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ARTICLE

Small cash transfers to older people: do they reduce poverty?

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Abstract
The literature has shown that, in developing countries, large cash transfers to older people improve the wellbeing of the recipients and their families. While social pensions have recently emerged in East Asia to deliver small cash benefits to older people, there is little consistent evidence of their effects. We examine the effects of the Basic Pension Scheme, a social pension in South Korea, on income and consumption poverty among older adults. We apply a difference-in-differences event study design and other complementary approaches to data covering the full period of program development from 2006 to 2021. The results show that the social pension decreases income poverty but not consumption poverty. While this study analysed the best data currently available, using better-quality data in future research would enable more robust analysis. Further research is also warranted to find how to improve the effectiveness of a non-contributory pension programme as a tool for reducing income and consumption poverty among older adults.

Keywords: cash transfer; consumption poverty; difference-in-differences; older people poverty; social pension

Introduction

Since the 1990s, several wealthy Western countries have reformed their pension systems to confront the challenges triggered by population ageing. Such reforms, aimed at relieving the public financial burden, may have adverse implications for old-age income security (Grech 2015; OECD 2019). In contrast, non-contributory public transfers to older people have been gaining traction in less-developed countries. The use of general revenue as a source of finance has been on the rise in societies with a significant coverage deficit with respect to contributory public pensions.

Social pensions have become common among middle- and low-income countries in Latin America, Africa and Asia since the 1990s (Robalino and Holzmann, 2009). As a result, whether non-contributory social pension programmes reduce poverty among older people has emerged as an important policy question. Academic research on large

cash transfers to older people in South Africa has proliferated since the pioneering work of Case and Deaton (1998; see Ardington et al. 2009; Bertrand et al. 2003; Duflo 2003; Edmonds et al. 2005; Jensen 2004). Studies on social pensions in Latin America, many of which provide generous benefits to older people, have also emerged (Bando et al. 2020; de Carvalho Filho 2008; Galiani et al. 2016; Juarez 2009). The literature shows that social pensions increase incomes, reduce poverty, and improve other measures of wellbeing among older individuals and their households.

East Asia, China, Japan, South Korea and Thailand have recently expanded non-contributory benefits to their older populations (Barrientos 2012; Choi and Kim 2010; Ning et al. 2016).[1] This expansion is in response to the high and growing risk of old-age poverty driven by socio-economic forces. While many countries in the region have achieved dramatic economic growth, their public contributory pensions remain underdeveloped. These countries have also witnessed a rapid decline in multi-generational living arrangements and traditional family-based support for older people (Chui 2007). In contrast to the programmes often examined in previous studies, however, most social pensions that have emerged in this region are characterized by modest levels of benefit. These small benefits may reflect productivist tendencies that prioritize economic growth, which persist in the welfare systems of the region (Holliday 2000). In these unique contexts, the effects of social pension programmes may differ from those found in the literature and require further investigation. In particular, the effects of these small benefits may be difficult to detect given the volatile surroundings. However, empirical evaluations of social pension programmes in East Asia are in the early stages (see Chen et al. 2018 and Nikolov and Adelman 2019 for China; Gerardi and Tsai 2014 for Taiwan; Herrmann et al. 2021 for Thailand; and Lee 2022, Lee et al. 2019 and Pak 2021 for South Korea).

This article aims to examine the effect of the Basic Pension Scheme (BPS), a social pension programme that provides a small cash benefit to older people, in South Korea (hereafter Korea). Korea is at the forefront in terms of the growth of old-age poverty and the development of related policy responses. Specifically, the relative poverty rate among older Koreans is exceptionally high at 40.4 per cent, nearly triple the average reported by the Organisation for Economic Co-operation and Development (OECD 2023). This high old-age poverty is accompanied by an unprecedented pace of population ageing. Korea's old-age dependency ratio, defined as the number of older people per 100 persons aged 15 to 64 years, is projected to become the world's highest at 98.0 by 2060 (United Nations, Department of Economic and Social Affairs, Population Division, 2019). On the other hand, Korea is known as a frontrunner in the development of welfare states in East Asia (Yang and Kühner, 2020). A recent example is the expansion of social pensions. Therefore, it is worthwhile to investigate its role in helping impoverished older adults.

We investigate whether the social pension reduces income and consumption poverty among older people in Korea. While the BPS has undergone three major stages in its development – namely, its introduction in 2008–2009 and two subsequent reforms in 2014 and 2018–2021 – most studies examine the reform in 2014 (see Lee 2022 for an exception). Empirical studies have produced mixed results. Some find the BPS to have a trivial effect on poverty (Lee and Kwon 2016; Park and Kim 2015; Shin and Do 2015), while others document that it mitigates poverty or improves

other measures of wellbeing (Ahn et al. in press; Hawang and Lee 2022; Kang et al. 2022; Lee 2022; Lee et al. 2019; and Pak 2020, 2021). These studies have applied quasi-experimental methods; many have adopted difference-in-differences approaches, while a few have used regression discontinuity designs. Despite the inconsistent findings, no study has tested the robustness of the results across different empirical strategies.

To fill this gap, this study addresses the inconsistency in the findings present in existing studies on the impact of the BPS by offering the most comprehensive examination over the period from 2008 to 2021 and by applying a set of different methodological approaches. The main results are obtained using a difference-in-differences event study (DD-ES) approach. Our event study approach, utilising quarterly data from the Household Income and Expenditure Survey (HIES), pinpoints the policy effects at the exact moments of policy changes and their dynamic patterns over time. We also adopt complementary approaches, such as an instrumental-variable (IV) approach and a regression discontinuity (RD) design, for robustness checks. Considering estimates for different periods of policy change and using different empirical techniques, this article reports that the social pension has the potential to reduce older people poverty.

Institutional background

Korea's public pension system has undergone several transformations over the past three decades. Since 1988, Korea has implemented a contributory public pension system for ordinary citizens, referred to as the National Pension Scheme (NPS). However, this programme falls short of furnishing sufficient pension income for most older individuals. To address the limitations of the NPS, the Basic Old-Age Pension Scheme (BOAPS) was introduced in 2008. The BOAPS offered a cash benefit to the majority of older individuals who lacked pension coverage or who received only meagre pension amounts.[2] The BOAPS achieved extensive reach, covering those at the bottom 70 per cent of the income and assets distribution among older people.[3]

While the BOAPS reflected growing public concerns about the citizenship rights of older individuals, it also revealed the government's reluctance to take on a large redistributive responsibility. Compared to the generous programmes in other countries that are often evaluated in the literature, the BOAPS provided a minimal cash benefit whose monthly maximum payment was set at 84,000 KRW (approximately 76 USD at the time, given that 1 USD fluctuated at approximately 1,100 KRW in the late 2000s) for an older individual, equivalent to 5 per cent of the average monthly income of the NPS participants in 2008. The BOAPS provided a flat-rate benefit for the majority of its recipients. The benefit was calculated on an individual basis (albeit reduced by 20 per cent for couple beneficiaries). A small number of recipients received reduced benefits if their disposable income after receiving the benefit was assessed to surpass the income threshold for eligibility (see Table S1 in the online supplementary material for detailed information on the BOAPS).

In July 2014, the BOAPS was replaced by the BPS, with an increased monthly maximum benefit of 200,000 KRW (approximately 182 USD). A new rule was introduced that reduced the benefits for NPS beneficiaries, but it affected only a limited number of pensioners.[4] As a result, the vast majority of the beneficiaries received the full benefit

from the BPS. In September 2018, the government further raised the benefit to 250,000 KRW (approximately 227 USD), eventually reaching 300,000 KRW (approximately 273 USD) from 2019 to 2021 (see Table S1 in the online supplementary material for more details).

Despite the modest benefit level, the BPS became the largest programme financed by the government's general revenue in 2021, driven by the rapid growth of the country's older population. The number of recipients almost doubled from 2.9 million in 2008 to 5.6 million in 2020. Government expenditures increased nearly eightfold from 2.2 trillion KRW (0.19 per cent of GDP) to 16.9 trillion KRW (0.89 per cent of GDP) over the same period. The oldest-old and women were over-represented among the beneficiaries. Furthermore, more than half of the beneficiaries were single older recipients (Korean Ministry of Health and Welfare 2022).

Effects of social pensions on poverty among older people

Social pensions aim to reduce poverty among older people. In particular, public income transfers whose eligibility is largely determined by age may be effective in delivering payments to older people with a high risk of poverty. Non-contributory benefits can be very effective in reaching a large population of poor older adults who have no or little income from contributory pensions (Case and Deaton 1998). They provide a significant and regular source of income until death for most older people, thereby relieving their economic hardship. Nevertheless, there have been concerns that cash transfers may cause unintended behavioural consequences for older recipients and their family members, offsetting their redistributive effects. For instance, public transfers, which are often means-tested, can impose significant marginal tax rates on earnings that have both income and substitution effects. However, since most social pensions rely on age eligibility and are of an unconditional nature in practice, they are likely to have only a pure income effect. It should be emphasised that the substitution effect involves a deadweight loss, while the income effect may lead to an improvement in the wellbeing of older people and their families (Kaushal 2014).

In prior research, the effect of social pensions on the labour supply is of great concern, with empirical studies indicating a decrease in paid work among older adults (Bando et al. 2020; de Carvalho Filho 2008; Galiani et al. 2016; Juarez and Pfutze 2015). In more industrialised and urbanised settings, where older people may have more work opportunities, the work disincentive effects may be more pronounced. Nevertheless, evidence suggests that a small benefit may have a modest effect on employment and may not encourage large-scale retirement (Kaushal 2014; Ning et al. 2016). Furthermore, the reduction in labour supply among older people driven by the income effect may not necessarily be a concern in countries such as Korea, where a substantial number of older adults are compelled to seek paid work for survival.

Public income transfers may also crowd out private transfers. The effects may depend on the motives behind private transfers. Transfers motivated by altruism are likely to be displaced by public transfers, while transfers based on exchange motives are not (see Jensen 2004 and Juarez 2009 for a succinct review of the crowding-out effects of public transfers). The benefit level is also a crucial factor. Studies find that public transfers providing generous benefits have substantial crowding-out effects on private

transfers (Jensen 2004; Juarez 2009), while less-generous transfers have few such effects (Chen et al. 2018; Nikolov and Adelman 2019). It should also be noted that income transferred to older parents by a public programme leads to only partial crowding out if the programme does not impose an additional tax burden on adult children (Nikolov and Adelman 2019).

If a social pension constitutes a permanent increase in income, it is likely to reduce consumption poverty. According to the life-cycle hypothesis, people spend additional income on consumption in later life stages rather than saving it (Modigliani 1966). Indeed, previous studies have shown that social pension programmes significantly increase consumption (Aguila et al. 2017; Galiani et al. 2016; Zheng and Zhong 2016) but have no significant effects on savings among pension-eligible households (Amuedo-Dorante et al. 2019). Nevertheless, in specific situations, particularly when dealing with low income and inadequate savings, older individuals might hesitate to increase their spending despite receiving public benefits or opt to abstain from expenditure to increase their precautionary savings (Lee et al. 2019). Furthermore, if increased income from social pensions allows older adults to reduce the burden of paid work, consumption poverty may be left unaffected.

We expect the BPS to reduce poverty among older people, although its effect may not be as strong as that of large cash transfers in some countries because its benefit is modest and covers across a larger population that includes non-poor older adults. The small cash benefit may not have significant effects on work efforts or private transfers. The means test for the BPS does not consider earnings of other family members as resources. Incomes of older individuals and their spouses, including market income and public transfer income, are counted but their labour incomes are substantially deducted (for further details, see Table S1). Thus, the BPS is less likely to reduce the work efforts of older adults or their family members. Moreover, the means test does not count private transfer income and one-to-one displacement of private transfers seems unlikely if older people remain impoverished even after receiving the BPS. Empirical studies show that the BPS has little effect on private transfer income or the labour supply (Sung and Lee, 2018; Yi 2018; see Koh and Yang 2021 for an exception). Research into the impact of the social pension on the economic wellbeing of older people has produced mixed results. Earlier studies underlined that the effects of the BPS on income and consumption are trivial and insignificant (Lee and Kwon 2016; Park and Kim 2015; Shin and Do 2015). However, recent evidence shows an increase in income and consumption and a reduction in poverty (Ahn et al. in press; Kang et al. 2022; Lee 2022; Lee et al. 2019).

Empirical strategy

Data

We use quarterly data from the HIES administered by Statistics Korea from 2006 to 2021. The HIES contains detailed information on income, consumption expenditure, public pension benefits, other public transfer income, private transfer income, employment, living arrangements and other socio-economic characteristics of individuals and their households. From 2006 onwards, the survey has become representative of the country's entire population by expanding its sample to include

single-person households. For most of the period under examination, information is collected every month using a self-recorded diary but is released in datasets aggregated on a quarterly or yearly basis.

The data for all years from 2006 to 2020 include samples of all four quarterly datasets for each year. The 2021 data cover only the first quarter, the latest available data at the time of our analyses. The use of quarterly data allows us to pinpoint the exact moments at which the BPS changed. Most of the previous studies rely on annual or biannual surveys, ignoring the fact that programmatic changes in the BPS were often implemented in the middle of a calendar year. Another advantage of the HIES is that its long time series allows us to examine all the changes in the BPS, including the phasing-in of the BOAPS in 2008–2009. However, the HIES underwent modifications regarding its sample, interview questionnaires and data collection methods during the examined period. Importantly, consumption data are not available between 2017 and 2018.[5]

The main outcomes of interest in this study are income and consumption poverty. Income is measured as disposable income, including all sources of market income, private transfer income and public transfer income, less tax and social contributions. Meanwhile, consumption is measured as expenditure for a wide range of consumption goods classified by the UN Classification of Individual Consumption by Purpose (COICOP), including food, clothing and footwear; actual rent and utilities; education and childcare; medical care; transportation; communication; recreation and culture; housing equipment; accommodation; and miscellaneous goods and services. We use a measure of anchored poverty, whereby individuals are defined as poor if their equivalised income or consumption is below a fixed poverty threshold over the examined period. Here, the poverty threshold is set at 50 per cent of the national median in 2006. Thus, we classify individuals as poor if their income or consumption in each year is below the fixed poverty threshold. By using the anchored poverty line, we can focus on changes in living standards among older people driven by policy reforms, eliminating the influence of changes in the national median income or consumption, which are largely determined by economic conditions among the working-age population, on the trend in old-age poverty. On the other hand, the anchored poverty line does not reflect the improvement in living standards over time, and analyses based on the anchored line are likely to produce results of the effects on extreme poverty in later years. We check the robustness of our findings using the relative poverty line.

Identification

Evaluating the effects of social pension programmes is a considerable challenge. Crucially, the decision to take up programme benefits is endogenous and may be correlated with the outcome of interest. Some people may more actively seek the benefit and may systematically differ in observed and unobserved characteristics from other people who may not. Furthermore, for the social pension in Korea, individuals are selected based on their level of financial resources, leading some individuals to change their income or asset levels to obtain eligibility. Thus, the comparison of outcomes for recipients and non-recipients may confound a programme's causal effect with differences in observed and unobserved individual characteristics.

The best approach to eliminate this selection bias would be a randomised controlled trial. Given that randomisation is rarely implemented, however, many studies on social pensions exploit naturally occurring exogenous variation in programme eligibility with respect to age or other target criteria outside an individual's influence. Our main analysis is based on a difference-in-differences (DD) approach and relies on the age eligibility rule to define the treatment and control groups. Specifically, the treatment group consists of individuals aged 65 and over, while the control group comprises individuals aged between 55 and 64.[6] We also apply IV techniques and RD designs for robustness checks. We evaluate three rounds of programme change over the examined period: the phasing-in of the BOAPS in 2008–2009, the replacement of the BOAPS by the BPS in 2014 and the increase in benefits of the BPS in 2018–2021.

The DD analyses estimate the treatment effects by interacting the treatment indicator with period dummies representing the time after a policy change. Our DD approach employs an event study specification to examine changes in outcomes at the moment of a policy change. This helps us to check the parallel trend assumptions in pre-reform periods and to examine the dynamic effects of policy reforms. Based on the quarterly data, we estimate the following model separately for each reform:

$$Y_{it} = \sum_{j} \alpha_j \cdot Quarter_{j=t} + \beta \cdot Treat_i + \sum_{j \neq -1} \gamma_j \cdot Quarter_{j=t} \cdot Treat_i + X_{it}\Phi + \varepsilon_{it} \quad (1)$$

where Y_{it} indicates the poverty status of individual i in quarter t. The right-hand side includes a full set of dummies for event time (all quarters in the pre- and post-reform years under examination), a treatment dummy for individuals aged 65 and over, and the interaction between the event time dummies and the treatment dummy. We use the quarter just before the policy change (indexed as −1) as a reference and index all other quarters relative to that quarter. By omitting the reference quarter, γ_j can be interpreted as the effect of the policy change in quarter t relative to the pre-reform quarter for the treatment group. We use data spanning eight quarters prior to and following each policy reform for the first two reforms in 2008–2009 and 2014. However, for the third policy reform in 2018–2021, data for only a single quarter before the treatment are accessible and utilised.

Covariates X_{it} include age, age squared, sex and education of the household head, receipt of public pension benefits, and year- and quarter-fixed effect terms. Age and age squared control for common age effects on the outcomes. We include the receipt of benefits from contributory public pensions, which may affect income among the treatment and control groups differently over time because of the maturation of the NPS and changes in the pension eligibility age over the examined period, as will be discussed later in Table 1.[7] Year- and quarter-fixed effect terms are included to control yearly and seasonal fluctuations in poverty rates.

We estimate linear probability models for income and consumption poverty, and standard errors are clustered at the household level to take into account autocorrelation within a household in the quarterly data. Later, we conduct tests of the parallel trend assumption. Specifically, we estimate the models additionally including group-specific linear trend terms to determine whether the estimated effect can be explained by extrapolating differential trends between the two groups (Acemoglu and Angrist 2001).

Results from the descriptive analysis

Table 1 describes the characteristics of older people in the treatment and control groups in the sample. The number of individuals in the sample ranges from almost 10,800 in 2007 to approximately 20,600 in 2019. The share of those aged 65 and older, who belong to the treatment group, is greater than that of the control group, who are aged 55 and older each year. Meanwhile, the share of the benefit recipients among the treatment group was 63 per cent in 2011, 70 per cent in 2015 and 71 per cent in 2019. This may indicate some under-reporting of the received benefit in the survey data in the early years of the BPS's implementation. In fact, the share of recipients has remained close to 70 per cent from 2009 onwards, according to a government administrative record (Korean Ministry of Health and Welfare 2022).[8] The average benefit amount substantially increased over the period.

In recent years, the sample shows a growing representation of individuals aged 75 and older, mirroring the trend of increased longevity among the population in Korea. Meanwhile, the treatment group contains higher proportions of women and less-educated people.[9] The trend in the receipt of contributory public pension benefits diverges for the treatment and control groups. In particular, the number of recipients increased from 34 per cent in 2007 to 55 per cent in 2019 in the treatment group. The treatment group also shows a rather steep increase in the average amount of public pension benefits since 2011. In contrast, the pension income of the control group started to stagnate around 2013 and even more so from 2018 onwards, mainly due to the increases in the pension eligibility age in the NPS (see Table 1). Following the 2007 NPS reform, which scheduled the pension eligibility age to increase incrementally to 65 by 2033, the eligibility age rose from 60 to 61 in 2013 and from 61 to 62 in 2018. This underscores the importance of taking into account the receipt of benefits from the contributory public pension in the analysis of the impacts of the BPS.

Figure 1 shows quarterly trends in the benefit amount from the BPS and the income and consumption poverty rates for the treatment and control groups from 2006 to 2021. The vertical dashed lines indicate the quarters when the BOAPS was phased in (starting from the first quarter of 2008 through the third quarter of 2008 to the first quarter of 2009); when the BOAPS was replaced by the BPS, with a benefit increase in the third quarter of 2014; and when the benefit increased to 250,000 KRW in the fourth quarter of 2018 and to 300,000 KRW from the second quarter of 2019 to the first quarter of 2021.

In the first graph, the quarterly trend in the average amount of the BPS benefit is illustrated for the treatment and control groups. Although the BOAPS was introduced in 2008, the amount is not shown for that year in the graph because information on the BOAPS benefit was not collected in the 2008 survey. Meanwhile, for the treatment group, the benefit amount was reported to be less than 50,000 KRW in the first quarter of 2009, after which it climbed, suggesting that respondents did not fully report the BOAPS benefit until late 2009. In the third quarter of 2014, the benefit amount more than doubled, rising from approximately 60,000 KRW to 130,000 KRW, while it again substantially increased between late 2018 and early 2021.

The second graph illustrates that income poverty rates among older people (the treatment group) declined from 46.9 per cent in the first quarter of 2006 to 16.7 per cent in the first quarter of 2021. The difference in income poverty rates between the

Table 1. Sample characteristics (unit: %, thousand KRW)

	2007		2011		2015		2019	
	Treat	Control	Treat	Control	Treat	Control	Treat	Control
BP beneficiary	0.0	0.0	62.65	0.71	69.66	0.65	71.03	0.29
BP benefit amount	0.0	0.0	58.11	0.42	135.78	0.66	176.10	0.34
Age								
55–64	48.44		43.52		40.86		46.93	
65–74	38.01		37.72		37.05		30.87	
75+	13.55		18.76		22.09		22.20	
Gender								
Female	53.12	43.95	59.60	50.58	60.5	49.55	56.64	47.02
Education								
Less than 12 yrs	75.88	58.32	75.48	54.85	70.29	44.04	66.79	29.08
PP beneficiary	34.03	31.00	36.88	37.54	50.98	28.04	54.79	22.95
PP benefit amount	181.12	174.83	177.93	185.54	258.10	195.39	307.15	188.41
N	10,833		15,179		18,489		20,614	
%	51.6	48.4	56.5	43.5	59.1	40.9	53.1	46.9

Notes: 1. 'Treat' indicates the sample of individuals aged 65 and over, while 'Control' indicates the sample of individuals aged 55–64 in households without members aged 65 and older. 2. 'Beneficiary' indicates that members of the household received the basic pension benefit. 3. The abbreviation 'BP' indicates the basic pension, while 'PP' indicates a public pension, including the NPS. 4. Monetary values are expressed in thousand KRW converted to 2006 values.

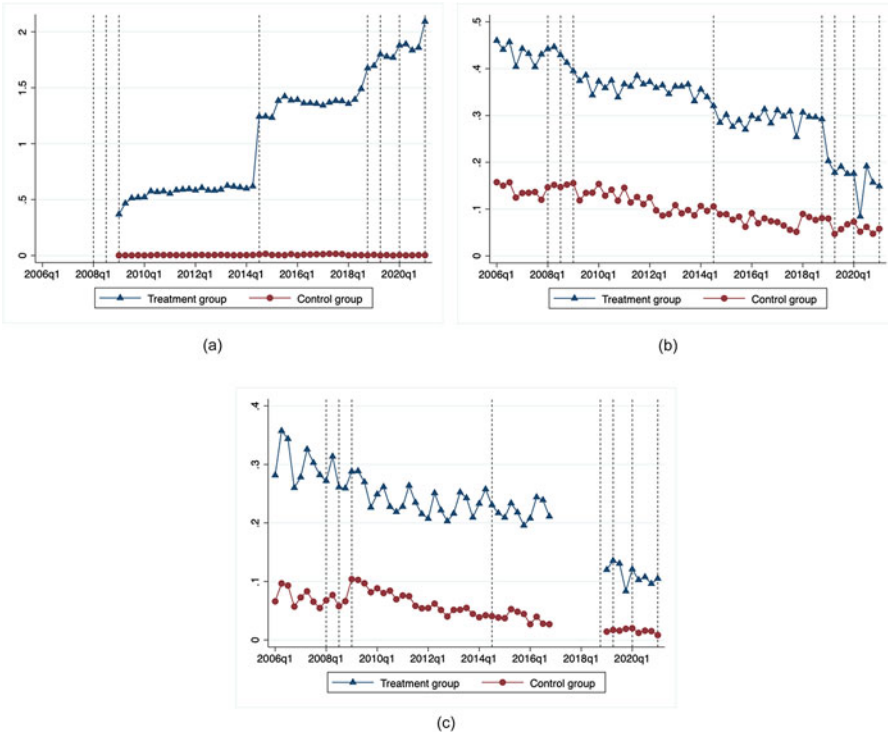

Figure 1. Trends in basic pension benefit and poverty rate, 2006–2020: (a) basic pension benefit (unit: 100,000 KRW); (b) income poverty rate; (c) consumption poverty rate.

two groups diminished over the examined period, mainly due to discontinuous drops for the treatment group after each of the three BPS changes in 2008–2009, 2014 and 2018–2021.[10] The third panel shows that consumption poverty rates decreased from 33.4 per cent in the first quarter of 2006 to 12.3 per cent in the first quarter of 2021. The overall trend in consumption poverty rates suggests a convergence between the two groups similar to the trend in income poverty rates. Note that consumption poverty rates are not shown for 2017 and 2018 because relevant data are not available in the survey (see note 5 for more details). We find declines in consumption poverty in 2008–2009 and 2019–2021 for the treatment group.

Recall that the second and third graphs are based on the anchored poverty line. If we adopt a relative poverty line, the poverty rate in the first quarter of 2021 is 31.3 per cent, instead of 16.7 per cent, for income poverty and 18.3 per cent, instead of 12.3 per cent, for consumption poverty. (The results are not shown in the figure.) The differences in poverty rates indicate that a large portion of the change in poverty rates over the period can be attributed to the substantial rise in the national median due to economic growth. While we use the anchored poverty line to focus on the effects of the BPS, it should be noted that these poverty measures do not adequately reflect changes in living standards over the 15 years.

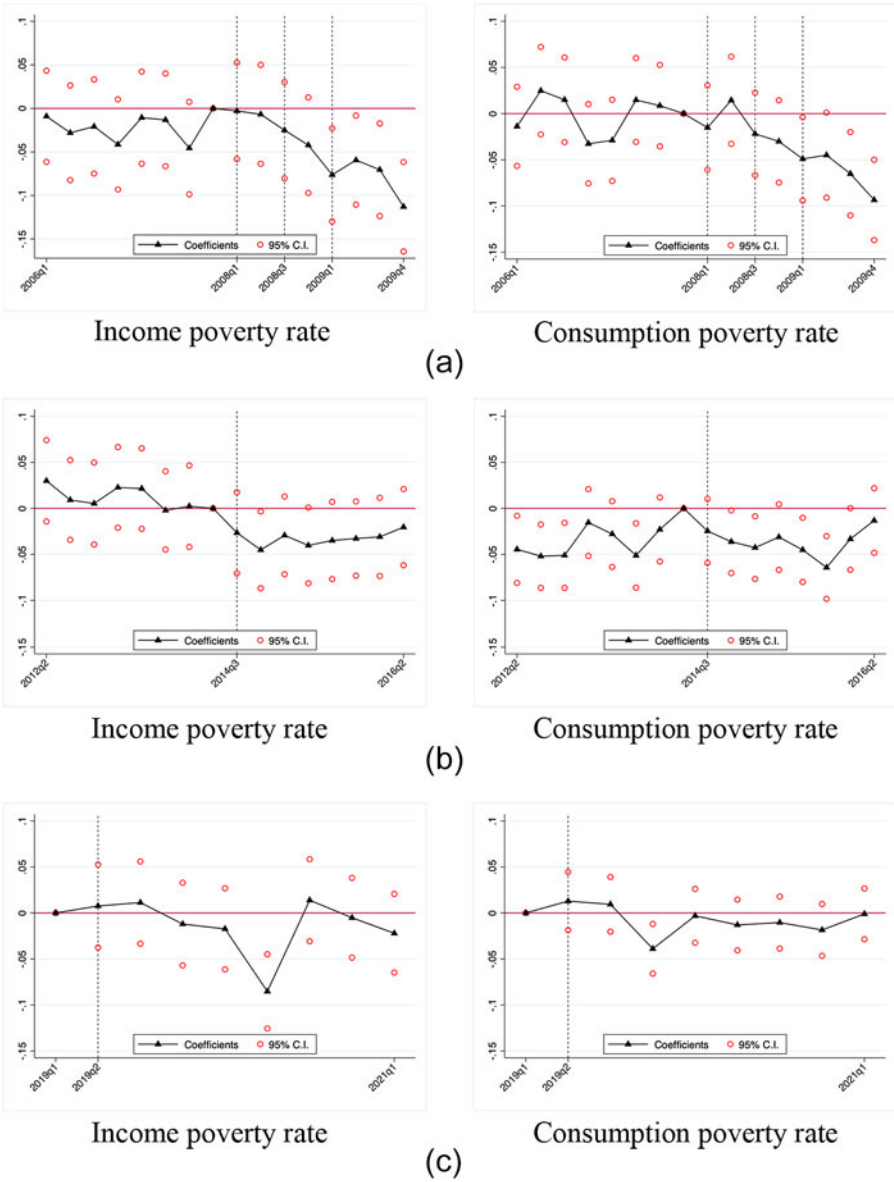

Figure 2. The DD-ES estimates of the effects of the basic pension scheme on poverty: (a) phasing-in in 2008–2009; (b) benefit increase in 2014; (c) benefit increase in 2019–2021.

Results from the main analyses

Figure 2 displays our DD-ES estimates of the effects of the BPS on income and consumption poverty rates while controlling for individual and household characteristics. First, we assess the effects of the phasing-in of the BOAPS in 2008–2009. In panel

(A), the graphs illustrate the coefficients for the interaction terms between a treatment indicator and quarter dummies with 95 per cent confidence intervals in red circles. The reference point is the fourth quarter of 2007, before the BOAPS was introduced in 2008. The confidence intervals in every quarter in 2006 and 2007 include zero, while the graphs show no specific trend, implying that the assumption of parallel trends in the poverty rates for the treatment and comparison groups is not violated. The coefficients for the post-treatment eight quarters in 2008 and 2009 show a generally downward trend for the first five quarters in the phase-in period and become significantly negative for most quarters in 2009 for both income and consumption poverty rates, indicating that the BOAPS reduced poverty. The quarters in 2008 seem to constitute a transition period, during which the BOAPS was only partially in effect. The sizes of the effects are larger than 5 percentage points for the quarters in 2009. The income and consumption poverty rates continue to drop until the last quarter of 2009.

In panel (B), we select the second quarter of 2014 as the base period to evaluate the effects of the BPS reform in July 2014. All the coefficients for post-reform quarters have a negative sign. For income poverty, the coefficient for the fourth quarter of 2014 is statistically significant at the 5 per cent level, while for the second quarter of 2015 it is marginally significant at the 10 per cent level. For consumption poverty, four coefficients are statistically significant, while two others are marginally significant (see Table 2, where the same estimates as illustrated in the graphs are provided in the first and third columns). Although inconclusive, the results show that the BPS potentially reduces poverty.

However, the evolution of poverty rates in the pre-2014 reform period suggests that the parallel trend assumption may not be satisfied. For income poverty, all the coefficients for the pre-treatment quarters imply a downward trend before the reform. Moreover, in the model of consumption poverty, the coefficients are often significantly different from zero during the pre-treatment period. We report estimates of the models with a group-specific linear trend term added in the second and fourth columns in Table 2. For income poverty, there is no evidence that the parallel trend assumption is violated. The group-specific linear trend (the coefficient for the interaction between the group dummy and the linear trend term) is not significantly different from zero. In contrast, for consumption poverty, the group-specific linear trend is statistically significant, revealing a differential trend between the two groups. However, the coefficients for the post-treatment period remain similar or increase in absolute size, suggesting an even stronger effect of the BPS after considering the differential trend. We conduct the same analyses for the phase-in of the BPS in 2008–2009 and find that the coefficients for the group-specific linear trend term are not significant (see Table S2 in the online supplementary material for the results).

Referring back to Figure 2, in panel (C) we partly examine the reform in 2018–2021 because of the interruption of the data series in 2017–2018. We cannot investigate the effects of the benefit increase to 250,000 KRW in September 2018. In addition, it should be noted that the increase in benefits was very modest and gradual for most quarters in 2019–2021. The benefit rose to 300,000 KRW for those in the bottom 20 per cent in the joint income and asset distribution among older people in April 2019, for those between the 20th and 40th percentiles in January 2020 and for the remaining recipients in January 2021. Therefore, our DD-ES estimation cannot capture the full effects of the

Table 2. DD-ES estimates of the effects of the basic pension reform in 2014

	Income poverty		Consumption poverty	
	(1)	(2)	(3)	(4)
Group	0.015 (0.017)	0.040*** (0.014)	0.029** (0.014)	−0.028** (0.011)
Group × 2012q3	0.030 (0.023)		−0.045**(0.019)	
Group × 2012q4	0.009 (0.022)		−0.052***(0.018)	
Group × 2013q1	0.005 (0.023)		−0.051***(0.018)	
Group × 2013q2	0.023 (0.022)		−0.015(0.019)	
Group × 2013q3	0.022 (0.022)		−0.028(0.018)	
Group × 2013q4	−0.002 (0.022)		−0.051***(0.018)	
Group × 2014q1	0.002 (0.023)		−0.023(0.018)	
Group × 2014q3	−0.027 (0.022)	−0.023 (0.020)	−0.025(0.018)	−0.015 (0.016)
Group × 2014q4	−0.045**(0.021)	−0.039* (0.020)	−0.036**(0.017)	−0.032* (0.017)
Group × 2015q1	−0.029 (0.022)	−0.020 (0.022)	−0.043**(0.017)	−0.044** (0.018)
Group × 2015q2	−0.040*(0.021)	−0.027 (0.024)	−0.031*(0.018)	−0.038* (0.020)
Group × 2015q3	−0.035 (0.021)	−0.019 (0.026)	−0.045**(0.018)	−0.057*** (0.021)
Group × 2015q4	−0.033 (0.021)	−0.014 (0.027)	−0.064***(0.017)	−0.082*** (0.023)
Group × 2016q1	−0.031 (0.022)	−0.009 (0.030)	−0.033*(0.017)	−0.056** (0.024)
Group × 2016q2	−0.020(0.021)	0.005 (0.032)	−0.013(0.018)	−0.041 (0.026)
Group × linear trend		−0.003(0.002)		0.005*** (0.002)
N	77,480	77,480	77,480	77,480

Notes: Year-fixed effects, quarter-fixed effects, sex, age, age squared, education and receipt of public pension benefits are also included in all the models.
Significance levels: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

reform in 2018–2021. In fact, we do not find significant effects for most quarters in 2019–2021.[11]

The DD-ES results show that the social pension has the potential to reduce income and consumption poverty at least in the first two reforms, for which enough data are available to allow us to fully examine the effects. For the policy change in 2008–2009, the effects on income and consumption poverty are generally greater than 5 percentage points. The effects of the change in 2014 are mostly smaller than 5 percentage points. On the other hand, the effects of the change in 2019–2021 are mostly close to zero. The differences in the effect sizes are understandable given that the benefit increases in the first two changes are of similar sizes (approximately 100 USD), while the increase in the third is much smaller (less than 50 USD until 2021). Notably, the anchored poverty line we use in these analyses is less likely to reflect the improvement in living standards over time. Thus, our findings may represent the effects of the BPS on extreme poverty for later years in the examined period. To check the robustness of the findings, we re-estimate the same models using the relative poverty line. The analyses produce results qualitatively similar to those illustrated in Figure 2, suggesting that our findings are not limited to extreme poverty (see Figure S1 in the online supplementary material for the results).

Robustness checks

We adopt two additional methods to check the robustness of our findings from the DD estimation. One deficiency in the DD approach is that it relies solely on an age-related eligibility criterion, ignoring the fact that only 70 per cent of age-eligible older people who meet the means test receive the BPS pension. Thus, these estimates may represent the effect on the total population of older people, including those who were never affected by the BPS due to their higher income. To capture the effect of the BPS reform on those affected, we apply an IV strategy. Since the programme changes in the BPS entailed an increase in the benefit rather than an expansion of the coverage, the amount of BPS benefit received is instrumented by the programme changes in the BPS (interactions between a treatment indicator and quarter dummies). In our two-stage least squares (2SLS) estimation, we first model the effects of the change in the BPS on the benefit received and then use the predicted benefit to estimate the effects of the change on poverty outcomes. Coefficients for the interaction terms show the effects of the BPS reform in the quarter relative to the second quarter of 2014, acting as a base quarter, as in the DD estimation. We conduct a 2SLS estimation for the 2014 reform because the HIES does not collect information on the benefit received in 2008; nor does it provide consumption data from 2017 to 2018.

The results from the first-stage estimation show that the BPS reform increased the benefit amount received by approximately 60,000 KRW to 80,000 KRW between the third quarter of 2014 and the second quarter of 2016. This is consistent with the fact that the benefit increase of 100,000 KRW affected only 70 per cent of older people. The IV estimate for income poverty indicates that a 100,000 KRW increase in the BPS benefit reduces the income poverty rate by 5.8 percentage points, which is greater than the reduced-form DD estimates reported in Table 2. For consumption poverty, however, the IV estimate (−0.005) is close to zero, suggesting that increased income due to the BPS reform has virtually no effect on consumption poverty (see Table S3 in the online supplementary material for the results).

Second, we address another deficiency in the DD approach by adopting an RD design. The DD method examines the differences in poverty rates between those aged 65 and over (treatment group) and those aged between 55 and 64 (control group). Since each group consists of individuals in broad age ranges, the group differences may be susceptible to changes other than the BPS reforms affecting people whose ages are not in the neighbourhood around the age threshold of 65 for the BPS. For example, the mandatory retirement age for most civilian workers was extended to 60 and over by law since 2016. In addition, the eligibility age for the contributory public pension was 60 until 2012, and it rose to 61 in 2013 and then to 62 in 2018. These changes may have influenced poverty rates among the control group, biasing the DD estimates.

The RD estimates based on observations close to the age threshold may provide more credible estimates (Cattaneo et al. 2020). We conduct RD analyses for the years 2009, 2015 and 2019 to examine the effects of the BPS after each of the three major programme changes. We select the year 2019 for the reform from 2018 to 2021 because this was the most recent year before the Covid-19 pandemic broke out. Like Edmonds (2006), we relate poverty rates to the age of individuals with a quadratic function, estimated separately above and below the cut-off. We attribute any discontinuous change

in poverty rates at the age threshold of 65 to the contribution of the BPS, assuming that poverty rates vary continuously according to age.

Since we are interested in the effect of the programme incorporating all three major changes, our exposition focuses on the results for the year 2019 (see Table S4 in the online supplementary material for all the RD results, including the years 2009 and 2015). While the coefficient estimated using the sample broadly covering individuals aged between 55 and 74 is positive and close to zero, the coefficients become negative and large as we narrow the age range of the samples. Our preferred estimates from the sample covering those between 62 and 67 years suggest that the BPS decreased the income poverty rate by 8.1 percentage points and the consumption poverty rate by 3.5 percentage points, although neither reduction is statistically significant.[12] For other years, most RD estimates based on those between 62 and 67 years have the expected signs. Notably, results for 2015 show that the BPS reduced the income poverty rate by 18.2 percentage points and the effect is statistically significant. Our examination indicates that work and business incomes were irregularly larger for those aged between 65 and 67 in the year, leading to an upwardly biased estimate of the effect.

Conclusion

Unlike the literature highlighting consistently favourable effects of social pensions, studies of the corresponding programme in Korea have produced mixed results; some studies have shown trivial effects on poverty, while others have reported significant poverty-reducing effects. The inconsistent findings may be due to the difficulty of detecting the effects of the programme's small benefit. Limitations in the data and methods used in previous studies may further aggravate the situation. To overcome these limitations, we comprehensively examined all the policy changes over a long period using multiple empirical methods.

Overall, the results show that the social pension has the potential to reduce income poverty, but the evidence does not consistently support the existence of favourable effects on consumption poverty. The DD-ES estimates for the BPS changes in 2008–2009 and 2014, for which data are fully available, generally show that the social pension has non-trivial effects on the reduction in income and consumption poverty, although these effects are not always statistically significant. The results from our preferred RD models suggest potentially beneficial effects for income poverty but not consumption poverty, which is also confirmed by the IV approach. Our findings are in line with recent studies that found a reduction in income poverty (Lee 2022; Lee et al. 2019). Other studies document improvements in consumption, material deprivation and other measures of wellbeing (Ahn et al. in press; Hawang and Lee 2022; Kang et al. 2022; and Pak 2020, 2021).

Some scholars have argued that the effectiveness of social pensions in improving income poverty among older adults might be compromised by crowding out other sources of income, such as work income or private transfers (Juarez 2009; Juarez and Pfutze 2015). Our finding of favourable effects on income poverty suggests that the potential decrease in other income sources may not be substantial in a society where old-age poverty is prevalent. Even if the crowding-out effects are non-trivial, these effects may not be undesirable from a policy perspective. Social pensions may reduce

the negative effects of continued work on the health of older people and lessen the burden of financial responsibility on adult children who are themselves experiencing financial difficulty.

Considering our finding of little effect on consumption poverty, we speculate that the social pension benefit may not have reached the level needed to reduce consumption poverty, while it does bring improvement in other measures of wellbeing. Consumption among older people may not be responsive to the modest benefit of the social pension. Poor older Koreans may choose to be extremely frugal and save their increased income in anticipation of adverse events, such as serious medical conditions.

In conclusion, this study shows that the social pension has the potential to reduce income poverty, but its impact on reducing consumption poverty is not substantiated. While this study analysed the best data currently available, using better-quality data in future research would enable more robust analysis. Further research is also warranted to find how to improve the effectiveness of a non-contributory pension programme as a tool for reducing income and consumption poverty among older adults.

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Ethical standards. We used secondary data, therefore ethical approval was not needed.

Notes

1. Japan has social pension schemes for housewives and low-income older people, both of whom are exempt from paying contributions, along with a contributory basic pension programme (Barrientos 2012). In China, a social pension, introduced as a voluntary contribution-based programme, provides benefits that are heavily funded by the government (Liu and Sun 2016).

2. Social pension in Korea refers to the BPS and its predecessor, the BOAPS. In this study, we often use the BPS as a general term for the Korean social pension scheme inclusive of the BOAPS.

3. Eligibility was extended to those who belonged to the lower 60 per cent in the joint distribution of income and assets among people aged 70 and over in January 2008. Eligibility was then expanded to those in the bottom 60 per cent among older people, including those aged between 65 and 69, in July 2008. By the beginning of 2009, the programme was fully phased in by expanding the coverage to older people aged 65 and older in the lower 70 per cent in the distribution.

4. For example, regular earnings up to 480,000 KRW per month and 30 per cent of additional earnings were not counted as income as of 2014, a generous allowance that may have reduced potential disincentive effects on work efforts. For NPS pensioners with a benefit greater than 150 per cent of the BPS maximum benefit, the BPS benefit was set to gradually decrease to half of the maximum benefit (see Table S1 for more details).

5. In 2016, Statistics Korea decided to continue an annual expenditure survey in the HIES but terminate its ongoing income survey component. Then, the previous decision was reversed in 2018. In the meantime, the

expenditure survey underwent a radical change when its quarterly data series was interrupted in 2017 and 2018. Statistics Korea has provided a new data series starting in 2019 based on a newly constructed sample that is otherwise similar to the original data series until 2016.

6. Some of those aged between 55 and 64 live in households with eligible older individuals. We eliminate these individuals from the control group. To include them in the control group would dilute the treatment effect since, as spouses of eligible older individuals or other household members, they share the BPS benefit.

7. Other social assistance programmes often changed concurrently with the BPS reforms over the examined period, as discussed. We explored whether adding a control variable for receiving other transfers changed the model results, and the results were unchanged. Thus, we do not include the variable in the models.

8. There cannot be a beneficiary in the control group by definition. However, fewer than 1 per cent of the control group members report a positive amount of benefit received since the introduction of the BOAPS, probably due to measurement error.

9. However, the sample in 2019 shows a pattern that diverges from the trend in age and gender composition between 2007 and 2015. The sample includes more individuals in the youngest (55–64) age group and fewer women than the sample in 2011 or 2015 does. The different patterns may have emerged due to significant changes in the sample of the HIES since 2017.

10. The poverty rate also decreased precipitously for the treatment group in the second quarter of 2020, when stimulus checks were distributed in response to the Covid-19 pandemic.

11. The significant effect on income poverty in the second quarter of 2020 may reflect the distribution of stimulus checks during the pandemic.

12. The RD estimates represent the effects on young older adults, many of whom are not eligible for the BPS. Recall that the BPS is a means-tested programme. Because incomes and assets decline as people age, the share of the BPS beneficiaries among those aged 65 is approximately 50 per cent or less, while it is almost 80 per cent among those aged between 80 and 84.

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