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研究報告書

平成24・25年度総合研究報告書

平成２５年度総括・分担研究報告

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平成 25 年度厚生労働科学研究補助金（地球規模保健課題推進研究事業）

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（H24- 地球規模 - 一般 - 002）

総合研究報告書

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研究要旨

本研究事業は2年計画で、わが国を含む先進諸国で実施されている国際高齢者パネル調査を利用して、異なる制度における高齢者の医療・介護保障や健康づくり対策の効果を検証し、高齢社会における医療保健政策ならびに社会経済政策に求められる要件を明らかにするとともに、高齢化が進むわが国における高齢者対応政策の特徴を浮き彫りにし、国際的な政策議論の中でわが国のプレゼンスを高めることを目的とした。初年度は日本のデータ（「くらしと健康調査」Japanese Study of Ageing and Retirement; JSTAR）データを用いて、引退による健康影響と社会参加への影響の記述分析を実施した。2年目となる最終年度は、JSTARを用いた先行研究を再分析しつつ、同様の分析を実施するために欧州のSurvey of Health Ageing and Retirement in Europe (SHARE)の公開データを入手・整備し、医療・メンタルヘルス・就労による健康影響に着目した比較分析を実施し、我が国の中高齢者の厚生労働政策の特徴を抽出することを試みた。その結果、我が国における65歳以上高齢者に対する医療政策の水準の高さが明らかとなる一方、50－65歳層に対する施策に課題が見られた。メンタルヘルスについては、日欧を通じて身体機能とメンタルヘルスの関連が一貫して強く抽出され、中高齢者の機能の維持向上とメンタルヘルス対策の不可分性が確認された。就労による認知機能へのネガティブな影響は日本と欧州で異なるジェンダーに見られ、引退・就労を巡る国間・ジェンダー間での保障政策や役割認知の違いなどを考慮した検討がさらに必要とされた。以上の検討を通じて、比較可能性の高い中高齢者パネルデータを用いた比較分析により、我が国固有の特徴と、先進国共通の高齢社会問題との抽出が可能となることが示された。引き続き科学的データ分析と比較制度論を高度に結合することで、世界をリードする高齢社会施策の発信を我が国から行うことが求められる。

A. 目的

本研究事業は2年計画で、わが国を含む先進諸国で実施中の国際高齢者パネル調査の比較分析を通じて、高齢社会における医療保健・社会経済政策に求められる要件を明らかにする。また高齢化が最も高度に進んでいるわが国の知見を他国と比較し提示することで、わが国における高齢者対応政策の特徴を浮き彫りにし、国際的な政策議論の動向の中でわが国のプレゼンスを高める。具体的には平成24年度はわが国におけるパネル調査（後述するJSTAR第3回データ）の分析を進める一方、次年度に向けて海外パネルデータの利用申請を行った。平成25年度は、我が国の制度と比較可能性が高い欧州データを用いて比較分析を実施し、比較政策的な議論を実施した。

高齢者割合が先進諸国中、最高となるわが国は、国際的フロンティアとして、高齢社会への対応をリードすることが期待されている。高齢者問題は、医療介護、就労・所得保障・家族間支援・社会的関係資本・住宅環境などあらゆる社会政策に及ぶ問題である。また高齢者とひとくくりにできず、多様・個別性を踏まえた政策対応が求められている。そのためには従来の縦割り調査ではなく、包括的な大規模パネル調査が必要とされ米国ではHealth and Retirement Study (HRS) が立ち上がり、政策立案に大きな影響力を発揮している。

わが国では「暮らしと健康」調査（Japanese Study of Ageing and Retirement）が2007年より開始され(Ichimura, et al. 2009)、2013年で第4回追跡が進行中である。われわれはJSTARのコアメンバーとして平成19-21年、22-23年厚生労働科学研究補助研究事業を通じて同調査実施を支援し、JSTARデータを用いた高齢者の医療・介護資源利用の状況とその要因について分析を重ねてきた。その実績を踏まえ、今回米国・英国・欧州などの姉妹調査とのデータ相互分析を実施することを企画した。

包括的大規模パネル調査を利用することで、これまで医療・介護、年金、就労など断片的にしか把握されていなかった高齢者の状況を、高齢者を中心とした生活観から鳥瞰することができる。これまで「高齢者対策」としてひとくくりにされてきたが、高齢者の状況は個別性・多様性が高いことから、経済・健康・社会状況に応じたセグメンテーションと、きめ細かい対応が求められている。包括的パネル調査は、そうした個別性への対応を可能とする。さらにこれを制度・文化・社会背景が異なる国同士で国際比較することによって、はじめてわが国における高齢社会問題の特徴、これまでの対応の特性・優位性・劣性などが

明らかとなることが期待される。

B．方法

先行研究が築いた中高齢者パネル（「暮らしと健康」調査（経済産業研究所ならびに一橋大学、東京大学の共同、研究代表者　清水谷諭・市村英彦）は先行研究の弱点を克服した国内唯一の高齢者を対象とした包括的パネルデータセットである。2007年より東日本を中心とした5地点で開始され、以後2年ずつ追跡調査ならびに新規地点の調査を導入し、現在全国10地点で実施されている。それぞれの地点（市町村）で住民票に基づき確率論的な代表的中高齢者サンプルを持っていることから、地域間の比較を行うことができる点が、欧米の先行研究においても見られなかった特徴となっている。2007、2009に実施された日本データ（JSTAR）の２回のパネルデータを主に用いた。JSTARが実施に当たって参考にしたのが、欧州各国の共同で2004年から実施されている Survey of Health Ageing and Retirement in Europe (SHARE)である。Munich center for the Economics of Ageing (MEA) ならびにMax-Planck-Institute for Social Law and Social Policyなどが中心となり、2004年のwave 1では北欧・大陸ヨーロッパなどを含む11か国で開始され、2010－11年までに18か国に展開し、最大4回の追跡調査を実施している。SHARE データは www.share-project.org のサイトを通じて、2013年11月現在、wave1から4までの個票データを公開している。データ利用登録・申請を実施することで、NetherlandsにあるTilburg University内にあるデータ管理センターからアクセスIDが発行され、誰でも利用が可能なように整備されている。今回はwave 1&2のRelease 2.6.0ならびに、imputationなども一部施したeasySHAREなどの加工データを用いて分析用データを作成した。

以上のデータセットを用いて、これまでJSTARを用いて実施してきた先行研究に基づき、医療サービスのアクセス公平性と医療受療の控えに関する分析を再検討・比較した。また中高齢者のメンタルヘルスに関する影響要因の抽出を行った。さらに引退による健康影響の推計を実施した。各分担分析に詳細を譲る。

なお上記の比較データ分析と並行し、平成25年度実施のJSTAR第4回追跡調査にあたり、健康・栄養関連調査項目を追加し、一部地点（佐賀県鳥栖市）において追跡調査を実施した。

C. 結果

１）平成24年度事業

JSTARのパネルデータを用いて、paid workからの離脱を引退とした分析を実施したところ、Paid workからの「引退」はメンタルヘルスに男性では負の効果が見られたが、女性では０ないし正の影響が見られ、引退のpropensityによる重みづけした結果では、さらにその傾

向が顕著だった。

しかし記述的分析を行った結果、引退の過程は複雑で、paid workからの引退過程も　フルタイムからパートなどを経るケースや、一気に引退に至るケースなど多様であり、その健康ならびに社会参加への影響は異なっていることが示唆された。また女性では専業主婦・家族の世話が引退的要素を含むものとそうでないものに分かれ、paid workを退く理由によって、その健康影響は異なっていた。社会参加については、その形態によってボランティアなどの地域参加、宗教・政治活動などの参加、趣味娯楽的活動への参加によって引退の影響は異なり、また男性では主に引退が社会参加を促進していたが、女性ではそうした傾向は認められなかった。

２）平成25年度事業

２－１）医療アクセスの公平性

外来診療アクセスは比較的公平性が保たれているものの、65歳未満で受療回数は低所得層でニーズが高い割に利用が満たされていないことにより、水平的不公平が存在することが示された。一方65歳以上の層では、アクセスならびに受療回数ともに、欧州各国と比較して水平的公平性の達成レベルは遜色が見られなかった。

２－２）費用を理由とした医療受療の控え

50歳以上75歳以下の層における医療・歯科など保健サービスの受療について、費用工面を要因とする受療控えの状況と、その関連要因について探索的に分析したところ、我が国では欧州各国に比べ受療控えの割合は低かった。その理由として、高齢者でニーズが高い歯科サービスや薬剤費用も公的保険がカバーしていること、フリーアクセス・高い医療機関密度によるアクセスの機会費用の低さ、さらに高額療養費制度などが、機能していると考えられた。一方、50～65歳では、欧州・日本に共通して、貯蓄の低さと糖尿病の2つが受療控えの有意要因となっていた。引退により労働所得から貯蓄の切り崩しへと家計が移行するとともに、医療ニーズが高まる年齢層で経済的理由による受療控えが国をまたいで見られたことは、自己負担など費用の適正化に加え、適切な受診行動を促す施策が必要とされていることが示唆された。

２－３）中高齢者のメンタルヘルスの規定要因

SHAREならびにJSTARで自記入式質問票に基づき、メンタルストレスの状況を測定し、それを規定する要因として、人口学的・社会経済的・機能要因などを探索的に検討したところ、日欧いずれにおいても機能状態・IADLや握力などとメンタルヘルスの関係が一貫して抽出された。このことから機能状態の維持は、高齢社会におけるメンタル対策として共

通のターゲットとなることが確認できた。その一方、年齢層・国などにより、婚姻や就労、子供との同居・隣接性などの影響は異なっており、家族制度・就労状況・所得水準・社会関係などは制度・文化により影響が異なる可能性が示唆された。特に子供との関連、所得・資産や学歴など社会経済的要因との関係は、中高齢者の生活を支える経済的・社会的資源の確保が多様性に富んでいることを示唆していた。

２－４）引退による認知機能への影響

傾向スコアマッチング・差の差分析により推計したところ、JSTAR男性、SHARE女性で、有意ないしマージナルに有意な認知機能の低下が検出されたのに対し、JSTAR女性、SHARE男性では有意な変化は見られなかった。国による就労・社会保障制度の違いに加えて、ジェンダーによる社会参加・就労参加の機会の違いなどを反映した可能性があり、今後比較制度論と合わせて、就労・引退の認知機能への影響を解釈することが必要である。

D. 考察

比較分析から得られたデータは、多様なニーズを持つ高齢者を的確にセグメントし、エージレス社会としての新しい高齢社会対策を打ち出すための、政策資料を提示するものとなる。本研究事業では、日本と欧州の比較可能性の高い中高齢者パネル調査データを分析することを通じて、高齢者に対する医療制度の特徴、メンタルヘルス対策の重点課題の抽出、就労・引退や社会参加と中高齢者の健康状態の間の密接かつ複雑な関係の理解を進めることが可能であることを示すことができた。先進国のみならず、中興国においてさらに深刻な形で出現する人口高齢化による社会・経済制度への影響と、それを克服する道筋の探索は、高齢社会問題がグローバル化したことを受けて、もはや一国の検討課題ではなくなっている。国や制度を越えた共通の課題と、社会規範や制度・文化の違いにより表現型が変わる問題とが混在する中で、比較可能性を持ち精緻な因果推計を許すパネル構造を有する、包括的データは、”glocal“な問題に対して科学的な評価・対処をするための強力な武器となっていることを本研究事業の２年間の活動を通じて確認することができた。実証的に高齢者の健康に影響する社会・経済など諸要因について検討を行い、高齢社会に対応するための科学的かつ開かれた政策議論を進めるための共通基盤として、引き続きパネルデータの構築・維持と、タイムリーな分析を進めるための活動を継続していくことが必要である。

E.　結論

２年間にわたる本研究事業の結果、本研究事業が目的と掲げた、中高齢者パネルデータの

国内外比較分析を通じて、我が国の中高齢者に対する、医療・健康づくり・就労などの政策について、その特徴の一部が浮き彫りとなった。我が国の施策が高度に達成している部分、欧州に比較して再検討が必要な部分などが抽出される一方、社会・文化・制度が複雑に絡む現象の存在も明らかとなった。今後こうした比較分析をより広く展開することで、世界をリードする高齢者対策を我が国から発信していくことが継続的に必要である。そのうえで、比較可能性の高い中高齢者パネルデータの構築・維持と、タイムリーな分析体制の確立が重要となることが確認された。

Title; Health Consequences of Transitioning to Retirement and Social Participation: Evidence from JSTAR panel data

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Despite of an extensive amount of published economic, psychological, and public health research, a consensual view on the causal relationship between retirement and health remains to be articulated. This lack of consensus is arguably due to the diversity in the transitional process from employment to full retirement, the usage of various characteristics of health outcome measures, social and economic conditions affecting the retirement decision, and the impact of crowding-out by activities substituting to formal work role (e.g., participation to the community network). We used panel data from the Japanese Study of Aging and Retirement (JSTAR) to fill the knowledge gap by scrutinizing the complex relationships among work status transition, social participation, and health conditions. We confirmed that transitioning from employment to retirement is a diverse and gradual process with distinct gender-related aspects. Social participation to informal community network is significantly related to exiting formal work situations for men, but not for women. Propensity-matched difference-in-difference analysis revealed that cognitive function declines after leaving paid work in male retirees, but not in female ones. The impact on cognitive function is significant when the retiree left work engagement with full-time basis, with less job stress, and with expected job security. Otherwise the decline was not significant. These results basically support the role theory of life transitions, and indicate that policies on work and health in the elderly population should facilitate retiree's gradual transitions of social roles diversifying according to ones' work characteristics, economic and social needs, and gender roles in the household.

Key words: retirement, cognitive function, social network participation, gender difference, panel data, propensity-matched difference-in-difference analysis JEL classification: I12, J14, J26

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I. Background

Retirement and retiree health status have been investigated by a large number of studies in the economics, psychological, and public health literature. However, a consensus on the causal relationship between retirement and health has not been reached. In the face of aging populations and increasing fiscal pressure from pensions for the elderly, economists have long been interested in health as human capital affecting retirement decisions [Gupta and Larsen 2010, Ichimura and Shimizutani 2012]. Recently, the impact of retirement on health has also been reported in the economic and public health literature [Behncke 2012; Bound 1989; Bound and Waidman 2007; Coe and Zammaro 2011; Dave, Rashad, and Spasojevic 2006; Fe and Hollingsworth 2011; Gallo, Bradley, Siegel and Kasl 2000; Lindeboom and Lindegaard 2010; Mojon-Azzi, Sousa-Poza, and Widmer 2007; Moon Glymour Suburamanian, Avendano, and Kawachi 2012; Sjo¨sten, Kivima¨ki, Singh-Manoux, et al. 2012; Westerlund Vahtera, Ferrie, et al. 2010; Zins, Gueguen, Kivimaki, et al. 2011].

Economists often use human capital theory to model the effect of retirement on health [Grossman 1972]. Because the Grossman model treats wage rate as a reflection of time cost and individual economic productivity, model implications for health investment after leaving paid work are somewhat vague [Dave, Rashad, and Spasojevic 2006]. Alternatively, psychologists who study retirement adjustment often rely on "role theory" and "life course theory" [Wang, Henkens, and van Solinge, 2011]. These theories regard retirement as a transition from the loss of work-related roles (e.g., as worker, or as organizational member) to the strengthening of other roles in the family and the community. Transitions in social roles affects wellbeing because social interaction exercised in different roles affects access to economic, psychological and social resources for health maintenance [Mein, Higgs, Ferrie, and Stansfeld 1998]. Studies on social relationship and elderly wellbeing have consistently found that elderly people who enjoy frequent social interaction have better physical, mental, and cognitive prognoses, and better survival after illness [Sugisawa, Sugisawa, Nakatani, and Shibata 1997: Sirven and Debrand 2008]. Consistent with the role theory, labor participation in later life could be beneficial because it allows access to economic investment in health, and provides opportunities for health-generating social participation.

One could argue, however, whether all types of labor participation can be health generating. Some types of labor have a deleterious effect on health (e.g., jobs with higher stress, hazardous toxic exposure, and excessive physical strain). Models published in the economic and social psychological literature have mostly failed to incorporate differences in retirement-health association across occupational types. In their panel survey of UK civil servants, Mein et al. (2003) included these differences and found that retirement was related to stress reduction for higher occupational classes, but not for lower occupational classes. Their study results also indicated that the types of health stock (e.g., physical, mental, cognitive, functional and social aspects) may be

differently affected by retirement, depending on the nature of pre-retirement occupational types and required capability.

In this discussion paper, we intended to add evidence on the ongoing discussion over health impact of work status transition in one's later life by use of a panel data derived from the Japanese Study of Ageing and Retirement (JSTAR). JSTAR interviews consist of questions about current employment status, type of employment, reasons for retirement, job stresses, and various measures of health (e.g., functional, cognitive, and mental). A supplemental questionnaire is used to collect information about social support, social networks, the types and frequencies of social participation, and perceived social capital. The rich data of the JSTAR would enable us to specify the causal impact of work status transitions onto health.

We begin the next section with a descriptive statistical analysis of work status transition from wave 1 to wave 2. The analysis was performed using stratification by gender because patterns of work status trajectory displayed distinct between-gender differences (i.e., female respondents viewed homemaker status as an alternative status to retirement). Description of the trajectory patterns helped us confirm that retirement is a gradual process, and that the treatment of homemaker status is problematic among females. Participation in different types of social networks was compared across work status trajectory categories to investigate whether social participation and labor participation endogenously affect each other. Interestingly, we found gender differences in the association between leave work status and participation in social networks. Retired male respondents were more likely to participate in voluntary and leisure activities. There were no significant associations with social participation among retired females or among homemakers. The results suggest that in males, the pattern of social participation may confound the health effect of retirement. With the results of descriptive analysis above, we conducted a propensity matched difference-in-difference analysis that revealed cognitive function is significantly declined among males who left paid work status, but the impact was not observed in females. Adhoc stratified analysis among male workers further identified that cognitive decline was only remarkable in males engaging with fulltime job, less job stress, and expected job security. These results are in accordance with the role theory, indicating that the causal relationship of labor participation onto health is conditional on gender roles, job characteristics. In the final section, we discuss policy implication of our results to form labor and health policy for the people in their mid to later life.

II. Descriptive analysis of transition in work status transition and social participation in the JSTAR population

II-1. Definition of retirement and work status transitions between wave 1 and wave 2

JSTAR interviewers ask whether the respondent currently participates in the labor force, including

tentative leave. If the respondent answers NO, a follow-up question asks whether he/she is currently seeking employment opportunities. If the answer to this question is YES, the respondent is categorized as "unemployed." If the answer is NO, the respondent is asked to choose the category that best describes his/her current status: "retired", "homemaker", "convalescent", or "other".[1]

Table 1-1 presents the trajectory of work status transition between waves 1 and 2 for both genders and for all age categories. Tables 1-2 and 1-3 present the results of a stratified analysis for male and female respondents. There was a 20–30% loss to follow-up in each category. Gender differences were observed in the attrition rate among retirees and homemakers at the time of wave 1; male homemakers and female retirees were likely to drop out of follow-up survey.

For both genders, respondents with full-time, part-time, and self-employed labor participation status were most likely to remain in the same category after two years. Striking gender differences were observed for the categories of "other employment", "unemployment", "retired", and "homemakers" at the wave 1 study period. Males in other employment or unemployment during wave 1 had the highest proportion of retirement during wave 2 (24.0% and 29.6%, respectively), followed by part-time workers (10.0%). Female retirement rate was less than 2% in all categories. Females in other employment were most likely to stay in the same category after two years, and females unemployed at wave 1 were most likely to become homemakers at wave 2 (32.6%). An unexpected finding was that 47.4% of females who defined themselves as retired at wave 1 returned to homemakers at wave 2. The descriptive analyses results presented in Tables 1s suggest that males transited to retirement via other employment, unemployment, and part-time status. Female respondents were more flexible in the use of homemaker status interchangeably with retirement status.

JSTAR also asks whether respondents were re-hired after compulsory retirement. About one-half of male respondents who were in full-time employment at wave 1 and have transitioned to a part-time position at wave 2 were re-hired (not shown in tables). About 22% of these re-hired males transited from part-time to part-time positions. In contrast, only a quarter of the female respondents who transitioned from full-time to part-time positions were re-hired cases. A considerable proportion of males transited to retirement through non-full time positions instead of shifting directly to retirement. Females take a different path to retirement.

To summarize, the descriptive analysis findings presented in this section were:

1. Retirement is a gradual process rather than a discrete event.

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[1] Ichimura and Shimizutani [2012] further used self-reported work time for formal paid work as a marker for "retirement" because of inconsistencies in self-reported retirement. We did not use this strategy because we defined retirement more broadly than "leaving formal labor force."
However, there may be some misclassification of status because some respondents indicated they were "at work" even though they were only working a few hours per day.

2. Males and females take different paths to retirement. Males use part-time and other work status conditions as a transit from fulltime to full retirement from paid work. Among females, change to homemaker status is used as an alternative to full retirement.

II-2. Descriptive analysis of work status transition and change in social participation

JSTAR asks respondents if they participate in social relationships other than with family, relatives, and friends, or in social settings other than the workplace. We performed a multiple correspondence analysis (a multivariate statistical technique for categorical data) to reduce the questionnaire's eight types of social network participation to a smaller number of categories. The resulting categories were "commitment", "prestige", and "preference-based" networks. Commitment network participation reflects activities such as volunteer activities in the community and other commitments that support the neighborhood. Prestige network participation consists of political and/or religious activities. Preference-based network participation includes sports, leisure, hobby, and learning activities.

Tables 2-1 to 2-3 present the proportions in each category of social network participation by categories of work status transition for males. Participation in commitment and preference-based networks occurred more frequently than participation in prestige networks. Compared with wave 1, males who became new retirees at wave 2 showed an increase in the proportion that joined commitment and preference-based networks. We also performed a logistic regression that used male participation in networks at wave 2 as a target variable (Table 3-1). Retirement at wave 2, adjusting for age, education, marital status, working status at wave 1, and corresponding network participation at wave 1, was significantly associated with the likelihood of joining commitment and preference-based networks at wave 2 (odds ratio=2.14 for commitment network, odds ratio=3.02 for preference-based network). Tables 2-4 to 2-6 and Table 3-2 present the results of similar analyses for females. The proportions that joined network activities were generally lower among females compared with males. For females, retirement and homemaker status at wave 2 was not associated with the likelihood of joining social network activities of any kind at wave 2.

To summarize this section;

1. In males, transition from paid work to retirement was significantly associated with participation to social network outside of the workplace, while females did not show change in social network participation for neighborhood and personal activities in the process of work status transition.

III. Health outcomes, work status transitions, and social participation

III-1 Analytic model and data description

In this section, we will conduct the final stage of our analysis to reveal the health impact of work status transitions using wave 1 and wave 2 data derived from JSTAR. In the previous studies, there were used several strategies for the purpose. Dave, Rashad and Spasojevic (2006) relied on the fixed effects model to account for time-invariant unobserved heterogeneity in the use of panel data of Health and Retirement Study. They limited their participants to those without health conditions at the baseline, arguing that the sample selection as such would prevent reverse causation from health to retirement. However, they did not explicitly control for the retirement selection process in their model. Alternatively, Coe and Zammaro (2008) used the age of compulsory retirement across different countries participating in the Study of Health Ageing and Retirement in Europe as an exogenous instrument for retirement. However, physiological age is a strong predictor of various health conditions, and at least theoretically, the relevancy of the instrument is questionable. Another strategy was adopted by Behnck (2010) where propensity to predict the likelihood of retirement in the subsequent wave was matched. However, there remained possible misspecification due to unobserved confounders. To overcome pitfalls in the previous studies, we chose to adopt propensity-matching difference-in-difference approach to account for the likelihood of work status transition, while controlling for unobserved time-invariant confounders. Propensity to predict leaving the status of paid work at wave 2 was obtained by probit regression model regressing on demographic, economic, social, and health conditions at the time of wave 1 to prevent reverse causation from health to retirement, following Dave, Rashad, and Spasojevic (2006). Then the matched pairs of those actually left paid work status (treated) and those remained the status (control) were compared in terms of their health differential between wave 1 and wave 2.

In the JSTAR, we have a variety of health measures such as self-reported health status (SRH), instrumental activities of daily life (IADL), grip strength, psychological depression measured with the Center of Epidemiology Studies Depression scale (CESD), comorbidities (e.g. heart disease, stroke, cancer, etc.), and cognitive functions. SRH, IADL, and psychological depression are influenced not only by physical and mental health statuses but also by the degree of support from the surrounding environments. SRH and depression are further responsive to transient psychological stress by life events other than retirement, and more vulnerable to report bias. The features of these health measures are susceptible to unobserved and time-variant heterogeneity which may not be cancelled out by fixed effects modeling. Grip strength is the most objective measurement of physical health among available measurement in JSTAR, and is known to predict the prognosis of survivorship and functional independence. However, our preliminary analysis suggests that grip

strength is a predictor of retirement decision rather than its consequence. Comorbidities of chronic conditions such as heart disease, stroke and cancer have been adopted as an outcome in previous studies. We chose not to use comorbidities because these conditions are more likely to be affected by life-course accumulation of risk factors and availability of healthcare, rather than a tentative event of retirement. Finally, cognitive function is an important function affected by change in cognitive demand in daily lives as is discussed in Coe and Zammaro (2008). The function is also influenced by age-related diseases (e.g. Alzheimer disease) and one's educational achievement, of which impacts are rather time-invariant. We chose to use cognitive function as a targeted outcome in our analysis, following Coe and Zammaro (2008).

In JSTAR, HRS, and sister surveys, measurement of cognitive function includes orientation, numeric calculation, and word recall. Disorientation was quite rare among JSTAR respondents, and not suitable for our analytic purpose. Word recall measurement asks respondents to remember the names of 10 objects (nouns) in the presented cards, then to immediately recall as many as possible (Ofstedal, Fisher and Herzog, 2005). The count of correct answers ranges 0-10, reflecting short-term working memory and vocabulary abilities. We used word recall in our analysis.

We limited our sample to those aged less than 65, age younger than legal eligibility for public pension, and were engaged in paid work at the time of wave 1. The propensity of leaving paid work status at wave 2 was obtained separately for genders, since as we have confirmed in the previous sections, the pattern of status transitions were distinct by gender groups. The propensity was obtained by regressing on residential place, age, educational achievement, and economic, social, and health conditions at the time of wave 1. Economic factors included income and deposit. Social factors included respondent's participation to commitment and preference-based social network. Finally, health conditions included IADL limitation, grip strength, depression, current smoker status, and dummy codes for comorbidities (heart disease, hypertension, stroke, diabetes, cancer, cataracts, and arthritis). The calculation of propensity score was conducted using a built-in STATA 13 command of "pscore" with logistic regression and checking balanced distribution across included predictor variables. Then, kernel propensity matching was performed with "attk" command. Nearest neighborhood matching was conducted by "teffect nnm" command with bias correction adjustment for continuous variables. One-to-one propensity score matching with nearest neighbor was conducted with "teffects psmatch" command. All the procedures obtained Average Treatment Effect on the Treated (ATET) rather than Average Treatment Effect (ATE). Multiple imputation with chained equations was performed using "mi impute chained" command in STATA.

III-2 results

Tables 4-1 and 4-2 displays descriptive statistics of targeted sample who were aged at 65 years or younger at the time of wave1, and were engaged in paid work status, after multiple imputation stratified by gender groups. Tables 5-1 and 5-2 show the results of logistic regression to predict propensity for leaving paid work status at the time of wave 2, regressed on respondent's characteristics at the time of wave 1. The prediction models for propensity scores showed significant likelihood ratio test statistics in males, but marginally significant in females. Pseudo-R-squares were around 0.11~ 0.13, suggesting that we may have misspecification to predict leaving paid work at wave 2 in our model.

Table 6-1 shows the estimation results of ATET using kernel matching, nearest neighborhood matching by Mahabinolous distance, and propensity score matching using the nearest neighborhood one-to-one matching, stratified by gender groups. To save overlapping assumption between treatment and control groups, the number of observations included in the analysis was smaller than the original number of samples. The estimated ATET was negative, suggesting that leaving paid work at wave 2 led to decline in cognitive function. The significance of estimation was varying according to matching algorithm. Results of one-to-one nearest propensity matching was significant, though we need some caution because the method has limitation in providing reliable estimation of standard errors. The lower rows of the table presents the results of ad-hoc stratified analysis by job characteristics. Those engaged in fulltime job, job with stress, and expectedly secured job showed a negative ATET estimation, while those engaged in non-fulltime status, job with less stress, and unsecured job exhibited null impact in cognitive function.
Table 6-2 shows the results for female sample. Except for nearest neighbor matching, the estimated ATET was close to zero. Even the nearest neighbor matching, the result was far from statistical significance.

IV. Discussion and Conclusion

Transition in work status in JSTAR participants was diverse and gradual. There was also striking gender differences in their trajectory path from labor participation to full retirement. For female respondents, becoming a homemaker was interchangeably used as an alternative to retirement. Thus, the results of treating "retirement" as a binary variable in the analytic model should be interpreted cautiously. In our analysis, we focused on "leaving paid work" as a transition event, which may indicate several attributes in one's later life. Leaving paid work may imply a loss of labor income, but is not necessarily accompanied by relief from social responsibility as a bread earner, or by a loss of social participation [Chaix, Isacsson, et al. 2007]. One may choose to shift from full-time

to non-full time work status, taking into consideration loss of income against gain in leisure, health investment, family care, or simply availability of job opportunity. Leaving paid work status was related to the likelihood of participating in some type of social networks, though network participation at wave 1 was not a significant predictor of leaving paid work at wave 2, as our propensity score model showed. The association between work status transition and social network transition was not so remarkable for females.

The decline in cognitive function among male retirees who left paid work at wave 2 was in accord with what the role theory predicts. Those males who had been with full-time engagement in paid work may face a gap in social role when they loses their role as an employee, while non-full-time workers may have a gradual transition which allows them to better learn a new role in family and community. Females had a relatively narrower disparity in functions across work status transition. Many of females worked as a part-time basis, and their balance between roles as a worker and as a homemaker may allow female workers to obtain richer role repertoire that may make them proof against cognitive decline due to role transitions.

The results from JSTAR participants may provide important implications for health and labor policy in ageing society. Policies to ease role transitions may have a health impact to save cognitive function of the elderly. Skill training and career building in community and family during paid work engagement is already adopted in some companies as a preparation for the "second" life after retirement.

Finally, some caution is necessary. The measurement of word recall was unexpectedly improved between wave 1 and wave 2 despite of physiological ageing for 2 years, suggesting there worked learning effect in the measurement. In our analysis of difference-in-difference, we assumed that the learning effect occurred homogenously across the sample, though the assumption may not be valid. In the following waves, the word recall was limited to those aged over 65, and the latest wave in 2013 reopen the measurement for all age groups. Once the data become available, the finding in this study should be confirmed with extended measurement.

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