The Impacts of Negative Income Tax on Labor Market and Health Outcomes: Evidence from a Large Scale Field Experiment

Hyuncheol Bryant Kim Jungmin Lee Sangyoon Park Hankyoung Sung*

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Abstract

This report presents experimental evidence on the short-run impacts of providing monthly income support to low-income households, focusing on their financial stability, employment, subjective well-being, and health outcomes. We examine a randomized experiment in South Korea, the Seoul Stepping Stone Income Project, where 1,584 out of 5,111 households received monthly payments based on their income and household size across two phases. Our findings, drawn from both administrative and survey data, consistently show that households receiving income support experienced increases in total income and expenditures. However, compared to the control group, recipients of income support display lower employment and labor income growth. Notably, income support led to improvements in mental health among low-income households.

*Hyuncheol Bryant Kim: Department of Economics, HKUST, and and Department of Preventive Medicine, Yonsei university College of Medicine, hbkim@ust.hk. Jungmin Lee: Department of Economics, SNU, jmlee90@snu.ac.kr. Sangyoon Park: Division of Social Science, HKUST, sangyoon@ust.hk. Hankyoung Sung: School of Economics, University of Seoul, hsung@uos.ac.kr. We would like to thank Ki Seong Park and Yong Min Kim for their valuable comments and Kangwoo Choi for his excellent research assistance. Disclaimer: Views and opinions expressed in this study are those of the authors and do not necessarily reflect the view of the Seoul Metropolitan Government or any of its officials. This project received IRB approval from Seoul National University (E2503/004-009) and is registered with the AEA RCT registry (AEARCTR-0010958).

1 Introduction

In developed countries, social security systems mainly rely on complicated means-testing procedures (Gough et al., 1997; Smeeding et al., 2000; Daly and Burkhauser, 2003; Gruber, 2003; Millar and Bennett, 2017). However, such systems have several shortcomings. First, means-testing can create disincentives for people to work or save, as they may fear losing their benefits if they earn or save too much (Hubbard et al., 1995; Sefton et al., 2008; Jacob and Ludwig, 2012). Second, means-testing can be complex and confusing for both beneficiaries and administrators, leading to a wide range of welfare blind spots and substantial administrative costs. For example, welfare programs in South Korea, such as the National Basic Livelihood Security System (NBLSS), have stringent eligibility conditions on recipient's income, wealth, working capability, as well as incomes of immediate family members. These conditions can prevent those in need from accessing welfare benefits, and increase administrative costs spent on screening and monitoring recipients.

Due to the shortcomings of existing social security systems, not only in South Korea but also in many developed countries, alternative systems such as Negative Income Tax (NIT) and Universal Basic Income (UBI) have been discussed for several decades. NIT, originally proposed by Juliet Rhys-Williams while preparing for the Beverage Report and later supported by Friedman (1962), is a system in which the government pays households a guaranteed minimum income with minimal eligibility conditions. Those with incomes below this level would receive a payment from the government to bring their income up to the minimum level. It has been studied based on experiments conducted in the U.S. and Canada between 1968 and 1980. Although it has not been put into practice, the theoretical concept of NIT and empirical investigation on its impact on labor supply had significant influence on welfare policy design through emphasizing the fundamental message that incentives matter (Moffitt, 2003).

In more recent years, unconditional and universal cash assistance schemes have been widely studied (Banerjee et al., 2019; Banerjee et al., 2022; Jones and Marinescu, 2022; Miller et al., 2024; Verho et al., 2022; Vivalt et al., 2024), with UBI rising as one of the important agenda in public policy debates. However, UBI programs do not specifically target low-income households and rather provide benefits to all individuals regardless of income or age. Providing UBI funds to households without earnings to ensure they meet their basic needs would be extremely expensive or fiscally infeasible (Hoynes and Rothstein, 2019).

This report presents the second-year interim results of Seoul Stepping Stone Income Project (SSIP), which is a modified version of NIT. The original version of NIT is a concept

that presupposes the abolition of the existing social safety system and its benefits, but SSIP replaces only cash transfer programs and allows recipients to continue receiving income support from other sources such as medical assistance and unemployment benefits.

We use both administrative data and survey data to investigate the impacts of SSIP treatment on various household outcomes. We present three main results during the second year of the experiment using primary outcomes defined in the pre-analysis plan. First, we document large increases in monthly household income (both administrative and survey data) and expenditures attributable to public transfer from SSIP. In particular, survey data show that expenditures on essential categories such as food, education and training, medical service, transportation and even charity increased. Second, we find that recipients of SSIP exhibited lower growth in labor income and employment relative to non-recipient households in the control group. Third, we observe significant improvements in the household head's self-reported mental health.

We also explore the heterogeneous effects of SSIP across various individual and household characteristics. We focus on age, gender, and mental health status, number of young children (less than 7 years old) or seniors (aged 65 or more) in the household, NBLSS receipt status, and regular employment status at the baseline. The decline in employment is more evident for those with 2 or more young children or seniors in the households and those not on NBLSS at the baseline. Those with NBLSS do not reduce their labor supply as much as those not on NBLSS. Individuals without regular employment at the baseline increase labor supply after receiving SSIP. The changes in employment in other types of individuals do not differ significantly from the main estimates. As for health outcomes, individuals considered unhealthy at the baseline gain better mental health than others following SSIP receipt. These results suggest that the impact of income support may depend on the underlying characteristics of recipients.

Our study contributes to the recent debate on UBI. To date, a total of 107 experiments on UBI have been or are being conducted worldwide (Hasdell, 2020). UBI programs generally yield positive effects on various outcomes including expenditure, health, education achievement, labor market participation, and fertility (Hoynes and Rothstein, 2019; Banerjee et al., 2019; Hanna and Olken, 2018). Focusing on developed countries, studies provide evidence that UBI raises household spending such as food expenditure, increases education investment (mostly short-term), and improves health statuses of family members. Yet, studies typically find little to no effects on household income, poverty, or labor market participation (Hasdell, 2020). For example, a study on the Finnish Basic Income experiment shows that replacing minimum unemployment benefits with basic income has no major short-term effects on days in employment (Verho et al., 2022). In another recent study, a universal and permanent cash

transfer to Alaskan residents had no significant effect on aggregate employment (Jones and Marinescu, 2022).

By design of the SSIP, our study also closely relate to experiments on NIT. The literature on NIT is mostly based on NIT experiments conducted in the U.S. and Canada between 1968 and 1980 (Moffitt, 2003). Table B1 provides a summary of existing studies on NIT (Robins, 1985; Hum and Simpson, 1993). Recently, large-scale experiments on NIT provide causal mechanisms between NIT benefits and a rich set of outcomes, particularly employment (Miller et al., 2024;Vivalt et al., 2024). Overall, most studies on these NIT experiments report a modest reduction in the target recipients' number of work hours and the amount they earned (Vivalt et al., 2024;Widerquist, 2005). However, concluding that NIT has a detrimental effect on labor supply has several limitations. Indeed, Joshua Angrist concluded that the findings were ambiguous because of the misreporting of income and lack of statistical power (Angrist and Pischke, 2010).

Specifically, studies on the Seattle/Denver Income Maintenance Experiment (SIME/DIME), the largest NIT experiment, relied on self-reported earnings rather than using official administrative data. This scenario can be problematic, as participants have incentives to underreport their actual earnings to retain their eligibility statuses. In fact, a study showed that cross-referencing self-reported income with government records substantially reduced the negative effect of NIT on labor supply (Burtless, 1986). Moreover, Ashenfelter and Plant (1990) showed that survey response attrition in SIME/DIME was systematically related to treatment status which causes grave concerns on the internal validity of the study findings.

Next, even if a negative effect existed on labor supply, studies show that this outcome was not driven by a drop in work hours but instead by a longer unemployment spell. This seemingly adverse effect on the unemployment spell was shown to be offset among the youth through increases in school attendance and high school graduation (Hanushek et al., 1986). Furthermore, studies have shown that NIT has positive effects on other indicators of recipients' well-being, such as health, home ownership, low-birthweight, and school performance (Levine, 2005). Furthermore, Vivalt et al. (2024) and Miller et al. (2024) finds large short-run improvements in stress, food security, and health care usage. Thus, only focusing on the effects of the labor supply can bias the evaluation of the program's effect on the well-being of society.

The remainder of the paper is structured as follows. In Section 2, we present the context and program of SSIP. Section 3 discusses the experiment design. Sections 4 and 5 goes on to discuss the data and empirical strategy we employ in this study. Section 6 presents the results. We conclude with a discussion in Section 7.

2 Context and Program

2.1 Existing Welfare System

The National Basic Livelihood Security System (NBLSS) is the most important existing social security program in South Korea. It is a non-contributory transfer program for the targeted population by supporting cash and in-kind benefits based on a means-test. Households with income" (which is the sum of income from various sources, including potential interest income flow from wealth) below a designated cutoff are eligible for this program.[1] In the year 2021, approximately 4.6% of the population was eligible for NBLSS (Korean Statistical Information Service, 2021).

The NBLSS is primarily composed of four types of benefits: livelihood income, medical, housing, and educational assistance (Nam and Park, 2020). The amount and types of benefit depend on the family's welfare needs and ability to work. The livelihood income assistance is available for those with income below 30% of the standard median income (the median income defined for each household size). The corresponding income cutoffs for medical, housing, and educational assistance are 40%, 46%, and 50% of the standard median income, respectively. For example, if a household's income is between 46% and 50% of the standard median income, only education assistance can be provided. For those below age 65, a proof of incapability to work is necessary to become eligible for these welfare programs.

However, the eligibility conditions for the NBLSS are often considered counterproductive because they consist of not only the recipient's income but also his or her asset and family members' incomes. For example, owning a house or car is considered as income when assessing eligibility, and therefore a person owning a car worth 2,000 USD would be ineligible for NBLSS. In addition, to be eligible for the medical assistance program, applicants must prove that none of their immediate family members have income. Consequently, the elderly whose children are earning income cannot receive medical benefits even when they are not receiving any support from their children.

Moreover, individuals eligible for livelihood income have little incentive to work due to the high marginal tax rate: the amount of livelihood income benefit decreases as income increases and, as a result, disposable income may also decrease. Furthermore, taking up a temporary job can come with a risk of being ineligible for livelihood benefits for a long duration even if the person is laid off or quits the job soon. Therefore, low-income households relying on livelihood income assistance may be discouraged to search for work, and stay out of the labor market.

[1] Besides income, wealth is another factor determining NBLSS eligibility and benefit size. Please refer to Figure 1. We provide a more detailed explanation in the next subsection.

As a supplement to NBLSS, the Seoul Metropolitan Government (SMG) operates welfare programs, with relaxed eligibility conditions compared to the NBLSS, to support families who are ineligible for the NBLSS but still in need of assistance from governments.[2] The Seoul Basic Security (SBS) supports households with income below 47% of the standard median income and with asset less than 120,000 USD. The SMG also provides rent support called Seoul Housing Brochure that is similar to the NBLSS's housing assistance benefit but has a lower eligibility condition, which is below 60% of the standard median income.

2.2 Seoul Stepping Stone Income Project (SSIP)

In July 2022, the SMG implemented the Seoul Safety Income Project (SSIP), renamed to Seoul Stepping Stone Income Project in September 2024, to introduce a comprehensive welfare system that provides income support to households under less stringent eligibility conditions than previous programs, including the NBLSS. The concept of SSIP was initially proposed in Park and Byun (2017). They pointed out the limitations of NBLSS, especially, its disincentive effect on labor supply, and suggested the Safety Income (SI) as an alternative system. As described in Section 1, the basic idea of the SSIP is similar to a NIT scheme.[3] For eligible households, SMG provides monthly payments equivalent to 50% of the difference between the household's income and 85% of the standard median income.[4] Thus, under the SSIP, households with no income receive 42.5% of the standard median income (= 50% of 85% of the standard median income), and the payment decreases as the household's income increases.

SSIP is a modified NIT program that allows recipients to continue receiving welfare assistance from other sources. Although NIT is a concept that presupposes the abolition of the existing social safety system and its benefits, recipients of SSIP are still eligible for unemployment benefits, and still receive medical and education support from the NBLSS. However, SSIP recipients are suspended from receiving livelihood and housing benefits. Elderly people who are not eligible for National Pension can still receive basic pension paid out to elderly but the benefit will be deducted from the SSIP. Regarding benefits from the SMG, SSIP recipients are not eligible for SBS but are eligible for housing benefit. In addition, young residents can receive deducted benefits from SMG. Table 1 summarizes eligibility of other

[2] In particular, other local governments also have income or rent assistance programs for young residents who satisfy income, employment, and housing eligibility conditions.

[3] There are some crucial differences between SI and NIT. For example, the SI scheme proposed in Park and Byun (2017) has a wider coverage than the NIT that scheme Friedman proposed. SI targets households below the standard median income, while NIT targets only households at the bottom 10% over the income distribution. Also Friedman (1962) suggested a tax reform removing all tax exemptions and deductions.

[4] Household income includes labor, business, property incomes, and public transfers.

welfare programs for SSIP recipients.

For a comparison of NBLSS and SSIP, Figure 1 illustrates the benefits of the SSIP and NBLSS for a three-person household (most typical example). The horizontal axis is the before-tax income of a three-person household that does not receive any social security benefits. The vertical axis represents disposable income after receiving SSIP benefits. The red line shows livelihood income of the NBLSS. For example, as of 2022, the monthly median income of a three-person household in Korea is about 3,251 USD. If the monthly income is less than 975 USD which is 30% of the median income, the income is compensated through livelihood income and housing assistance.

The blue line represents income after support from SSIP. A few points must be noted from this figure. First, SSIP provides greater income support than NBLSS for those who are already eligible for NBLSS (as shown by the blue line constantly being above the red line for households with income less or equal to 43% of the standard median income). Second, SSIP covers more households than NBLSS. For example, a three-person household with 1,800 USD is not eligible for the NBLSS; whereas under the SSIP, the three-person household receives 482 USD (= 50% × [2,763 (85% of the standard median income) − 1,800 (before-tax income)]) as income support each month. Households without zero income receive 1,382 USD as income support.

It is also important to note in Panel (a) of Figure 1 that the effective tax rate on earnings is lower for SSIP than for NBLSS. A one dollar increase in earnings decreases 0.5 dollar of SSIP benefits, while it decreases 0.7 dollar of NBLSS benefits. Hence, static labor supply theory predicts that the labor supply disincentive should be weaker under SSIP relative to NBLSS.

Panel (b) of Figure 1 shows the eligibility condition and benefits with respect to household assets. First, the maximum amount of assets for SSIP eligibility (252,635 USD) is more than twice as large as that for NBLSS (106,524 USD), covering a wider range of households than NBLSS. Second, note that there is a cutback in NBLSS benefits after passing a threshold (53,472 USD for a three-person household). However, SSIP benefits do not depend on the size of household assets. Hence, the disincentive for asset accumulation (e.g., bank savings or owning a car) is also weaker for SSIP than for NBLSS.

3 Experiment Design

This project studies the impacts of the SSIP on household's finance, employment, education, family relationship, and health. In collaboration with the SMG, we conduct a randomized controlled trial in which randomly selected households will receive a monthly income payment

for three years. The amount of income subsidy depends on the household's income from the previous month and is reassessed on a regular basis during the study period. We will use eight rounds of survey data and administrative data collected throughout the five-year study period. In this report, we present the second year interim results using data from three follow-up surveys for Phase 1 households and one for Phase 2 households. We provide more details on eligibility, sampling, SSIP treatment, and data collection below.

3.1 Eligibility Criteria and Sampling Procedure

Figure 2 shows how households were recruited for the study. The recruitment was conducted in two phases, with Phase 1 starting in July 2022 and Phase 2 starting in July 2023. All households in the sample were surveyed in the baseline before being assigned to treatment and control groups. For Phase 1, 1,500 households with less than 50% of the standard median income and assets less than 272,803 USD (326 million KRW) were selected. In Phase 2, 3,300 additional households with less than 85% of the standard median income have been recruited.[5]

Participants for Phases 1 and 2 were recruited through the SMG's website in early 2022 and 2023, respsectively. The program was advertised through South Korean news media. In Phase 1, 33,803 households applied, and 5,000 households were randomly selected. For Phase 2, 76,051 households applied and 15,000 households were randomly selected. The SMG validated their eligibility for SSIP using administrative data. Of the 5,000 participants, 2,440 were found to be eligible for SSIP, and, from the 2,440 eligible candidates, 1,584 households were randomly selected to participate in the Phase 1 experiment and to complete a baseline survey. Simlarly, 8,466 households were eligible for SSIP and 3,588 applicants were randomly selected for Phase 2 experiment. Stratification was based on two characteristics: age and household size, with three categories of age (-39, 40-64, and 65+) and four categories of household size (1, 2, 3, and 4+) used for random sample selection.[6]

3.2 Treatment

Households in the treatment group of the SSIP receive a monthly payment that is equal to half of the difference between their income and 85% of the standard median income. To determine the monthly payment, the SMG checks household income every month through the central welfare database, which is based on tax records. Eligible households are also subject

[5]SMG designed the first and second phases with different income eligibility thresholds due to legal issues.

[6]In 2023, study participants for the second phase were recruited using a similar process. Among eligible candidates, 3,300 households were randomly selected, with 1,100 assigned to the treatment group and 2,200 assigned to the control group using random assignment.

to an income and means test at least once a year during the three-year period to verify their eligibility. Each eligible household receives a debit card to withdraw their monthly SSIP payment. There are no constraints on how or where the payment is spent.

Households receiving income support through other government programs were still eligible for the SSIP. However, the SSIP payment is adjusted against six other major income support programs, including NBLSS (livelihood/housing support), Basic Income, Seoul Basic Living Security Program (SBLSP), Youth Allowance, Youth Rent Support, and Housing Vouchers. Specifically, NBLSS recipients who receive SSIP support will see their livelihood and housing support payments cease, but they will retain their eligibility for the NBLSS. Recipients of the Basic Income and SMG's Youth Allowance, Youth Rent Support, and Housing Vouchers will continue to receive their benefits but SSIP payment will be adjusted accordingly. Recipients of the SBLSP will lose income support once they are chosen to receive SSIP income payments.

4 Data

4.1 Data Collection

We use information from both administrative data and in-person surveys with adult members of households. The administrative data are collected by the Korea Social Security Information Service (SSIS), the central government agency responsible for operating the social welfare system. It includes household-level income, which covers labor, business, interests, and public transfer (excluding SSIP), as well as assets and debt. For treatment groups, we have access to the data on monthly payments of SSIP benefits. The average monthly SSIP payments for each phase are summarized in Figure 3. The benefits increase over time with the adjustment of the nationwide median income criteria every January.

We conduct a total of eight rounds of household surveys for Phase 1 and six rounds for Phase 2 participants. These include baseline surveys conducted before the first SSIP benefit payment, and follow-up survey every six months starting from the first payment.[7] In the survey, we ask questions about household finance, employment, health, family, and social relationships. The household head is the main respondent for the household survey. Additionally, we conduct individual-level online surveys with adult household members aged 19-64 to collect information on several key outcomes, such as employment, health, and life satisfaction.

[7]We plan to implement an endline survey one year after the end of the SSIP income payment.

4.2 Outcome Variables

Table 2 presents primary and secondary outcome variables specified in our pre-analysis plan (Kim et al., 2023). We define outcome groups with respect to the following three groups: economic outcomes (household finance and employment), health outcomes, and family and society outcomes. First, economic outcomes include household finance (earned income, income from public transfers, income from private transfers, expenditure, assets, and debts), employment (regular employment status, whether the respondent worked last week, and work hours), as well as housing condition and satisfaction. Second, health outcomes include subjective health status, health behaviors (eating, smoking, drinking, sleeping), and mental health status (self-esteem, depression, stress, happiness, and life satisfaction). Third, family and society outcomes include family satisfaction, family conflict, attitude to marriage, fertility preference, amount of money spent on education/training and children's education, social relationships, and self-community interest.[8] In Table 2, we indicate outcome groups that are surveyed only in the annual survey with an asterisk mark.

4.3 Characteristics of Study Population and Randomization Balance

Tables 3 and 4 present baseline characteristics and balance test results for all households in both phases of the experiment using administrative and survey data, respectively.[9] Columns 1 to 3 show the baseline mean for the control group, the difference between the treatment and control groups, and p-value of the equality test, respectively. In addition, column 4 of Table 3 presents the p-value from Kolmogorov-Smirnov test for distribution equality.

The average total monthly income for the control group at the baseline is 1,370,000 KRW (≈ 1046 USD), in which labor income consisted the largest income source (1,070,000 KRW ≈ 817 USD), followed by public transfer from welfare programs (193,000 KRW ≈ 147 USD) (Table 3).[10] The average value of total asset is 109,730,000 KRW (≈ 83,745 USD) and the debt is 35,170,000 KRW (≈ 26,841 USD) for control households. Columns 2 and 3 report mean differences and p-values from t-test of mean differences. For all variables except nonfinancial debt, we fail to reject the null hypothesis of no difference in mean between control and treatment groups at 10 percent significance level. In Column 4, we report p-values from Kolmogorov-Smirnov test for equality of distribution between control and treatment. We find no significant relationship between treatment status and distributions of

[8] To clarify on the data source, we indicate whether an outcome is measured from administrative data (A) or surveys (S). Note that some outcome groups are not included in the biannual survey (e.g., 1st follow-up survey) and only included in the annual survey.

[9] The balance test results conducted separately for each phase are included in Tables B3 through B6.

[10] The monetary value in KRW is converted to that in USD based on the exchange rate on the September 29th in 2024, where 1 USD equals 1310 KRW.

the baseline financial variables in the administrative data.

Table 4 reports balance test results using the baseline survey data. The average household head is equally likely to be a male or a female, 51.5 years old and 35 percent of them are married. More than three-quarters received high school education or above (80 percent) and 59 percent had regular employment prior to the survey. The median household size was two and 42 percent had children. 10.4 percent of households were receiving livelihood cash assistance from NBLSS prior to SSIP, which are similarly distributed across control and treatment groups. Average monthly household income is 1,778,000 KRW ($\approx$ 1,357 USD) which is approximately 1.3 times the amount reported in the administrative data.[11] Average monthly household expenditure is 2,101,700 KRW ($\approx$ 1,605 USD).[12] About 68 percent of household heads reported to have debt while 13.4 percent owned a house.

The last column reports the p-value from a test of equality of mean between control and treatment groups. Among 33 baseline characteristics, only two characteristics report significant differences at a 5% level (graduate a 2-year college, have children aged under 7). Overall, the balance test results using administrative and survey data suggest that the randomization was successful, with the sample well-balanced across treatment and control groups at baseline.

4.4 Sample Representativeness

As a policy experiment, it is imperative to discuss about the representativeness of our sample and its implications for external validity. In our experiment, study participants had to apply for SSIP and, therefore, may be different in terms of characteristics and behavior from those who did not apply to SSIP. To examine whether the SSIP sample is different from the population sample we compare SSIP households to households in the Survey of Household Finances and Living Conditions (SHFLC).[13] To identify individuals comparable to the SSIP eligible sample, we limit the SHFLC sample to households residing in the Seoul Capital Area, which includes Seoul, Incheon, and Gyeonggi Province, and have a household income below 50% of the standard median household income (the same income criteria used for SSIP

[11] The discrepancy could arise due to informal income not reported to the national tax service or because there are co-residents with positive incomes who are not officially registered as household members.

[12] During the baseline survey for Phase 1, a small percentage of households did not report income (3 percent of control; 1 percent of treatment), expenditure (5.3 percent of control; 0 percent of treatment), or asset (8.9 percent of control; 12.4 percent of treatment). We leave non-response values as missing rather than imputing any arbitrary values.

[13] The SHFLC is an annual nationwide survey that collects information on household income, assets, liabilities, and standard of living. The survey data is publicly available on the Statistics Korea website (www.kostat.go.kr). Approximately 20,000 households are sampled based on population censuses to ensure national representativeness. For our analysis, we will use survey data from the year 2022.

eligibility).[14]

Appendix Table B2 presents average characteristics of households in the SHFLC and SSIP. Compared to SSIP, household heads in SHFLC are older and less educated, and households have lower reported income and assets but receive more income through public transfer. This is probably because the SSIP oversampled individuals under the age of 39 and undersampled those aged 40-64 and 65 and older to ensure an adequate representation of the working-age population. For example, individuals under the age of 39 make up 11.8% of the population in Seoul, but were sampled at a rate of 30% in SSIP. Meanwhile, individuals aged 65 and older make up 35% of the population, but were sampled at a rate of 20% in SSIP. However, we observe some similarities in other household characteristics, such as household head's gender, household size, and tenancy type.

5 Empirical Strategy

We discuss our empirical strategy for evaluating the effects of SSIP on participants' outcomes. To ensure credibility and transparency of the project findings, we have registered our experiment and the pre-analysis plan at the AEA RCT Registry (RCTID: AEARCTR-0010958) prior to having access to the first follow-up survey data. At the time of writing this report, we have collected two rounds of administrative data and three rounds of survey data for Phase 1 and one round of administrative data and one round of survey data for Phase 2 since the start of the SSIP treatment. We adopt a panel data estimation framework as written in the pre-analysis plan.

5.1 Estimation

Given the randomized controlled design of the study, we employ a straightforward approach for estimating the impact of SSIP on participants' outcomes. Specifically, we use a difference-in-differences estimation to estimate the effects of SSIP across treatment assignment status and time periods with the following specification:

$$Y_{hsct} = \alpha + \beta \cdot \text{SSIP}_{hs} \cdot \text{Post}_{ct} + X_{hsc}\gamma + \phi\text{SSIP}_{hs} + \eta_{sc} + \delta_t + \epsilon_{hs} \tag{1}$$

where Y_{hsct} is the outcome for household h in strata s (12 clusters by age and household size) surveyed in phase c at wave t. SSIP_{hs} is equal to one if household h is treated with SSIP and zero otherwise. Post_{ct} equals one for all waves after the baseline and zero if otherwise. X_{hsc} is a set of controls for household-level characteristics at the baseline to avoid endogenous

[14] Participants can only be identified at the Greater Capital Area level in the publicly available data.

control issues (Callaway and Sant'Anna, 2021).[15] The strata-by-phase and wave fixed effects is denoted by η_{sc} and δ_t, respectively. Standard errors are clustered at the household level.[16]

Our parameter of interest is β which captures the difference in the outcome variable between households that receive income support from SSIP and households that do not, netting out unobserved time, strata, and cohort characteristics. Our identification assumption is that treatment status is orthogonal to any unobserved factor that affects the household's outcome. According to the design of the experiment, households are randomly assigned to treatment, which is arguably supported by the balance test results in Section 4.3. Moreover, we collect vast amounts of information through surveys and administrative data which help us to identify and control for plausible confounding factors.

We also explore heterogeneous treatment effects with respect to household and individual characteristics. We look at the heterogeneity of SSIP effects across the household head's age, gender, health, regular employment status, and number of household members aged below 7 or above 65. As shown in previous studies of NIT, SSIP income benefits may have a stronger effect on young recipients relative to older ones. Moreover, we are interested in whether the program effects are stronger and more favorable for households headed by females relative to males, since female-headed households are typically more economically disadvantaged. We also examine if the employment effects of SSIP differ depending on whether the individuals were working or not. In addition, we check if household heads are more likely to decrease labor supply with more household members that need care.

Lastly, we check for the heterogeneity of the effects across NBLSS receipt status at the baseline. NBLSS and SSIP differ in the generosity of the benefits and labor incentives. Thus, it is of interest to examine whether the treatment effects differ between households that were previously NBLSS recipients and households that were not. Given the difference in incentives between NBLSS and SSIP, which we explained in Section 2.2, we expect the impact of SSIP on labor supply to differ by the status of NBLSS receipt at the baseline.

5.2 Attrition

We provide a summary of the number of observations by attrition status in Table 5. Panel A displays administrative data, while Panel B shows survey data. In general, attrition rates for the control group are larger than those for the treatment group, even in the administrative data.[17] For the administrative data, the attrition rates of the control group in the latest

[15] Results are robust if we allow X_{hsc} to vary over time or drop them in the regression.

[16] In a setup where we look at the effects across each wave, we use a simple OLS regression with the treatment indicator SSIP_{hs} and strata fixed effects.

[17] The main reason for this is that those in the control group are less willing to consent to access administrative data.

wave are 11.5% (119 out of 1039) for Phase 1 and 7% (174 out of 2488) for Phase 2. Similar figures for the treatment group are 3.9% (19 out of 484) for Phase 1 and 3.2% (35 out of 1100) for Phase 2. This pattern also appears in the survey data, as shown in Panel B. In the latest survey wave (January 2024), the attrition rates for the control group are 30.5% (317 out of 1039) for Phase 1 and 16.3%(406 out of 2488) for Phase 2. These are larger than the attrition rates for the treatment group, measured at 2.9% (14 out of 484) for Phase 1 and 1.2% (13 out of 1100) for Phase 2.

Table 6 shows that the difference in attrition rate between the two groups are statistically significant across all waves for the survey and administrative data. Furthermore, the difference in attrition rates increases over time. For Phase 1, the differential attrition rates for the first follow-up wave are 5.7 percentage points in the administrative data and 17.1 percentage points for the survey data. This figure increases to 7.8 percentage points and 27.8 percentage points for the most recent waves of the administrative and survey data, respectively. This was not unexpected since participants in the control group receive no benefit from SSIP and may therefore be less willing to consent to the use of administrative data and to participate in the follow-up survey.

To understand the nature of attrition, we conduct a determinants of attrition test. We estimate a linear probability model using attrition as the outcome and baseline characteristics as independent variables. We report the results using both administrative and survey data in Table 7. We focus on the control group because the attrition rate for the treatment group is low. Overall, we find little evidence of systematic relationships between baseline characteristics and attrition among control group participants. For the survey data, we find that the attrition is correlated with business income at the 5% level. For the administrative data, attrition is correlated with schooling status, Rosenberg Self-Esteem Scale, Cohen Perceived Stress Scale, income and wealth measures, age and gender. However, the direction of any bias due to attrition is ambiguous. For example, we find that household heads who attended school at the baseline are more likely to the follow-up administrative survey. If they are less likely to work, labor force participation and earnings of the control group would be underestimated. On the other hand, household heads with higher incomes are more likely to be observed in the administrative data, implying that incomes of the control group could be overestimated due to attrition.

Although our project is still in its early stages and may experience additional attrition in remaining surveys, we would like to note that the current attrition rate is lower compared to other social experiments. For example, the Finland Basic Income Experiment reported attrition rates of 79.71 percent for control group and 68.65 percent for treatment group (Kangas et al., 2019).

Nevertheless, we acknowledge that our estimates of outcomes from survey data are likely to be affected by bias from selective attrition, and complement our analysis with several empirical approaches. First, we complement the outcomes on household finance and employment using relevant information from the administrative data. Second, we confirm that our findings are robust when we analyze the balanced panel of household heads who respond to all survey waves (Tables B7 - B9). Finally, we impute missing responses based on available responses from the past waves and baseline characteristics (Table B10 and Figure A1). We find that even after imputation, our findings remain largely unchanged.

6 Results

In this section, we report on the two year interim results based on administrative and survey data. We analyze four surveys and three administrative data for Phase 1 and two surveys and two administrative data for Phase 2, respectively. Theoretically, long-term impacts are likely to differ qualitatively from short-term impacts. Therefore, the results presented in this report cannot be interpreted as the final evaluations of SSIP.

6.1 Household Finance and Employment

Table 8 presents the estimates for household income, assets, and debt. All outcome variables are continuous and measured in units of 10,000 KRW. The first row shows a decrease in monthly household income without SSIP payment. In the second row, we observe a large and statistically significant increase in monthly income, including SSIP payment. The estimate suggests that the average household's monthly income increases by 543,000 KRW ($\approx$ 414 USD) with SSIP treatment. Next, we break down income into four categories to investigate the treatment effects on each income source: labor, business, property, and public transfer. The estimate for labor income is -26.4 (standard error: 3.44). This corresponds to a 24.2 percent decrease in labor income relative to the control group.[18] Furthermore, we find that treated households are 12.4 percentage points less likely than control households to earn any labor or business income, or 18.2 percent less than the control group average (0.697). On the other hand, the estimates are not statistically significant for other income categories. Public transfer with SSIP suggests that the average household in the SSIP treatment group

[18] According to survey data, labor income did not change much between the baseline and follow-up survey for both treatment and control groups. For example, labor income increased by 3 percent for the control group. There are some measurement issues, which we will have to investigate more deeply. Labor income in survey data is 60-80 percent larger than labor income in administrative data. It might be because of unreported earnings as administrative data cover only reported income. Also the discrepancy might be due to the definition of household members. There might be some co-residents who are not officially household members.

received a monthly payment of 1,097,000 KRW (≈ 837 USD). In the next rows, we investigate treatment effects on household asset and debt, but we do not find any significant changes.

Next, we turn to survey data to leverage more detailed information on household income and expenditure. Table 9 presents estimates on various outcomes from the survey data. Panel A shows estimates on household finance. In the survey, participants were asked to report pre-tax monthly average income over the past six months across five categories (labor/business, property, public transfer, private transfer, and others). Total monthly household income is calculated by adding all income categories. We find that treated household's total monthly income increases on average by 386,690 KRW (≈ 295 USD), which is a 21.7 percent increase from the control group's average household's income of 1,778,000 KRW (≈ 1,357 USD). This estimate is approximately two-thirds of that reported from the administrative data. The estimate for monthly household expenditure is 175,180 KRW (≈ 134 USD) representing a 8.3 percent increase in treated household's expenditure relative to the control group.

We also examine treatment effects on expenditure by category. Estimation results are reported in Table 10. Focusing on estimates with statistical significance at the five percent level, SSIP treatment is associated with expenditure increases in essential categories such as donations, food, housing (besides rent), medical service, education and training of adult household members, transportation, and debt interest. It is important to emphasize that expenditures in these categories can be seen more as investments rather than mere consumption. They can serve to uphold health, ensure family stability, and additionally, contribute to the enhancement of labor market productivity. Interestingly, households in SSIP, despite having lower incomes that fall below 50% of the standard median income, allocated a portion of their benefits toward charitable donations.

In Panel B of Table 10, we present the results related to welfare program enrollments. It is important to recall that beneficiaries of SSIP may become ineligible for certain welfare programs. Among them, the most notable one is NBLSS livelihood assistance. Indeed, we find a negative effect.[19] Additionally, we observe a decline in the likelihood of treatment households receiving medical and housing assistance. Note that these changes in enrollment are not attributed to SSIP treatment status since treated households are still eligible for medical and housing assistance. The reductions in enrollments for EITC align with the decreases in employment at the extensive margin, as indicated in Panel B of Table 9.

To provide a better understanding of labor supply behavior, we utilize various questions

[19]We find that the effect is not 100%; the estimate is -0.022 while the control group mean is 0.103. This discrepancy may be because the survey question was ambiguous. Even though they cannot receive NBLSS livelihood assistance, their eligibility remains intact for the case that they may want to switch back to NBLSS. Thus, respondents might have responded that they "received" livelihood assistance although they could not because they already received SSIP.

on employment from the survey data. The results are presented in Panel B of Table 9. Specifically, we measure a respondent's employment status by asking whether he or she worked for income for at least one hour during the past week or had any regular employment. The estimate for the former is -0.116 and the latter is -0.103. Both are statistically significant at the one percent level. Looking at regular employment status, the employment rate of the treatment group is 17.2 percent lower than the control group average (0.597). Similar figures using whether the individual worked for income last week is 20.4 percent. These are comparable to the estimate from using binary labor or business income variable from the administrative data (estimate -0.127, equivalent to a 18.2 percent decline). Conditional on being employed in the past week, we find no significant effect on having a side job. For work hours at the main job, the estimated coefficient is -1.059 but statistically insignificant at any conventional level. Though it may appear that there is little effect of SSIP treatment at the intensive margin, we interpret this result with caution. The survey data is based on self-reported work hours, which may be prone to measurement error, and, thus, our estimate may be biased towards zero.

We also examine treatment effects on secondary outcomes, including job search activity, willingness to work, and job satisfaction. The results are reported in Panels C and D of Table 10. For respondents who are currently unemployed, we find no significant effect on job search activity. For respondents who are currently employed, there is no significant difference in willingness to work extra hours in current job between treatment and control groups. On the other hand, we find that household heads in the treatment group are, albeit with marginal significance, more satisfied with their job with regard to potential career development (Panel D).

We analyze how the treatment effect changes with time by breaking down $\text{SSIP}_{hs} \cdot \text{Post}_{ct}$ in Equation (1) to separate indicators across each post-baseline survey wave. We do this for the Phase 1 participants only since there is only one follow-up survey from Phase 2 participants at this point. Figure 4 presents this result for the labor supply outcomes. The labor supply decreases with time, with regular employment declining by 9 percentage points in the first follow-up survey and by 13 percentage points in the third follow-up survey. Similar patterns appear for whether the individual worked for income last week (from 12 to 16 percentage points). Figure 5 represents this for household expenditure. Expenditure on education and training, food increases over time. It should be noted that the dynamic effect may change with more information from further follow-up surveys.

6.2 Health and Well-being

We analyzed the impact of SSIP on the mental health and nutritional status of household heads. To measure mental health, we used three scales commonly used in health research: the Rosenberg Self-Esteem Scale, the Center for Epidemiological Studies Depression (CES-D) Scale, and the Cohen Perceived Stress Scale. We standardized each scale's score and constructed a mental health index by averaging the standardized scores.

We estimate specification (1) and report the results in Panel C of Table 9. We separately reported the estimate for each mental health scale, and the results showed that there are significant decline in depression, stress and an increase in overall mental health index. Depression and stress declines by 0.074 and 0.078 standard deviations, respectively. The mental health index improves by 0.055 standard deviation for the treatment group. However, the results on mental health are based on self-reports, which may raise concerns about the accuracy of the measures. Social desirability bias is a potential concern, as individuals in the treatment group may be inclined to provide responses that are perceived as socially desirable.

In the subsequent two rows, we report estimates on the treatment effect of SSIP on nutritional status. To assess nutritional status and dietary habits, we employ the Adult Nutrition Quotient Survey, developed by the Korean Nutrition Society. This survey requires participants to report the frequency of their consumption of specific foods (such as vegetables, fruits, milk and dairy products, etc.) and their adherence to healthy dietary practices (like checking nutrition labels and alcohol consumption). Since these questions pertain to objective facts, we anticipate that any potential Hawthorne effect, if present, would be minimal. The nutrition index is calculated by adding all responses in which a higher score represents better nutritional status and healthier dietary behavior. The control group's mean score is 55.61 out of a total possible score of 100. The estimate of the effect on nutrition index is 0.62 and not statistically significant.

We investigate how the impact of SSIP on health outcomes differs across time in figure 6. Overall, the positive health impacts are the most evident in the first follow-up surveys but dissipates over time. Stress and depression declines by 0.1 and 0.17 standard deviations in the first follow-up survey, respectively. In later surveys, the effect becomes statistically indifferent to zero at 5% level. Overall mental health index improves by 0.06 standard deviations and 0.08 standard deviations in the first and third followup surveys, but the latter estimate is not statistically significant. Again, it should be noted that the results may change with more information from the subsequent follow-up surveys.

Next, we evaluate the impact of SSIP on leisure and housing condition, our other sec-

ondary outcomes related to well-being. The results are shown in Panels E and F of Table 10. We find no significant difference in time spent in recreation or internet surfing. Similarly, the estimates for other leisure activities are also statistically insignificant, except for socializing. Housing condition is evaluated along six dimensions (e.g., lighting, ventilation, soundproofing, heating, hygiene, public transport accessibility) on a scale of 1 (poor) to 3 (good). Housing standards are measured based on whether the house is equipped with a kitchen, bathroom and indoor bathing facilities. We find no significant estimate for housing conditions and standards.

6.3 Heterogeneity Analysis

We conduct heterogeneity analysis on the impacts of SSIP treatment on household outcomes. Specifically, we examine heterogeneous treatment effects with respect to household head's gender, age, mental health, number of household members needing care, NBLSS status, and regular employment status at the time of the baseline survey. The results for the first four characteristics are presented in Tables C1-C4 in Appendix Section C, with the rest presented in Tables 11 and 12. First, regarding the head's gender, we find that increases in income and expenditure among male-headed households are larger, while the differences are not statistically significant. The probability of being employed regularly and working for income last week is lower for females but the difference is only marginally statistically significant. We have to caution the potential concern of multiple hypotheses testing. In Panels C and D, there are little differences in health outcomes and income measured from the administrative data.

With respect to age, we distinguish three age groups: 39 or younger, 40-64, and 65 or older. We find that the effect on household income is the largest for the youngest group. The negative effect on labor is largest among the individuals aged 40-64. In Panel C, we find that the positive effects on health are concentrated among the middle-aged group, for which the positive effect on nutrition is the smallest. Overall, the differences across age groups are not statistically significant.

Appendix Table C3 presents the results by mental health status. We take averages of the standardized Rosenberg Self-Esteem, CES-D, and Cohen Stress Indices and classify the individuals as mentally health if this score is greater or equal to 0. Otherwise, we classify individuals as unhealthy. Income gains are more evident for healthy individuals. Those who are mentally unhealthy are more likely to be not employed, although this difference with healthy individuals are not statistically significant. The positive effects on depression and stress are larger for the unhealthy.

We also test for heterogeneous effects of SSIP across the number of household members

needing care in Appendix Table C4. We define household members needing care as young children (aged 7 or below) or seniors (aged 65 or above). We find that the estimated decrease in labor supply is larger for households that have two or more members needing care. This may suggest that those who have more members who need care substitute labor with more time spent home. This is not a finalized result as there are few households with 2 or more members needing care (468 observations out of 12056, or roughly 4% of all households) and we do not have exact details on their time use. Other outcomes do not vary across different number of members needing care.

Next, we examine whether the results differ depending on whether households were the recipients of NBLSS before they applied for SSIP. This heterogeneity analysis is particularly important since SSIP was originally proposed as an alternative to NBLSS. As we explained earlier, standard labor supply theory predicts that the disincentive for labor supply should be weaker or even reversed for those NBLSS recipients. Substitution effect of SSIP would be positive for this group.

Table 11 shows the results for those who were on NBLSS against those who were not. We find that the treatment households who were on NBLSS at the baseline do not decrease labor supply, both in terms of regular employment and having worked in the previous week. The estimated effect is positive, although statistically insignificant. Those not on NBLSS decrease their labor supply by approximately 11 percentage points. While the income effect drives the labor supply down for both groups, substitution effect works in opposite directions. SSIP benefits are larger than those of NBLSS (Figure 1). Thus, income effect decreases labor regardless of NBLSS status at baseline. On the other hand, substitution effect is positive for those on NBLSS while negative for others. Therefore, it is sensible that the reduction in labor supply for those who were previously receiving NBLSS is not as sizeable as those who were non-recipients of NBLSS.

Table 12 presents the result on the heterogenous effects of SSIP based on regular employment status at the baseline. For those without regular employment at the baseline, employment increases by approximately 3 percentage points and is statistically significant at the 5% level. For those with work, employment decreases by roughly 19 percentage points. In addition, there is a significant improvement in mental health for those without regular employment. While further investigation is warranted, this may suggest that investment spending or extra funds made possible with SSIP allowed them to seek employment and improve health conditions.

6.4 Robustness Check

6.4.1 Addressing attrition issues in the survey data

In this section, we present that our findings remain robust even after taking several approaches to address attrition issues. First, we re-run the regressions only using households that responded to all surveys up to this point. This would limit our sample to a total of 4,361 households (2804 control and 1557 treatment households across two phases). Balance test on this sample in Tables B7 and B8 shows that the observable characteristics do not differ across treatment and control groups even in this sample. The regression results, shown in Table B9, remain largely unchanged from our main outcomes in the previous section. Employment decreases by approximately 10 percentage points. Health and expenditure outcomes remain largely similar.

Second, we run the regression after imputing missing responses. In one approach, we replace the missing outcomes with the most recent non-missing response from that household. Results are presented in Table B10. The results remain similar. Employment decreases by roughly 9-10 percentage points. Improvements in mental health also remain. There are similar changes to the expenditure pattern.

For the two labor supply outcomes, we also impute missing responses by calculating the likelihood of working based on baseline characteristics. Using the non-missing responses, we run the probit regression with employment status as an outcome and baseline characteristics as covariates. Based on this regression result, we calculate the predicted probability of working given the baseline characteristics for the missing households.[20] Then, we impute the missing labor supply outcome with 1 (being employed, or worked last week) if the predicted probability exceeds certain cutoff value. In this exercise, we use 0.2, 0.5, and 0.8 as the cutoff. Results are presented in Figure A1, alongside the main regression outcomes used in the previous section. The negative effect of SSIP on employment remains. The negative effects are larger when the cutoff value is lower.[21] The range of estimates produced in this exercise bounds the estimate from the main specification. Thus, our finding of negative employment effects are credible.

[20] There is no attrition at the baseline survey. Thus, even for those missing the latter stages of the surveys, calculating the predicted probability is possible using baseline level information

[21] As attrition is more frequent in the control group, a lower cutoff would increase employed individuals more for the control group than the treatment group. Thus, the differences in the share of employed individuals across the two groups will be greater with lower cutoffs.

7 Discussion and Conclusion

We study the impacts of SSIP, which provides monthly income support to low-income households in Seoul, South Korea based on a negative income tax scheme. Total of 5,111 households were randomly assigned to treatment and control groups over the two phases of this study. Our findings show that households receiving monthly income support had higher total income and expenditure compared to the control group. In particular, the survey data show that expenditures on essential items such as food and medical service increased. We find that recipient households exhibited lower growth in labor income and employment relative to the control group. We find suggestive evidence that employed household heads with income support have higher job satisfaction than those without. Finally, recipients of income support experienced improvements in mental health.

In this last section, we want to discuss the implications and limitations of this second-year progress report. First of all, it should be noted that the findings of this report are limited to short- to mid-term results. We expect that long-term effects, which might or might not appear within the span of the current experiment, would differ from short-term effects. We find that SSIP recipients experience improvements in mental well-being, likely attributable to increased income. Hence, these positive outcomes that we observe in the short-term can lead to enhanced labor productivity in the long-run because both physical and mental health are directly related to active labor market participation and productivity.

Another reason why long-term effects might differ from short-term effects is because SSIP does not strongly depress the incentive for savings or asset accumulation. Compared to NBLSS, SSIP sets a more lenient wealth threshold for eligibility, and notably, there is no deduction of benefits based on accumulated wealth. This is particularly important in the context of labor markets in South Korea where self-employment is quite prevalent among the poor. Financial resources within the household are crucial inputs for creating and maintaining small-size family-owned businesses. For instance, given high failure rates of small businesses, SSIP provides a form of insurance, allowing households to smooth consumption across periods. Therefore, SSIP can be instrumental in preserving labor market engagement and enhancing the productivity of financially vulnerable households (Chetty and Looney, 2006).

Randomized experiments have a limitation in providing direct insights into general equilibrium effects (Duflo et al., 2007). This can also be thought from the perspective of external validity or scale-up. When scaling up the implementation of SSIP to cover the entire city of Seoul or even nationwide, there is a possibility that some effects not captured in our experiment may emerge. For example, if there is a decrease in labor supply among SSIP

recipients, equilibrium wages might rise at the lower end of the wage distribution.[22] Moreover, the impact of SSIP on the overall welfare system hinges on its integration and potential replacement of existing welfare programs, such as NBLSS. If SSIP replaces NBLSS, then it could result in an increase in labor supply among low-income households, leading to a fall in market wages for mostly low-skilled workers.

It is also important to consider the temporary nature of SSIP, scheduled to conclude after three years. However, if integrated into the national welfare program, it would completely reshape the incentives individuals encounter over their life cycles. For example, the introduction of SSIP benefits may alter long-term savings behaviors, particularly affecting the motivation for post-retirement consumption savings. This shift in individual incentives could have lasting consequences and influence the capital market in the long run. Therefore, the broader implications of SSIP extend beyond its immediate effects on labor supply and wages.

[22] Rothstein (2010) simulated the economic incidence of the EITC. He showed that a large portion of EITC benefits was actually captured by employers through reduced wages.

References

Angrist, Joshua D and Jörn-Steffen Pischke, "The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con Out of Econometrics," *Journal of Economic Perspectives*, 2010, *24* (2), 3–30.

Ashenfelter, Orley and Mark W Plant, "Nonparametric Estimates of the Labor-Supply Effects of Negative Income Tax Programs," *Journal of Labor Economics*, 1990, *8* (1, Part 2), S396–S415.

Banerjee, Abhijit, Paul Niehaus, and Tavneet Suri, "Universal Basic Income in the Developing World," *Annual Review of Economics*, 2019, *11*, 959–983.

_ , Rema Hanna, Benjamin A Olken, and Diana Sverdlin-Lisker, "Social Protection in the Developing World," *Mimeo*, 2022.

Burtless, Gary, "The Work Response to a Guaranteed Income: A Survey of Experimental Evidence," in "Conference Series;[Proceedings]," Vol. 30 Federal Reserve Bank of Boston 1986, pp. 22–59.

Callaway, Brantly and Pedro H. C. Sant'Anna, "Difference-in-Differences with Multiple Time Periods," *Journal of Econometrics*, 2021, *225* (2), 200–230.

Chetty, Raj and Adam Looney, "Consumption Smoothing and the Welfare Consequences of Social Insurance in Developing Economies," *Journal of Public Economics*, 2006, *90* (12), 2351–2356.

Daly, Mary and Richard V Burkhauser, "The Supplemental Security Income Program," in "Means-Tested Transfer Programs in the United States," University of Chicago Press, 2003, pp. 79–140.

Duflo, Esther, Rachel Glennerster, and Michael Kremer, "Using Randomization in Development Economics Research: A Toolkit," in T. Paul Schultz and John A. Strauss, eds., *Handbook of Development Economics*, Vol. 4, Elsevier, 2007, pp. 3895–3962.

Friedman, Milton, *Capitalism and Freedom*, University of Chicago, 1962.

Gough, Ian, Jonathan Bradshaw, John Ditch, Tony Eardley, and Peter Whiteford, "Social Assistance in OECD Countries," *Journal of European Social Policy*, 1997, *7* (1), 17–43.

Gruber, Jonathan, "Medicaid," in "Means-Tested Transfer Programs in the United States," University of Chicago Press, 2003, pp. 15–78.

Hanna, Rema and Benjamin A Olken, "Universal Basic Incomes versus Targeted Transfers: Anti-Poverty Programs in Developing Countries," *Journal of Economic Perspectives*, 2018, *32* (4), 201–226.

Hanushek, Eric A et al., "Non-Labor-Supply Responses to the Income Maintenance Experiments," in "Lessons from the Income Maintenance Experiments: Proceedings of a Conference Held at Melvin Village, New Hampshire," Vol. 30 1986, pp. 106–130.

Hasdell, Rebecca, "What We Know about Universal Basic Income," *A Cross-Synthesis. Stanford Basic Income Lab*, 2020.

Hoynes, Hilary and Jesse Rothstein, "Universal Basic Income in the United States and Advanced Countries," *Annual Review of Economics*, 2019, *11*, 929–958.

Hubbard, R Glenn, Jonathan Skinner, and Stephen P Zeldes, "Precautionary Saving and Social Insurance," *Journal of Political Economy*, 1995, *103* (2), 360–399.

Hum, Derek and Wayne Simpson, "Economic Response to a Guaranteed Annual Income: Experience from Canada and the United States," *Journal of Labor Economics*, 1993, *11* (1, Part 2), S263–S296.

Jacob, Brian A and Jens Ludwig, "The Effects of Housing Assistance on Labor Supply: Evidence from a Voucher Lottery," *American Economic Review*, 2012, *102* (1), 272–304.

Jones, Damon and Ioana Marinescu, "The Labor Market Impacts of Universal and Permanent Cash Transfers: Evidence from the Alaska Permanent Fund," *American Economic Journal: Economic Policy*, 2022, *14* (2), 315–340.

Kangas, Olli, Signe Jauhiainen, Miska Simanainen, and Minna Ylikännö, "The Basic Income Experiment 2017–2018 in Finland: Preliminary Results," 2019.

Kim, Hyuncheol, Jungmin Lee, HanKyoung Sung, and Sangyoon Park, "Performance Evaluation of the Seoul Safety Income Project (SSIP)," *AEA RCT Registry*, 2023.

Korean Statistical Information Service, "Livelihood Protection Recipient Statistics," 2021.

Millar, Jane and Fran Bennett, "Universal Credit: Assumptions, Contradictions and Virtual Reality," *Social Policy and Society*, 2017, *16* (2), 169–182.

Miller, Sarah, Elizabeth Rhodes, Alexander W. Bartik, David E. Broockman, Patrick K. Krause, and Eva Vivalt, "Does Income Affect Health? Evidence from a Randomized Controlled Trial of a Guaranteed Income," Working Paper 32711, National Bureau of Economic Research 2024.

Moffitt, Robert A, "The Negative Income Tax and the Evolution of US Welfare Policy," *Journal of Economic Perspectives*, 2003, *17* (3), 119–140.

Nam, Jaehyun and Hyungjohn Park, "The 2015 Welfare Reform of the National Basic Livelihood Security System in South Korea: Effects on Economic Outcomes," *International Journal of Social Welfare*, 2020, *29* (3), 219–232.

Park, Ki Seong and Yanggyu Byun, "Effects of Safety Income System," *Journal of Labour Economics*, 2017, *40* (3), 57–77.

Robins, Philip K, "A Comparison of the Labor Supply Findings from the Four Negative Income Tax Experiments," *Journal of Human Resources*, 1985, pp. 567–582.

Rothstein, Jesse, "Is the EITC as Good as an NIT? Conditional Cash Transfers and Tax Incidence," *American economic Journal: Economic Policy*, 2010, *2* (1), 177–208.

Sefton, James, Justin Van De Ven, and Martin Weale, "Means Testing Retirement Benefits: Fostering Equity or Discouraging Savings?," *The Economic Journal*, 2008, *118* (528), 556–590.

Smeeding, Timothy M, Katherin Ross Phillips, and Michael O'Connor, "The

EITC: Expectation, Knowledge, Use, and Economic and Social Mobility," *National Tax Journal*, 2000, *53* (4), 1187–1209.

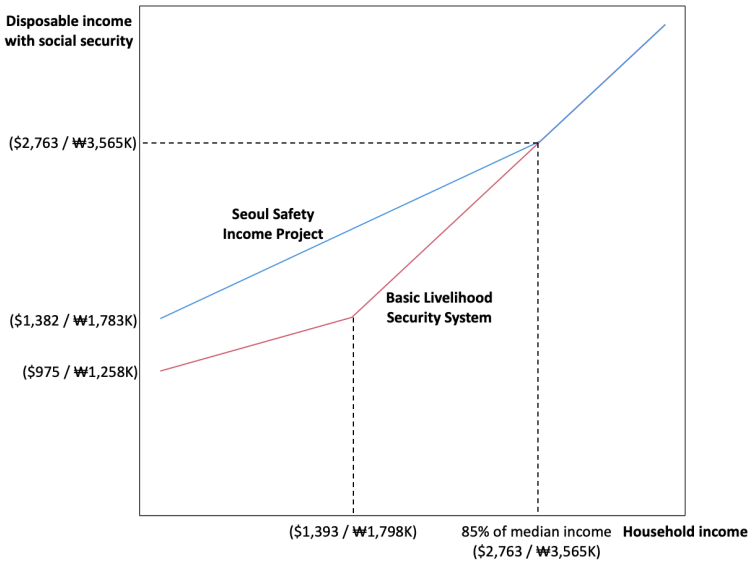
Verho, Jouko, Kari Hämäläinen, and Ohto Kanninen, "Removing Welfare Traps: Employment Responses in the Finnish Basic Income Experiment," *American Economic Journal: Economic Policy*, 2022, *14* (1), 501–522.

Vivalt, Eva, Elizabeth Rhodes, Alexander W. Bartik, David E. Broockman, and Sarah Miller, "The Employment Effects of a Guaranteed Income: Experimental Evidence from Two U.S. States," Working Paper 32719, National Bureau of Economic Research 2024.

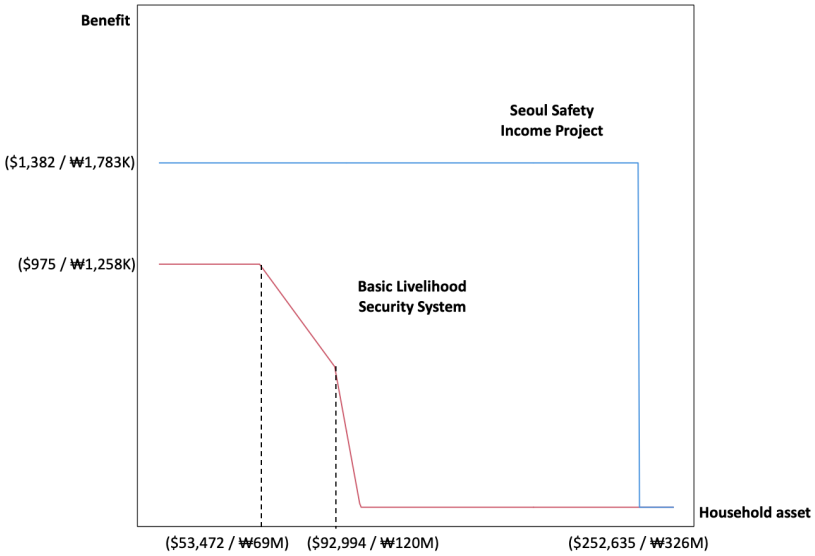
Watts, Hollister Williams O'Connor Wilderquist Levine, "A Retrospective on the Negative Income Tax Experiments: Looking Back at the Most Innovative Field Studies in Social Policy," 2005, pp. 95–106.

Widerquist, Karl, "A Failure to Communicate: What (If Anything) Can We Learn from the Negative Income Tax Experiments?," *The Journal of Socio-Economics*, 2005, *34* (1), 49–81.

Figure 1: NBLSS and SSIP Schedule by Labor Income and Asset



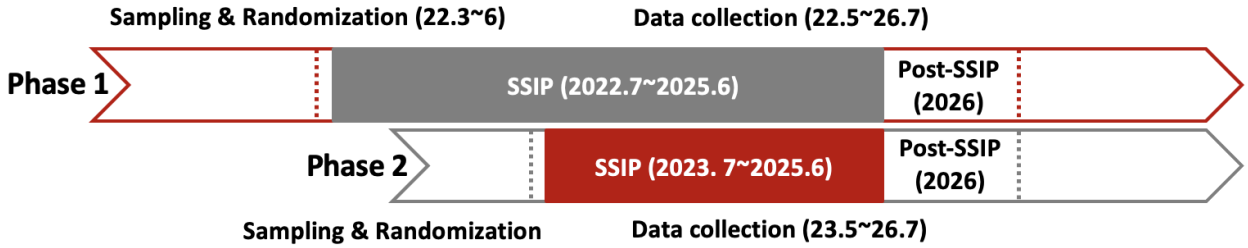
(a) Labor income



(b) Asset

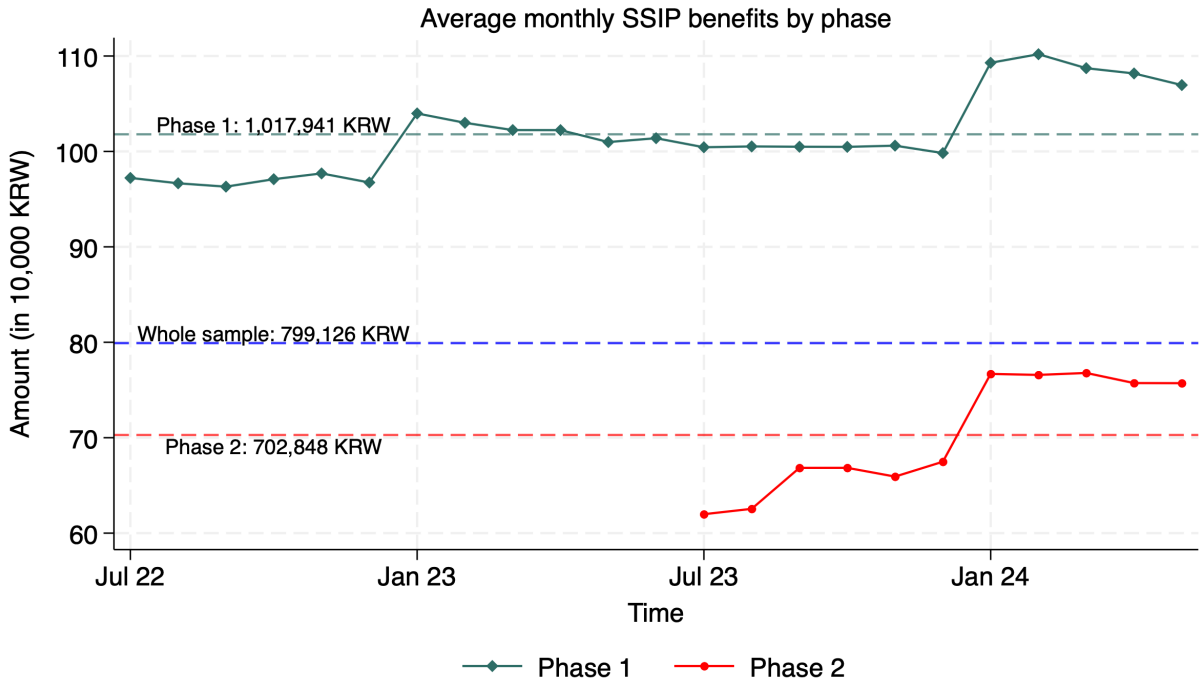
Notes: This figure shows the benefit schedule from NBLSS and SSIP by labor income and asset of a three-person household. (a) shows the relationship between household labor income (x-axis) and disposable income including the social security benefits (y-axis). (b) shows the relationship between household asset (x-axis) and the amount of social security benefits (y-axis).

Figure 2: SSIP Recruitment



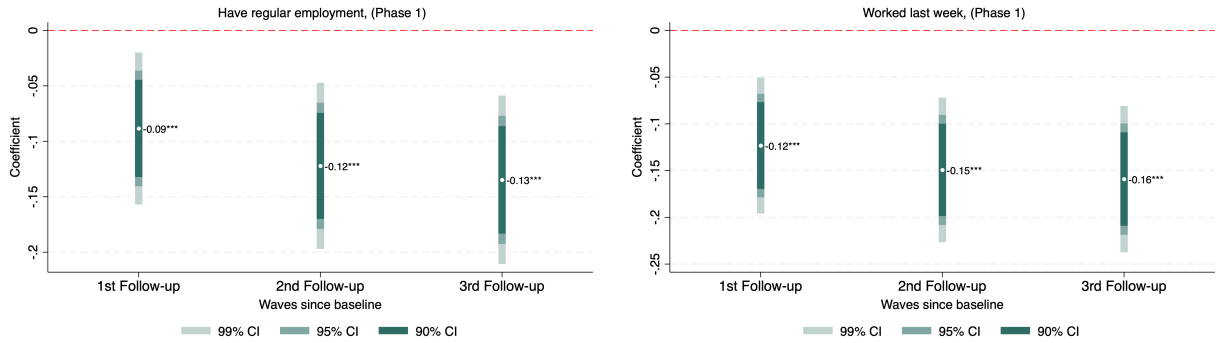
Notes: This figure shows the recruitment and data collection plan of SSIP impact evaluation. Baseline survey was conducted before the initial SSIP provision in each phase, marked as dotted line.

Figure 3: Average SSIP Benefits



Notes: This figure shows the average monthly SSIP benefits for each Phase of the program. The dotted lines represent the overall average benefit for Phase 1, Phase 2, and all recipients.

Figure 4: Effects of SSIP Over Time: Labor Supply Outcomes

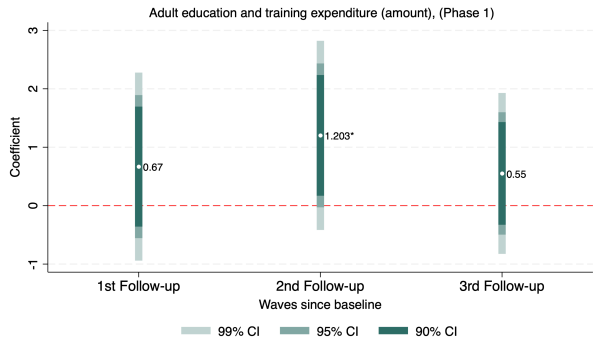


(a) Have regular employment

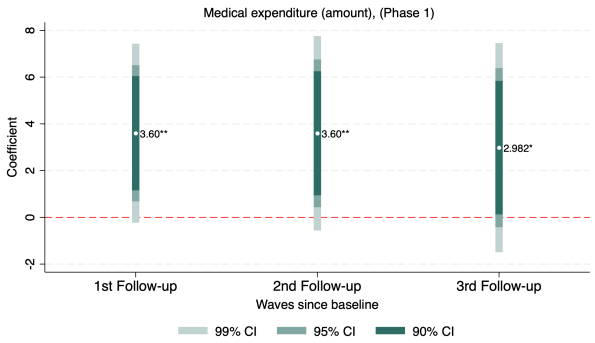
(b) Worked for income last week

Notes: This figure shows the outcomes of the regression that tracks how the effects of SSIP changes over different survey waves for Phase 1 participants. The regression controls cohort-by-strata fixed effects, wave fixed effects, and control variables. Standard errors are clustered at the household level.

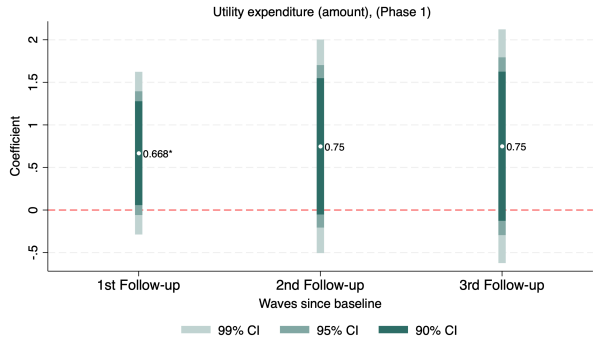
Figure 5: Effects of SSIP Over Time: Household Expenditure



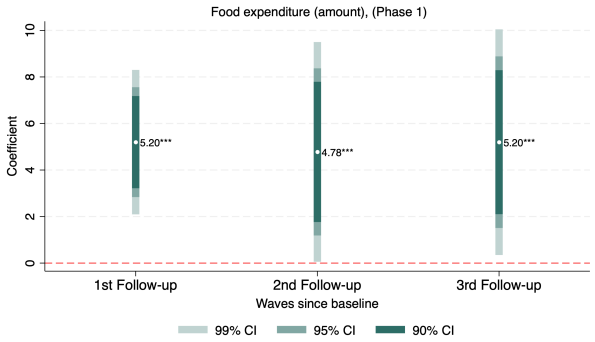
(a) Education/training of adult members



(b) Medical Expenses



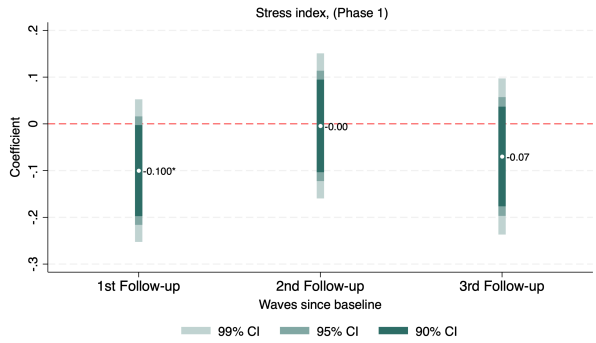
(c) Utility bills



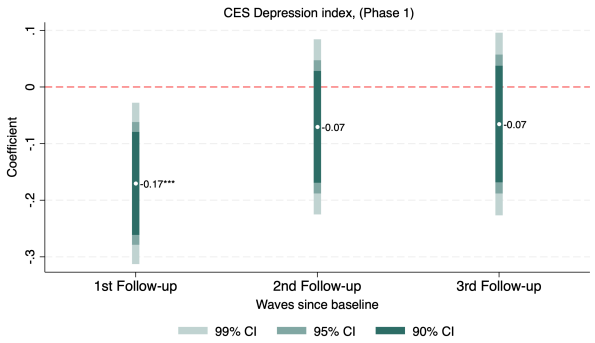
(d) Food expenditure

Notes: This figure shows the outcomes of the regression that tracks how the effects of SSIP changes over different survey waves for Phase 1 participants. The regression controls cohort-by-strata fixed effects, wave fixed effects, and control variables. Units are measured in 10,000 KRW. Standard errors are clustered at the household level.

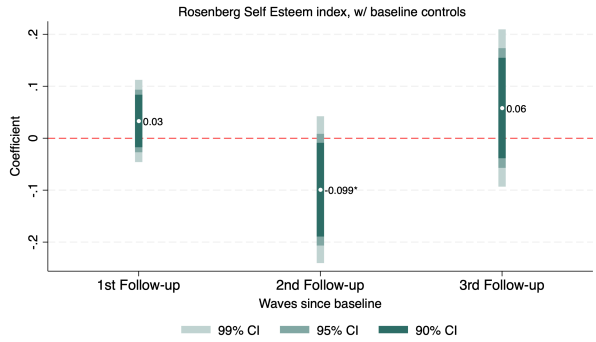
Figure 6: Effects of SSIP Over Time: Health



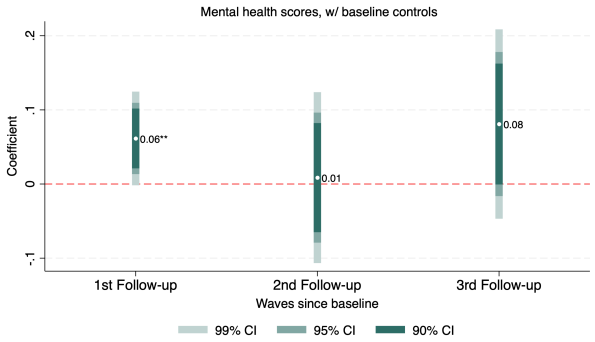
(a) Stress (Standardized Cohen Index)



(b) Depression measure (Standardized CES)



(c) Self Esteem (Standardized Rosenberg Index)



(d) Overall Mental health

Notes: This figure shows the outcomes of the regression that tracks how the effects of SSIP changes over different survey waves for Phase 1 participants. The regression controls cohort-by-strata fixed effects, wave fixed effects, and control variables. Standard errors are clustered at the household level.

Table 1: Eligibility of Other Welfare Programs When Receiving SSIP

	Types of Assistance		Temporary suspension	Deduction from SSIP	Maintaining eligibility
Central Government	NBLSS	Livelihood assistance	Yes	No	Yes
		Medical Assistance	No	No	Yes
		Housing Assistance	Yes	No	Yes
		Educational Assistance	No	No	Yes
	Basic Pension		No	Yes	Yes
Seoul Metropolitan Government	Seoul Basic Livelihood Security		Yes	No	No
	Youth Income Assistance		No	Yes	Yes
	Youth Rent Assistance		No	Yes	Yes
	Seoul Housing Voucher		No	Yes	Yes

Table 2: Key Outcome Variables

	Groups	Categories	Outcome variables
Primary outcomes	Economic	Household finance (A,S)	Income, expenditure, assets, debts, other social benefits
		Employment (A,S)	Employment status, work hours
		Education/training (S)	Expenditure on education/training and child education
		Housing (S)	Housing conditions
	Health	Health (S)	General health status, nutrition, healthy behaviors
		Mental health (S)	Self-esteem, depression, stress
	Family and society*	Family (S)	Family satisfaction, family conflict, attitude towards marriage, ideal number of children
		Social behavior (S)	Social relationship, trust in others
		Life satisfaction (S)	Life satisfaction, relative deprivation, and happiness
Secondary outcomes	Economic	Household finance (S)	Expenditure, asset, and debt by subcategory, enrollment in other welfare support programs
		Employment (S)	Job search effort, determination to work, job satisfaction, willingness to work extra hours, having side jobs, leisure activities
		Housing (S)	Housing condition and house ownership status
	Health*	Health (S)	Specific questions on general health status
	Family and society*	Social relations (S)	Charity donations, degree of social isolation, hobbies, volunteering activities

Notes: A indicates administrative data and S indicates survey response data. * indicates outcome groups not included in biannual surveys and only included in annual surveys.

Table 3: Baseline Balance Test: Administrative data

	(1) Control mean	(2) Difference	(3) t-test p-value	(4) K-S p-value
Income				
Total Income	137	1.38	.622	.148
Labor Income	107	-.474	.869	.71
Business Income	10.5	1.37	.241	.979
Any labor or business income	.666	.0153	.246	.981
Property Income	3.47	-.121	.618	.967
Public transfers	19.3	.576	.587	.977
Assets				
Total assets	10973	-4.4	.989	.995
General assets	7220	104	.691	.99
Financial assets	3859	-97.9	.472	.514
Car	223	-10.6	.489	.945
Debt				
Total debt	3517	-321	.112	.144
Financial debt	3513	-228	.247	.158
Nonfinancial debt	106	-78.9**	.0381	1
Personal debt	11.1	-10.2	.235	1

Note: The balance test includes adjustment for strata fixed effects when conducting mean difference test using the t-test. The p-values from Kolmogorov-Smirnov test for distribution equality are reported in the column 'KS test p-value'. Units are 10,000 KRW. There are 5,111 observations in total, with 1,523 observations (1,039 in control group, 484 in treatment group) from Phase 1 and 3588 observations (2488 in control group, 1100 in treatment group) for all the variables. Asterisks indicate statistical significance of each estimates, where ***:p<0.01, **:p<0.05, *:p<0.1

Table 4: Baseline Balance Test: Survey Data

	(1) Control mean	(2) Mean difference	(3) t-test p-value		(1) Control mean	(2) Mean difference	(3) t-test p-value
Individual Characteristics				**Household characteristics**			
Male	0.500	0.003	0.836	Monthly income	177.80	-4.848	0.149
Age	51.47	0.106	0.590	Monthly expenditure	210.27	-4.258	0.234
Married	0.348	0.001	0.920	Total household assets	9205.8	-235.9	0.465
Worked regularly	0.597	-0.001	0.985	Currently having debt	0.680	-0.009	0.522
Worked last week	0.568	0.006	0.687	Received training	0.061	0.003	0.723
Attending school	0.015	-0.001	0.847	Own house	0.134	-0.011	0.284
Below middle School	0.182	0.003	0.794	No. rooms in house	2.091	0.011	0.549
High School	0.366	0.003	0.813	Housing condition	2.304	-0.026*	0.097
Junior college (2-year)	0.101	-0.018**	0.031				
Above university (4-year)	0.339	0.014	0.313	**NBLSS**			
				Livelihood assistance	0.104	-0.007	0.365
Household composition				Medical assistance	0.098	-0.007	0.386
Living alone	0.386	0.022	0.139	Housing assistance	0.241	-0.020*	0.095
Two persons	0.295	-0.016	0.220	Education assistance	0.202	-0.035	0.886
Three or more persons	0.318	-0.005	0.721				
Household with children	0.421	-0.011	0.223	**Health status**			
With Children aged < 7	0.105	0.013**	0.047	General health status	0.626	-0.025*	0.070
With Children aged < 18	0.229	-0.002	0.791	Rosenberg Self-Esteem	-0.018	0.046	0.135
Living with age ≥ 65	0.246	0.003	0.656	CES-D Depression	0.015	0.013	0.683
				Cohen Perceived Stress	0.027	-0.027	0.376

Notes: Estimates are adjusted for strata fixed effects when conducting mean difference test using the t-test.Unit is 10,000 KRW from 'Monthly household income' to 'Total household assets'. 'Housing condition' was surveyed using 3–point Likert scale, 1: Good–3: Bad and then reverse-coded. 'General health status' is a binary variable which equals 1 when the respondent evaluated his or her health status as above average. 'Rosenberg Self-Esteem Scale', 'CES-D Depression Scale', and 'Cohen Perceived Stress Scale' are all standardized. The number of observations is 5111(1039 in control group and 484 in treatment group for Phase 1, 2488 in control group and 1100 in treatment group for Phase 2) except for "Monthly household income" (1007, 479; 2488,1100), "Monthly household expenditure" (984, 484; 2488, 1100), "Total household assets" (947, 424; 2488, 1100) and "Education assistance" (231, 110; 574, 234). "Education assistance" is recoded as missing if there is no child aged <18 in the household. Asterisks indicate statistical significance of the estimates where ***:p<0.01, **:p<0.05, and *:p<0.1.

Table 5: Summary of Observations in Administrative and Survey Data

	Sample			Attrition		
	Total	Control	Treated	Total	Control	Treated
A: Administrative data						
Phase 1						
Baseline (April 2022)	1523	1039	484			
1st follow up (April 2023)	1455	974	481	68	65	3
2nd follow up (April 2024)	1385	920	465	138	119	19
Phase 2						
Baseline (May 2023)	3588	2488	1100			
1st follow up (January 2024)	3379	2314	1065	209	174	35
B: Survey data						
Phase 1						
Baseline (May 2022)	1523	1039	484			
1st follow up (January 2023)	1334	855	479	189	184	5
2nd follow up (August 2023)	1250	775	475	273	264	9
3rd follow up (January 2024)	1192	722	470	331	317	14
Phase 2						
Baseline (May 2023)	3588	2488	1100			
1st follow up (January 2024)	3169	2082	1087	419	406	13

Notes: Attrition indicates the number of households that did not participate in the follow-up survey in the form of absence or refusal to respond to the questions.

Table 6: Sample Attrition

	Dependent Variable: Not responded			
	Control Mean	Estimate	SE	Obs
Admin Data				
Phase 1, Follow-up 1	0.063	-0.057***	(0.008)	1523
Phase 1, Follow-up 2	0.115	-0.078***	(0.014)	1523
Phase 2, Follow-up 1	0.070	-0.039***	(0.007)	3588
All waves	0.044	-0.030***	(0.003)	11745
Survey Data				
Phase 1, Follow-up 1	0.177	-0.171***	(0.013)	1523
Phase 1, Follow-up 2	0.254	-0.239***	(0.015)	1523
Phase 1, Follow-up 3	0.305	-0.278***	(0.016)	1523
Phase 2, Follow-up 1	0.163	-0.151***	(0.008)	3588
All waves	0.128	-0.120***	(0.004)	13268

Notes: Control mean refers to the share of non-respondents in the control group. The estimates and standard errors for the treatment dummy are reported. The regression for the attrition rates for each survey wave includes strata fixed effects. The regression in which the attrition rate across all waves is estimated includes fixed effects for cohort-by-strata and survey waves. Asterisks indicate statistical significance of the estimate, where ***:p<0.01,**:p<0.05, and *:p<0.1

Table 7: Determinants of Attrition in Control Group

	Survey data		Administrative data	
	Estimate	SE	Estimate	SE
Male	-0.003	(0.003)	0.016***	(0.006)
Age	-0.0002	(0.001)	-0.0007**	(0.0003)
Married	0.001	(0.004)	0.005	(0.008)
Attending school	-0.011	(0.012)	-0.047***	(0.016)
High school	-0.003	(0.005)	0.002	(0.007)
Junior college (2-year)	0.003	(0.007)	0.002	(0.007)
Above university (4-year)	-0.0009*	(0.005)	0.013	(0.008)
Worked for income last week	-0.004	(0.005)	0.002	(0.006)
One person	-0.003	(0.006)	0.005	(0.010)
Two person	-0.003	(0.005)	-0.001	(0.008)
With children aged <7	-0.004	(0.006)	0.001	(0.011)
Living with age 65 or older	-0.005	(0.005)	0.009	(0.008)
Livelihood assistance	0.001	(0.006)	0.002	(0.010)
Medical assistance	0.002	(0.006)	-0.009	(0.010)
Housing assistance	-0.001	(0.004)	-0.010	(0.007)
Monthly household income	-0.005	(0.005)	-0.533***	(0.100)
Monthly household expenditure	0.059	(0.050)	0.486*	(0.250)
Total household assets	-0.0001	(0.001)	0.001	(0.001)
Currently having debt	-0.003	(0.003)	0.006	(0.006)
Received educational training	0.004	(0.003)	0.004	(0.009)
Own house	0.001	(0.003)	-0.018**	(0.005)
Number of rooms in house	0.004*	(0.002)	-0.008*	(0.004)
Housing condition	-0.002	(0.003)	0.003	(0.006)
General health status	0.002	(0.004)	-0.001	(0.007)
Rosenberg Self-Esteem Scale	0.002	(0.002)	0.009**	(0.004)
CES-D Depression Scale	-0.001	(0.002)	-0.001	(0.004)
Cohen Perceived Stress Scale	0.003	(0.002)	-0.009**	(0.004)
Labor income	-0.001	(0.002)	-0.008**	(0.003)
Business income	-0.005**	(0.002)	-0.017**	(0.009)
Public transfer	-0.003	(0.002)	-0.006	(0.008)
General asset	-0.001	(0.001)	-0.001	(0.001)
Financial asset	-0.001	(0.001)	0.001	(0.001)
Car	0.004*	(0.0025)	0.020***	(0.007)
Total debt	-0.001	(0.001)	0.001**	(0.0005)

Notes: This table shows the results from estimating two linear probability models, one to find determinants of attrition in the control group of administrative data (N=5744), and the other one in the control group of survey data (N=5566). The unit of income (including "Public transfer") and expenditure variables is 1,000,000 KRW, and the unit of asset and debt variables is 10,000,000 KRW for convenient interpretation of the coefficients. Asterisks indicate statistical significance of the estimates where ***:p<0.01, **:p<0.05, and *:p<0.1.

Table 8: Treatment Effects of SSIP: Administrative Data

	Control Mean	Estimate	SE	Obs
Income				
Income	143	-33.3***	(4.94)	11330
Income w/ avg SSIP receipt	143	54.3***	(5.03)	11330
Income w/ most recent SSIP	143	56.8***	(4.88)	11330
Labor Income	109	-26.4***	(3.44)	11330
Business Income	10.7	-3.65	(2.59)	11330
Any labor or business income	0.697	-0.124***	(0.014)	11330
Property Income	3.52	-2.59	(2.58)	11330
Public transfers	20.2	-0.647	(1.1)	11330
Transfers w/ avg SSIP receipt	20.2	86.9***	(1.61)	11330
Transfers w/ most recent SSIP	20.2	89.5***	(1.78)	11330
Assets				
Total assets	11472	-122	(231)	11330
General assets	7340	-261	(192)	11330
Financial assets	3907	128	(102)	11330
Car	226	10.5	(17.7)	11330
Debt				
Total debt	3677	168	(137)	11330
Financial debt	3556	88.6	(133)	11330
Nonfinancial debt	108	73.6	(41.5)	11330
Personal debt	11.2	1.44	(10.3)	11330

Note: The regression includes cohort-by-strata fixed effects, survey wave fixed effects and control variables. All units are denoted in 10,000 KRW. Asterisks indicate statistical significance of each estimates, where ***: $p<0.01$, **: $p<0.05$, and *: $p<0.1$

Table 9: Effects on Household Finance, Employment, and Health: Survey Data

	Mean	Estimate	SE	Obs
A: Household finance				
Income increased in last 6 months	0.070	0.108***	(0.010)	12056
Monthly household income	177.8	38.669***	(3.712)	12019
Monthly household expenditure	210.3	17.518***	(3.489)	12001
Spent on education/training (indicator)	0.040	0.022***	(0.008)	12056
Expenditure on education/training	1.131	0.801***	(0.293)	12054
Spent for child care/education	0.591	0.012	(0.026)	4023
Expenditure on child care/education	30.21	-2.046	(1.969)	4023
Spent on medical services	0.719	0.063***	(0.015)	12056
Expenditure on medical services	11.17	2.061***	(0.799)	12051
B: Employment				
Work regularly	0.597	-0.103***	(0.015)	12056
Worked for income last week	0.568	-0.116***	(0.015)	12056
Worked for family business last week	0.012	-0.003	(0.006)	5451
Worked side jobs	0.043	-0.017	(0.011)	6607
Working hours for main job	33.64	-1.059	(0.686)	6670
Total working hours	33.86	-1.369**	(0.661)	6943
C: Health				
Rosenberg Self-Esteem Scale	-0.020	0.013	(0.031)	12056
CES-D Depression Scale	0.015	-0.074**	(0.030)	12056
Cohen Perceived Stress Scale	0.028	-0.078**	(0.032)	12056
Mental health index	-0.021	0.055**	(0.025)	12056
Nutrition index	55.61	0.620	(0.400)	8007

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income and expenditure variables in 'A: Household finance and employment'. 'Rosenberg Self-Esteem Scale', 'CES-D Depression Scale', 'Cohen Perceived Stress Scale' are standardized, and 'Mental health index' is their average. 'Nutrition index' ranges from 0 to 100. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table 10: Effects on Expenditures and Welfare Program Enrollment: Survey Data

	Mean	Estimate	SE	Obs
A: Expenditure				
Private transfer	7.153	0.744	(0.597)	12053
Charity & donation	1.724	0.515**	(0.232)	12053
Food	56.636	3.967***	(1.346)	12055
Housing (rent)	20.357	0.885	(0.674)	12047
Housing (others)	13.858	1.002***	(0.275)	12053
Education & training	1.148	0.801***	(0.293)	12054
Child care & education	30.370	-2.046	(1.969)	4023
Medical service	11.137	2.061***	(0.799)	12051
Transportation	12.199	0.989**	(0.452)	12056
Communication	10.499	0.384*	(0.229)	12055
Other purposes	15.519	1.762**	(0.750)	12050
Debt interest	23.446	2.621**	(1.29)	12018
B: Welfare program enrollment				
Livelihood assistance	0.103	-0.022***	(0.007)	12056
Medical assistance	0.097	-0.022***	(0.007)	12056
Housing assistance	0.240	-0.045***	(0.009)	12056
Education assistance	0.203	-0.057***	(0.022)	2721
Earned Income Tax Credit (EITC)	0.133	-0.033***	(0.011)	12056
Child Tax Credit (CTC)	0.263	-0.012	(0.030)	2721
Community basic assistance	0.004	-0.001	(0.001)	12056
Housing voucher	0.008	0.006**	(0.003)	12056
Youth allowance	0.025	-0.001	(0.015)	1820
Youth rent subsidy	0.037	0.019	(0.015)	1820
Basic old age pension	0.848	0.037	(0.027)	2469
Not applicable for any program	0.466	0.035***	(0.013)	12056
Any of the NBLSS program	0.280	-0.035***	(0.009)	12056

Notes:The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Outcomes in 'A.Expenditure' are denoted in 10,000 KRW. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table 10: Effects on Employment Intention and Job Satisfaction: Survey Data

	Mean	Estimate	SE	Obs
C: Employment Intention				
Job search in past 4 weeks	0.212	-0.009	(0.022)	5098
Wanted a job last week	0.124	-0.011	(0.022)	4049
Wanted extra work hours in current job	0.381	0.007	(0.036)	3066
Wanted more side jobs	0.057	0.027	(0.017)	3066
Wanted longer work hours in other main job	0.049	-0.031	(0.017)	3066
D: Job satisfaction				
Wage & income	2.482	0.050	(0.043)	6932
Job stability	2.816	0.044	(0.043)	6932
Work content	3.347	0.043	(0.039)	6932
Work environment	3.186	-0.049	(0.039)	6932
Work hours	3.163	0.008	(0.043)	6932
Development potential	3.004	0.102**	(0.042)	6932
Relationships/communication	3.571	0.051	(0.039)	6932
Job satisfaction index	3.081	0.036	(0.027)	6932

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table 10: Effects on Leisure and Housing: Survey Data

	Mean	Estimate	SE	Obs
E: Leisure				
Recreation	0.377	0.017	(0.017)	12056
Internet surfing	0.600	0.006	(0.013)	12056
Culture	0.117	0.011	(0.013)	12056
Sports	0.060	0.010	(0.010)	12056
Travel	0.099	0.015	(0.012)	12056
Socializing	0.216	0.035**	(0.016)	12056
Religious activity	0.153	0.010	(0.013)	12056
Others	0.000	0.001	(0.001)	12056
Nothing	0.015	-0.005	(0.015)	12056
Time spent in recreation (min)	30.549	2.026	(2.191)	12056
Time spent in Internet surfing (min)	101.804	4.138	(3.928)	12056
F: Housing condition				
Lighting	2.402	0.010	(0.017)	12056
Ventilation	2.469	-0.003	(0.016)	12056
Soundproofing	1.899	-0.012	(0.017)	12056
Heating/insulation	2.302	-0.001	(0.016)	12056
Hygience	2.209	0.008	(0.017)	12056
Public transport accessibility	2.537	0.001	(0.014)	12056
Housing condition index	2.303	0.001	(0.011)	12056
G: Satisfies minimum housing standards				
Kitchen	0.972	0.001	(0.005)	12056
Bathroom	0.974	0.003	(0.004)	12056
Bathing facility	0.977	-0.004	(0.004)	12056

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table 11: Heterogeneity Analysis by NBLSS Receipt: Labor and Business Income

	Control mean		Treatment effect		Difference
	Non-NBLSS	NBLSS	Non-NBLSS	NBLSS	(2)-(1)
A. Household finance					
Income increased in last 6 months	0.0722	0.0396	0.11***	0.081***	-0.028
			(0.011)	(0.027)	(0.028)
Monthly household income	182.1	109.5	39.53***	20.33***	-19.19***
			(3.77)	(6.88)	(6.648)
Monthly household expenditure	215.4	129.0	18.2***	1.821	-16.38**
			(3.547)	(7.537)	(7.425)
Spent for education/training	0.0424	0.0139	0.02***	0.051**	0.031
			(0.008)	(0.026)	(0.025)
Expenditure on education/training	1.203	0.343	0.813***	0.592	-0.22
			(0.299)	(0.374)	(0.353)
Spent for child care/education	0.594	0.554	0.008	0.133	0.125
			(0.026)	(0.091)	(0.091)
Expenditure on child care/education	30.75	21.57	-1.873	-2.59	-0.717
			(1.995)	(4.881)	(4.802)
B. Employment					
Have regular job	0.633	0.0931	-0.111***	0.023	0.134***
			(0.015)	(0.04)	(0.04)
Worked for income last week	0.602	0.0891	-0.125***	0.017	0.142***
			(0.016)	(0.04)	(0.039)
Worked for family business last week	0.0135	0.00435	-0.003	0	0.004
			(0.007)	(0.01)	(0.009)
Hold other jobs	0.0430	0.0222	-0.017	-0.053	-0.035
			(0.011)	(0.038)	(0.037)
Working hours for main job	33.72	23.02	-1.079	-0.06	1.139
			(0.687)	(4.404)	(4.407)
Total working hours	34.17	23.23	-1.341**	-0.531	0.81
			(0.68)	(4.386)	(4.387)

C. Health					
Rosenberg Self-Esteem Scale	0.00399	-0.373	0.016	-0.072	-0.088
			(0.031)	(0.116)	(0.117)
CES-D Depression Scale	-0.0202	0.528	-0.068**	-0.16	-0.092
			(0.03)	(0.135)	(0.137)
Cohen Perceived Stress Scale	0.00519	0.371	-0.074**	-0.131	-0.057
			(0.033)	(0.113)	(0.113)
Mental health index	0.00634	-0.424	0.053**	0.073	0.02
			(0.025)	(0.107)	(0.108)
Nutrition index	55.62	55.33	0.707*	-1.267	-1.974
			(0.401)	(1.544)	(1.54)
D. Income (Admin data)					
Total Income	150.1	38.52	-33.75***	-29.24***	4.505
			(4.983)	(8.88)	(8.252)
Labor Income	114.6	21.25	-26.76***	-23.51***	3.253
			(3.54)	(6.238)	(6.567)
Business Income	11.36	0.448	-3.791	-1.174	2.617
			(2.693)	(1.369)	(2.424)
Public Transfers	12007.0	3282.8	-0.796	2.072	2.869
			(1.114)	(2.389)	(2.369)
Total Assets	12007	3282.8	-156.7	221	377.7
			(236.989)	(617.455)	(639.6)
Total Debt	3832.5	1293.6	169.4	18.11	-151.3
			(139.805)	(325.153)	(327.8)

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 10373 and 957 each in "Non-NBLSS" group and "NBLSS" group for outcomes in Panel D. For outcomes in other panels, there are 11010 and 1046 observations respectively in "Non-NBLSS" group and "NBLSS" group. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table 12: Heterogeneity Analysis by Regular Employment Status at Baseline

	Control mean		Treatment effect		Difference
	Not Worked	Worked	Not Worked	Worked	(2)-(1)
A. Household finance					
Income increased in last 6 months	0.064	0.074	0.13***	0.093***	-0.036**
			(0.014)	(0.012)	(0.016)
Monthly household income	134.7	206.4	43.84***	35.44***	-8.394
			(4.526)	(4.454)	(5.128)
Monthly household expenditure	169.2	237.6	20.4***	15.75***	-4.657
			(4.493)	(4.314)	(5.42)
Spent for education/training	0.036	0.044	0.027***	0.017**	-0.01
			(0.01)	(0.009)	(0.011)
Expenditure on education/training	0.855	1.347	1.103***	0.559*	-0.544
			(0.392)	(0.327)	(0.411)
Spent for child care/education	0.534	0.612	-0.003	0.014	0.017
			(0.04)	(0.029)	(0.044)
Expenditure on child care/education	24.26	32.46	-3.157	-1.489	1.668
			(3.026)	(2.213)	(3.301)
B. Employment					
Have regular job	0.16	0.897	0.036**	-0.185***	-0.221***
			(0.018)	(0.017)	(0.021)
Worked for income last week	0.152	0.854	0.025	-0.201***	-0.226***
			(0.018)	(0.018)	(0.022)
Worked for family business last week	0.009	0.025	-0.003	-0.007	-0.004
			(0.006)	(0.011)	(0.011)
Hold other jobs	0.018	0.046	-0.003	-0.021*	-0.017
			(0.017)	(0.017)	(0.016)
Working hours for main job	27.55	34.38	0.227	-1.584**	-1.811
			(1.572)	(0.703)	(1.606)
Total working hours	27.71	34.86	-0.01	-1.862***	-1.852
			(1.572)	(0.694)	(1.6)

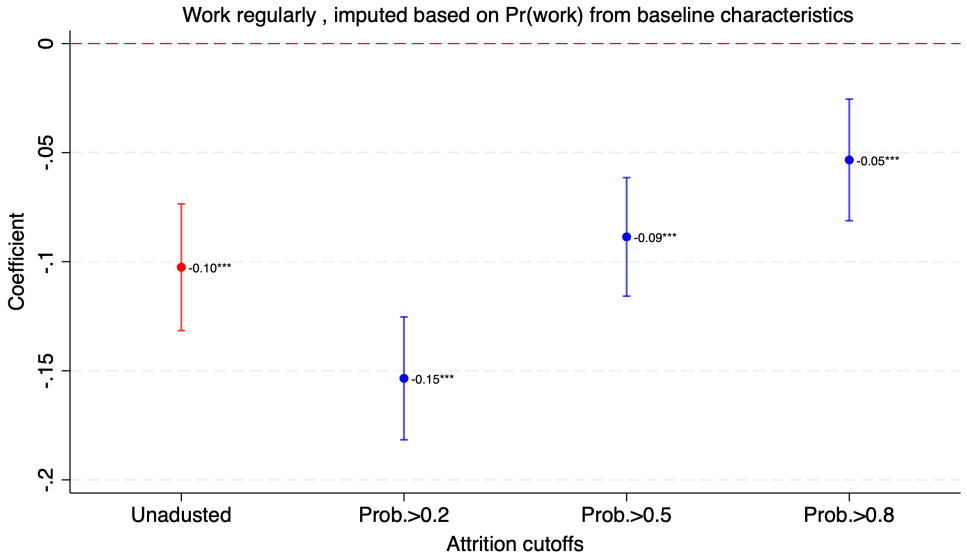
C. Health					
Rosenberg Self-Esteem Scale	-0.217	0.114	0.045	-0.009	-0.053
			(0.043)	(0.037)	(0.051)
CES-D Depression Scale	0.242	-0.14	-0.16***	-0.015	0.145***
			(0.042)	(0.036)	(0.049)
Cohen Perceived Stress Scale	0.221	-0.103	-0.137***	-0.037	0.1**
			(0.043)	(0.039)	(0.05)
Mental health index	-0.226	0.119	0.114***	0.014	-0.1**
			(0.035)	(0.031)	(0.043)
Nutrition index	54.2	56.41	1.15**	0.321	-0.829
			(0.551)	(0.456)	(0.6)
D: Income data (admin)					
Total Income	106.5	168.4	-32.63***	-33.61***	-0.982
			(6.896)	(5.135)	(6.69)
Labor Income	68.24	136.7	-21.2***	-29.91***	-8.705
			(4.854)	(4.235)	(5.911)
Business Income	7.11	13.13	-4.785	-2.895	1.89
			(4.244)	(1.807)	(3.23)
Public Transfers	28.57	14.45	-3.614***	1.452	5.065***
			(1.321)	(1.353)	(1.571)
Total Assets	10581.4	12080.2	-350.7	36.34	387.1
			(392.146)	(320.251)	(538.5)
Total Debt	2916	4196	-78.91	345*	423.9
			(222.259)	(184.018)	(296.9)

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 4600 and 6730 each for those in 'Not worked' and 'Worked' groups for outcomes in Panel D. For outcomes in other panels, there are 4920 and 7136 observations respectively for 'Not worked' and 'Worked' groups. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1

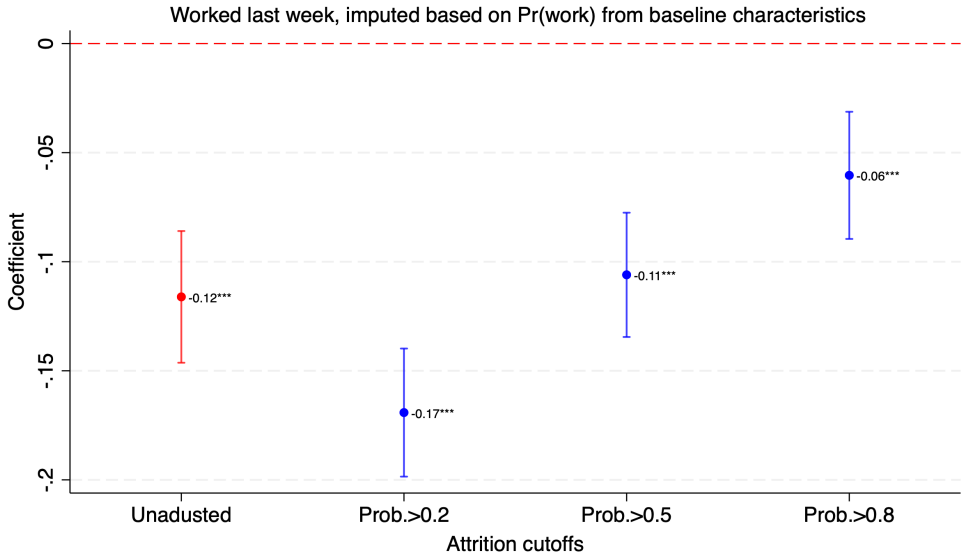
Appendix

A Figures

Figure A1: Imputation using probability of working based on baseline characteristics



(a) Have regular emplotyment



(b) Worked last week

Notes: Figure shows coefficient estimates under different cutoffs on probability the probabilty of working based on baseline characteristics.

B Tables

Table B1: NIT Experiments in the U.S.

Name	Location(s)	Data collection	Sample size: Initial (final)	Sample Characteristics
The New Jersey Graduated Work Incentive Experiment(NJ)	New Jersey & Pennsylvania	1968-1972	1,216 (983)	Black, white, and Latino, 2-parent families in urban areas with a male head aged 18-58 and income below 150% of the poverty line
The Rural Income-Maintenance Experiment (RIME)	Iowa & North Carolina	1970-1972	809 (729)	Both 2-parent families and female-headed households in rural areas with income below 150% of the poverty line.
The Seattle/Denver Income-Maintenance Experiments (SIME/DIME)	Seattle & Denver	1970-1976, (some to 1980)	4,800	Black, white, and Latino families with at least one dependent and incomes below $11,000 for single parents, $13,000 for two parent families.
The Gary, Indiana Experiment (Gary)	Gary, Indiana	1971-1974	1,799 (967)	Black households, primarily female-headed, head 18-58, income below 240% of the poverty line.
The Manitoba Basic Annual Income Experiment (Mincome)	Winnipeg and Dauphin, Manitoba	1975-1978	1,300	Families with, head younger than 58 and income below $13,000 for a family of four

Table B2: Comparison of Study Participants

	SHFLC	SSIP
Male	0.480	0.500
Age	63.33	51.47
Education		
High school	0.349	0.366
College or higher	0.177	0.440
Household size	1.602	2.142
Married	0.240	0.348
Widowed or separated	0.559	0.357
Own house	0.183	0.134
Pay annual rent	0.198	0.263
Pay monthly rent	0.536	0.537
Income	99.83	137.00
Public transfer	56.01	19.30
Asset	6776.6	10973
Observations	688	5111

Notes: This table reports the average characteristics of study participants in the Survey of Household Finances and Living Conditions (SHFLC) and Seoul Safety Income Project (SSIP). The summary statistics for SSIP participants are obtained from the baseline survey for both phases of the study. The unit of income, public transfer, and asset is 10,000 KRW and are obtained from the administrative data. All other variables for SSIP participants are obtained from the survey data.

Table B3: Baseline Balance Test for Phase 1: Administrative data

	(1) Control mean	(2) Difference	(3) t-test p-value	(4) K-S p-value
Income				
Income	90.8	2.79	0.353	0.236
Labor Income	65.9	-0.731	0.816	0.872
Business Income	6.71	2.2	0.171	0.929
Any labor or business income	0.548	0.011	0.671	0.622
Property Income	4.7	-0.354	0.152	0.941
Public transfers	16.3	1.66	0.219	0.99
Assets				
Total assets	9052	214	0.669	0.152
General assets	5857	266	0.515	0.168
Financial assets	3336	-63.2	0.777	0.0902
Car	164	12.9	0.626	0.434
Debt				
Total debt	2622	-405	.0155	0.896
Financial debt	2662	-456*	0.099	0.756
Nonfinancial debt	50.2	66.6	0.32	0.999
Personal debt	7.47	-15.8	0.422	0.999

Note: The balance test includes adjustment for strata fixed effects when conducting mean difference test using the t-test. The p-values from Kolmogorov-Smirnov test for distribution equality are reported in the column 'KS test p-value'. Units are 10,000 KRW. There are 1,523 observations (1,039 in control group, 484 in treatment group). Asterisks indicate statistical significance of each estimates, where ***:p<0.01, **:p<0.05, *:p<0.1

Table B4: Baseline Balance Test for Phase 1: Survey Data

	(1) Control mean	(2) Mean difference	(3) t-test p-value		(1) Control mean	(2) Mean difference	(3) t-test p-value
Individual Characteristics				**Household characteristics**			
Male	.492	-0.027	0.311	Monthly income	146	-7.43	0.245
Age	52.8	-0.074	0.823	Monthly expenditure	175	4.19	0.352
Married	.312	-0.015	0.454	Total household assets	8212	10.9	0.984
Worked regularly	0.527	-0.007	0.796	Currently having debt	0.648	-0.008	0.744
Worked last week	0.495	0.014	0.612	Received training	0.059	0.009	0.624
Attending school	0.022	-0.003	0.706	Own house	0.115	0.003	0.881
Below middle School	0.182	-0.009	0.631	Number of rooms in house	2.06	0.029	0.411
High School	0.372	-0.001	0.977	Housing condition	2.3	-0.013	0.660
Junior college (2-year)	0.084	-0.018	0.212				
Above university (4-year)	0.344	0.033	0.195	**NBLSS**			
				Livelihood assistance	0.159	-0.006	0.725
Household composition				Medical assistance	0.151	-0.013	0.465
Living alone	0.427	-0.042	0.115	Housing assistance	0.338	-0.045*	0.062
Two persons	0.279	0.012	0.621	Education assistance	0.274	0.041	0.446
Three or more persons	0.295	0.030	0.242				
Household with children	0.385	0.007	0.690	**Health status**			
With Children aged under 7	0.099	0.007	0.591	General health status	0.543	-0.012	0.648
With Children aged under 18	0.222	-0.008	0.621	Rosenberg Self-Esteem Scale	-0.126	0.012	0.831
Living with age 65 or older	0.261	0.015	0.224	CES-D Depression Scale	0.140	0.005	0.930
				Cohen Perceived Stress Scale	0.150	-0.079	0.149

Notes: Estimates are adjusted for strata fixed effects when conducting mean difference test using the t-test. Unit is 10,000 KRW from 'Monthly household income' to 'Total household assets'. 'Housing condition' was surveyed using 3–point Likert scale, 1: Good–3: Bad and then reverse-coded. 'General health status' is a binary variable which equals 1 when the respondent evaluated his or her health status as above average. 'Rosenberg Self-Esteem Scale', 'CES-D Depression Scale', and 'Cohen Perceived Stress Scale' are all standardized. The number of observations is 1523 (1039 in control group and 484 in treatment group) except for "Monthly household income" (1007, 479), "Monthly household expenditure" (984, 484), "Total household assets" (947, 424) and "Education assistance" (231, 110). "Education assistance" is recoded as missing if there is no child aged <18 in the household. Asterisks indicate statistical significance of the estimates where ***:p<0.01, **:p<0.05, and *:p<0.1.

Table B5: Baseline Balance Test for Phase 2: Administrative data

	(1) Control mean	(2) Difference	(3) t-test p-value	(4) K-S p-value
Income				
Income	166	3.83	0.251	0.333
Labor Income	133	2.7	0.446	0.722
Business Income	12.9	1.03	0.498	0.999
Any labor or business income	0.741	0.015	0.306	0.999
Property Income	2.71	-0.051	0.878	0.990
Public transfers	21.1	0.126	0.928	0.981
Assets				
Total assets	12174	-28.5	0.944	0.391
General assets	8067	87.3	0.792	0.583
Financial assets	4184	-96.3	0.565	0.235
Car	259	-19.5	0.293	0.438
Debt				
Total debt	4077	-222	0.393	0.0966
Financial debt	4041	-69.4	0.785	0.143
Nonfinancial debt	140	-139***	0.003	0.999
Personal debt	13.3	-8.2	0.384	0.999

Note: The balance test includes adjustment for strata fixed effects when conducting mean difference test using the t-test. The p-values from Kolmogorov-Smirnov test for distribution equality are reported in the column 'KS test p-value'. Units are 10,000 KRW. There are 3588 observations (2488 in control group, 1100 in treatment group) for all the variables. Asterisks indicate statistical significance of each estimates, where ***:p<0.01, **:p<0.05, *:p<0.1

Table B6: Baseline Balance Test for Phase 2: Survey Data

	(1) Control mean	(2) Mean difference	(3) t-test p-value		(1) Control mean	(2) Mean difference	(3) t-test p-value
Individual Characteristics				**Household characteristics**			
Male	0.509	0.016	0.354	Monthly income	201	-1.690	0.657
Age	50.4	0.220	0.367	Monthly expenditure	235	-5.010	0.273
Married	0.375	0.008	0.525	Total household assets	9943	-294	0.455
Worked regularly	0.652	0.001	0.872	Currently having debt	0.702	-0.009	0.560
Worked last week	0.625	0.001	0.946	Received training	0.063	-0.001	0.971
Attending school	0.010	-0.001	0.958	Own house	0.149	-0.017	0.174
Below middle School	0.182	0.008	0.512	Number of rooms in house	2.110	0.003	0.911
High School	0.362	0.005	0.787	Housing condition	2.319	-0.029	0.112
Junior college (2-year)	0.113	-0.017	0.107				
Above university (4-year)	0.338	0.005	0.779	**NBLSS**			
				Livelihood assistance	0.062	-0.005	0.513
Household composition				Medical assistance	0.058	-0.003	0.684
Living alone	0.358	0.049***	0.006	Housing assistance	0.168	-0.010	0.438
Two persons	0.309	-0.029*	0.076	Education assistance	0.153	-0.034	0.168
Three or more persons	0.333	-0.020	0.240				
Household with children	0.445	-0.018*	0.082	**Health status**			
With Children aged < 7	0.108	0.016**	0.047	General health status	0.672	-0.028*	0.090
With Children aged < 18	0.233	-0.001	0.934	Rosenberg Self-Esteem	0.059	0.059	0.104
Living with age ≥ 65	0.235	-0.003	0.707	CES-D Depression	-0.078	0.013	0.710
				Cohen Perceived Stress	0.062	-0.011	0.761

Notes: Estimates are adjusted for strata fixed effects when conducting mean difference test using the t-test. Unit is 10,000 KRW from 'Monthly household income' to 'Total household assets'. 'Housing condition' was surveyed using 3–point Likert scale, 1: Good–3: Bad and then reverse-coded. 'General health status' is a binary variable which equals 1 when the respondent evaluated his or her health status as above average. 'Rosenberg Self-Esteem Scale', 'CES-D Depression Scale', and 'Cohen Perceived Stress Scale' are all standardized. The number of observations is 3588(2488 in control group and 1100 in treatment group) "Education assistance" (574, 234). "Education assistance" is recoded as missing if there is no child aged <18 in the household. Asterisks indicate statistical significance of the estimates where ***:p<0.01, **:p<0.05, and *:p<0.1.

Table B7: Baseline Balance Test for Balanced Panel Sample: Administrative data

	(1) Control mean	(2) Difference	(3) t-test p-value	(4) K-S p-value
Income				
Total Income	137.65	0.900	0.749	0.199
Labor Income	120.02	-0.709	0.812	0.624
Business Income	13.97	1.305	0.375	0.957
Property Income	4.44	-0.202	0.502	0.805
Public transfers	20.55	0.029	0.806	0.970
Assets				
Total assets	11000	-0.006	0.999	0.996
General assets	7450	64.73	0.809	0.994
Financial assets	3940	-88.51	0.518	0.577
Car	286	-15.40	0.408	0.917
Debt				
Total debt	3570	-324.83	0.122	0.215
Financial debt	4100	-237.42	0.280	0.282
Nonfinancial debt	154.61	-116.40**	.0335	0.999
Personal debt	16.40	-15.44	0.220	0.999

Note: The balance test includes adjustment for strata fixed effects when conducting mean difference test using the t-test. The p-values from Kolmogorov-Smirnov test for distribution equality are reported in the column 'KS test p-value'. Units are 10,000 KRW. The number of observations is 4361 (722 in control group and 470 in treatment group for Phase 1, 2082 in control group and 1087 in treatment group for Phase 2). Asterisks indicate statistical significance of each estimates, where ***:p<0.01, **:p<0.05, *:p<0.1

Table B8: Baseline Balance Test for Balanced Panel Sample: Survey Data

	(1) Control mean	(2) Mean difference	(3) t-test p-value		(1) Control mean	(2) Mean difference	(3) t-test p-value
Individual Characteristics				**Household characteristics**			
Male	0.501	-0.002	0.875	Monthly income	178	-6.38*	0.073
Age	51.4	0.062	0.761	Monthly expenditure	210	-3.4	0.367
Married	0.348	0.002	0.893	Total household assets	9209	-311	0.355
Worked regularly	0.597	-0.018	0.231	Currently having debt	0.680	-0.005	715
Worked last week	0.568	-0.014	0.369	Received training	0.061	0.004	0.672
Attending school	0.015	-0.001	0.768	Own house	0.134	-0.011	0.288
Below middle School	0.181	0.002	0.847	Number of rooms in house	2.09	0.009	0.666
High School	0.367	0.013	0.384	Housing condition	2.3	-0.023	0.151
Junior college (2-year)	0.101	-0.018**	0.022				
Above university (4-year)	0.340	0.006	0.653	**NBLSS**			
				Livelihood assistance	0.104	-0.007	0.365
Household composition				Medical assistance	0.098	-0.008	0.325
Living alone	0.387	0.024	0.117	Housing assistance	0.241	-0.026**	0.037
Two persons	0.296	-0.017	0.225	Education assistance	0.202	-0.010	0.693
Three or more persons	0.317	-0.007	0.646				
Household with children	0.420	-0.010	0.258	**Health status**			
With Children aged < 7	0.105	0.014**	0.047	General health status	0.626	-0.033**	0.022
With Children aged < 18	0.229	-0.005	0.548	Rosenberg Self-Esteem	-0.019	0.023	0.472
Living with age ≥ 65	0.245	0.004	0.514	CES-D Depression	0.014	0.051	0.118
				Cohen Perceived Stress	0.028	0.001	0.993

Notes: Estimates are adjusted for strata fixed effects when conducting mean difference test using the t-test. Unit is 10,000 KRW from 'Monthly household income' to 'Total household assets'. 'Housing condition' was surveyed using 3–point Likert scale, 1: Good–3: Bad and then reverse-coded. 'General health status' is a binary variable which equals 1 when the respondent evaluated his or her health status as above average. 'Rosenberg Self-Esteem Scale', 'CES-D Depression Scale', and 'Cohen Perceived Stress Scale' are all standardized. The number of observations is 4361 (722 in control group and 470 in treatment group for Phase 1, 2082 in control group and 1087 in treatment group for Phase 2) except for "Monthly household income" (711, 466; 2082,1087), "Monthly household expenditure" (720, 470; 2082,1087), "Total household assets" (663, 413; 2082,1087) and "Education assistance" (194, 82; 633, 96). "Education assistance" is recorded as missing if there is no child aged <18 in the household. Asterisks indicate statistical significance of the estimates where ***:p<0.01, **:p<0.05, and *:p<0.1.

Table B9: Treatment Effects of SSIP: Using a Balanced Panel

	Control mean	Coeff.	S.E.	Obs.
Survey data				
Income increased in last 6 months	0.074	0.109***	(0.011)	11106
Work regularly	0.610	-0.092***	(0.015)	11106
Worked for income last week	0.582	-0.104***	(0.016)	11106
Total working hours	33.62	-1.369**	(0.683)	6213
Spent on education/training (indicator)	0.040	0.022***	(0.008)	11106
Expenditure on education/training	1.155	0.848***	(0.309)	11106
Spent for child care/education	0.601	0.014	(0.026)	3729
Expenditure on child care/education	30.37	-2.784	(1.973)	3729
Standardized Depression Index (CES-D)	-0.017	-0.094***	(0.030)	11106
Standardized Stress Index	0.006	-0.092***	(0.033)	11106
Mental health scores	0.003	0.070***	(0.025)	11106
Admin data				
Income	145.4	-33.76***	(5.018)	10856
Income with SSIP	145.4	53.71***	(5.113)	10856
Labor Income	110.7	-26.92***	(3.465)	10856
Total Assets	11485	-164.7	(225.3)	10856
Total debt	3645	109.6	(131.8)	10856

Note: The table shows regression results on the primary outcomes only using the household heads who have responded to all waves up to this point. The regression includes cohort-by-strata fixed effects, survey wave fixed effects and control variables. All monetary units are denoted in 10,000 KRW. Asterisks indicate statistical significance of each estimates, where ***: p<0.01, **: p<0.05, and *: p<0.1

Table B10: Treatment Effects of SSIP: Imputation using past values

Source	Control mean	Coeff.	S.E.	Obs.
Survey data				
Income increased in last 6 months	0.067	0.115***	(0.010)	13268
Work regularly	0.587	-0.089***	(0.014)	13268
Worked for income last week	0.556	-0.099***	(0.015)	13268
Total working hours	33.22	-1.958***	(0.559)	8348
Spent on education/training (indicator)	0.042	0.018***	(0.007)	13268
Expenditure on education/training	1.149	0.737***	(0.281)	13261
Spent for child care/education	0.572	0.020	(0.024)	4531
Expenditure on child care/education	29.58	-2.029	(1.836)	4531
Standardized Depression Index (CES-D)	0.042	-0.129***	(0.029)	13268
Standardized Stress Index	0.048	-0.114***	(0.031)	13268
Mental health scores	-0.042	0.093***	(0.024)	13268
Admin data				
Income	144.6	-25.36***	(4.544)	11745
Income with SSIP	144.6	48.32***	(4.770)	11745
Labor Income	113.3	-14.02***	(2.965)	11745
Total Assets	11557	-250.3	(215.3)	11745
Total debt	3902	110.7	(114.1)	11745

Note: The table shows regression results on the primary outcomes where missing responses are imputed based on the previous non-missing response. The regression includes cohort-by-strata fixed effects, survey wave fixed effects and control variables. All monetary units are denoted in 10,000 KRW. Asterisks indicate statistical significance of each estimates, where ***: p<0.01, **: p<0.05, and *: p<0.1

C Heterogeneity Analysis

Table C1: Heterogeneity Analysis by Gender: Survey Data

	Control mean		Treatment effect		Difference
	Female	Male	Female	Male	(2)-(1)
A. Household finance					
Income increased in last 6 months	0.068	0.072	0.108***	0.108***	0
			(0.013)	(0.014)	(0.016)
Monthly household income	163	191.8	37.36***	39.81***	2.453
			(4.437)	(4.614)	(5.175)
Monthly household expenditure	199.1	220.9	16.21***	18.76***	2.551
			(4.388)	(4.414)	(5.359)
Spent for education/training	0.042	0.039	0.03***	0.013	-0.018
			(0.01)	(0.009)	(0.011)
Expenditure on education/training	1.265	1.032	0.832**	0.766**	-0.066
			(0.373)	(0.332)	(0.395)
Spent for child care/education	0.582	0.604	0.011	0.012	0.001
			(0.032)	(0.032)	(0.039)
Expenditure on child care/education	28.39	32.53	-2.523	-1.459	1.064
			(2.483)	(2.53)	(3.074)
B. Employment					
Have regular job	0.582	0.615	-0.124***	-0.082***	0.042*
			(0.02)	(0.019)	(0.025)
Worked for income last week	0.555	0.583	-0.133***	-0.101***	0.032
			(0.02)	(0.02)	(0.025)
Worked for family business last week	0.01	0.015	-0.005	-0.0	0.005
			(0.007)	(0.008)	(0.008)
Hold other jobs	0.035	0.05	-0.011	-0.022*	-0.011
			(0.013)	(0.012)	(0.013)
Working hours for main job	30.48	36.56	-0.833	-1.256	-0.423
			(0.879)	(0.892)	(1.126)

Total working hours	30.78	37.15	-1.105	-1.506*	-0.401
			(0.869)	(0.883)	(1.111)
C. Health					
Rosenberg Self-Esteem Scale	-0.04	0	0.028	-0.001	-0.029
			(0.04)	(0.039)	(0.05)
CES-D Depression Scale	0.102	-0.073	-0.09**	-0.059	0.032
			(0.038)	(0.038)	(0.048)
Cohen Perceived Stress Scale	0.105	-0.048	-0.081**	-0.077*	0.004
			(0.041)	(0.04)	(0.049)
Mental health index	-0.083	0.04	0.066**	0.045	-0.021
			(0.033)	(0.033)	(0.043)
Nutrition index	57.53	53.75	0.667	0.593	-0.073
			(0.505)	(0.481)	(0.581)
D: Income data (admin)					
Total Income	128.1	158.7	-32.46***	-34.5***	-2.042
			(5.647)	(6.291)	(6.693)
Labor Income	97.38	120.6	-27.36***	-25.71***	1.652
			(4.477)	(4.624)	(5.962)
Business Income	7.951	13.46	-1.685	-5.653	-3.968
			(1.782)	(3.885)	(3.037)
Public Transfers	17.97	22.41	-0.422	-0.882	-0.46
			(1.269)	(1.404)	(1.537)
Total Assets	11294.8	11652.4	-368	80.19	448.2
			(343.478)	(355.687)	(526.4)
Total Debt	3484.7	3871.7	-178.2	510.3**	688.4**
			- (205.703)	(201.67)	(301.5)

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 5686 and 5644 each for females and males for outcomes in Panel D. For outcomes in other panels, there are 6019 and 6037 observations respectively for females and males. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1

Table C2: Heterogeneity Analysis by Age: Survey Data

	Control mean by age			Treatment effect			Difference	
	-39	40-64	65+	-39	40-64	65+	(2)-(1)	(3)-(1)
A. Household finance								
Income increased in last 6 months	0.104	0.066	0.034	0.114***	0.101***	0.121***	-0.013	0.007
				(0.017)	(0.013)	(0.018)	(0.02)	(0.023)
Monthly household income	210.5	173.6	141.4	45.19***	39.22***	27.62***	-5.974	-17.57**
				(5.975)	(4.367)	(5.385)	(6.346)	(6.99)
Monthly household expenditure	238.8	211.3	166.1	18.57***	18.62***	13.25**	0.049	-5.319
				(6.026)	(4.25)	(5.666)	(6.701)	(7.69)
Spent for education/training	0.079	0.03	0.013	0.034**	0.02**	0.006	-0.014	-0.028*
				(0.015)	(0.008)	(0.008)	(0.016)	(0.015)
Expenditure on education/training	2.393	0.826	0.249	0.963*	0.84**	0.483	-0.123	-0.48
				(0.509)	(0.345)	(0.313)	(0.551)	(0.523)
Spent for child care/education	0.738	0.532	0.231	-0.022	0.032	-0.231*	0.055	-0.209*
				(0.037)	(0.029)	(0.112)	(0.041)	(0.115)
Expenditure on child care/education	29.94	31.02	18.78	-4.231	-0.606	-18.53**	3.625	-14.3*
				(2.757)	(2.292)	(9.006)	(3.047)	(9.22)
B. Employment								
Have regular job	0.71	0.639	0.338	-0.098***	-0.107***	-0.093***	-0.009	0.006
				(0.025)	(0.02)	(0.027)	(0.03)	(0.035)
Worked for income last week	0.676	0.611	0.31	-0.105***	-0.127***	-0.101***	-0.022	0.005
				(0.025)	(0.02)	(0.026)	(0.03)	(0.034)
Worked for family business last week	0.017	0.014	0.006	0.004	-0.004	-0.006	-0.008	-0.01
				(0.011)	(0.008)	(0.006)	(0.011)	(0.01)
Hold other jobs	0.053	0.04	0.024	-0.02	-0.012	-0.034**	0.008	-0.015
				(0.014)	(0.012)	(0.014)	(0.014)	(0.015)
Working hours for main job	35.29	33.87	27.19	-0.213	-1.544*	-0.352	-1.331	-0.138
				(1.07)	(0.832)	(2.007)	(1.229)	(2.244)
Total working hours	35.97	34.24	27.35	-0.638	-1.694**	-0.663	-1.056	-0.025
				(1.054)	(0.83)	(1.991)	(1.214)	(2.224)

C. Health								
Rosenberg Self-Esteem Scale	0.113	-0.07	-0.075	0.052	-0.014	0.04	-0.066	-0.012
				(0.052)	(0.04)	(0.051)	(0.062)	(0.068)
CES-D Depression Scale	-0.161	0.076	0.1	-0.073	-0.074*	-0.094*	0.000	-0.021
				(0.046)	(0.039)	(0.053)	(0.055)	(0.065)
Cohen Perceived Stress Scale	-0.109	0.058	0.144	-0.088*	-0.091**	-0.038	-0.003	0.049
	-			(0.052)	(0.041)	(0.052)	(0.059)	(0.068)
Mental health index	0.128	-0.068	-0.106	0.071*	0.05	0.057	-0.021	-0.014
				(0.043)	(0.033)	(0.043)	(0.052)	(0.057)
Nutrition index	53.65	60.43	45.53	1.919***	0.008	0.369	-1.911***	-1.55*
				(0.576)	(0.492)	(0.727)	(0.656)	(0.851)
D: Income (Admin)								
Total Income	155.9	138.9	137.9	-26.08***	-37.35***	-34.71***	-11.27	-8.626
				(7.008)	(5.432)	(12.752)	(7.815)	(13.72)
Labor Income	136.3	110.4	67.98	-19.69***	-31.28***	-23.83***	-11.59	-4.138
				(6.677)	(4.292)	(5.718)	(7.558)	(8.372)
Business Income	10.82	13.13	4.069	-4.975**	-3.713	-1.65	1.262	3.325*
				(2.322)	(3.435)	(5.171)	(2.558)	(1.865)
Public Transfers	6.945	13.07	56.8	-0.801	-1.713	1.971	-0.912	2.772
				(1.569)	(1.324)	(2.023)	(1.643)	(2.345)
Total Assets	11924	11328.5	11241	128.7	-403.2	193.8	-532	65.07
				(492.877)	(349.455)	(525.318)	(639.5)	(743.9)
Total Debt	5187.4	3397.7	2371.5	214.3	242.6	-101.3	28.27	-315.6
				(321.475)	(197.788)	(246.858)	(408)	(413.4)

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 3169, 5908, and 2253 each for groups '-39'. '40-64'. and '65+' . For outcomes in other panels, there are 3455, 6227, and 2374 observations respectively for groups '-39'. '40-64'. and '65+'. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.

Table C3: Heterogeneity Analysis by Mental Health: Survey Data

	Control mean		Treatment effect		Difference
	Unhealthy	Healthy	Unhealthy	Healthy	(2)-(1)
A. Household finance					
Income increased in last 6 months	0.063	0.078	0.112***	0.104***	-0.008
			(0.013)	(0.014)	(0.016)
Monthly household income	158.5	198.5	36.12***	41.87***	5.75
			(4.367)	(4.704)	(5.19)
Monthly household expenditure	194.7	226.9	14.85***	20.47***	5.617
			(4.236)	(4.579)	(5.378)
Spent for education/training	0.031	0.051	0.011	0.034***	0.023**
			(0.008)	(0.01)	(0.011)
Expenditure on education/training	0.765	1.572	0.653**	0.967**	0.314
			(0.317)	(0.397)	(0.407)
Spent for child care/education	0.564	0.616	0.025	0.000	-0.025
			(0.032)	(0.032)	(0.039)
Expenditure on child care/education	28.08	32.32	-1.466	-2.68	-1.214
			(2.579)	(2.438)	(3.099)
B. Employment					
Have regular job	0.512	0.695	-0.117***	-0.082***	0.035
			(0.019)	(0.019)	(0.025)
Worked for income last week	0.485	0.663	-0.127***	-0.100***	0.026
			(0.019)	(0.02)	(0.025)
Worked for family business last week	0.013	0.011	-0.002	-0.005	-0.003
			(0.007)	(0.007)	(0.007)
Hold other jobs	0.038	0.046	-0.026*	-0.009	0.017
			(0.012)	(0.013)	(0.012)
Working hours for main job	31.95	34.97	-0.94	-1.163	-0.223
			(0.958)	(0.831)	(1.148)
Total working hours	32.32	35.48	-1.288	-1.35*	-0.062
			(0.954)	(0.818)	(1.135)

C. Health					
Rosenberg Self-Esteem Scale	-0.487	0.497	0.156***	-0.113***	-0.27***
			(0.037)	(0.038)	(0.046)
CES-D Depression Scale	0.498	-0.521	-0.252***	0.093***	0.345***
			(0.037)	(0.034)	(0.043)
Cohen Perceived Stress Scale	0.477	-0.468	-0.235***	0.066*	0.3***
			(0.039)	(0.039)	(0.045)
Mental health index	-0.487	0.495	0.214***	-0.09***	-0.305***
			(0.031)	(0.03)	(0.038)
Nutrition index	53.32	57.89	1.168**	0.333	-0.835
			(0.501)	(0.476)	(0.574)
D: Income data (admin)					
Total Income	125.6	163	-36.92***	-29.29***	7.627
			(6.027)	(6.259)	(7.276)
Labor Income	91.81	127.9	-28.19***	-24.41***	3.786
			(4.183)	(4.965)	(6.033)
Business Income	8.008	13.67	-3.013*	-4.392	-1.379
			(1.828)	(3.865)	(6.874)
Public Transfers	21.15	19.1	-1.116	-0.081	1.035
			(1.281)	(1.406)	(1.551)
Total Assets	10651.2	12385.1	-114.8	-142.6	-27.73
			(347.838)	(354.992)	(531.8)
Total Debt	3334.6	4057.3	145.2	183.4	38.21
			(199.787)	(210.979)	(305.5)

Notes: The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 5935 and 5395 each for 'Unhealthy' and 'Healthy' groups for outcomes in Panel D. For outcomes in other panels, there are 6338 and 5718 observations respectively for 'Unhealthy' and 'Healthy' groups. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1

Table C4: Heterogeneity Analysis by number of people needing care

	Control mean by age			Treatment effect			Difference	
	0	1	2+	0	1	2+	(2)-(1)	(3)-(1)
A. Household finance								
Income increased in last 6 months	0.07	0.065	0.091	0.108***	0.11***	0.109***	0.002	0.001
				(0.011)	(0.02)	(0.039)	(0.021)	(0.04)
Monthly household income	162.9	213.6	297.8	35.38***	40.89***	93.4***	5.51	58.01***
				(3.954)	(6.275)	(12.732)	(6.427)	(12.78)
Monthly household expenditure	192.8	253.3	350.7	15.48***	21.09***	41.95**	5.61	26.46
				(3.747)	(6.938)	(17.902)	(7.172)	(18.29)
Spent for education/training	0.042	0.031	0.051	0.018**	0.039**	0.014	0.02	-0.004
				(0.008)	(0.016)	(0.025)	(0.016)	(0.026)
Expenditure on education/training	1.172	0.876	1.756	0.777**	1.187**	-0.211	0.41	-0.988
				(0.312)	(0.503)	(0.933)	(0.505)	(0.932)
Spent for child care/education	0.529	0.675	0.793	0.004	0.019	0.041	0.015	0.037
				(0.03)	(0.041)	(0.051)	(0.045)	(0.054)
Expenditure on child care/education	31.24	24.12	37.33	-3.047	0.668	-3.304	3.715	-0.257
				(2.258)	(3.092)	(5.414)	(3.369)	(5.657)
B. Employment								
Have regular job	0.596	0.554	0.807	-0.102***	-0.091***	-0.144**	0.012	-0.042
				(0.016)	(0.03)	(0.062)	(0.033)	(0.063)
Worked for income last week	0.57	0.519	0.754	-0.119***	-0.099***	-0.125**	0.019	-0.006
				(0.017)	(0.03)	(0.062)	(0.032)	(0.063)
Worked for family business last week	0.011	0.015	0.023	-0.004	0.006	-0.029	0.01	-0.025
				(0.007)	(0.01)	(0.022)	(0.01)	(0.021)
Hold other jobs	0.046	0.026	0.049	-0.017	-0.014	-0.033*	0.003	-0.016
				(0.012)	(0.015)	(0.018)	(0.014)	(0.017)
Working hours for main job	32.97	35.05	38.45	-1.178	-1.423	2.148	-0.244	3.326
				(0.75)	(1.376)	(2.681)	(1.483)	(2.723)
Total working hours	33.4	35.53	39.11	-1.39*	-1.862	1.561	-0.472	2.951
				(0.74)	(1.369)	(2.711)	(1.469)	(2.749)

C. Health								
Rosenberg Self-Esteem Scale	-0.046	0.008	0.343	0.014	0.039	-0.094	0.025	-0.108
				(0.033)	(0.06)	(0.135)	(0.063)	(0.137)
CES-D Depression Scale	0.054	-0.083	-0.311	-0.071**	-0.088	-0.082	-0.017	-0.011
				(0.033)	(0.055)	(0.111)	(0.057)	(0.113)
Cohen Perceived Stress Scale	0.046	0.022	-0.262	-0.071**	-0.102*	-0.094	-0.031	-0.023
				(0.035)	(0.058)	(0.135)	(0.061)	(0.136)
Mental health index	-0.049	0.023	0.305	0.052*	0.076	0.027	0.024	-0.025
				(0.027)	(0.049)	(0.113)	(0.052)	(0.115)
Nutrition index	56.26	52.82	55.21	0.716*	0.189	0.525	-0.527	-0.191
				(0.427)	(0.75)	(1.376)	(0.771)	- (1.386)
D: Income (Admin)								
Total Income	125.7	199.9	240.2	-28.86***	-54.24***	-25.76	-25.38*	3.094
				(4.183)	(14.116)	(19.298)	(13.28)	(19.43)
Labor Income	99.04	129.5	210.1	-25.31***	-32.09***	-22.2	-6.778	3.109
				(3.818)	(7.134)	(19.4)	(7.823)	(19.75)
Business Income	8.71	19.73	10.63	-2.435	-10.1	2.385	-7.669	4.82
				(1.593)	(7.971)	(6.416)	(6.871)	(6.324)
Public Transfers	15.82	40.99	16.37	-0.317	-1.508	-2.698	-1.191	-2.381
				(1.164)	(2.146)	(4.267)	(2.238)	(4.238)
Total Assets	10409.2	15017.6	16869.4	-100.1	-359.6	376.2	-259.5	476.3
				(275.892)	(629.966)	(1720.899)	(714.9)	(1776.4)
Total Debt	3105.5	5214	8102	271.3*	-204.3	-134.5	-475.6	-405.8
				(160.731)	(368.619)	(1133.655)	(417.1)	(1164.2)

Notes: The members of the household who need care are defined as the number of members aged 7 or below and 65 or above. The regression includes estimates for the interaction between the treatment variable and the post dummy. The regression includes strata-by-cohort fixed effects, wave fixed effects, and baseline control variables. Unit is 10,000 KRW for income variables. The number of observations is 8886, 2028, and 416 each for groups '0'. '1'. and '2+' . For outcomes in other panels, there are 9463, 2125, and 468 observations respectively for groups '0'. '1'. and '2+'. Asterisks indicate statistical significance of estimates. ***:p<0.01; **:p<0.05; *:p<0.1.