンアクセス 0件）

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2. 論文標題 Changes in demographic and socioeconomic determinants of living alone among women in Sweden and Japan since the 1990s	5. 発行年 2021年
3. 雑誌名 Stockholm Research Reports in Demograph	6. 最初と最後の頁 1-38
掲載論文のDOI（デジタルオブジェクト識別子） 10.17045/sthlmuni.14402519.v1	査読の有無 無
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1. 著者名 Shen Yichen, Fu Rong, Noguchi Haruko	4. 巻 16
2. 論文標題 <scp>COVID</scp> 19's Lockdown and Crime Victimization: The State of Emergency under the Abe Administration	5. 発行年 2021年
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3. 雑誌名 Health Economics	6. 最初と最後の頁 505-524
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1. 著者名 Yichen Shen, Rong Fu ,Haruko Noguchi	4. 巻 NA
2. 論文標題 COVID 19's Lockdown and Crime Victimization: The State of Emergency under the Abe Administration	5. 発行年 2021年
3. 雑誌名 Asian Economic Policy Review	6. 最初と最後の頁 Early View
掲載論文のDOI（デジタルオブジェクト識別子） 10.1111/aepr.12339	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 -

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2. 発表標題 MIRAI and beyond: a successful collaboration from MIRAI 2017-2019
3. 学会等名 MIRAI 2.0 TEG Aging Workshop (招待講演) (国際学会)
4. 発表年 2021年

1. 発表者名 Rong FU
2. 発表標題 Effects of College Education on Family Formation, Birth Weight, and Lifetime Fertility in East Asia: Evidence from a Japanese Zodiac Superstition
3. 学会等名 International Health Economics Association 14th World Congress (国際学会)
4. 発表年 2021年

1. 発表者名 Rong FU
2. 発表標題 The Best of Both Worlds? The Economic Effects of a Hybrid Fee-For-Service and Prospective Payment Reimbursement System
3. 学会等名 Irdes-Dauphine AHEPE 6th Workshop (国際学会)
4. 発表年 2020年

1. 発表者名 Rong FU
2. 発表標題 The consequences of changing family behavior for the elderly: comparing Sweden and Japan,
3. 学会等名 MIRAI 2.0 Kickoff Meeting (招待講演) (国際学会)
4. 発表年 2020年

1. 発表者名 Rong FU
2. 発表標題 The Best of Both Worlds? The Economic Effects of a Hybrid Fee-For-Service and Prospective Payment Reimbursement System
3. 学会等名 international Health Economics Association (国際学会)
4. 発表年 2019年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

personal homepage <a href="https://sites.google.com/view/nataliefu-homepage/research">https://sites.google.com/view/nataliefu-homepage/research</a> <a href="https://sites.google.com/view/nataliefu-homepage">https://sites.google.com/view/nataliefu-homepage</a>
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6. 研究組織		
氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考

7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8. 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関
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