Does a Government Public Transfer Program Crowd Out Intergenerational Transfers?

Evidence from South Korea[*]

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Abstract

Government public transfers through welfare programs are widely used to tackle elderly poverty. These programs often influence the level of pre-existing support from family members, and might displace such private support. In this paper, we analyze the effects of a new old-age pension program on intergenerational financial transfers in South Korea. Applying various empirical approaches, we find robust evidence that money transfers from adult children to parents was completely crowded out after the introduction of the public transfer program. We find little evidence for alternative hypotheses for crowding-out effects, such as the effects of endogenous change in living arrangement as a substitute for financial support, the endogenous labor supply of the elderly, and the global financial crisis. The results imply that the effectiveness of government antipoverty programs through public transfers could be dampened by a reduction in intergenerational transfers.

JEL codes: I3; J1; H55.
Keywords: government public transfer program; crowding out; intergenerational transfer

1. Introduction

The elderly are often considered a vulnerable group because of their low income (National Research Council, 2001). In response to worsening poverty among the elderly, government public transfer programs have been introduced in many countries (OECD, 2013). These programs are often added to pre-existing support from family members (Lewis, 1954; Ranis and Fei, 1961; Gale and Scholz, 1994), and thus, might crowd out private support and neutralize the effects of public transfers.

Existing economic theories provide ambiguous predictions on the crowding-out effects of government public transfers. According to altruistic motives of intergenerational transfers (Becker, 1974), if adult children care about their parents' well-being, they make intergenerational transfers to equalize their marginal utility. If there is a positive shock to parental income through public transfers, parents' marginal utility would decrease; thus, children would respond to it by reducing inter-vivo transfers to equalize marginal utility and maximize total utility (Barro, 1974). On the other hand, the exchange of services mechanism (Cox, 1987) relates to the valuable services parents provide to their adult children, such as taking care of grandchildren and running errands. An increase in parents' income through government transfers leads to an increase in demand for leisure by parents, which, in turn, increases the price of parental services. This might result in more private transfers from adult children to ensure that their parents continue to provide services.[1]

In this paper, we empirically study the effects of a public transfer program on intergenerational financial transfers from adult children to their parents in South Korea (hereafter

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[1] Lucas and Stark (1985), Cox (1987), Altonji et al. (1992, 1997), Cox and Jimenez (1992, 1993), Cox and Rank (1992), Cox and Jakubson (1995), McGarry and Schoeni (1995), Cox et al. (1998), and McGarry (2000) test underlying motives of public transfers and also provide mixed evidence.

Korea). We focus on a Korean policy that offers a unique and interesting setting to address our research question. First, Korea is rapidly becoming an aging society, making elderly poverty a crucial social issue.[2] By 2050, Korea will be the second oldest country after Japan, with the proportion of people 65 years or older projected to approaching 35% of the Korean population (United Nations, 2013). Second, Korea has lacked social safety net programs for the elderly until relatively recently.[3] Traditionally, adult children have assumed responsibility for supporting their elderly parents, as is the case in many Asian countries (Lee, 2003). However, in recent years, the support from family members has been declining rapidly (Kim, 2010). In an attempt to reduce elderly poverty, in 2008, the Korean government introduced the Basic Old Age Pension (BOAP) program, a non-contributory means-tested program that provides supplemental cash income to poor elderly citizens.

To identify the effects of the BOAP on financial transfers from children to parents, we exploit its age eligibility condition, which determines the program receipt status. Since eligibility for the BOAP is restricted to individuals aged 65 years or older, we construct a treatment group that includes households that had potential beneficiaries for the pension, and a control group that includes households without any beneficiaries. We then compare changes in financial transfers from children before and after the introduction of the BOAP between the treatment and control groups by estimating a difference-in-differences (DD) specification using data from the Korean Household Expenditure and Income Survey. Our graphical examinations confirm that our analysis satisfies the common trends assumption, which is a key identification condition of the

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[2] The percentage of the population aged 65 years and older has been increasing rapidly (Korea National Statistical Office). Korea has the highest poverty rate of those aged over 65 years old among OECD countries (OECD, 2013).

[3] There were two pension programs before the BOAP: Basic Living Security (BLS) and Pension for Elderly (PE). The BLS is applicable only to those in extreme poverty (its benefits were reduced due to the BOAP), while the PE was terminated after the BOAP was introduced.

DD approach. We find that the trends of financial transfers of the treatment and control groups were parallel before the introduction of the BOAP.

We find strong and robust evidence that the BOAP completely crowded out intergenerational financial transfers from children to their parents. Our DD estimation results show that monthly BOAP benefits increased by 61,000 Korean Won (KRW). At the same time, monthly private transfers from adult children reduced by 60,000 (KRW).[4] Our event-study approach shows that the timing of the increase in BOAP benefits coincided with the decrease of private transfers. The estimated coefficients of BOAP benefits and private transfers imply that the introduction of the BOAP completely crowded out private transfers.

The BOAP targets the low-income elderly. If the decrease in financial transfers were indeed due to the introduction of the BOAP, we could expect to observe larger reductions among the elderly with low socioeconomic status (SES). This conjecture is plausible because the design of the BOAP was intended to target relatively poor households.[5] We examine these heterogeneous crowding-out effects by SES using a difference-in-differences-in-differences (DDD) approach. Our DDD estimation results show that the elderly with lower SES experienced larger reductions in financial transfers than did their counterparts with higher SES.

As robustness checks, we re-estimate the effects of the BOAP after including differential time trends of private transfers and using subsets of treatment and control groups. We still find robust evidence of the crowing-out effects of the BOAP.

In addition, we test an alternative hypothesis. First, we investigate whether, instead of providing financial transfers, adult children might have altered the mode of private support and

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[4] 1,000 KRW represents approximately 1 US Dollar.

[5] The BOAP targets individuals who are at least 65 years old and whose income is in the bottom 70% of income distribution.

decided to live with their parents (Jung et al., 2016). However, find no evidence for this hypothesis. Second, the elderly eligible for the BOAP could have reduced their labor supply, as non-labor income increased through the BOAP, and thus, children could have reduced their private transfers based on the exchange motive. However, we find no evidence that the elderly reduced their labor supply in response to the introduction of the BOAP. Finally, there was an overlap in timing between the introduction of the BOAP and the global financial crisis, which began in 2008. If the children in the treatment group experienced a more severe recession shock than did those in the control group, this could have caused the differential reduction in private transfers. However, we find little differential impact of the financial crisis on labor market outcomes, such as wages and the probability of employment.

Our findings imply that the effectiveness of government public transfers could be neutralized because of a reduction in financial transfers from other family members. These results provide important policy implications for many countries that are in the phase of becoming aging societies. Public transfers to the elderly have been introduced or the coverage for such programs has been extended in these countries (OECD, 2013). The evidence we present from the recent pension policy introduction in Korea implies that the role of inter-vivo transfers should be considered for the optimal design of such public transfer programs to meet the needs of the elderly.

This paper contributes to the literature related to the effectiveness of public welfare programs. Cox and Fafchamps (2007) point out that a number of empirical studies provide mixed evidence on the crowding-out effects of public transfers, from zero effects to complete displacement. Therefore, the effects of the pension program for the elderly on private transfers have been uncertain in Korea, although the existing literature shows evidence of crowding-out

effects of public transfers for the elderly in rural South Africa (Jensen, 2004) and urban Mexico (Juarez, 2009).[6] In addition, this paper is related to the literature on the effectiveness of a broader range of government welfare programs (Aid to Families with Dependent Children in the US: Rosenzweig and Wolpin, 1994; public health insurance expansion: Cutler and Gruber, 1996; Gruber and Simon, 2008; unemployment insurance: Cullen and Gruber, 2000; grants: Andreoni and Payne, 2011).

The structure of the remainder of the paper is as follows. In Section 2, we provide background information about economic theories of intergenerational transfer and the BOAP, before explaining our data sources and empirical strategy in Sections 3 and 4, respectively. We present our empirical findings in Section 5, and offer some concluding remarks in Section 6.

2. Background

2.1 Theoretical Framework

There are two main motives for making intergenerational transfers: altruistic and exchange motives.[7] If parents and children are linked by altruism, and children support their parents, because their parents' well-being affects their own utility, public transfers could crowd out private transfers (Barro, 1974; Becker, 1974). As the government supports parents' income, altruistic children have an incentive to provide less financial support, thereby keeping the marginal utility of parents and adult children equal. On the other hand, if children provide support in exchange for services from parents, crowding out might not occur, because parents

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[6] Kim (2012) examines the effects of pension programs on private transfers in Korea. However, the author uses the elderly's income to define treatment status. However, the research design may not be free from the endogeneity issue between elderly income and transfers from children.

[7] More details about the economic models are presented in the Appendix I.

would demand more leisure and children would have to provide more support for services (Cox, 1987).[8]

2.2 The BOAP and Elderly Support in Korea

Aging and elderly poverty are emerging as key social issues in Korea. In 1993, the proportion of those aged 65 years or over was around 6% of the total population. This ratio has been increasing quickly over time. By 2013, the ratio was 12% and predicted to be 21% in 2026 (Choi, 2015). Moreover, about 35% of elderly households were in absolute poverty in 2013 (Lee, 2015).

Traditionally, adult children—especially first sons—took care of elderly parents. Perhaps reflecting these traditional social obligations, there has been little public assistance for the elderly. For example, in order to be eligible for the National Basic Livelihood Security Law, which provides basic assistance to the poorest households, the law requires the applicant to prove that adult children are unable to provide private assistance (Yeo, 2004). Recently, however, support from family members has been declining rapidly (Kim, 2010).

In response to this worsening elderly poverty issue, in 2008, the Korean government introduced the BOAP program, a non-contributory program that provides supplemental cash income to poor elderly citizens. Although this program is called a pension, it is more like a means-tested elderly welfare program, such as Supplemental Security Income in the US.[9] Program eligibility is based on an individual's age and financial resources; the program covered

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[8] In addition to the exchange motive, several other motives have been discussed as competing hypotheses to the altruistic motive. For example, Bernheim et al. (1985) and Lucas and Stark (1985) suggest that a child could give support to secure inheritance from his/her parent. Rosenzweig and Stark (1989) and Rosenzweig (1998) propose that intergenerational transfers might be a result of informal risk sharing between parent and child.

[9] Based on the authors' calculation, approximately 45,000 KRW was paid on average to elderly citizens aged 65 years and older, and increased to 60,000 KRW as government spending on the BOAP expanded (Korea Ministry of Health and Welfare). This amount represents approximately 50% of the elderly people's average medical expenditure.

elderly citizens who were aged 65 years and older at the beginning of July 2008. In 2008, elderly citizens with incomes in the bottom 70% of the population were eligible for BOAP benefits.[10] During 2008–2013, the Korean government spent around 4 trillion KRW (roughly 3.6 billion US Dollars) on the BOAP, or 2% of total government spending.

Figure 1 shows a cross-sectional relationship between intergenerational transfers and elderly households' pre-transfer income as examined in the previous literature on the motives for intergenerational transfers (Altonji et al., 1992; Juarez, 2009). Panel A shows the relationship between private transfers and household income, excluding private transfers, in households with elderly aged 65 years or over (potential beneficiaries). Each dot represents the average amount of private transfers among households in each cell. Panel B shows the share of private transfers of household income, including private transfers. The amounts of private transfers tend to be larger among elderly households with lower income. In addition, private transfers from children tend to consist of a larger share among the low-income elderly. This evidence implies that private financial transfers indeed are an important source of income for the elderly. This is generally consistent with the altruistic motive (Becker, 1974): there are larger private transfers from children to the poorer elderly. However, at a relatively low level of income distribution, private transfers have a positive association with parents' income level, which is consistent with predictions based on the exchange motive (Cox, 1987). The results imply that there could be both altruistic *and* exchange motives among the low-income elderly, who are the main beneficiaries of the BOAP.

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[10] Income is calculated as the sum of annual income and 5% of net assets, excluding private and means-tested public transfers. The poverty threshold was 640 KRW per month for couples and 400 KRW for unmarried individuals during the study period (Korea Ministry of Health and Welfare). For a more detailed explanation, refer to Kim (2012).

3. Data

For the empirical analysis, we used data from the Korea Household Income and Expenditure Survey (KHIES) for 2003–2013. The survey collects rich information on household income, including public transfers and private transfers from other households and expenditure in the previous year as well as demographics from around 8,700 nationally representative households.[11]

To define the treatment and control groups, we used the aforementioned age eligibility condition of the BOAP.[12] In the baseline analysis, we defined a treatment group as a household that includes any household members aged 65 years or older. To characterize those households, we calculated the age of the eldest person of each household, and included households in the treatment group if that age was between 65 and 84 years old. We defined a comparable control group if the age of a household's eldest person was between 45 and 64 years old. The results were robust when we used a narrower age range (i.e., 65–74 vs. 55–64 years old) and the household head's age to define the treatment and control groups.

The KHIES includes questions on whether surveyed households received public transfers, and if so, what type of public transfers they were, the amount of the transfers, etc. The KHIES provides information on the amount of BOAP benefits received. From the authors' calculations, the average benefits were approximately 45,000 KRW in the introduction year, and increased to 60,000 KRW as government spending on the BOAP increased.

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[11] These were ordinary households of one or more members residing in dong, eup, or myeon nationwide. These administrative units are roughly townships in urban districts or rural counties. Note that this study excluded farm, forest, and fishery households, collective households, foreigner households, households providing food and accommodation, long-term absent households, and households composed of members not related by blood.

[12] Although the BOAP targets low-income elderly and financial status can be another determinant for the eligibility of BOAP benefit, we prefer to use ages of the elderly because of concern about the endogeneity of income. For example, the elderly could lower their income level by reducing labor supply to be eligible for the BOAP.

To measure intergenerational financial transfers, we used information on private financial transfers from outside the household. One limitation of the KHIES data is that there is no direct information on the source of transfers. To alleviate this, we compared other data: the Korea Retirement and Income Survey. Table 1 shows average amounts of annual private transfers by source. Private transfers from children account for 96% of private transfers from outside the household for the elderly. This allows us to interpret the variable of private transfer from outside the household as a reasonable measure of intergenerational transfer. As our measure still does not include intra-household intergenerational transfers, we provide robustness check results by restricting our sample to those who do not live with any of their children. We converted nominal values for each year into real values in 2010 KRW using the consumer price index (CPI).

As control variables, we used the characteristics of household heads, such as marital status, education attainment status, and gender, and used proxies for households' pre-determined income status, such as number of owned cars and home ownership. We converted all nominal values for each year into real values in 2010 KRW using the CPI.

To test an alternative hypothesis of substitution from financial support to co-residing, we used the probability of co-residence of parents and their adult children, and the probability of living alone or only with a spouse. Due to the change in definitions of those variables, we restricted the sample to the years 2006 to 2013. To test other alternative hypotheses, such as the effects of the global financial crisis and endogenous labor supply response of the elderly, we also used the Korea Labor and Income Panel Survey (KLIPS) to create individual-level labor market outcomes, such as an employment indicator, hours worked per week, and monthly wages. In

addition, we used several control variables to test those alternative hypotheses, including education level, region, marital status, gender, age, and firm size.

4. Empirical Strategy

To estimate the effects of the BOAP on intergenerational financial transfers, we compared changes in intergenerational transfers before and after the introduction of the policy in 2008 between treatment and control groups. To implement this research design, we considered the following DD specification:

$$y_{i,t} = \alpha + \mu_t + \theta_a + \beta_{DD} \cdot Treat_i \cdot Post_t + X_{i,t}\gamma + \varepsilon_{i,t} \quad (1)$$

where $i, a,$ and t indicate individual household, age of the household's eldest person, and calendar years (2003–2013), respectively. $y_{i,a,t}$ represents intergenerational financial transfers from outside the household, and μ_t and θ_a are year and age fixed effects, respectively. $Treat$ is defined as 1 if the age of the household's eldest person is between 65 and 84 years old, and 0 if it is between 45 to 64 years old. $Post$ is a binary variable indicating whether the calendar year is 2009 or after.[13] β_{DD} is a coefficient of the differential changes in intergenerational transfers between the treatment and control groups before and after the introduction of the BOAP, which captures the impact of the BOAP on the intergenerational financial transfers from children. $X_{i,a,t}$ includes characteristics of the household, such as education attainment, marital status, and

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[13] Although the actual policy was implemented in 2008, the reported BOAP benefits and private transfers are from the previous year.

gender of the household head, and car and housing ownership. $\varepsilon_{i,a,t}$ is an error term. Standard errors are clustered at the levels of age of the household's eldest person.

Since we examined differential changes—instead of differences in levels—in private transfers between the treatment and control groups, a key identification condition is that we can isolate the difference in characteristic conditioning on θ_a as long as the treatment and control groups share common trends. To confirm this, we checked if the treatment and control groups have parallel trends of intergenerational financial transfers before the introduction of the BOAP. In addition, we included an interaction term between treatment status and linear year trend ($Treat \cdot Year$) in specification (1) in the robustness checks.

Then, we modified the DD specification to examine the timing of the effects of the BOAP on BOAP benefits and private financial transfers. We considered following an "event-study" design (MacKinlay, 1997) by replacing $Treat_a \cdot Post_t$ with the interaction terms of the year fixed effects and treatment status, as follows:

$$y_{i,t} = \alpha + \mu_t + \theta_a + \sum_{k \neq 2008} \beta_t \cdot Treat_i \cdot 1\{t = k\} + X_{i,t}\theta + \epsilon_{i,t} \quad (2)$$

We followed the same notations used for regression specification (1). k indicates calendar years except for 2008. β_t estimates changes in BOAP benefits and private financial transfers relative to 2008.

Given that the BOAP is an anti-poverty program, we could expect to observe differential effects of the program on private transfers among elderly with a lower income. Instead of income level (Juarez, 2009; Kim, 2012) we use other proxies for income, such as car ownership and education attainment, because income level can be chosen endogenously by the elderly because

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of the introduction of the BOAP. We then estimated heterogeneous BOAP effects by pre-

determined income proxies using DDD specification:

$$y_{i,t} = \delta_0 + \delta_{DDD} \cdot Treat_i \cdot Post_t \cdot SES_s + \delta_{DD} \cdot Treat_i \cdot Post_t + \mu_t + \theta_a + \lambda_s$$

$$+ \delta_1 \cdot Post_t \cdot SES_s + \delta_2 \cdot Treat_i \cdot SES_s + X_{i,t}\psi + u_{i,t} \qquad (3)$$

We followed the same notation used for regression specification (1). Here, s indicates SES

measured by car ownership and educational attainment, and SES_s is a binary indicator of car

ownership and high school attendance. The car ownership dummy variable is defined as 1 if a

household does not have a car, and 0 otherwise. The high school attendance dummy variable is

defined as 1 if the education attainment level of the household eldest person is less than high

school, and 0 otherwise. In addition, we included SES fixed effects (λ_s), and its interactions with

$Post_t$ and $Treat_i$ ($Post_t \cdot SES_s, Treat_i \cdot SES_s$). δ_{DD} captures the effects of the BOAP on

intergenerational transfers among relatively high SES groups. δ_{DDD} is the coefficient of interest,

which captures the differential impacts of the BOAP on intergenerational transfers by SES status

(i.e., additional BOAP effects among relatively low SES groups, if any).

5. Empirical Results

Figure 2 shows trends of the average BOAP benefits from 2003 to 2013 by treatment status.

There is a clear trend break of the benefits after 2008 among the treatment group, but there is no

break of the benefits among the control group. Table 2 presents the estimated effect of the BOAP

on the amount of benefits received by households. In column (1), the estimated BOAP benefits

are around 60,000 KRW, and are statistically significant at the 1-percent level. The results are

robust when we included quarter fixed effects and replace year fixed effects and quarter fixed effects with year–quarter fixed effects. The results confirm the graphical evidence of Figure 2.

Figure 3 shows trends of intergenerational financial transfers from 2003 to 2013 by treatment status. In panel A, before the introduction of the BOAP, trends of private transfers from children between the treatment and control groups appear to be parallel. This implies that time-invariant differences between the two groups can be ruled out by comparing changes in private transfers between them. Immediately after the introduction of the BOAP, there are clear differential reductions in private transfers. Private transfers significantly decreased in the treatment group, but there was little change in the control group.

We then estimated the effects of the BOAP on intergenerational financial transfers using DD specification (1). Table 3 presents the estimated β_{DD} with t-ratio. In columns (1) to (3), we used the baseline definitions of the treatment and control groups. The estimated β_{DD} in column (1) is around 58,000 KRW. The magnitude of the BOAP effects are around one-third of the average amounts of transfers before 2008. The estimates are statistically significant at the 1 percent level. The results are robust when we added quarter fixed effects in column (2) and replaced year fixed effects and quarter fixed effects with year–quarter fixed effects in column (3).

To examine the relationship between BOAP benefits and private transfers, we conducted an event-study approach using regression specification (2). Figure 4 shows estimated β_ts, changes in outcome variables compared to 2008, with 95% confidence intervals. There are three observations. First, the timing of reduction in private transfers coincides with the introduction of the BOAP. The timing of changes in both BOAP benefits and private transfers are the same: there are sharp changes in BOAP benefits and private transfers in 2009. Second, subsequent patterns of changes in BOAP benefits and private transfers are also similar: there are little

changes in both BOAP benefits and private transfers after 2009. Finally, given the estimated

changes, the ratio between private transfers and BOAP benefits is close to 1, which implies that

the introduction of the BOAP almost crowds out private transfers from children.

We then investigated heterogeneous effects of the BOAP on intergenerational transfers

by predetermined income measures. Given that the BOAP is an anti-poverty program, and that

observed DD estimates are due to the introduction of the BOAP, we should observe larger

reductions in private transfers among the lower-income elderly. Due to the potential endogeneity

issue of income mentioned in footnote 12|, we used other proxies for income, such as car

ownership and education attainment.[14] Figure 5 shows trends of intergenerational transfers by car

ownership (panel A) and education level (panel B). There were clear differential reductions of

intergenerational financial transfers in 2008 between the treatment and control groups among the

elderly with low SES. However, figures for the elderly with high SES show no differential

reductions of intergenerational transfers by treatment status. The results imply that most

reductions in intergenerational transfers observed from Figures 3 and 4 and Table 3 mainly

occurred among relatively poor households.

To estimate the heterogeneous effects on intergenerational transfers by SES, we used

specification (3); the results are summarized in Table 4. The estimated β_{DD} is small in magnitude

and statistically insignificant among groups with higher SES in terms of car ownership and

education. However, β_{DDD} is around 100,000 KRW among households without car ownership.

This estimate is larger than the estimate of the baseline regression, and is statistically significant

at the 1-percent level. β_{DDD} is around 78,000 KRW among households whose eldest person did

not graduate from high school, and is statistically significant at 5-percent level. The results

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[14] We did not present heterogeneous effects by other characteristics, because trends did not show parallel pre-trends
between treatment and control groups.

confirm there were heterogeneous effects of the BOAP, and the reduction in intergenerational

transfers in 2008 was larger among households with lower SES.

Table 5 shows that the effects of the BOAP on private transfers are robust under different

regression specifications. To test the parallel pre-trends assumption, we included an interaction

term between the treatment status and linear year term to the baseline specification in column

(1).[15] For other robustness checks, i) we used a subset of baseline treatment and control groups:

age of the household's eldest person is between 65 and 74 (65 and 69) years old for the treatment

group and is between 55 and 64 (60 and 64) years old for the control group (columns (2) and (3));

ii) we used other information, the household head's age, to define the treatment group (column

(4)); iii) we restricted the sample to those who did not live with any children in the same place in

order to examine the effects of the BOAP among those without private transfers within the

household (column (5)). The results are robust: the BOAP reduced the intergenerational transfers,

although the effects are not statistically significant when using 65 – 69 years old for the

treatment group and 60 – 64 years old for the control group. Corresponding figures for columns

(2) to (5) are available in Appendix III (Figure A2).[16]

As alternative hypotheses, first we examined the effects of the BOAP on living

arrangement measured by the probability of co-residence of parents and their adult children, and

the probability of living alone or only with a spouse. The BOAP is expected to increase the

elderly's income, and thus, adult children might begin to live with their parents to reduce

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[15] In addition, we examine where the main effects come from. Figure A1 and Table A1 (Appendix III) show that households with older beneficiaries experienced larger reductions in private financial transfers compared to those with relatively younger beneficiaries.

[16] The DD approach cannot provide a causal estimate if there are time-varying omitted factors by treatment status that have differential trend breaks that coincide with those of private financial transfers. To overcome this limitation and to provide more assumption-free estimates, we applied a regression discontinuity design by exploiting the age eligibility condition in Appendix II. We still find that the BOAP reduced private financial transfers (Figure A3 and Table A2 in Appendix III).

financial support (Jung et al., 2016). Thus, the probability of co-residence (living alone or only with a spouse) might have increased (decreased) after the introduction of the BOAP. Figure 6, however, shows that trends of the probability of co-residence (panel A) and the probability of living alone or only with a spouse (panel B) tend to diverge after the introduction of the BOAP. Table 6 shows the DD estimates of the BOAP for those living arrangements. Consistent with the graphical results, the estimated signs are opposite to the alternative hypothesis.

Then, we examined the effects of the BOAP on the elderly's labor supply using the KLIPS. The government's income transfer programs could reduce labor supply. Based on the exchange motive, this might have caused children to reduce private transfers to parents. Figure 7 shows the trends of the probability of employment (panel A) and hours worked per week (panel B) of the treatment and control groups. There are few differential changes in the elderly's labor supply compared to the control groups. Table 7 presents the DD estimation results. Consistent with the graphical evidence, the effects of the BOAP on the elderly's labor supply is small in magnitude and statistically insignificant. The results imply that the BOAP did not discourage the elderly's labor supply decisions.

Finally, we studied whether the global financial crisis differentially reduced children's income. There is an overlap in the timing of the global financial crisis and the introduction of the BOAP. If children of treatment group experienced more severe recession shocks, then they could reduce financial transfers more than could those of the control group. To test this, we used the KLIPS for 2003–2013. Figure 8 shows the trends of employment proportion (panel A) and monthly wages among the employed (panel B) by age group. Older individuals are more likely to be adult children elders in the treatment group.[17] In addition, the trends of the probability of

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[17] The average ages of birth ranged from 25 to 29 years old from the 1970s to the 1990s (OECD family database).

employment and monthly wages are fairly parallel around the timing of the global crisis. Table 8 shows the DD estimates of the effects of the global financial crisis on labor market outcomes by children's age. For all columns, we used individuals aged 20 to 29 years old as the control group, and treatment groups, including those aged 30 to 39 years old (column (1) and (4)), those aged 40 to 49 years old (column (2) and (5), and those aged 50 to 59 years old (column (3) and (6)).[18] DD estimates of the probability of employment and monthly wages are small in magnitude and generally statistically insignificant. The results confirm that the children of the treatment group were less likely to experience severe recession shocks than were those of the control group.

6. Concluding Remarks

In this study, we investigated whether the introduction of a South Korean government transfer program for the elderly crowded out private financial transfers from children to parents. We find evidence of almost complete crowding out. Our results imply that the effectiveness of transfer programs could be hampered in countries where intergenerational transfers are widely practiced. Therefore, to design such public transfer programs, policymakers should consider the role of inter-vivo transfers and potential responses from the extended family.

We conclude with some caveats. Due to the reduced financial transfers to the elderly, adult children and possibly even grandchildren might experience a boost in income, and hence, utility, as government transfers flow into their extended families. There could be potential benefits for extended families in terms of improved health, nutrition, or other measures of well-

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[18] We included sex, marital status, firm size dummies, regional fixed effects, and dummies for educational attainment status.

being. We did not investigate these possibilities due to data limitations. We leave these topics as

future study.

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Figures and Tables

Figure 1. Intergenerational Transfers and Household Income

A. Intergenerational transfer and income

B. Share of intergenerational transfer
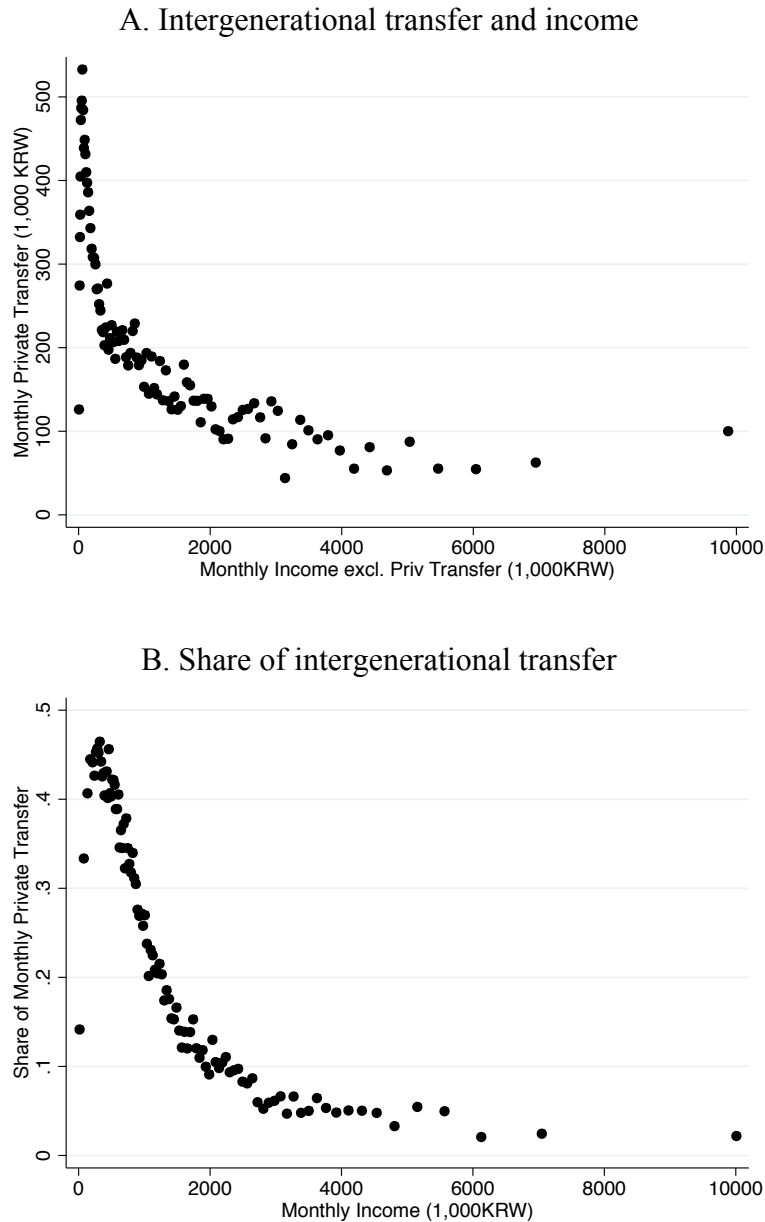
Data Source: The KHIES 2003 – 2008.
Note: Panel A shows the average of private financial transfers against household income, excluding private financial transfers, in 50 equal-sized cells. Panel B shows the average of the proportion of private financial transfers out of household income in 50 equal-sized cells. We converted nominal values for each year into real values in 2010 KRW using the CPI. We restricted sample to households whose eldest person's age is 65 years or older.

Figure 2. Trends of the BOAP Benefits
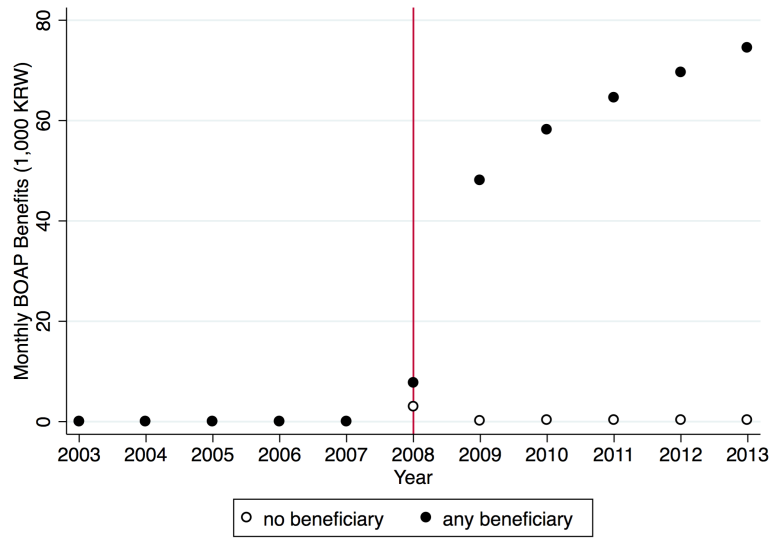
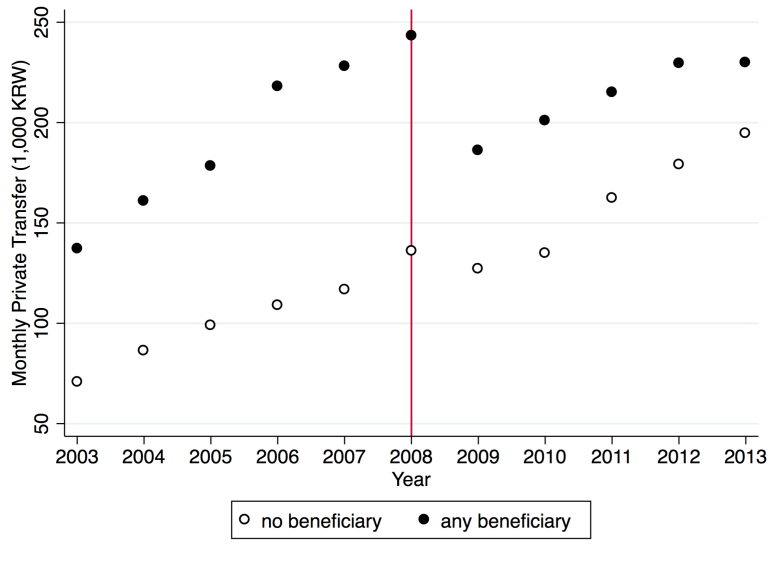Data Source: The KHIES 2003 – 2013.
Note: The dependent variable is the amounts of BOAP transfers (1,000 KRW). We converted nominal values for each year into real values in 2010 KRW using the CPI. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old.

Figure 3. Trends of Private Financial Transfers

Data Source: The KHIES 2003 – 2013.
Note: The dependent variable is the amounts of private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and control group includes households whose eldest person's ages are between 45 and 64 years old.

Figure 4. Event Study Design Estimates of the Effects of the BOAP on Private Financial Transfers

Data Source: The KHIES 2003 – 2013.
Note: Dependent variables are the amounts of BOAP transfers and private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose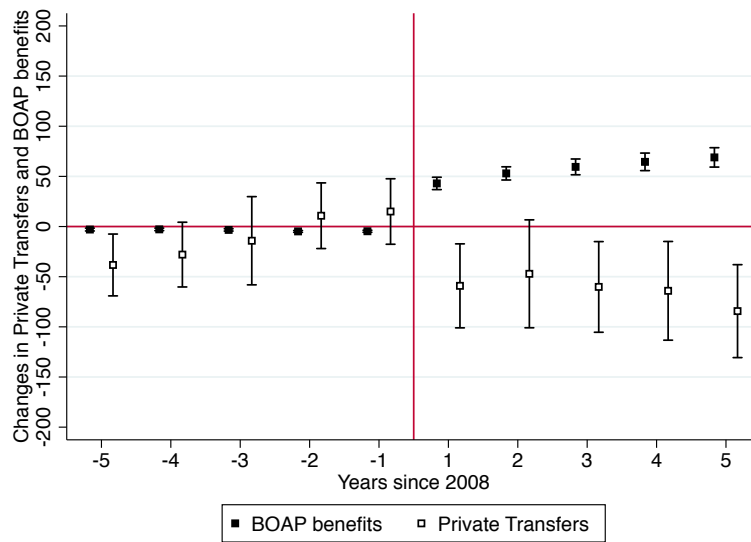 eldest person's ages are between 45 and 64 years old. Black squares represent estimated differential changes in BOAP benefits compared to 2008. White squares represent estimated differential changes in private financial transfers compared to 2008. Estimated standard errors were corrected for heteroskedasticity and were clustered at the age of a household's eldest person. Vertical lines represent the 95% confidence interval.

Figure 5. Trends of Private Financial Transfers by Socioeconomic Status
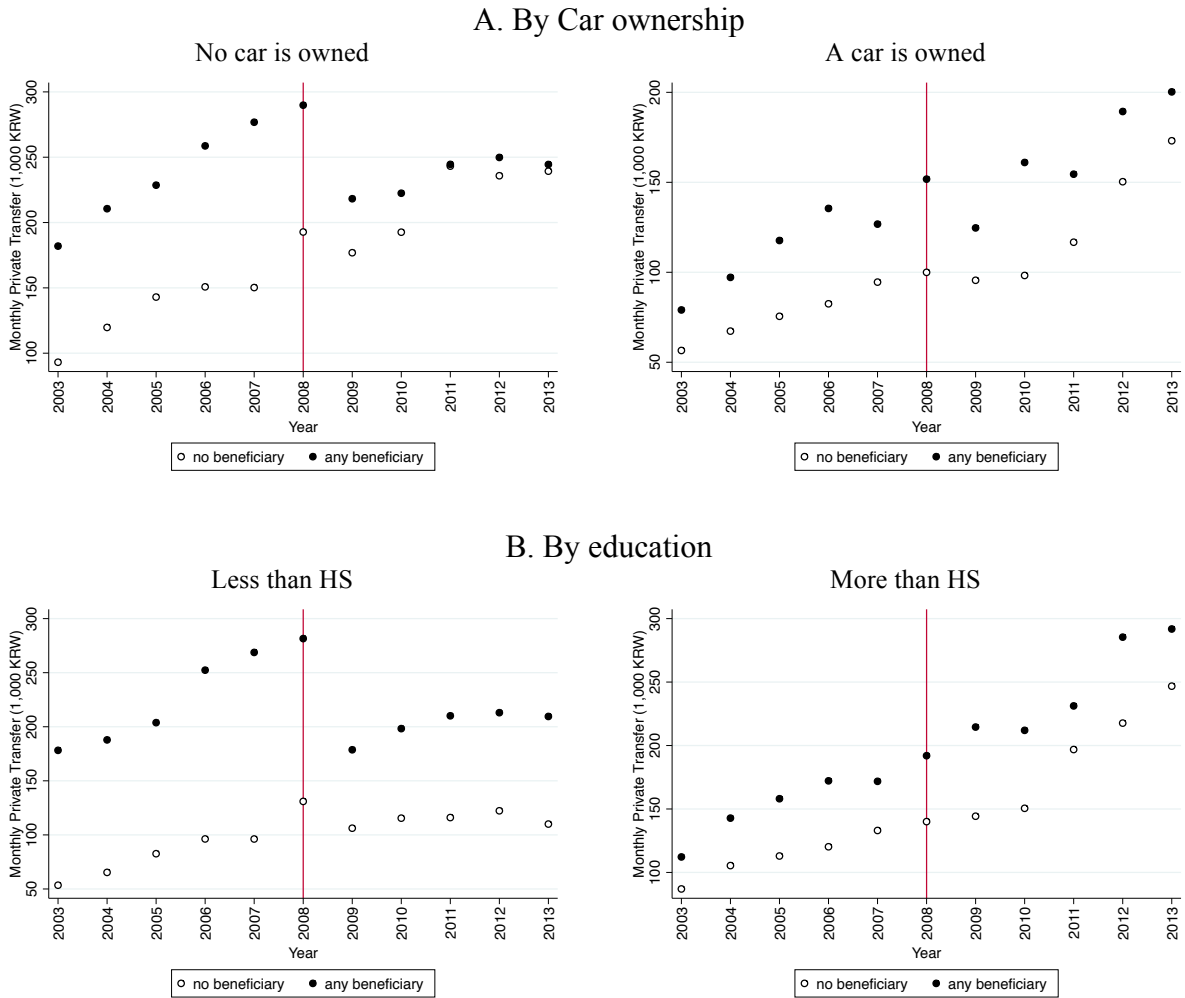
A. By Car ownership

No car is owned

A car is owned

B. By education

Less than HS

More than HS

Data Source: The KHIES 2003 – 2013.
Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old.

Figure 6. Trends of the Probability of Co-residence

A. Probability of Co-residence

B. The Probability of Live Alone or Only with Spouse
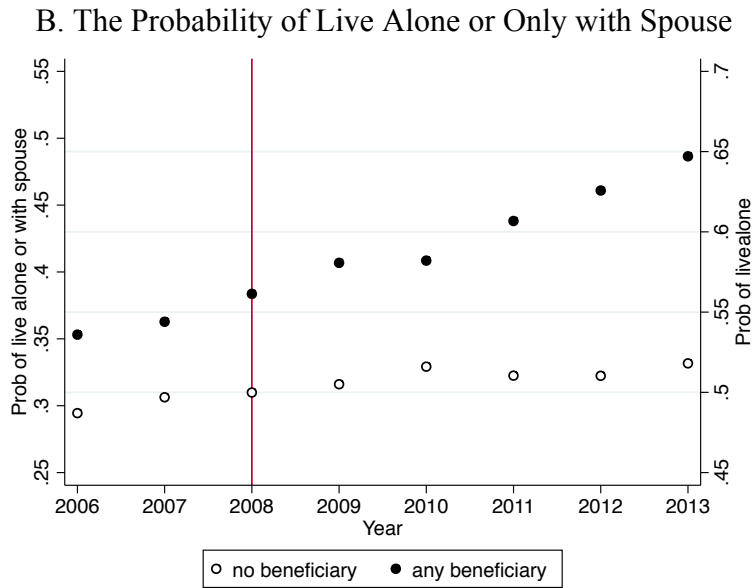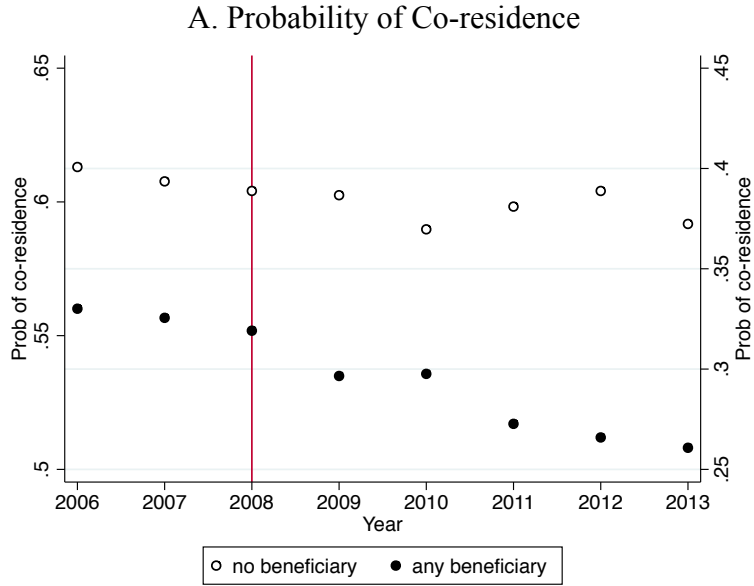
Data Source: The KHIES 2006 – 2013.
Note: Dependent variables are the probability of co-residing with children and the probability of live alone or only with spouse. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old.

Figure 7. Trends of the Elderly's Labor Supply

A. Employment

B. Working hours (among employed)

Data Source: The KLIPS 2003 – 2013.
Note: Dependent variables are the probability of employment and the average hours worked per week among employed. The treatment group includes individuals aged between 65 and 84 years old, and the control group includes individuals aged between 45 and 64 years old.

Figure 8. Trends of Children's Labor Market Outcomes

A. Employment

B. Monthly wage among employed
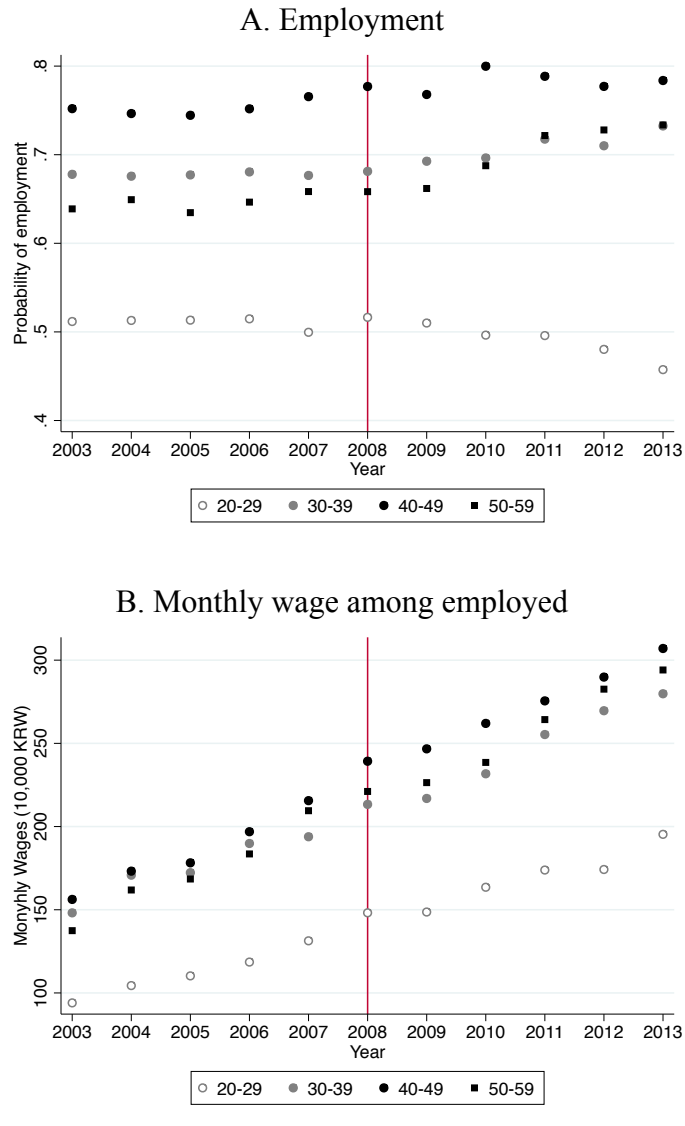
Data Source: The KLIPS 2003 – 2013.
Note: Dependent variable are the probability of employment and monthly wages (10,000 KRW) by four age groups of children (20-29 years old, 30-39 years old, 40-49 years old, and 50-59 years old). We converted nominal values of monthly wages for each year into real values in 2010 KRW using the CPI.

Table 1. Private Transfers from Outside Households (1,000 KRW)

Age	From Children	Any
45 – 64	769	922
65 – 84	2,036	2,118

Data Source: The Korea Retirement and Income Survey 2005-2007
Note: We converted all nominal values for each year into real values in 2010 KRW using the CPI.

Table 2. The Effects of the BOAP on BOAP Benefits

	(1)	(2)	(3)
Treat×Post	61.37***	61.37***	61.37***
	(15.10)	(15.11)	(15.11)
Observations	210,958	210,958	210,958
R-squared	0.52	0.52	0.52
Age FE	Y	Y	Y
Year FE	Y	Y	
Quarter FE		Y	
Year-Quarter FE			Y

Data Source: The KHIES 2003 – 2013.
Note: The dependent variable is the amount of BOAP transfers (1,000 KRW). The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old. For control variables, we included the age of household head, the number of owned cars, a dummy for house ownership, dummies for household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and were clustered at the age of a household's eldest person. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.

Table 3. The Effects of the BOAP on Intergenerational Financial Transfers

	(1)	(2)	(3)
Treat×Post	-58.65***	-57.68***	-57.65***
	(-4.19)	(-4.20)	(-4.19)
Observations	210,958	210,958	210,958
R-squared	0.10	0.10	0.10
Age FE	Y	Y	Y
Year FE	Y	Y	
Quarter FE		Y	
Year-Quarter FE			Y

Data Source: The KHIES, 2003 – 2013.

Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old. For control variables, we included age of household head, number of owned cars, dummy for house ownership, dummies for household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of a household's eldest person. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 4. Heterogeneous Effects of the BOAP on Intergenerational Financial Transfers by SES

	By Car ownership (1)	By education (<HS) (2)
SES×Treat×Post	-98.53***	-77.67**
	(-4.55)	(-2.12)
Treat×Post	-7.78	19.18
	(-0.38)	(0.56)
Observations	210,958	210,958
R-squared	0.12	0.12
Age FE	Y	Y
Year-Quarter FE	Y	Y

Data Source: The KHIES, 2003 – 2013.

Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. SES proxies are dummy variables indicating whether a household does not have car (column (1)) and whether eldest person's education attainment level is less than high school (column (2)). The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old. For control variables, we included age of household head, dummy for house ownership, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of a household's eldest person. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.

Table 5. Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Treat×Post	-64.20***	-53.83*	-29.25	-101.30***	-72.92**
	(-3.13)	(-1.94)	(-1.49)	(-7.00)	(-2.06)
Observations	210,958	103,130	51,591	190,854	80,324
R-squared	0.10	0.06	0.04	0.12	0.08
Age FE	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y
Treat*Year	Y	Y	Y	Y	Y

Data Source: The KHIES, 2003 – 2013.
Note: The dependent variable is the amount of private transfers (1,000 KRW) from other households. In columns (1) and (5), treatment group includes households whose eldest person's ages are between 65 and 84 years old, and control group includes households whose eldest person's ages are between 45 and 64 years old. In columns (2) and (3), treatment group includes households whose eldest person's ages are between 65 and 74 (65 and 69) years old, and control group includes households whose eldest person's ages are between 55 and 64 (60 and 64) years old. In columns (4), the treatment group includes households that the household head's ages are between 65 and 84 years old, and the control group includes households whose household head's ages are between 45 and 64 years old. In column (5), we limited sample to those who do not live with their children. For control variables, we included age of household head, number of owned cars, a dummy for house ownership, dummies for household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of a household's eldest person for all columns except column (4). In column (4), estimated standard errors were corrected for heteroskedasticity and clustered at the age of household head. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The Effects of the BOAP on Living Arrangement

	Prob(Co-residence) (1)	Prob(Live Alone or only with spouse) (2)
Treat×Post	-0.02	0.02*
	(-1.44)	(1.85)
Observations	160,195	160,195
R-squared	0.28	0.36
Age FE	Y	Y
Year-Quarter FE	Y	Y
Treat*Year	Y	Y

Data Source: The KHIES, 2006 – 2013.

Note: The dependent variables are the probability of co-residing with children and the probability of live alone or only with spouse for column (1) and (2), respectively. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old. For control variables, we included age of household head, number of owned cars, dummy for house ownership, dummies for the household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of a household's eldest person. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 7. The Effects of the BOAP on Elderly's Labor Supply

Dependent Var.	Employment (1)	Working hours (2)
Treat×Post	0.02	-1.97
	(1.58)	(-1.41)
Observations	55,368	29,924
R-squared	0.48	0.08
Age FE	Y	Y
Year FE	Y	Y
Treat*Year	Y	Y

Data Source: The KHIES, 2003 – 2013.
Note: The dependent variables are the probability of employment and the average hours worked per week among employed in column (1) and (2), respectively. The treatment group includes individuals aged between 65 and 84 years old, and control group includes individuals aged between 45 and 64 years old. For control variables, we included sex, marital status, firm size dummies, regional fixed effects, and dummies for educational attainment status. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of an individual. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8. The Effects of the Great Recession on Children's Labor Market Outcomes

Dependent Var.	Employment			Monthly Wages (10,000 KRW)		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat×Post	0.03*	0.01	0.01	3.45	2.96	-11.78
	(1.79)	(0.58)	(0.37)	(0.62)	(0.39)	(-1.55)
Observations	45,369	42,041	38,209	26,707	25,657	20,898
R-squared	0.5	0.47	0.47	0.25	0.26	0.27
Age FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Treat*Year	Y	Y	Y	Y	Y	Y

Data Source: The KHIES, 2003 – 2013.

Note: The dependent variable is the probability of employment and monthly wages (10,000 KRW). We converted nominal values of monthly wages for each year into real values in 2010 KRW using the CPI. For all columns, the control group includes individuals aged 20 to 29. We defined individuals aged 30 to 39 as the treatment group in columns (1) and (4), individuals aged 40-49 as the treatment group in columns (2) and (5), and individuals aged 50-59 as the treatment group in column (3) and (6). For control variables, we included sex, marital status, firm size dummies, regional fixed effects, and dummies for educational attainment status. Estimated standard errors were corrected for heteroskedasticity and clustered at the age of an individual. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Appendix I: A Model of Intergenerational Transfers

The following theoretical framework, which mainly stems from Cox (1987), incorporates both motives.

Consider a household that consists of a parent (p) and a child (c) in a given period. The child cares about the well-being of his/her parents, and the parents provide services (s). Suppose the utility of the child, U_c, given by $U_c = U\left(c_c, s, V(c_p, s)\right)$, where $V(\cdot)$ is the well-being of the parent, c_c and c_p are consumption levels for the child and the parent. The child is assumed to be altruistic, so that $\frac{\partial U}{\partial V} > 0$. We also assume that parent dislikes providing service, $\frac{\partial V}{\partial s} < 0$. Both consumption and services are assumed to be normal goods.

The budget constraints for child and parent are $c_c = I_c - t$ and $c_p = I_p + t$, where t denotes financial transfers from child to parent, and I_c and I_p are pretransfer income levels of children and parent, respectively. A nonnegativity condition is $V(c_p, s) \geq V_0(I_p, 0)$. This implies that the level of utility associated with providing no services, and consuming out of a parent's own income, is lower than the utility of consuming higher income as a return for providing services. The Lagrangian for the child's maximization problem is $\mathcal{L} = U_c\left(I_c - t, s, V(I_p + t, s)\right) + \lambda(V(c_p, s) - V_0(I_p, 0))$. The child chooses s and t to maximize $\mathcal{L}$.

When the parent is more than compensated for providing s (i.e. the nonnegativity constraint is not binding), Cox (1987) shows that the relationship between a child's private transfer and a parent's income is expressed as $\frac{\partial t}{\partial I_p} = -1 + \frac{\partial t}{\partial I_c}$. This implies that an increase in the parent's pretransfer income through the BOAP can reduce the amount of transfer from their child. The magnitude of any crowding out effects will be close to -1 if $\frac{\partial t}{\partial I_c}$ is close to zero. If the non-

negativity constraint is binding, the exchange motive can be a dominant motive for the transfer.

The comparative static can be eased by assuming the relationship between transfer and service as

$t = ps$ where p is the implicit price of services. Then the relationship between the parent's

pretransfer income and transfer from the child is written as $\frac{\partial t}{\partial I_p} = \frac{\partial s}{\partial I_p} p + \frac{\partial p}{\partial I_p} s$. As Cox (1987)

showed, a parent with higher income is less likely to provide services to their child ($\frac{\partial s}{\partial I_p} < 0$),

and the child has to pay a higher price for services to the parent ($\frac{\partial p}{\partial I_p} > 0$). The effects of an

increase in parental pretransfer income through BOAP on private transfer is ambiguous.

Appendix II: Regression Discontinuity Design Estimation

The DD approach could not provide a causal estimate if there are time-varying omitted factors that have differential trend breaks coincide with those of private financial transfers. To overcome this limitation and provide a more assumption-free estimates, we applied a regression discontinuity design (RDD) by exploiting the age eligibility condition. We also used an age profile of pre-periods as an additional counterfactual, and considered the following regression specification:

$$Y_{i,t} = \alpha_0 + f(Age_{i,t} - c) + \alpha_1 \cdot 1[Age_{i,t} \geq c] + f(Age_{i,t} - c) \cdot 1[Age_{i,t} \geq c]$$

$$+\alpha_2 \cdot Post_t + f(Age_{i,t} - c) \cdot Post_t + \beta_{RDD} \cdot 1[Age_{i,t} \geq c] \cdot Post_t$$

$$+\alpha_3 \cdot 1[Age_{i,t} \geq c] \cdot f(Age_{i,t} - c) \cdot Post_t + X_{i,t}\delta + u_{i,t} \qquad (4)$$

where i and t indicate an individual household and the calendar year, respectively; $Y_{i,t}$ includes monthly private transfers from children; $c \equiv 65$; $f(\cdot)$ is an underlying relationship between private financial transfers and ages of the eldest person in the household (e.g., 2nd order polynomials); $1[\cdot]$ is an indicator function for households with beneficiaries; $Post_t$ is an indicator of the time period after the introduction of the BOAP (2009 - 2013); and $X_{i,t}$ includes aforementioned control variables. The coefficient of interest, β_{RDD}, captures the effects of the BOAP on financial private transfers. Since the age variable is not continuous variable, we used flexible polynomials such as 3rd, 4th, and 5th order polynomials for $f(\cdot)$ as robustness checks, and calculated clustered standard errors at the age of the eldest person in the household for statistical inference (Lee and Card, 2008).

Figure A3 shows changes in private financial transfers between pre-periods (2003-2008) and post-periods (2009-2013) by age of the eldest person in a household. The graph shows a discontinuous change in the amounts of transfers around at age 65. Table A2 shows RDD estimation results. In column (1), the estimated discontinuity is -49.77 KRW and is statistically significant at 1-percent level. The result is robust when using higher order polynomials of $f(\cdot)$. These results confirm that the BOAP reduced private financial transfers.

Reference

Lee, D.S. and Card, D. 2008. Regression discontinuity inference with specification error. *Journal of Econometrics*, *142*(2), pp.655-674.
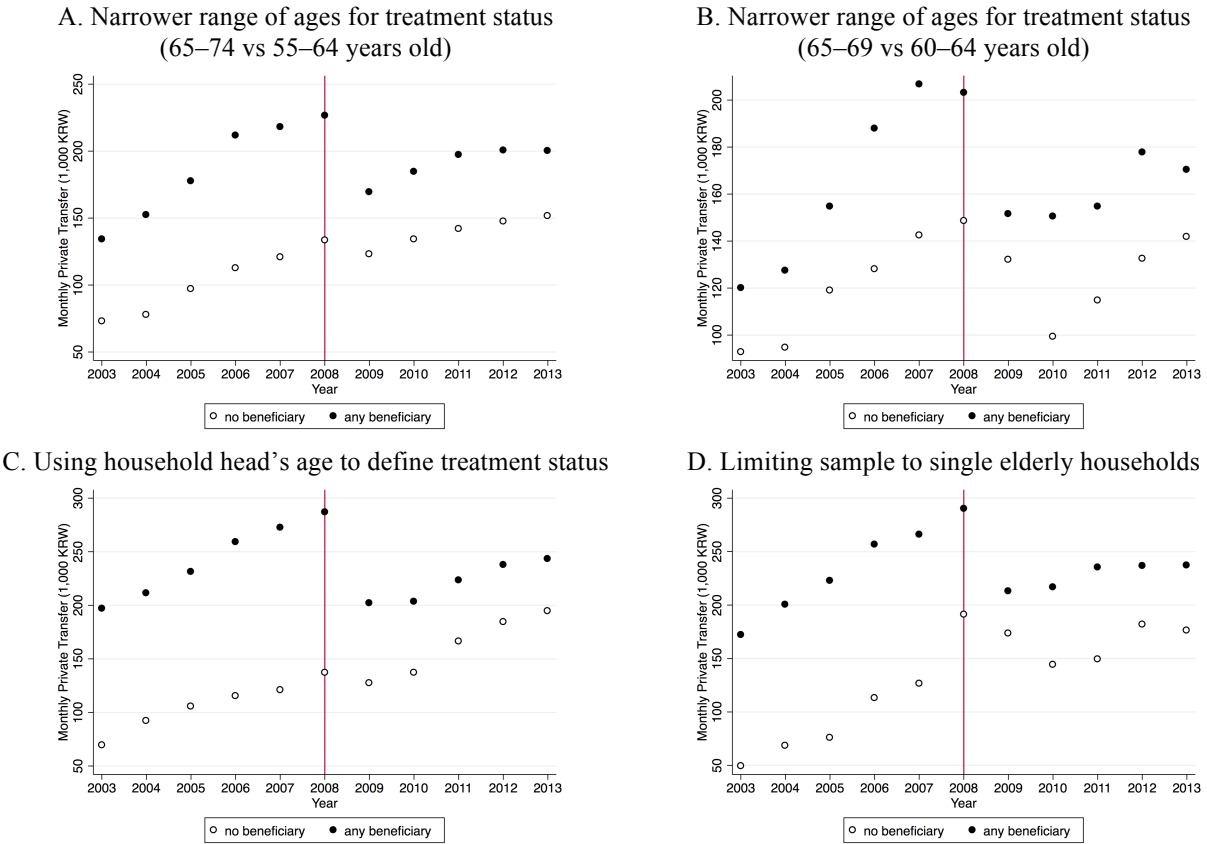
Appendix III: Figures and Tables

Figure A1. Trends of Intergenerational Financial Transfers by Age-Groups
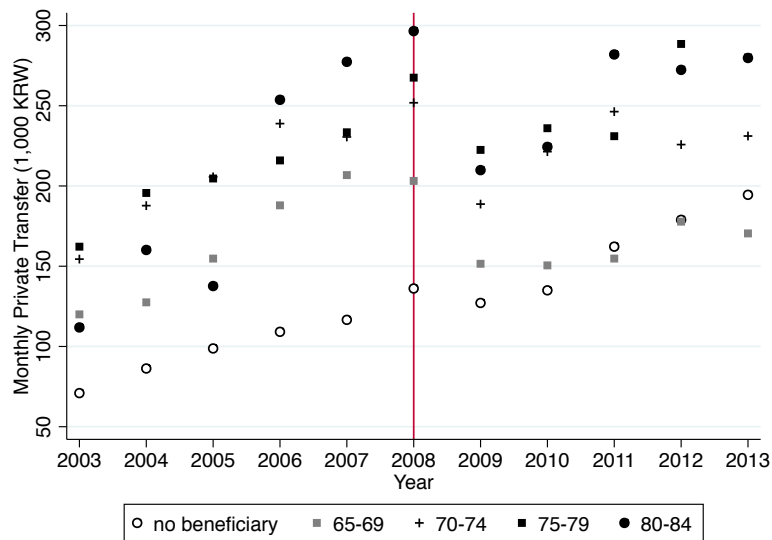
Data Source: The KHIES 2003 – 2013.
Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. We divided the treatment group into four sub-groups by age of the eldest person in a household.

Figure A2. Trends of Intergenerational Financial Transfers under Different Specifications

A. Narrower range of ages for treatment status
(65–74 vs 55–64 years old)

B. Narrower range of ages for treatment status
(65–69 vs 60–64 years old)

C. Using household head's age to define treatment status

D. Limiting sample to single elderly households

Data Source: The KHIES 2003 – 2013.

Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. In panel A (B), the treatment group includes households whose eldest person's ages are between 65 and 74 (65 and 69) years old, and the control group includes households whose eldest person's ages are between 55 and 64 (60 and 64) years old. In panel C, the treatment group includes households that household head's ages are between 65 and 84 years old, and the control group includes households whose household head's ages are between 45 and 64 years old. In panel D, we restricted sample to households with single generation.

Figure A3. Changes in Private Financial Transfers by Age of the Eldest Person
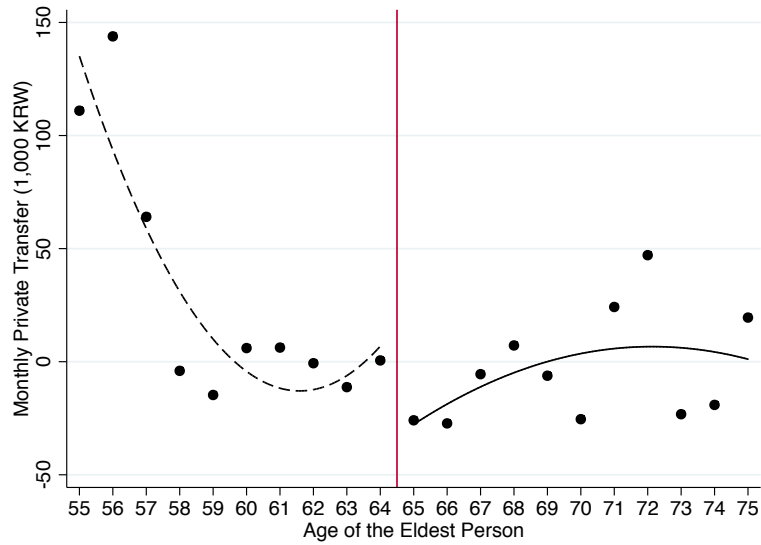
Data Source: The KHIES 2003 – 2013.

Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. We converted nominal values for each year into real values in 2010 KRW using the CPI. We plot changes in financial transfers between pre (2003-2008) and post (2009-2013) periods at each age (of the eldest person in a household) level.

Table A1. The Effects of the BOAP on Intergenerational Financial Transfers by Age Group

	(1)
$\text{Treat}_{65-69} \times \text{Post}$	-66.35***
	(-3.90)
$\text{Treat}_{70-74} \times \text{Post}$	-46.29
	(-1.07)
$\text{Treat}_{75-79} \times \text{Post}$	-54.87***
	(-2.68)
$\text{Treat}_{80-84} \times \text{Post}$	-124.96***
	(-4.35)
Observations	210,958
R-squared	0.10
Age FE	Y
Year-Quarter FE	Y
Treat*Year	Y

Data Source: The KHIES, 2003 – 2013.
Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. The treatment group includes households whose eldest person's ages are between 65 and 84 years old, and the control group includes households whose eldest person's ages are between 45 and 64 years old. We further divided the treatment group into four 5-years old age groups (65-69, 70-74, 75-79, and 80-84). Corresponding treatment dummy variables are denoted with subscriptions. For control variables, we included the age of household head, the number of owned cars, a dummy for house ownership, dummies for household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and were clustered at the age of a household's eldest person. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A2. RD Estimation of the Effects of the BOAP on Intergenerational Financial Transfers

	(1)	(2)	(3)	(4)
Treat×Post	-49.78***	-56.46***	-47.12***	-54.84***
	(-3.50)	(-4.12)	(-3.25)	(-4.28)
Observations	106,923	106,923	106,923	106,923
R-squared	0.06	0.06	0.06	0.06
Order of Polynomials	2nd	3rd	4th	5th

Data Source: The KHIES, 2003 – 2013.

Note: The dependent variable is the amount of private financial transfers (1,000 KRW) from other households. We restricted the sample to households whose eldest person's ages are between 55 and 75. For control variables, we included the age of household head, the number of owned cars, a dummy for house ownership, dummies for household head's educational attainment, and marital status and gender of household head. Estimated standard errors were corrected for heteroskedasticity and were clustered at the age of a household's eldest person. Robust t-statistics in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.