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The Effect of Social Pension on Material Hardship among Older Adults in Korea: Regression Discontinuity Estimation

Seoyeon Ahn¹, Ji Young Kang^{2*}, Yung Chun³ and Sojung Park⁴

¹National Pension Research Institute, Jeonju, South Korea, ²Department of Social Welfare, Chungnam National University, Daejeon, South Korea, ³Social Policy Institute, Washington University in St. Louis, St. Louis, US and ⁴Brown School of Social Work, Washington University in St. Louis, St. Louis, US

*Email: jiyoungksw@gmail.com

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Abstract

The goal of this study was to examine the effect of a social pension programme for older adults in South Korea, Basic Pension Scheme (BPS) on material hardship and subjective well-being. We apply a regression discontinuity design (RDD) to estimate the effect of the BPS on the material hardship and life satisfaction of older people between the ages of sixty-one and sixty-eight. Data come from Korea Welfare Panel Study (KOWEPS) wave 12 survey (2017, N = 3,932). The BPS benefit reduces the risks of housing hardship, bill payment delay and food insecurity. Interestingly, while the effect sizes of the BPS on mitigating the material hardship increase as income decreases, the lower-income groups were less satisfied with the pension provision than middle- and upper-income groups. This study contributes to the growing body of literature on material hardship for older adults in an Asian country facing persistent old-age poverty and immature public pensions.

Keywords: Basic Pension; material hardship; life satisfaction; old-age poverty

Introduction

Material hardship or deprivation generally refers to the inability of a household to afford necessary goods and services (e.g. food and medication) (Fusco *et al.*, 2010; Donni, 2019). As a non-monetary, outcome-based measure of material well-being, material hardship is a more accurate direct measure of multi-dimensional poverty than the conventional income-based poverty indicator (Nolan and Whelan, 2010). As the global population ages, poverty has urgent policy implications for older adults' economic well-being and social cohesion. To date, most anti-poverty policies and programmes are based on the income-based indicator. For older people, however, standard measures of income poverty may underestimate their material hardship (Morciano *et al.*, 2015) since current income may capture only a fraction of the resources at their disposal (Adena and Myck, 2014). Age-related physical and cognitive decline may exacerbate a person's well-being even when his or her income is relatively high (Levy, 2015).

This study contributes to the growing body of literature on the effect of social pensions for older adults in Asian countries facing persistent old-age poverty and immature public pensions. Social pensions have been increasingly implemented in various regions throughout Latin America, Africa, and Southeast and East Asia (Willmore, 2007; Yang *et al.*, 2010; Hujo and Cook, 2012). However, the effects of non-contributory social pensions can vary across different contexts. As a developed country, Korea faces severe old age poverty, the highest among Organisation for

Economic Cooperation and Development (OECD) countries (OECD, 2022a). The slow expansion of contributory pension programmes has led to a significant expansion of the role of the social pension (i.e. non-contributory cash payments to older people – Koh and Yang, 2021). It is policy-relevant to examine whether and how social pensions reduce material hardships among the old age population in relation to their different needs for food, housing, or medical services in the Korean context. In so doing, this study contributes knowledge of East Asia to the Western-based body of knowledge on material hardship among older people.

Focusing on the Korean experience, we examine the effects of public cash transfer programme on material hardship and non-material well-being among older households in Korea. To date, investigations of national anti-poverty programmes in Korean and international settings have focused on poverty reduction using an income-based indicator (Amuedo-Dorantes and Juarez, 2015; Lee *et al.*, 2019). Using a quasi-experimental design and data from a nationally representative panel survey of South Korean adults, this study evaluates whether and to what extent the transfer programme decreases older households' material hardship generally and by category. Empirical evidence of the differential effects on more disadvantaged older adults is particularly important for non-contributory pension programmes, given policymaking factors that determine whether and how to allocate resources to the neediest people (Barrientos, 2015).

Background

Policy context: social pension programme in Korea

By 2050, 38.2 per cent of Korea's population will be aged sixty-five or older (Ministry of Health and Welfare, 2012). At 49.6 per cent, Korea's later-year poverty rate is the highest of any OECD country, and four times higher than the OECD country average (OECD, 2015). The yet-to-mature public pension system has exacerbated this spike in Koreans' later-year poverty. Its twenty-year-old contributory public pension scheme, the National Pension Scheme (NPS), covers less than 50 per cent of its working-age population (Jones and Urasawa, 2014) and the income-replacement level remains only about 20 per cent (National Pension Research Institute, 2016). In 2008, the basic old-age pension (BOAP) was introduced to complement the NPS to address the problem of poverty among older people. The BOAP is a means-tested, non-contributory pension for older people whose income is below a specified threshold.

However, BOAP, a non-contributory pension called a social pension, was not successful in addressing poverty among older people. The electoral pledge by President Park also fuelled calls for an increase in benefit amount. In July 2014, the government replaced the social pension programme with the Basic Pension Scheme (BPS), which doubled the monthly benefit levels while keeping the coverage of 70 per cent of the older population intact. It provided a maximum monthly benefit of 200,000 KRW (about USD 166.18 as of 2020) to single persons and 320,000 KRW (about USD 265.89) to couples in 2014¹. This expansion, known as one of the largest social welfare reforms in Korean history, provides an interesting opportunity to examine how the increase of benefit amounts affected elderly's material hardships.

Social pension and material hardships

The outcomes of welfare policy programmes can be evaluated with indirect indicators, such as income or resources, or direct measures, such as expenditure or quality-of-life indicators (Ringen, 1988). As a non-monetary, direct measure of material well-being, material hardship measures a household's actual living standard by focusing on the affordability of necessities (Guio *et al.*, 2012) such as food, housing, utilities, medical care, clothing, and consumer durables (Beverly, 2001). Cumulative research has shown income, poverty, and material hardship partially overlap; in many countries, those are completely distinct between the groups of people who are considered poor based on income and those deemed poor based on hardship (cf. Weon and

Rothwell, 2020). The discrepancy is not surprising given that a material hardship can occur when a household is above the national poverty line, just as households below the national poverty line are not necessarily deprived (Whelan *et al.*, 2004). Material hardships are not always of monetary nature (Israel, 2016), but pertain to a household's needs or resources. A person is considered deprived when she cannot achieve a particular doing or being because she does not have the financial resources (Saunders and Wong, 2011; Guio *et al.*, 2012).

Social pension can increase someone's resources in old age by supplementing the market income, thereby reducing material deprivation for people who would otherwise not have enough financial resources to finance their lives. Given that older adult households are more likely than the working age population to have lower fixed (regular based) incomes, the BPS benefit, paid on a regular basis (monthly), can redress the structural constraints in consumption for purchasing the basic needs for older adults and reduce material deprivation.

A growing body of research supports the role of public transfers on material hardship among older adults in international contexts. Public transfers have improved food insecurity (Case and Menendez, 2007), poverty, or consumption in India (Unnikrishnan and Imai, 2020), in Mexico (Galiani *et al.*, 2016), in China (Wu and Ramesh, 2014; Zheng and Zhong, 2016), and in the USA (Lu *et al.*, 2021). Notten and Guio (2020) showed that the universal social transfer could substantially reduce material hardship among older households in EU countries. The effects of social transfer are found to be greater among low-income countries or where people reported severe material hardship.

In the Korean context, many up-to-date studies have focused on the effect of BOAP, the previous form of BPS, and found that it reduced difficulties in paying tax and for adequate heating (Shin and Do, 2015), increased consumption (Shin and Do, 2015; Jung *et al.*, 2016; Koh and Yang, 2021), economic satisfaction (Kang and Moon, 2013), or non-financial well-being (Pak, 2020). A few studies have examined the effect of BPS and found that it brought a 9.3 per cent decrease in the poverty rate and a 47,000 KRW decrease in the poverty gap (Lee *et al.*, 2019), as well as significant increases in total expenditure of about 144,300 KRW (116 US dollars) (Kang *et al.*, 2022).

Nonetheless, the impact of the social pension on material hardship may not be substantial if it causes behavioural changes, such as a decline in private transfers from children or a decrease in labour supply among older adults. These two potential factors are relevant to the Korean context. Korea's older population tends to have high reliance on private transfers relative to those in counterpart countries (Whang *et al.*, 2021) and the immature national pension system and confucianism culture highlights the responsibility of children to take care of their parents in old age. On average, private transfers comprise approximately 27 per cent of household incomes for elderly individuals (Koh and Yang, 2021). While a line of research found no significant crowding effect from public transfer (Lee *et al.*, 2019; Pak, 2020), others accumulated evidence of the crowding out of private transfers in Korea, thereby making insignificant changes to disposable income (Jung *et al.*, 2016) or making the overall impact of BOAP on economic well-being less significant (Koh and Yang, 2021). If the crowd-out effect occurs, the public transfers may not effectively improve material hardship. Furthermore, a social pension could affect the labour supply among the older population. Employment rate among the older population in Korea, 34.1 per cent of Koreans aged sixty-five and above, is the highest among OECD countries in 2020 (OECD, 2022b). Koh and Yang (2021) found that the effects of BOAP on the probability of being employed and on working hours among the elderly were low and statistically insignificant. However, another study indicated that a social pension increased the likelihood of retirement and reduced working hours (Unnikrishnan and Imai, 2020).

Present study

Even though many studies found a positive effect from the social pension in poverty reduction, little is known about the effect of BPS, which raises an interesting question about setting up empirical evidence of newly implemented policy in Korea. We first asked to what extent the BPS, affects

the material hardship and life satisfaction among older adults as a growing research emphasises the importance of the simultaneous examination of material well-being and subjective well-being (Lloyd-Sherlock *et al.*, 2012). Next, we examined if and to what extent the effects of BPS on the material and non-material well-being varies by income level. This study contributes to the literature that investigates whether social pensions in Korean and international settings have focused predominantly on income increases and poverty reduction (Jensen, 2004; Kakwani and Subbarao, 2007; Gasparini *et al.*, 2010; Amuedo-Dorantes and Juarez, 2015; Lee *et al.*, 2019) by examining the effect of the BPS on material hardship among older adults. Furthermore, a detailed examination of the social pension on material hardship and well-being by income level can provide a better picture of whether and to what extent the cash income may help people at the lower end of the income distribution range (Israel, 2016).

Data and sample

This study uses panel data from the Korea Welfare Panel Study (KOWEPS), an annual longitudinal survey of South Koreans aged fifteen and older. Since 2006, KOWEPS has interviewed, analysed, and disseminated information from a representative sample of 7,072 families (Kim *et al.*, 2006), providing information on socioeconomic characteristics, annual household income, and family structure in combination with assessments of health and physical development of each household member. For this study, we used wave 12 (from 2017).

We restrict our sample to those who are likely to be eligible for the Basic Pension: Koreans whose income and assets are less than or equal to 70 per cent of the total older population. As the household is the unit of observation for the asset measurement in KOWEPS, the estimation of individual income or assets was not possible. Therefore, in this study, the sample consists of the head of the household and their spouse. Also, considering the well-known under-reporting of income and asset information in survey data, we did not use the official income and assets in 2017 as the receipt of BPS benefit. Instead, we used the 2017 official calculation formula to determine the income and assets of the bottom 70 per cent of the older population in this dataset. We then selected those individuals whose income and assets were equal to or under 70 per cent of this entire sample ($N = 4985$). From this initial sample, we further excluded those who are recipients of National Basic Livelihood Security (NBLSS) ($N = 468$), a minimum income guarantees for poor households below the poverty line. For the NBLSS recipients, their benefit amount is designed to be reduced by the equivalent of the payout from the BPS. As such, an accurate estimation of BOAP benefit among the NBLSS recipients would be challenging. After deleting observations with missing dependent variables ($n = 194$, 4.3 per cent), the final study sample for a nonparametric Regression Discontinuity Design was to 4,323 individuals. Then, we restrict sampling to those who are forty-five years old or over for the parametric approach to generalise the causal effect of the treatment among the middle-aged population ($N = 3,932$).

Empirical model design

To evaluate the impact of BPS receipt on material hardships and life satisfaction of older people aged sixty-five and over, we used two empirical approaches: a conventional parametric approach and a nonparametric Regression Discontinuity Design (RDD).

Parametric approach

To estimate the BPS impacts, we use the following set of regression models:

$$Y_i = \beta_0 + \rho D_i + \gamma X_i + \varepsilon_i$$

where Y_i is an outcome measure for observation i , X_i is a set of covariates, and ϵ_i is a random error term for observation i . Most importantly, D_i is a dichotomous eligibility indicator; i.e. $D_i = 1$ for eligible population, those whose age is above the cutoff (i.e. sixty-six); otherwise, $D_i = 0$. Then ρ estimates the treatment effect of the BPS near the cut-off point ($x_c = 66$). Depending upon the types of dependent variables, we employ Ordinary Least Square regression (material hardship indicator and life satisfaction measure) and Logistics regression approaches (four domain-specific hardships measures). For an intuitive interpretation of the logistic regression results, we report marginal effects of each independent variable, which estimate percentage points change in the risk of a dependent variable in accordance with a unit increase in the independent variable.

Dependent variables

For material hardship, we construct two types of hardship indicators – domain-specific and overall – building upon previous investigations of the measurement properties of hardship indicators (US Department of Health and Human Service, 2004; Israel, 2016; Ahn and Song, 2017; Notten and Guio, 2019). Starting from European countries with the EU's stated goal to reduce material deprivation and social exclusion, research on material deprivation has gained importance in countries, such as Australia, Canada, and New Zealand (Saunders and Wong, 2011; Perry, 2015; Notten, 2016). In the United States, research communities use similar but not identical material hardship indicators (Huston and Bentley, 2010; Wu and Eamon, 2010). Even though many studies do not reach a consensus on the definition and measurement of material hardship, many consider deprivation as a binary condition based on a total number or a threshold of individual items (Israel, 2016; Notten and Guio, 2019). Some based on the U.S. contexts also use domain-specific material hardships and food insecurity, housing insecurity, utility needs, and medical needs are often derived (cf. US Department of Health and Human Service, 2004). Housing crowding, housing quality, and durable goods have also been explored in a few studies, but we did not include them in this study because KOWEPS does not have questionnaires related to this domain.

We selected the following items from the KOWEPS:

- *Housing problem*: (1) You/your family had to move out due to a default on rent payment for more than two months (1 = yes, 0 = no); (2) You/your family could not afford to heat your home (1 = yes, 0 = no).
- *Difficulty with basic utility bills*: (1) Difficulty meeting monthly bills (1 = yes, 0 = no); (2) Utilities (i.e. electricity, phone, water) were cut off because you failed to pay taxes (1 = yes, 0 = no).
- *Health care hardship*: (1) You/your family members could not afford to seek necessary medical care (1 = yes, 0 = no); (2) You/your family members had your national health insurance benefit suspended due to a failure of contribution (premium) payment (1 = yes, 0 = no).
- *Food insecurity*: (1) 'The food that (I/we) bought just did not last, and (I/we) did not have money to get more' (1 = never true, 2 = sometimes true, 3 = often true); (2) '(I/We) could not afford to eat balanced meals' (1 = never true, 2 = sometimes true, 3 = often true); (3) 'In the last 12 months, did (you/other adults in your household) ever cut the size of your meals or skip meals because there was not enough money for food?' (1 = yes, 0 = no); (4) 'In the last 12 months, did you ever eat less than you wanted to because there was not enough money to buy food?' (1 = yes, 0 = no); (5) You/your family was ever hungry but did not eat because you could not afford enough food? (1 = yes, 0 = no)

For each hardship indicator, we coded 1 for those who reported that they experiences more than one hardship in each question (Nahm, 2010). For the aggregated material hardship indicator, we construct a continuous measure by summing the four recoded items. The total score indicated

levels of severity of material deprivation on a continuum ranging from 0 to 4, with higher scores indicating more material hardship.

We operationalise life satisfaction by adopting a question on it ('How satisfied are you with your life?') measured using a 5-point Likert scale ranging from 1 ('very dissatisfied') to 5 ('very satisfied') and treat it as a continuous variable.

Covariates

A set of demographic characteristics is controlled: age, age square; gender (women = 0, men = 1); education (up to elementary = 1, middle = 2, more than high, but less than four years of college = 3, more than college = 4); number of family members; living arrangements (single = 1, couple only = 2, single with children or other family members = 3, couple with children or other = 4); and region (rural = 0, city = 1); number of working persons in the household; disability status (no disability = 0, any disabilities = 1); chronic disease history (non-chronic condition = 0, any chronic illnesses = 1). In order to control the roles of private transfers and labour supply that might have influenced on the effect of social pension, we included total amount of private transfers (as logarithm) and working status (not working = 0, working for pay = 1).

Regression discontinuity design

One of the drawbacks of conventional parametric regression approaches is internal validity. That is, due to the potential existence of unobservables as well as endogeneity, results from such parametric models are easily biased (Manski, 1993; Keele and Minozzi, 2013). The main advantage of RDD over other competing approaches is that it is closer to a natural experimental design as individuals close to a given cut-off are likely to be very similar, and the only thing that makes them different is the treatment assignment below and above the cut-off (Imbens and Lemieux, 2008; van der Klaauw, 2008; Lee and Lemieux, 2010). RDD enables us to take into account both observed and unobserved heterogeneity in the estimation of the treatment effect (the impact of the programme) because one below the cut-off could be a counterfactual for those who are above the cut-off, and vice versa, if they are close enough to the cut-off. In this study, we adopt the fact that observations just below and above the cut-off (age sixty-five) are likely to be very similar to each other concerning observed and unobserved characteristics; hence, the mean difference in the values of the outcomes identifies a Local Average Treatment Effect (LATE) of the BPS for the subpopulation of people at or near age sixty-five.

Because the RDD estimates LATE of the treatment of interest, we limit the sample to those who are close enough to the cut-off. Then an important issue is how to define the term 'close enough' through a bandwidth selection process. In general, the selection of bandwidth in nonparametric estimations aims to balance precision and bias. Using a broader bandwidth is likely to yield more precise effects because of using more data for the regression, but this also leads to bias and vice versa. Although it is advisable to check for the appropriate functional form, in practice, it may not be as critical when one is modelling using data very close to the cut-point – especially if there are very large samples in this interval. This is because the smaller the analytic bandwidth, the more likely it is that the slope of the regression line is approximately linear in this smaller interval (McCall and Bielby, 2012).

Hence local regression models focus on their subsample to estimate the LATE. A distinct difference between the nonparametric RDD approach and other conventional local regression models is that the former determines its bandwidth for the local estimation based upon its given data. Of many bandwidth selection procedures, we adopt mean squared error (MSE) optimal bandwidth selector, which is the default bandwidth selector for the RD treatment effect estimator. We also note that the results with the MSE are robust and similar to other bandwidth selection procedures, such as coverage error-rate (CER)-optimal bandwidth selector.

We utilise the ‘sharp’ RDD² to estimate discontinuity in outcomes at the age cut-off. Our main estimating equation is given by

$$Y_i = f(x_i) + \rho D_i + \varepsilon_i$$

$$D_i = \begin{cases} 1 & (\text{if } x_i \geq 66) \\ 0 & (\text{if } x_i < 66) \end{cases}$$

where Y_i is an outcome measure for observation i , $f(x_i)$ is an unknown smooth function of the running variable, i.e. age, and ε_i is a random error term for observation i . Most importantly, D_i is a dichotomous eligibility indicator; i.e. $D_i = 1$ for eligible population, those whose age is above the cutoff (i.e. sixty-six); otherwise, $D_i = 0$. Then ρ estimates the treatment effect of the BPS near the cutoff point ($x_c = 66$).

The analyses were conducted in the following order: to check design validity for RDD modelling, we first graphically check the distribution pattern among key variables. Second, parametric and RDD modellings are conducted with the entire sample, then followed up by the same set of analyses with three split samples by income level equalised by household members.

Empirical findings

Sample characteristics

Table 1 presents summary statistics for the sample used for the parametric model. The largest proportion in the sample had food insecurity (7.9 per cent), followed by utility (2.7 per cent) and housing (2.3 per cent). A clear, descriptive pattern indicates that individuals in the lower-income group tend to have more food insecurity (18.2 per cent), utility insecurity (3.8 per cent), and housing insecurity (5.4 per cent). Members of this group tend to be older, female, with limited education, and single. They also had a higher incidence of disability (22.0 per cent) and chronic disease (85.8 per cent).

Analytic results

Parametric approach

Table 2 indicates that recipients of the BPS were likely to have less sense of material hardship in aggregate form (-0.069 , $p < 0.05$), and less hardship in housing (-0.021 , $p < 0.05$) and food insecurity (-0.055 , $p < 0.01$). The recipients also tended to be satisfied with their lives (0.13 , $p < 0.01$). In terms of income (Table 3), we did not find any discernible influence of the benefit on material hardship in aggregate form, except in the lower income group at a marginal degree (-0.150 , $p < 0.1$). The positive effect of the benefit persists in housing and food insecurity for the lower-income group only ($b = -0.060$, $p < 0.05$ and $b = -0.133$, $p < 0.01$ respectively). The benefit was associated with more life satisfaction ($b = 0.198$, $p < 0.01$). Private transfer is associated with lower level of material hardships ($b = -.011$, $p < 0.01$), housing ($b = -.002$, $p < 0.01$), food insecurity ($b = -.006$, $p < 0.001$) and more life satisfaction ($b = .02$, $p < 0.01$). Working status is not statistically significant.

Nonparametric approach

To test the validity of the RDD, we check the main assumption that individuals do not control the variable that is used to determine treatment eligibility (i.e. age sixty-six). We confirmed no sudden change in the number of respondents in the study at age sixty-six since such a discontinuity might imply that individuals had control over their recorded age (Figure 1). We then checked that there were no discontinuities at age sixty-six in the following variables: gender, education, marriage,

Table 1 Descriptive characteristics of the variables in use (45 or older)

		By Eligibility			By Income		
		Total	Eligibles	Non-eligibles	Upper	Middle	Lower
<i>Life satisfaction</i>		3.41 (0.68)	3.47 (0.65)	3.37 (0.69)	3.54 (0.65)	3.37 (0.64)	3.23 (0.71)
<i>Material hardships (aggregate)</i>		0.15 (0.52)	0.09 (0.41)	0.19 (0.58)	0.06 (0.31)	0.16 (0.53)	0.30 (0.72)
<i>Housing (%)</i>		2.31	1.38	3.00	1.02	1.70	5.42
<i>Utility (%)</i>		2.65	0.63	4.15	1.53	3.34	3.75
<i>Health care (%)</i>		1.89	1.15	2.43	0.43	3.26	2.73
<i>Food insecurity (%)</i>		7.93	6.13	9.25	2.55	7.50	18.16
<i>Age</i>		64.0 (10.74)	74.53 (6.01)	56.21 (5.59)	60.36 (8.97)	64.75 (10.50)	69.60 (11.36)
<i>Gender (%)</i>	<i>Male</i>	41.06	39.28	42.37	46.16	39.66	33.71
	<i>Female</i>	58.94	60.72	57.63	53.84	60.34	66.29
<i>Educational attainment (%)</i>	<i>Elementary school or lower</i>	36.5	55.46	22.45	20.68	39.85	60.58
	<i>Middle school</i>	19.28	18.99	19.49	20.18	22.16	13.88
	<i>High school or vocational college</i>	33.55	18.36	44.81	43.01	29.78	21.47
	<i>College (4 years) or higher</i>	10.67	7.19	13.25	16.13	8.2	4.07
<i>Marriage (%)</i>		62.76	61.70	63.54	72.75	63.16	44.28
<i>Disability (%)</i>		17.59	18.63	16.83	12.67	20.95	22.07
<i>Chronic diseases (%)</i>		76.24	90.90	65.38	68.72	79.26	85.83
<i>Private transfer (log)</i>		2.73 (4.62)	5.40 (2.38)	0.76 (4.88)	1.89 (4.82)	3.45 (4.40)	3.32 (4.26)
<i>Working status (%)</i>	<i>Working</i>	42.06	25.19	54.55	59.59	36.89	17.27
	<i>Non-working</i>	57.94	74.81	45.45	40.41	63.11	82.73
<i>Family size</i>		2.20 (1.04)	1.75 (0.66)	2.53 (1.15)	2.53 (1.10)	2.13 (0.97)	1.69 (0.80)
<i>Number of working family members</i>		0.85 (0.89)	0.46 (0.65)	1.14 (0.93)	1.31 (0.96)	0.65 (0.66)	0.28 (0.49)
<i>Living arrangements (%)</i>	<i>Single</i>	25.97	34.50	19.65	15.7	23.34	47.87
	<i>Couple only</i>	36.55	53.93	23.68	34.16	43.79	31.4
	<i>Single with other</i>	11.76	4.52	17.12	12.07	13.95	8.35
	<i>Couple with other</i>	25.72	7.05	39.54	38.08	18.91	12.38
<i>Region</i>	<i>Urban</i>	87.92	82.92	91.63	92.43	87.28	80.65
	<i>Rural</i>	12.08	17.08	8.37	7.57	12.72	19.35
<i>Observations</i>		3,932	2595	1337	1170	1343	1419

Note. Mean or Percentage reported
Standard deviations in parentheses

Table 2 Empirical model estimates, parametric approach (OLS and Logit)

	Hardship					Life Satisfaction
	Aggregated	Housing ^M	Utility ^M	Health ^M	Food ^M	
<i>Treatment</i>	-0.069*	-0.021*	-0.008	-0.001	-0.055**	0.130**
	(0.031)	(0.011)	(0.010)	(0.008)	(0.019)	(0.042)
<i>Age squared</i>	-0.000	-0.000	-0.000	-0.000	-0.000	-0.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<i>Age</i>	0.013	0.012	0.001	0.004	0.012	0.02
	(0.021)	(0.007)	(0.007)	(0.006)	(0.013)	(0.030)
<i>Treatment * Age</i>	0.013	0.005	0.001	0.001	0.010	0.00
	(0.009)	(0.003)	(0.003)	(0.002)	(0.005)	(0.012)
<i>Gender</i>	-0.014	-0.005	-0.003	0.000	0.005	0.060*
	(0.018)	(0.005)	(0.005)	(0.004)	(0.010)	(0.024)
<i>Educational attainment</i>						
<i>Middle school</i>	-0.002	0.006	0.003	-0.003	-0.009	0.080**
	(0.021)	(0.007)	(0.007)	(0.006)	(0.013)	(0.029)
<i>High</i>	-0.081**	-0.009	-0.010	-0.014**	-0.035**	0.140**
	(0.022)	(0.005)	(0.006)	(0.005)	(0.012)	(0.031)
<i>Higher than college</i>	-0.014	0.003	0.004	-0.005	-0.027	0.220**
	(0.036)	(0.010)	(0.010)	(0.009)	(0.018)	(0.049)
<i>Marriage</i>						
<i>Married</i>	-0.128	-0.573*	-0.569	-0.573	-0.099	0.120
	(0.085)	(0.246)	(0.575)	(0.308)	(0.093)	(0.117)
<i>Disability</i>						
<i>Having a disability</i>	0.009	-0.008	-0.004	-0.003	0.015	-0.08**
	(0.020)	(0.006)	(0.006)	(0.006)	(0.011)	(0.028)
<i>Health</i>						
<i>Having a chronic disease</i>	0.031	0.004	-0.004	-0.005	0.038**	-0.10**
	(0.022)	(0.006)	(0.005)	(0.005)	(0.014)	(0.030)
<i>Private transfer (log)</i>	-0.011**	-0.002**	0.000	-0.000	-0.006***	0.02**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
<i>Working Status</i>						
<i>Working</i>	0.004	-0.005	0.001	0.004	0.004	0.080*
	(0.024)	(0.007)	(0.006)	(0.006)	(0.016)	(0.033)
<i>Family size</i>	0.033	-0.000	0.006	-0.002	0.023	-0.020
	(0.023)	(0.005)	(0.004)	(0.005)	(0.012)	(0.032)
<i>Number of working family members</i>	-0.075**	-0.013*	-0.009*	-0.007	-0.046***	0.07**
	(0.017)	(0.005)	(0.004)	(0.004)	(0.012)	(0.023)

(Continued)

Table 2 (Continued)

	Hardship					Life Satisfaction
	Aggregated	Housing ^M	Utility ^M	Health ^M	Food ^M	
<i>Living arrangement</i>						
<i>Couple only</i>	0.048 (0.088)	0.416** (0.138)	0.413 (0.681)	0.416* (0.202)	0.049 (0.087)	-0.030 (0.122)
<i>Single with children or other family members</i>	-0.046 (0.042)	-0.000 (0.005)	-0.005 (0.003)	0.006 (0.006)	-0.027 (0.018)	-0.14* (0.058)
<i>Couple with children or others</i>	0.071 (0.103)	0.429*** (0.042)	0.424 (0.229)	0.431*** (0.038)	0.012 (0.079)	-0.13 (0.143)
<i>Urbanicity</i>						
<i>City</i>	0.032 [†] (0.018)	0.003 (0.005)	0.007 (0.005)	0.007 (0.004)	0.020* (0.010)	0.03 (0.025)
N	3,932	3932	3932	3932	3932	3,932

Note. [†]p<0.10 * p<0.05 ** p<0.01 *** p<0.001
Standard errors in parentheses
^MMarginal effect estimated for Logistic models

Table 3 Heterogeneous treatment effect estimates by income, parametric approach (OLS and Logit)

	Hardship					Life Satisfaction
	Aggregated	Housing ^M	Utility ^M	Health ^M	Food ^M	
Panel A: Upper-income group (N=1,170)						
<i>Treatment</i>	-0.035 (0.031)	N/A -	-0.010 (0.023)	0 (.)	0.010 (0.025)	0.198** (0.068)
Panel B: Middle-income group (N=1,343)						
<i>Treatment</i>	-0.059 (0.045)	-0.004 (0.018)	-0.029 (0.022)	0.013 (0.018)	-0.010 (0.028)	0.123 [†] (0.070)
Panel C: Lower-income group (N=1,419)						
<i>Treatment</i>	-0.150 [†] (0.083)	-0.060* (0.025)	0.003 (0.015)	0.025 (0.021)	-0.133** (0.045)	0.049 (0.093)

Note. [†]p<0.10 * p<0.05 ** p<0.01 *** p<0.001
Standard errors in parentheses
^MMarginal effect estimated for Logistic models

disability, chronic disease, private transfer, working status, number of employed family members, living arrangement, urbanicity (region).

Largely consistent with the results from the parametric analysis, the BPS benefit is likely to reduce the material hardship in the aggregate by 0.095 (Table 4) in the RDD model. With respect to domain-specific hardship, the BPS benefit reduces the risks of housing hardship, utility cut-off/bill payment delay, and food insecurity by 1.6, 1.7, and 5.0 percentage points. Considering the lower risk of experiencing those hardships (2.3 per cent, 2.7 per cent, and 7.9 per cent,

Table 4 Treatment effect estimates, nonparametric approach (RDD)

	Hardship					Life Satisfaction
	Aggregated	Housing ^M	Utility ^M	Health ^M	Food ^M	
Treatment	-0.095**	-0.016**	-0.017**	-0.011	-0.050***	0.150***
	(0.020)	(0.006)	(0.006)	(0.005)	(0.011)	(0.029)
	2,228	1,997	2,457	2,228	2,457	2,228

Note. †p<0.10 * p<0.05 ** p<0.01 *** p<0.001
 Standard errors in parentheses
^MMarginal effect estimated for Logistic models

respectively), the effect sizes are substantial. The benefit also was associated with greater life satisfaction (b = 0.150).

Figures 2 and 3 showed the plot for local squared polynomial regression discontinuity estimates. Confirming the results from Table 4, the results indicate a noticeable difference in the slopes for the regression line between the two groups in terms of material hardship in aggregate and life satisfaction.

Lastly, Table 5 shows the results for each income group. Across all groups, the cash benefit was likely to lead to less material hardship in aggregate. The positive effect of the benefit in housing and food insecurity persisted only in the lower-income group (b = -0.062, p<0.01 and b = -0.139, p<0.001 respectively).

Discussion

This study examined the effect of a social pension programme for older adults in South Korea and found the significant effect of a social pension to reduce material hardship on aggregate and in housing and food insecurity in domain-specific hardship. In investigating the heterogeneous policy effect, the more significant effect of a social pension on life satisfaction emerged among the higher-income group than the lower-income group. The attention to material hardship, not the conventional income-based poverty as an outcome of the anti-poverty policy, can better capture differences among individuals who do have unmet basic needs (e.g. housing, clothing, and medical care). This comprehensive approach to economic vulnerability may help policymakers to be more mindful of actual basic needs and targeted services to people in need (Beverly, 2001; Heflin and Iceland, 2009). Also, by evaluating the national policy effect of material hardship among older adults in Asia, this study expands the knowledge on national efforts at reducing poverty and well-being in old age.

The finding that older people are less likely to experience material hardship when they receive the social pension confirms the positive influence of the social pension on reducing material hardship (Kim, 2019) and poverty (Lee *et al.*, 2019) but deviates from the findings in Koh and Yang (2021) with no significant effect from BOAP on public transfer. We speculate that this conflicting finding from Koh and Yang (2021) may be based on the increase in benefit amounts in 2014. As the benefit was double that of BOAP, the BPS benefit might have exceeded the private transfer amounts that used to be paid by family or children and have been able to compensate for the loss of private transfer. Our findings suggest that even with potential changes in private transfers and labour supply among the older population, the effect of BPS on material hardship is salient and robust. This result may have been underestimated because the effect was estimated on the condition of potential crowd-out effects or labour supply changes. If the crowd-out occurred and labour supply declined, the estimated results may be considered as a lower boundary of the effect.

South Korea belongs to the high-income group with a GDP per-capita of \$31,579 as of 2020 (World Bank, 2022). As one of the world’s fastest aging countries (OECD, 2018), it has the highest

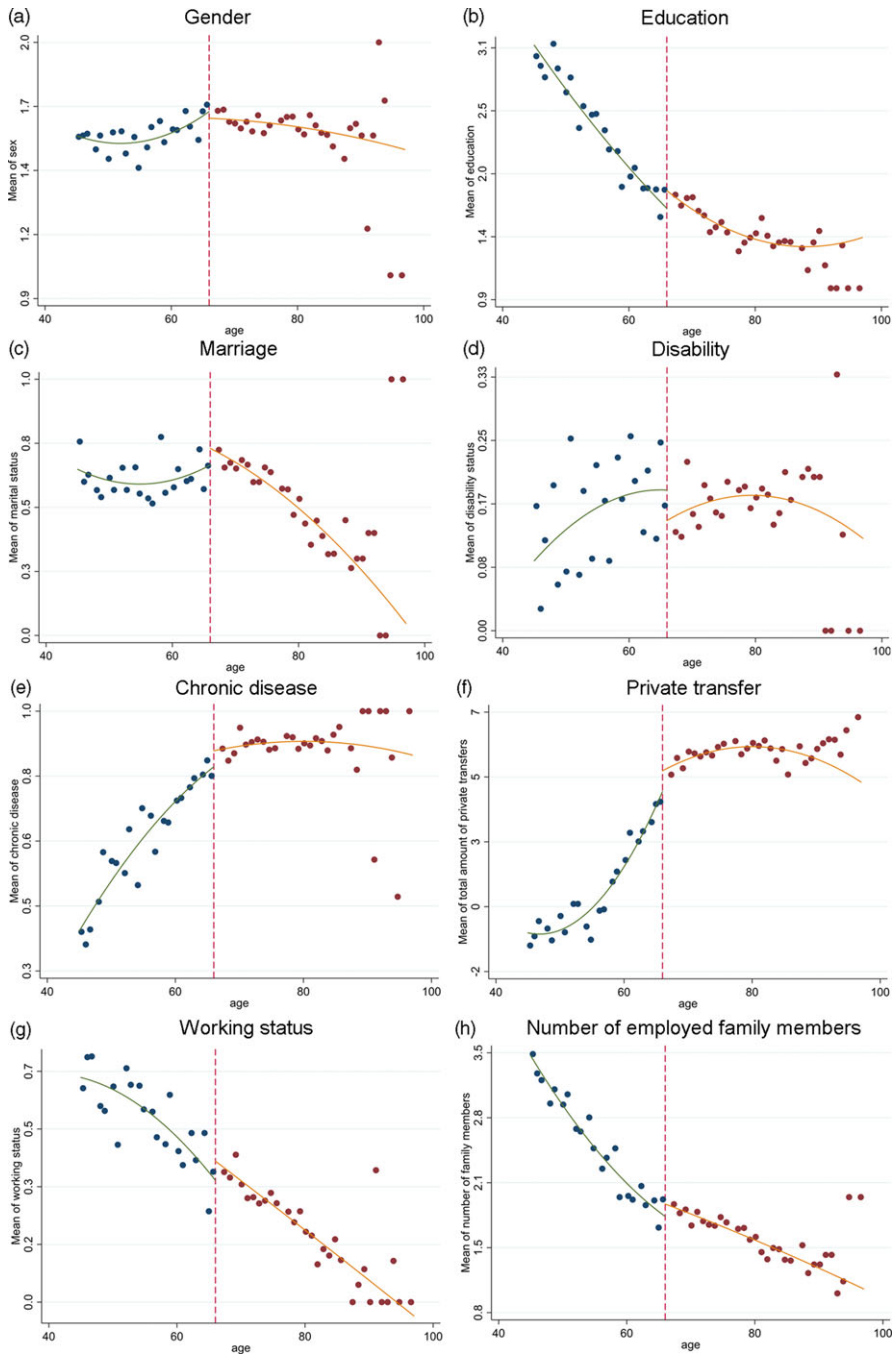


Figure 1. Validity check.

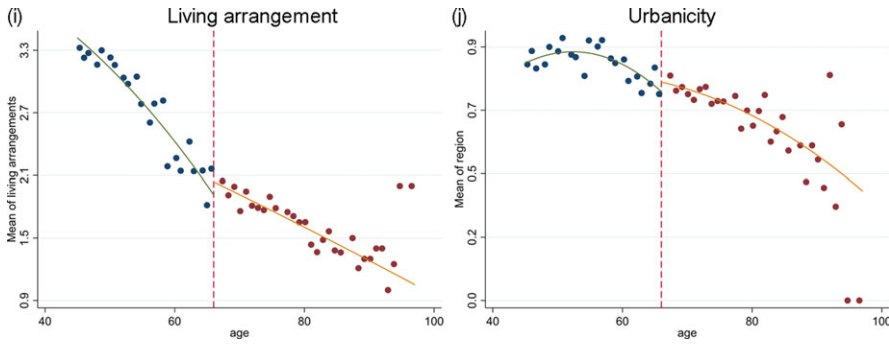


Figure 1. (Continued)

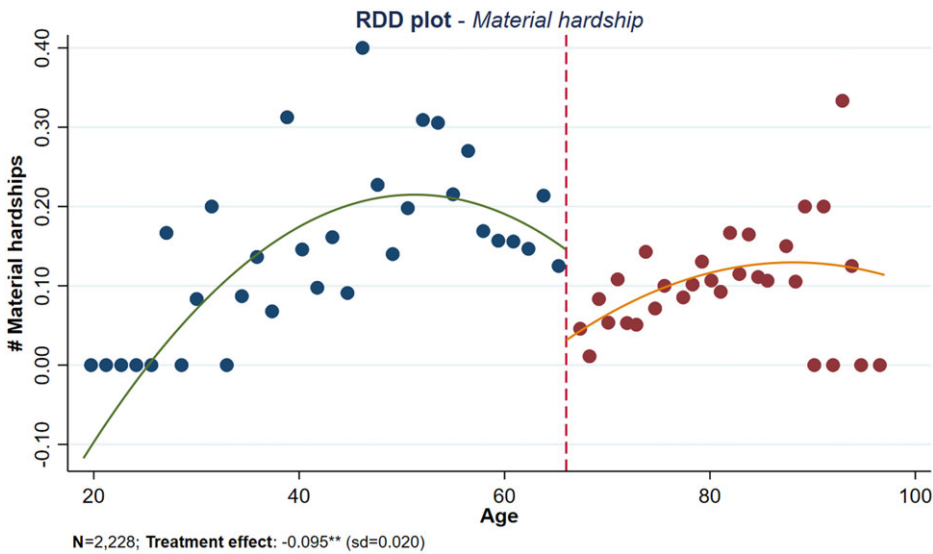


Figure 2. Local squared polynomial regression discontinuity estimates – Material hardship, aggregated.

rate of poverty among the elderly due to immature public pension systems and rapid shifts in the traditional family system. With the caution that this finding should be understood under the culture- and country-specific contexts, we believe that our findings still have significant implications for both developing and developed countries in the context of an aging global population. Social pensions are being adopted as a strategy for poverty reduction in low-middle income countries (Yang *et al.*, 2010) and the effects of social transfer are reported to be greater among low-income countries (Notten and Guio, 2019). Our findings further suggest that social pensions can also be an effective tool for high-income countries with severe material hardship like Korea.

Turning to specific domain-related findings, a consistent positive effect of the BPS was found in housing hardship and food insecurity, the most severe amongst deprivation domains. In terms of food insecurity, the older people in both the middle and lowest income group were likely to experience a reduced level of hardship. The noticeably positive effect of the cash transfer on food insecurity reveals the degree of unmet need among Korean older people. Contrasted with the prior research in other countries that shows lower rates of food insecurity for older adults compared to younger adults (Kim and Kim, 2009), Korean older adults are among the most vulnerable populations to food insecurity (Kim *et al.*, 2019). In Korea, low-income people are eligible for

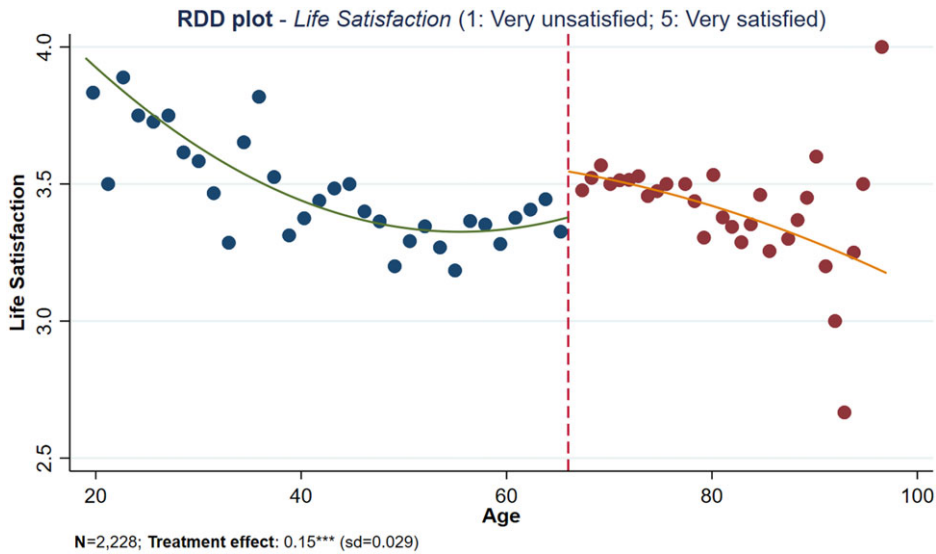


Figure 3. Local squared polynomial regression discontinuity estimates – Life satisfaction, aggregated.

Table 5 Heterogeneous treatment effect estimates by income, Nonparametric approach (RDD)

	Hardship					Life Satisfaction
	Aggregated	Housing ^M	Utility ^M	Health ^M	Food ^M	
Panel A: Upper-income group (N=748)						
Treatment	-0.050**	N/A	-0.007	N/A	-0.023	0.220***
	(0.016)	-	(0.010)	-	(0.014)	(0.044)
Panel B: Middle-income group (N=837)						
Treatment	-0.150***	-0.004	-0.035*	-0.032*	-0.065***	0.220***
	(0.030)	(0.006)	(0.014)	(0.013)	(0.017)	(0.047)
Panel C: Lower-income group (N=643)						
Treatment	-0.250***	-0.062**	-0.019	0.001	-0.139***	0.160**
	(0.057)	(0.019)	(0.012)	(0.014)	(0.026)	(0.063)

Note. †p<0.10 * p<0.05 ** p<0.01 *** p<0.001
 Standard errors in parentheses
^MMarginal effect estimated for Logistic models

congregate or home-delivered meals, mostly administered by local governments and community-based organisations (Lee, 2012). Among the government budget for food assistance programmes, only 1 per cent is used for older adults, and over two-thirds of older adults who received food assistance programmes are dissatisfied with the programmes (Lee, 2012). Our findings corroborate these findings of the widespread unmet needs for food and suggest the cash benefit in the BPS may have resolved this problem. That is, two-thirds of the sample in this study benefited from the cash transfer, not just meeting their immediate need for food for material survival, but that the cash made it possible for them to obtain more nutritious food. Considering the consistent and growing evidence on the negative effect of food insecurity on health and well-being (cf. Han

and Kang, 2019; Kim *et al.*, 2019), and its potential cumulative effect, the BPS provides a critical imperative for continued and expanding policy and programme intervention.

With respect to housing hardship, the benefit of the BPS benefit was found only in the lowest income group. This finding reveals the most economically vulnerable older people's need for basic housing insecurity remains unmet. Korea has a chronic problem with affordable housing; the burden of housing costs among lower-income households is much heavier than the 20 per cent rent-to-income ratio (RIR) recommended by the OECD (Park, 2013). Solid evidence links the housing burden among low-income renters to poor health and diminished well-being (Park *et al.*, 2015). As housing tends to be a major spending item among older adults in Korea (Choi, 2011), financial assistance to reduce the housing cost burden may have other positive consequences, including increased spending on food.

Another important finding is that there is heterogeneity in the way in which socioeconomic status is experienced and lived (Beverly, 2001) in terms of material hardship and subjective well-being. The lower income groups in this study, who are not eligible for most kinds of public assistance were likely to benefit from the public cash transfer. A household can experience hardship when its income of a household is above the national poverty line, just as households below the national poverty line are not necessarily deprived (Whelan *et al.*, 2004). Out of the eligible BPS recipients (i.e. the lower 70 per cent group of the entire older population's income and asset level), our finding suggests that the cash benefit of the BPS satisfied the basic needs such as housing and food for older people in the lower-income group. This positive effect for these groups is notable, considering that this study excluded the poorest older people for an accurate estimation of the BPS. The positive effect of the cash transfers on reducing material hardship among lower-income groups provides significant empirical evidence for such future policy reform effort in finding ways to target cash transfer programmes to people experiencing hardship (Levy, 2015).

The cash benefit was likely to increase satisfaction in general, but on closer examination, an interesting pattern emerged: while the lower-income group tend to benefit more than others as the BPS reduces material hardship (either in aggregate form or specific domain), the opposite trend was found for life satisfaction. In the parametric model, the positive effect was found only among the upper-income group, and in the RDD model, the association tends to decrease in the lower-income groups. Our finding provides empirical evidence that rejects the implicit assumption that if material needs are satisfied, other domains of well-being will follow suit (Lloyd-Sherlock *et al.*, 2012). This seems to contradict the conventional law of diminishing marginal utility in economics which posits that as consumption or benefit increases, the marginal utility from each additional benefit unit declines. According to the law, the treatment effect on life satisfaction should be greater for the lower-income group because they spend less on goods and services than higher-income groups. One possible explanation may lie in a differential purpose the cash benefit serves across the income groups. People in the lower-income groups would spend the pension benefit to pay off their bills or debt. In contrast, people in the upper and middle-income groups would spend the money in restaurants or on gifts for their grandchildren. That is, members of the upper and middle-income groups who use the benefit to spend it on luxuries would feel more satisfied than the lower-income group, who spend it on necessities.

This study points to an important avenue for future research. It is important to examine cross-national disparities to examine the extent to which the effect of social pension affects low-income people's domain-specific material hardship. Like Korea, many countries experiencing a demographic shift toward an older population implemented social pension. However, the extent to which and what type of material hardships were affected would differ by its institutional contexts. Even within basic pension schemes, countries have different features in coverage, maximum benefit levels, or a form of universal flat or means-tested flat pension (Willmore, 2007). BPS benefit amounts are designed to be adjusted in conjunction with public pension. The amount of BPS decreases as the amount of national pension benefits increases. In the future, as national pension matures and the amount of BPS benefits continuously increases, BPS will be a crucial source of

income for the low-income group as opposed to the national pension for the upper-middle class. Such institutional design can be an important policy lesson for poverty reduction in Asian countries, where elderly poverty rate is high and the introduction of public pension is delayed. Future studies can extend upon how these differences in forms of social pension impact material hardship, and how they reduce poverty in relation to other pensions in multiple pillar systems. Cultural contexts should also be noted. Among four domains, the BPS reduced housing deprivation and food insecurity the most significantly in Korea. It is an empirical inquiry to examine to what extent the strongly positive effect in the housing area found in this study can also be found in another society with a national housing policy centred on minimising affordability problem. From a policymaking perspective, in low-to-middle income countries, material hardship has always been important in understanding of poverty and living standards. Since these countries have limited institutional and financial capacity to design and deliver poverty reduction programmes (Barrientos, 2015), it is essential to prioritise public spending by identifying and directly measure specific areas of basic material vulnerability in old age. For the same reason, information about these can be critical evidence needed for policy reform efforts for economically advanced countries as well.

We acknowledge some limitations in this study. Since the data in this study is annually collected, precise information on the month of the birthday was not available. Given that the participants can start to apply for and receive BPS at age sixty-five, we used sixty-six as the age of eligibility for the BPS benefit. Due to this conservative use of age cut-off, the effect of the BPS may be underestimated since some people aged sixty-five are eligible for the benefit but not considered as such in this study. Another limitation is due to the unit of the beneficiary of the BPS. Since the benefit is provided to the individual, it is possible that a younger and non-eligible spouse may benefit indirectly from the programme. This confluence precludes an accurate assessment of the effect of the programme.

As social pensions are being adopted as a strategy for poverty reduction in low-middle income countries (Yang *et al.*, 2010), the empirical analysis of social pension's effect on material hardship has important implications for public policy and future research for emerging and developing economies that encounter challenges associated with a rapidly aging population, and nascent social security systems with limited coverage.

Notes

1 As of 2020, the maximum BPS amount is 253,750 KRW (USD 210.84) and 300,000 KRW (USD 249.27) for the low-income for each person. For a couple, the total amount will be reduced by 20 per cent reflecting equalised household expense. For example, the maximum benefit amounts for the low-income couple will be $600,000 \times 0.8 = 480,000$.

2 RDD consists of the sharp regression discontinuity (SRDD) and fuzzy regression discontinuity (FRDD) approaches. If the treatment (BPS receipt) is strictly defined based on the conditioning variable (age), a sharp regression discontinuity method can be applied. In our context, the idea of the regression discontinuity is to estimate the impact of pensions by comparing the outcomes of pensioners aged sixty-five and just above sixty-five and the outcomes of non-pensioners who are aged just below sixty-five. The sharp regression discontinuity identifies the local effect of pensions at the age threshold of sixty-five. The validity of RDD crucially depends on whether individuals are able to manipulate the treatment assignment (Lee and Lemieux, 2010), which would invalidate the assumption of local randomisation of the treatment around the cut off. In our context, the manipulation would mean that the older individuals in the sample manipulated their age in anticipation of the benefit pay-out, which cannot happen. Therefore, manipulation can be ruled out.

References

- Adena, M. and Myck, M. (2014) 'Poverty and transitions in health in later life', *Social Science and Medicine*, **116**, 202–10.
- Ahn, S. and Song, N. K. (2017) 'Unemployment, recurrent unemployment, and material hardships among older workers since the Great Recession', *Social Work Research*, **41**, 4, 249–62.
- Amuedo-Dorantes, C. and Juarez, L. (2015) 'old-age government transfers and the crowding out of private gifts: the 70 and above program for the rural elderly in Mexico', *Southern Economic Journal*, **81**, 3, 782–802.

- Barrientos, A.** (2015) 'Is there a role for social pensions in Asia?', *Asia and the Pacific Policy Studies*, **2**, 1, 8–20.
- Beverly, S. G.** (2001) 'Measures of material hardship: rationale and recommendations', *Journal of Poverty*, **5**, 1, 23–41.
- Case, A. and Menendez, A.** (2007) 'Does money empower the elderly? Evidence from the Agincourt demographic surveillance site, South Africa', *Scandinavian Journal of Public Health*, **35**, Suppl 69, 157–64.
- Choi, O.** (2011) 'A study on transition to retirement of the middle-aged in Korea: focused on the career job and the bridge job', *Journal of the Korean Gerontological Society*, **31**, 1, 15–31. [In Korean]
- Donni, P. L.** (2019) 'The unobserved pattern of material hardship and health among older Americans', *Journal of Health Economics*, **65**, 31–42.
- Fusco, A., Guio, A.-C. and Marlier, E.** (2010) 'Income poverty and material deprivation in European countries', *Eurostat Methodologies and Working Papers*, Luxembourg: Eurostat.
- Galiani, S., Gertler, P. and Bando, R.** (2016) 'Non-contributory pensions', *Labor Economics*, **38**, 47–58.
- Gasparini, L., Cruces, G., Bergolo, M. and Ham, A.** (2010) 'Vulnerability to poverty in Latin America – empirical evidence from cross-sectional data and robustness analysis with panel data', *Chronic Poverty Research Centre Working Paper No. 170*.
- Guio, A.-C., Gordon, D. and Marlier, E.** (2012) 'Measuring material deprivation in the EU: indicators for the whole population and child-specific indicators', *Eurostat Methodologies and Working Papers*, Luxembourg: Publications Office of the European Union (OPOCE).
- Han, E. and Kang, J.** (2019) 'Determinants of food insecurity among middle-aged in Korea: focusing on factors of income, economic activity, and living alone', *Social Welfare Policy*, **46**, 1, 161–84. [In Korean]
- Heflin, C. M. and Iceland, J.** (2009) 'Poverty, material hardship, and depression', *Social Science Quarterly*, **90**, 5, 1051–71.
- Hujo, K. and Cook, S.** (2012) 'The political economy of social pension reform', in S. W. Handayani and B. Babajanian (eds.), *Social Protection for Older Persons: Social Pensions in Korea*, Asian Development Bank, 11–59.
- Huston, A. C. and Bentley, A. C.** (2010) 'Human development in societal context', *Annual Review of Psychology*, **61**, 411–37.
- Imbens, G. W. and Lemieux, T.** (2008) 'Regression discontinuity designs: a guide to practice', *Journal of Econometrics*, **142**, 2, 615–35.
- Israel, S.** (2016) 'More than cash: societal influences on the risk of material deprivation', *Social Indicators Research*, **129**, 2, 619–37.
- Jensen, R. T.** (2004) 'Do private transfers 'displace' the benefits of public transfers? Evidence from South Africa', *Journal of Public Economics*, **88**, 1–2, 89–112.
- Jones, R. S. and Urasawa, S.** (2014) 'Reducing the high rate of poverty among the elderly in Korea', *Economics Department Working Paper No. 1163*, Paris, France: OECD Publishing.
- Jung, H., Pirog, M. and Lee, S. K.** (2016) 'Do public pensions crowd out private transfers to the elderly?: evidence from South Korea', *Journal of Pension Economics and Finance*, **15**, 4, 455–77.
- Kakwani, N. and Subbarao, K.** (2007) 'Poverty among the elderly in sub-Saharan Africa and the role of social pensions', *The Journal of Development Studies*, **43**, 6, 987–1008.
- Kang, J. Y., Park, S. and Ahn, S.** (2022) 'The effect of social pension on consumption among older adults in Korea', *The Journal of the Economics of Ageing*, **22**, 100364.
- Kang, S. and Moon, S.** (2013) 'The effect of the basic pension on the economic satisfaction of the elderly', *Policy Analysis and Evaluation Journal*, **23**, 4, 59–85 [in Korean].
- Keele, L. and Minozzi, W.** (2013) 'How much is Minnesota like Wisconsin? Assumptions and counterfactuals in causal inference with observational data', *Political Analysis*, **21**, 2, 193–216.
- Kim, C.** (2019) 'A study on the BPS effects on material hardship among older people', *Working paper presented at the conference of Korean Social Security Association on 12 October*, 2, 787–814.
- Kim, K. and Kim, M.** (2009) 'Development and validation of food security measure', *The Korean Journal of Nutrition*, **42**, 4, 374–85. [In Korean].
- Kim, M., Yeo, Y., Sohn, C., Kim, K., Kim, M., Seo, B., Oh, J., Yoo, H., Song, C., Lee, B., Kang, S., Ahn, S., Ku, I., Kim, T., Baek, H., Jeong, S. and Yoon, M.** (2006) *The 2006 Korea Welfare Panel Study: A Descriptive Report*, Korea Institute for Health and Social Affairs, <http://repository.kihasa.re.kr/handle/201002/413> [in Korean] [accessed 10.05.2022].
- Kim, Y., Park, A. and Kim, K.** (2019) 'Food insecurity and depressive symptoms of older adults living alone in South Korea', *Ageing and Society*, **39**, 9, 2042–58.
- Koh, K. and Yang, H.** (2021) 'Social insurance in an aging population: impacts of a government transfer program in South Korea', *Economic Development and Cultural Change*, **69**, 4, 1301–21.
- Lee, D. S. and Lemieux, T.** (2010) 'Regression discontinuity designs in economics', *Journal of Economic Literature*, **48**, 2, 281–355.
- Lee, I.** (2012) *Strategic Approach Toward Vitalizing Food Assistance Programs*, Korea Rural Economic Institute, Naju, South Korea.
- Lee, S., Ku, I. and Shon, B.** (2019) 'The effects of old-age public transfer on the well-being of older adults: the case of social pension in South Korea', *The Journals of Gerontology: Series B*, **74**, 3, 506.
- Levy, H.** (2015) 'Income, poverty, and material hardship among older Americans', *The Russell Sage Foundation Journal of the Social Sciences*, **1**, 1, 55–77.

- Lloyd-Sherlock, P., Saboia, J. and Ramírez-Rodríguez, B. (2012) 'Cash transfers and the well-being of older people in Brazil', *Development and Change*, **43**, 5, 1049–72.
- Lu, P., Shelley, M. and Liu, Y. -L. (2021) 'Government transfers and poverty alleviation among older adults in the United States from 2002 to 2014', *Social Policy and Society*, **20**, 4, 561–79.
- Manski, C. F. (1993) 'Identification problems in the social sciences', *Sociological Methodology*, **23**, 1–56.
- McCall, B. P. and Bielby, R. M. (2012) 'Regression discontinuity design: recent developments and a guide to practice for researchers in higher education', in J. C. Smart and M. B. Paulsen (eds.), *Higher Education: Handbook of Theory and Research*, Dordrecht: Springer, 249–90.
- Ministry of Health and Welfare (2012) *Needs Assessments and Support Services for Older People 2011*, Seoul, Republic of Korea: Ministry of Health and Welfare.
- Morciano, M., Hancock, R. and Pudney, S. (2015) 'Disability costs and equivalence scales in the older population in Great Britain', *Review of Income and Wealth*, **61**, 3, 494–514.
- Nahm, C. (2010) 'Socioeconomic determinants and health consequences of food insecurity in Korea', *Journal of Regional Studies*, **18**, 19–46. [In Korean]
- National Pension Research Institute (2016) *2015 Korean National Pension Facts Book*, Jeonju, Republic of Korea: National Pension Research Institute.
- Nolan, B. and Whelan, C. (2010) 'Using non-monetary deprivation indicators to analyze poverty and social exclusion: lessons from Europe?' *Journal of Policy Analysis and Management*, **29**, 2, 305–25.
- Notten, G. (2016) 'How poverty indicators confound poverty reduction evaluations: the targeting performance of income transfers in Europe', *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement*, **127**, 3, 1039–56.
- Notten, G. and Guio, A. -C. (2019) 'The impact of social transfers on income poverty and material deprivation', in B. Cantillon, T. Goedemé and John Hills (eds.), *Decent Incomes for All. Improving Policies in Europe*, Oxford: Oxford University Press, 85–107.
- Notten, G. and Guio, A. -C. (2020) *At the Margin: By How Much Do Social Transfers Reduce Material Deprivation in Europe?*, Statistical Working Papers, Luxembourg: Publications Office of the European Union (OPOCE).
- Organisation for Economic Co-operation and Development (OECD) (2015) *OECD Social Expenditure Statistics* [Data file], https://www.oecd-ilibrary.org/social-issues-migration-health/data/oecd-social-expenditure-statistics_socx-data-en [accessed 10.05.2022].
- Organisation for Economic Co-operation and Development (OECD) (2018) *Working Better with Age: Korea*, Paris: OECD Publishing. DOI: [10.1787/9789264208261-en](https://doi.org/10.1787/9789264208261-en).
- Organisation for Economic Co-operation and Development (OECD) (2022a) 'Poverty rate' (indicator). DOI: [10.1787/0fe1315d-en](https://doi.org/10.1787/0fe1315d-en).
- Organisation for Economic Co-operation and Development (OECD) (2022b) 'LFS by sex and age –indicators', *OECD.Stat*, https://stats.oecd.org/Index.aspx?DataSetCode=-lfs_sexage_i_r [accessed 06.05.2022].
- Pak, T. Y. (2020) 'Social protection for happiness? The impact of social pension reform on subjective well-being of the Korean elderly', *Journal of Policy Modeling*, **42**, 2, 349–66.
- Park, H. (2013) 'A study of housing rent support policies for low-income households - a comparative analysis of the Korean housing benefit system and the Japanese housing assistance system', *Journal of The Residential Environment Institute of Korea*, **11**, 3, 139–57. [In Korean]
- Park, J., Heo, Y., Oh, U. and Yoon, S. (2015) 'Changes in physical and mental health as a function of substandard housing conditions and unaffordable housing', *Korean Journal of Social Welfare*, **67**, 2, 137–59. [In Korean]
- Perry, B. (2015) *The Material Well-Being of New Zealand Households: Trends and Relativities Using Non-Income Measures, with International Comparisons*, Ministry of Social Development, Wellington.
- Ringen, S. (1988) 'Direct and indirect measures of poverty', *Journal of Social Policy*, **17**, 3, 351–65.
- Saunders, P. and Wong, M. (2011) 'Using deprivation to assess the adequacy of Australian social security payments', *Journal of Poverty and Social Justice*, **19**, 2, 91–101.
- Shin, E. and Do, Y. K. (2015) 'Basic old-age pension and financial wellbeing of older adults in South Korea', *Ageing and Society*, **35**, 1055–74.
- Unnikrishnan, V. and Imai, K. S. (2020) 'Does the old-age pension scheme improve household welfare? Evidence from India', *World Development*, **134**, 1–15.
- US Department of Health and Human Service (2004) *Measures of Material Hardship*, ASPE Research Brief, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files/138916/rb.pdf [accessed 22.04.2022].
- van der Klaauw, W. (2008) 'Regression–discontinuity analysis: a survey of recent developments in economics', *Labour*, **22**, 2, 219–45.
- Weon, S. and Rothwell, D. W. (2020) 'The association between poverty indicators and material hardship in South Korea', *International Journal of Social Welfare*, **29**, 1, 29–40.
- Whang, N., Lee, W., Jin, W., Lee, S. and Ahn, S. (2021) *Changes in Public and Private Transfer and the Aging Population*, Korea Institute for Health and Social Affairs. Report, 2021–24.

- Whelan, C., Layte, R. and Maitre, B.** (2004) 'Understanding the mismatch between poverty and deprivation', *European Sociological Review*, **20**, 4, 287–302.
- Willmore, L.** (2007) 'Universal Pensions for developing countries', *World Development*, **35**, 1, 24–51.
- World Bank** (2022) 'GDP per capita (current US\$)', *World Bank National Accounts Data, and OECD National Accounts Data Files*, <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=KR> [accessed 10.05.2022].
- Wu, A. M. and Ramesh, M.** (2014) 'Poverty reduction in urban China: the impact of cash transfers', *Social Policy and Society*, **13**, 2, 285–99.
- Wu, C. and Eamon, M. K.** (2010) 'Does receipt of public benefits reduce material hardship in low-income families with children?', *Children and Youth Services Review*, **32**, 10, 1262–70.
- Yang, Y., Williamson, J. B. and Shen, C.** (2010) 'Social security for China's rural aged: a proposal based on a universal non-contributory pension', *International Journal of Social Welfare*, **19**, 2, 236–45.
- Zheng, H. and Zhong, T.** (2016) 'The impacts of social pension on rural household expenditure: evidence from China', *Journal of Economic Policy Reform*, **19**, 3, 221–37.

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