The Effects of Cash Transfers to Health Savings Accounts on Healthcare Utilization and Health

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Abstract

I examine the effects of cash transfers on healthcare utilization and health by exploiting a healthcare policy in Singapore that provides a cash transfer of 100SGD or 200SGD to mandatory health savings accounts for all citizens born before 1959. Using monthly longitudinal data from the Singapore Life Panel, I compare the outcomes of individuals born right before and after January 1959. I find that the receipt of cash transfers in an individual health savings account leads to a higher probability of doctor visits and higher monthly health spending. In addition, I provide evidence that the cash transfer to a health savings account increases the probability of diagnosis of chronic conditions.

Keywords: health savings account, consumer-directed health plan, healthcare demand, health, liquidity constraint

JEL: D12, D91, I11, I38

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1. Introduction

In March 2014, the Singapore government launched the 5-Year Medisave Top-up Plan. Under this plan, all Singaporean citizens who were born between 1949 and 1959 receive an annual payment of 100SGD or 200SGD into their health savings account (HSA), regardless of assets or income levels.[1] The 5-Year Medisave Top-up Plan covers approximately 15% of the Singapore citizens, and transferred almost 53 million SGD[2] (38.6 million USD) in benefits until 2019. This policy presents the opportunity to study the effects of cash transfers to HSAs.

Although there is a rich literature studying the effects of cash transfers, inferring the impact of cash transfers to HSAs from these studies is difficult. The Permanent Income Hypothesis (PIH) predicts that households should not respond to transitory expected income increase (Jappelli and Pistaferri, 2010). But recent empirical evidence on tax rebates rejects the prediction and show households increase their non-durable consumption upon receiving the cash transfers (Johnson et al., 2006; Agarwal et al., 2007; Parker et al., 2013). Similarly, although a transfer to the HSA is expected to be used on healthcare services and ultimately improve health conditions, it is also possible that households increase spending on other categories instead if they treat the transfer as fungible (Hoynes and Schanzenbach, 2009).

In this study, I examine the effects of the 5-Year Medisave Top-up Plan through regression discontinuity design, comparing individuals who were born right before and after the birthdate cut-off of the program. The setting offers a number of advantages over previous empirical settings. First, there are no confounding factors at the birthdate cut-off. The 5-Year Medisave Top-up Plan only provides eligible citizens with cash transfers in HSAs without changing health insurance coverage or copayment rates. Second, the eligibility of the program only depends on individual's official birthdate record and the enrolment does not require any application. Therefore, it is virtually impossible for individuals to manipulate their eligibility status. Third, since the Medisave account is a part of the national pension scheme, more than 96% of the population owns such an account, avoiding the selection bias.

My analysis draws on data from a newly available, nationally representative survey in Singapore, the Singapore Life Panel (SLP). I organize the analysis around the potential costs and benefits of cash transfers. I examine, on the cost side, the impact of receiving Medisave top-up on healthcare utilization and on the benefit side, the effects of the program on self-

[1] Singaporean citizens who were born before 1949 are eligible for larger amount of cash transfers to their Medisave accounts under a scheme called the Pioneer Generation Package (PGP),
[2] 1 SGD = 0.73 USD as of September 2018.

reported health, probability of new chronic condition diagnosis, and subjective well-being. To understand the mechanisms further, I analyze the heterogeneity in spending response across households with different liquidity constraints and across different categories of healthcare demand.

The findings are summarized as follows. First, the receipt of cash transfers in a medical savings account raises healthcare utilization mainly through increasing the probability of doctor visits. Second, I find no significant improvements in self-assessed health or life satisfaction. However, there is significant increases in the number of chronic condition diagnosis, suggesting a potential long-term benefit (Lette et al., 2017).

To shed further light on the mechanisms behind the estimated average responses of healthcare utilization, I contrast the responses across different types of households and different subcategories of healthcare spending. Healthcare demand rose primarily in pharmaceutical products. Consistent with previous studies on effects of cash transfers, households with liquidity constraints display a higher propensity to consume (Johnson et al., 2006; Agarwal et al., 2007; Parker et al., 2013; Kaplan and Violante, 2014). I also find evidence that cash transfers make households without chronic conditions more likely to consult doctors, implying long-term benefits of the program through preventive measures.

This study contributes to the literature as follows. In the recent decades, the concept of HSA has been adopted by many countries to counter rising healthcare costs.[3] In the US, the HSA has been paired with a high-deductible health insurance to form the consumer-directed health plans (CDHP).[4] Despite the increasing adoption of consumer-directed health plans (CDHP) among employers in the US, studies on the effects of policy interventions using HSAs are scarce. Previous studies regarding HSAs have mainly focused on its effects on healthcare cost reduction and preventive care utilization (Baicker et al., 2006; Lo Sasso et al., 2010; Bundorf 2016; Haviland et al., 2016; Brot-Goldberg et al., 2017; Eisenberg et al., 2017). It is unclear whether cash transfers to HSA could increase healthcare demand, while incurring minimal moral hazard costs. Because Singapore's health financing scheme is comparable to

[3] Other Singapore, the US employers have adopted consumer-directed health plans (CDHP), a combination of HSA and high-deductible health plans (HDHP). China has adopted HSA for urban workers since 1998. South Africa has had medical savings accounts (MSA) since 1993 and more than half of private insurance in the country consists of MSA plans. Hong Kong has also developed a plan to use MSA but is currently under public consultation (Hanvoravongchai, 2002).

[4] Under the context of US, HSA and MSA refer to two difference schemes: qualification for MSA is more stringent than HSA. In this paper, I treat HSA and MSA interchangeably by focusing on the main feature as non-taxable account for medical purposes.

CDHP[5], I am able to identify the effects of cash transfer to individual HSA. The cash transfers analyzed in this study targets the population of all employment status (as opposed to specific employee populations in the previous literature). Therefore, it provides novel evidence on healthcare demand responses to cash transfers.

This study is also related to empirical literature estimating the effects of expected income changes on household consumption expenditures (Parker, 1999; Souleles, 1999, 2002; Johnson et al., 2006; Agarwal et al., 2007; Parker et al., 2013; Kaplan and Violante, 2014). The majority of existing studies have found impact of expected income changes on non-durable consumption. Few studies have examined the effects on health expenditure. Among those that undertake such research, few studies find that increases in income lead to dangerous health behavior, such as drug abuse and alcoholism (Dobkin and Puller, 2007; Miller et al., 2009; Evans and Moore, 2011; Gross and Tobacman, 2014). Since HSA can be used only to purchase healthcare services, a cash transfer to individual HSA may generate distinctively different effects on consumer behaviors than that predicted in the previous literature.

The rest of the paper is organized as follows. Section 2 presents the institutional background of the health financing schemes in Singapore and the 5-Year Medisave Top-up Plan. Section 3 describes the data. Section 4 presents the empirical identification strategy. Section 5 presents and discusses the main results. Section 6 reports the findings of heterogeneous effects. Section 7 shows the robustness checks. Section 8 concludes.

2. Background

2.1 Institutional Setting in Singapore

The healthcare financing system in Singapore consists of Medisave, MediShield Life, and Medifund, the so-called "3M" system (Barr, 2008; Lim, 2017). Medisave is an individual HSA through which citizens build savings for their healthcare needs. It is the primary source of healthcare financing for Singaporeans and pays smaller healthcare bills. Monthly contributions to Medisave are mandatory, ranging from 7% to 9% of monthly salary with a ceiling (Ministry of Health, Singapore, 2010). Amounts accumulated in Medisave can be used for outpatient treatments, inpatient charges, and surgical expenses up

[5] See Table 1 for a detailed comparison. Both systems feature a tax-free individual savings account that can be used only to purchase medical services and an insurance, which covers only large amounts of healthcare expenditure.

to a limit. Individuals cannot withdraw cash directly from Medisave. In addition, individuals can use Medisave to pay for the medical bills of family members.

MediShield Life is mandatory health insurance complementary to Medisave. It covers prolonged hospitalization and large medical expenses. Medifund is an endowment fund set up for the government to help citizens who cannot afford medical expenses. The amount individuals can claim is subject to the fund's budget surplus for the year as well as individual financial and social circumstances.

2.2 Health Savings Account and Consumer-directed Health Plans (CDHPs)

The HSA plus a high-deductible health insurance scheme is not unique in Singapore. It has been adopted by many countries to control the rising healthcare costs. One example would be the consumer-directed health plans in the US. A CDHP, which typically features a high deductible health plan (HDHP) with HSA, represents an emerging alternative healthcare insurance in the last decade. Early proposals for medical savings accounts can be traced to the late 1990s (Stano, 1981; Pauly, 1994; Pauly and Goodman, 1995). The advocates of the plan contrast it with traditional comprehensive, tax-subsidized insurance, which creates moral hazard and inefficiencies for healthcare demand.

The motive for the CDHP is the desire to create highly informed consumers and to give them incentives and the tools to take charge of their own healthcare decisions. Their search for price and quality would reduce the power of health providers and existing inefficiency in the healthcare market. Since the CDHP's legalization in 2002, it has been adopted rapidly by employers in the US. Thirteen percent of employers offered CDHPs in 2008 and 26% of employers who did not offer a CDHP said they were very likely to do so in the next year (Lo Sasso et al., 2010). By 2017, almost one-third of covered employees were enrolled in CDHPs (Mercer, 2017).

The Medisave plus MediShield Life financing scheme is very similar to the CDHP. Both are designed to minimize the inefficiency costs caused by moral hazard while providing insurance coverage. The philosophy behind the 3M system—promoting individual responsibility—makes higher degrees of co-payment essential (Lim, 2017). Table 1 presents a comparison of the Singapore health financing scheme and CDHP. Both Medisave and HSA are tax-free individual accounts that can be used only to purchase healthcare services. Individuals first pay out of their HSA accounts to meet healthcare expenditure. Medisave and HSA have maximum annual contribution amounts capped at

approximately 3000–6000 USD per year, respectively. Similarly, individuals who are enrolled in the MediShield Life and HDHP are required to pay a high amount of deductible and coinsurance rate before receiving reimbursement from the insurance. Both schemes have approximately 10% coinsurance rate with minimum deductibles set at 1000–2000 USD per year.

2.3 5-Year Medisave Top-up Plan

To improve the welfare state of the elderly, the Singapore government launched the 5-Year Medisave Top-up Plan in 2014. Singaporean citizens who were born between January 1, 1950 and December 31, 1959 are eligible for the program and receive 100 SGD or 200 SGD in their Medisave accounts from 2014 to 2019.

Table 2 displays the top-up schedule for the eligible recipients. The annual home value is the estimated annual rental revenues if the property were to be rented out, excluding furniture and maintenance fees, and is determined annually by Singapore's tax authority (Agarwal and Qian, 2014). The majority of citizens (i.e., individuals living in HDB flats who do not own more than one property) receive the higher top-up amount of 200 SGD per year.

Recipients receive the top-up automatically in their Medisave accounts if they had previously signed up for a government payment. For those who have not, the sign up is online and linked directly with individual National Registration Identification Card (NRIC) number. To guarantee the benefits reach the targeted population, eligible Singaporeans will be notified in July each year through text messages, letters and government mobile application reminders. The actual transfer takes place every year at August 1st.

The 5-Year Medisave Top-up Plan presents a unique policy setting as compared to other social welfare programs. First, the eligibility of the program does not coincide with any changes in the healthcare cost-sharing scheme. Second, the cash transfer is anticipated. Given the recurrent nature of the transfer, presumably, the eligible individuals have enough time to learn about the top-up either from the news, from letters informing them of the top-up, or from friends/family.

The key to our identification is that individuals who are eligible for the 5-Year Medisave Top-up Plan do not need to provide qualifying documents for the program. Individual recipient status is determined from the government's administrative record, and therefore, it is practically impossible for individuals to manipulate birthdate for eligibility.

3. Data

I use data from the SLP for the empirical analysis. The SLP is a longitudinal survey for a representative sample of Singapore citizens and permanent residents aged 50 to 70 years. The baseline of the SLP is July 2015, and the monthly sample ranges from 7,000 to 9,000 individuals. The survey contains both individual-level information, such as health, income, and education, and household-level variables, such as consumption and wealth. The SLP is comparable to the U.S. Health and Retirement Study and the Survey on Health, Retirement and Ageing in Europe.

The SLP is conducted as an internet survey with four types of survey frequency. Every month, the SLP asks the respondents a set of standard questions regarding consumption, income, labor market status, health, and life satisfaction. Household consumption includes spending across 8 broad categories and 33 subcategories, along with credit card use and transfers to/from friends and family members. In the month of January every year, there is a longer survey eliciting the details of the household's wealth by compiling extensive data on 40 subcategories of assets and debts. Quarterly modules ask respondents about health insurance, work expectations, and subjective well-being. Periodically, there are one-off modules collecting data on topics relevant to policymakers' interests.

3.1 Sample Definition

To ensure the representativeness of the national population, I restrict the sample to individuals who were 50 to 70 years old at the baseline and participated beyond the baseline and the first wave. This exclusion brought the study population to 12,096 individuals (representing 9,358 unique households).

Since the outcome variables are reported at both the household and individual levels, I construct two samples. For healthcare utilization, the SLP surveys the respondent's household spending on prescription medication, non-prescription medication, outpatient, and inpatient services. Since each respondent would report consumption at the household level, the household is the unit of analysis for the effects of receiving top-ups on healthcare utilization.

The SLP provides three identifiers: household ID, respondent ID, and spouse ID. Under the same household identifiers, some of the respondents are not married, and some comprise more than one married couple. Appendix Table 1 reports the composition of marital status and spouse records in the SLP. To identify the household structure accurately, I construct a new household identifier based on the respondent's marital status and reported spouse ID. In total, 2,164 new household identifiers are created.

To examine the actual effects of being eligible for receiving Medisave top-up on household healthcare utilization and to avoid double counting, I keep only one representative member per household per wave. Therefore, I select the observations reported from the household member who is most knowledgeable about household finance. Given the demands of an empirical approach, the data provide relatively reasonable samples: more than 1,568 households fall within the 12-month bandwidth. For self-reported health, the probability of a new diagnosis of chronic conditions, and overall well-being, the unit of analysis is the individual, since the respondents report at the individual level. In total, 1,620 individuals fall within the 12-month bandwidth.

Different from many survey datasets, the SLP is conducted monthly, and thus, the participation patterns of respondents potentially influence the estimation results. Appendix Table 2 reports the result from a simple ordinary least square (OLS) regression investigating the relationship between the number of waves in which a respondent participated and a set of demographic characteristics, restricting the sample to within the 12-month bandwidth. The table shows that older respondents participated in more waves as compared to the younger ones. Respondents who obtain secondary education and post-secondary education are more likely to answer than those who have primary or less education. Given the significant differences in characteristics of respondents who participated more often in the survey, pooling waves together would likely bias the estimation.

One approach for dealing with attrition and other changes in the composition of the sample would be to investigate a continuously participating cohort in the SLP. To minimize the measurement errors, I keep individuals who have participated in more than nine waves every survey year and pool data from October 2015 to July 2018. In total, 1,495 individuals fall within the 12-month bandwidth and are kept in the sample, amounting to 26,082 person-wave observations.

3.2 Summary Statistics

Table 3 Panel A reports the demographic characteristics of the individual-level sample. For the eligible sample, 53% are female, and more than 82% married. The sample consists of 84% Chinese, 8.8% Malay, and 5.3% Indian. More than one-third of the sample has post-secondary education and 60% has private insurance. By comparison, the control group has similar characteristics to the treatment group except for education. Since the non-eligible individuals are younger than the eligible individuals are, the former on average obtain more years of education owing to the improved economic situation. Panel B reports the household

characteristics. On average, the control sample incurs higher medical and non-medical expenses. In addition, non-eligible households have higher financial wealth than eligible households do.

4. Empirical Methodology

To estimate the size of the discontinuity in outcomes and treatment, I follow standard methods for regression discontinuity analysis (Imbens and Lemieux, 2008; Lee and Lemieux, 2010). The main estimating equation for household healthcare utilization is

$$Y_{ht} = f(b) + \alpha_1 MT_h + \delta X'_{ht} + \gamma_t + \epsilon_{ht}, \quad (1)$$

where h is a household represented by the person who is most knowledgeable about household finance. Y represents household-level outcome variables, such as medical consumption expenditure. $f(b)$ is a smooth function of birthdate including the square and cubic term of birthdate. MT_h is a dummy variable indicating whether the household is eligible (i.e., if any household member was born before December 31, 1959). X_{ht} is a vector of control variables, including characteristics of the financially representative person of household h, such as gender, marital status, education, and race. I also include a series of wave dummies γ_t, to absorb the seasonal variation in consumption expenditures as well as other concurrent aggregate factors. I restrict the sample to households with members who were born 12 months before and after the cut-off birthdate and estimate equation (1) using pooled data from October 2015 to July 2018. The coefficient of interest is α_1, which measures the average effects of being eligible for receiving Medisave top-ups.

Similarly, for health and subjective well-being measurements, I estimate the following equation:

$$Y_{it} = f(b) + \beta_1 MT_i + \delta X'_{it} + \gamma_t + \epsilon_{it}, \quad (2)$$

where Y_{it} indicates the health or well-being measurements of individual i at wave t. Individual program eligibility, MT_i, is a dummy variable indicating whether individual i is eligible for receiving the Medisave top-up. X_{it} is a vector of control variables, including gender, marital status, education, and race. Standard errors are clustered at age in months to account for common characteristics within cells of the same age. γ_t controls for wave fixed effect. The coefficient of interest is β_1, which measures the average effects of being eligible for receiving Medisave top-ups on health and subjective well-being.

The causal inference rests on the assumptions that the assignment of eligibility cannot be manipulated by the participants and the expected outcomes of the household below and

above the cut-off birthdate are continuous. Eligibility for the 5-Year Medisave Top-up Plan is determined by the birth record in the government administrative data. The enrolment does not require an application from the eligible individuals and the due benefits amount is calculated based on an individual's housing records. Individuals who are eligible receive the due amount automatically. Therefore, since the Medisave account is part of the pension scheme (Central Provident Fund), more than 96% of the population has such an account, thereby enabling me to avoid selection bias.

Continuity requires the inclusion of all other factors that might affect the healthcare demand trend smoothly around the cut-off birthdate. Following Lee and Lemieux (2010), I fit the same models as equation (1) without controls for confounding variables and testing for discontinuities around the cut-off birthdate. Table 3 in the Appendix reports the regression results. Most of the variables are not statistically different between above and below the birthdate cut-off, except years of education and probability of mother still being alive.

To consider these differences further, Figure 1 in the Appendix compares the covariates of interest in the 12 months around the birthdate cut-off. Most of the comparisons show similar levels across the birthdate cut-off. Notably, the median wealth of households above and below the birthdate cut-off is not significantly different. In summary, it seems that individuals who were born right before and after the birthdate cut-off are nearly identical based on observable variables.

5. Results

5.1 Healthcare Utilization

To examine the effects of cash transfers to HSA on healthcare demand and utilization, I study three outcome variables: probability of doctor visits, household monthly spending on healthcare and the budget shares of health spending in total household expenditure. Most healthcare consumption decisions, such as treatments and purchase of pharmaceutical products, are not made solely by consumers themselves but jointly with physicians. The decision to consult a doctor is one of the few healthcare demands made exclusively by consumers, and thus, reflects the true effects of receiving a cash transfer.

Figure 1 shows the actual and fitted age profiles of the probability of doctor visits on pooled survey data. The markers in the figure represent averages of the probability of having a doctor visit in the survey month (by age in months). The positive numbers represent individuals who were born before the birthdate cut-off and the negative numbers represent those that were

born after. The lines represent fitted regressions from models with a quadratic birthdate profile. Overall, there is a general decreasing trend in the probability of outpatient visits before the birthdate cut-off but the probability jumps sharply at the cut-off. There is still a decreasing trend in the probability of doctor visits above the birthdate cut-off, but the rate of decrease is much smaller than that below the birthdate cut-off.

Columns I and II of Table 4 report the results that account for trends and other covariates for the probability of doctor visits. The OLS estimate in Column II includes all control variables. On average, eligible households incur a 4.05% higher probability than non-eligible households of having a doctor visit. This indicates a 12% increase in the probability of a doctor visit than the mean monthly probability of 33.4% in the 12 months below the birthdate cut-off (the "untreated" group in this regression discontinuity design). Column I reports the estimates without controls. Both statistical significance and magnitude are similar.

Figure II shows the actual and fitted age profile of the average month healthcare spending. Overall, there is a decreasing trend in monthly health spending before the birthdate cut-off. But the average spending increases sharply right after the cut-off. Columns III and IV of Table 4 present the estimates for household health expenditure using equation (1), both with and without control variables. The total household health expenditure includes spending on prescription medication, over-the-counter medication, outpatient services, inpatient services, and nursing homes. I find that, on average, receiving the Medisave top-up to HSA significantly increases monthly health spending by 27.62 SGD.

To test the perception of the fungibility of the transfer, I examine the budget share of health spending in total household expenditure. If the household treat the transfers to the HSAs same as cash payments, I would expect an increase in both medical and non-medical consumption but no change in budget share of healthcare expenditure. However, if respondents treat the transfers to the HSAs differently since the top-ups could only be used to purchase medical services and are labeled for healthcare purposes, I would expect an increase in the budget share of healthcare spending.

Figure III shows the actual and fitted age profiles of the budget share of health spending in total household expenditure. The markers in the figure represent average percentage of health spending in monthly household consumption (by age in months). The lines represent fitted regression from models with a quadratic birthdate profile. There is a decreasing trend in the percentage of health spending in the total household budget before the birthdate cut-off but the percentage jumps sharply at the cut-off. After the birthdate cut-off, the trend is reversed as increasing with age.

Column V and VI of Table 4 report the regression estimates both with and without control variables. Receiving cash transfers to HSA significantly increase the health budget share in the household total expenditure. On average, receiving the top-up increases monthly percentage of health spending by 0.385%, 9.4% increase as compared to the mean of the control group, 4.09%. I also examine the effects of receiving cash transfers to other categories of consumption such as food, clothing, and leisure. The detailed results are reported in Appendix Figure 2. No significant effects are found for other consumption categories.

5.2 Health

To examine the effects of receiving Medisave top-ups, I examine two outcome variables: the probability of reporting health as excellent or very good, and the probability of reporting life satisfaction as very satisfied or satisfied. Figure 4 shows the effect of receiving Medisave top-ups on self-rated health being excellent or very good in a survey month. Figure 5 presents the effect on life satisfaction being very satisfied or satisfied. Overall, there is little effects of receiving Medisave top-ups on either self-rated health or life-satisfaction.

Table 5 presents the estimates of receiving the Medisave top-up on self-rated health and life satisfaction. Columns I and II of Table 5 show that the estimate of cash transfers on self-rated health is not statistically significant. The result is, to some extent, expected. In general, it is difficult to detect the effect on health in a regression discontinuity framework, since health is a stock (Grossman, 1972). Thus, it may take a while for the most observable effects to be realized. The remaining columns in Table 5 present estimates for an individual's probability of being "very satisfied" or "satisfied" about life in general. Like self-rated health, the estimate is not statistically significant.

Despite the lack of effects on improving current health states, receiving cash transfers could enhance the health of recipients in the long run if chronic conditions were discovered early owing to more frequent doctor consultation. To explore this mechanism, I examine the effect of receiving Medisave top-up on the probability of having any chronic condition diagnosed by the doctor in the survey month[6]. Figure 6 shows the actual and fitted age profiles of the probability of having any chronic conditions diagnosed in a survey month. Columns I and II of Table 6 report the estimates.

[6] In SLP, respondents were surveyed every month on their chronic conditions. The wording of the question is "In last month, did a doctor tell you that you have any of the following conditions? Please check all that apply."

On average, being eligible of receiving a Medisave top-up increased the probability of having chronic conditions diagnosed every month by 0.073. Similarly, being eligible for receiving a Medisave top-up increased the number of chronic conditions diagnosed by a doctor every month by 0.105, a 46.7% increase over the average number of chronic conditions in the control group, 0.225.

6. Differences in Responses across Households and Goods

This section analyses heterogeneity in response to receiving the Medisave top-up, across different types of households and different subcategories of health care services. This analysis provides evidence on why household healthcare demand responds to the top-up. For brevity, I report results using the full set of control variables only.

6.1 Liquidity Constraints

The presence of liquidity constraints is one of the main reasons that households respond to anticipated income increase (Parker, 1999; Johnson et al., 2006; Parker et al., 2013). Shapiro and Slemrod (2003) found that households in the low-income groups show no consumption response to the tax rebate whereas households who own publicly-traded stocks demonstrate the highest propensity to consume. Similarly, both Kaplan and Violante (2014) and Campbell and Hercowitz (2015) show that middle-income class face substantial liquidity constraints and is the major force in driving the consumption responses to cash transfers.

To verify whether cash transfer to the HSA has similar effects as predicted in the previous studies, I test the differences in healthcare demands based on household income and liquid assets. Following Johnson et al. (2006), I use two variables to identify households that are potentially liquidity constrained: family income before taxes, and liquidity assets, which is the sum of the balances in an individual's checking and savings accounts. I split households into three groups—low, high, and intermediate—with the cut-offs between groups chosen to include about one-third of the top-up recipients in each group. The median asset differences between each group are approximately 10 times.

I begin by testing differences in healthcare demand across income groups. The estimation results are reported in Table 7. Among the three income groups, low-income households spent the least among the three groups of their Medisave top-up on healthcare services. For both middle and high-income groups, receiving Medisave top-up significant increases the probability of doctor visits, whereas no significant effects are found for the low-income group. For health expenditure, the middle-income group spends the most: on average,

receiving cash transfers in HSA increases household health spending by 47.03 SGD. Receiving Medisave top-up also increases the healthcare spending of the high-income group although the magnitude is much smaller.

As income is an indicator of the presence of liquidity constraints, the results of Table 7 are counter-indicative. Households in the low-income group are more likely to save rather than spend the top-ups whereas middle-income group is more likely to be consume the extra cash. One potential mechanism is that low-income households expect larger future medical expenditure as compare to the middle- and high-income group.[7] Therefore, they are more likely to save up the cash transfers. Shapiro and Slemrod (2003) find similar conclusions as individuals who expect to be worse off are the least likely to spend.

Table 8 presents the estimation results testing the differences across liquidity groups. For both probabilities of doctor visits and household healthcare spending, the program has the largest impacts on the intermediate asset group with median liquid wealth of 10,000 SGD. For the probability of doctor visits, receiving Medisave top-up increases the monthly probability of doctor visits among the intermediate asset group by 5.74%, almost double the effects for the low and high asset liquidity groups. Similarly, receiving top-up significantly increases monthly health spending by 65.22 SGD while no significant effects are found for the high asset group. For the low asset group, receiving cash transfers in HSA leads to a reduction in household healthcare expenditure.

In summary, I find that households with middle-income or medium liquid wealth consumed the most of their Medisave top-ups, whereas the low-income or low liquid wealth groups were more likely to save the top-ups and consume in the future. The finding in and of itself is consistent with the "wealthy hand-to-mouth" story. The middle-income households, holding little or no liquid wealth despite owning sizeable quantities of illiquid wealth, have the largest propensities to consume out of additional income owing to liquidity constraints and liquidation costs.

What did households buy with the top-ups? Table 9 shows the estimation results with different dependent variables in each panel measuring spending across the different subcategories within the broad measure of health expenditure. For conciseness, I present the results by liquid asset groups.

[7] Health is associated with socioeconomic status (SES). Low-SES individuals tend to have worse health conditions and adopt risky health behaviours such as smoking and alcoholism (Pampel et al., 2010).

There is substantial heterogeneity in household's responses to healthcare services across the liquid asset groups. To start, receiving Medisave top-up increases a household's spending on prescription medication for all three groups. The magnitude of the effects is largest and most significant for the intermediate group. For over-the-counter medication, the program increases spending for both low and intermediate liquid asset groups. However, the program leads to a significant reduction in over-the-counter medication spending for the high liquid asset group. Combined with the findings in Table 8, in which all three groups increase their probability of doctor visits upon receiving the top-up, the results suggest that the underlying preferences for healthcare services might vary according to liquidity.

For outpatient services, receiving top-ups does not lead to improvement in a household's outpatient expenditure for the low and high liquid asset groups; however, it significantly increases spending for the intermediate group. On average, receiving Medisave top-up significantly increases the intermediate group's monthly spending on outpatient services by 6.47 SGD.

For inpatient spending, receiving the top-ups increases the household expenditure on inpatient services for both the intermediate and high liquid asset groups. On average, receiving top-ups significantly increases the intermediate asset group's spending by 49.64 SGD in inpatient services. Receiving top-ups has no significant effects on inpatient expenditure among the low liquid asset group.

The results indicate the existence of liquidity-based preferences for healthcare services among households. Upon receiving cash transfers in HSA, both low and intermediate households prefer to spend on over-the-counter medication. On the contrary, liquidity-unconstrained households (i.e., high liquid asset group) prefer to increase consumption of prescribed medication and medical consultation. Compared to prescribed medication, over-the-counter drugs do not require a doctor's consultation and are typically used for general treatments, such as pain relief, fever, or allergies. The differences in preferences for healthcare services based on liquidity shows that liquidity-constrained households might avoid treatments or doctor consultations. However, seeking relief from over-the-counter medication indicates potential high demand for healthcare services among liquidity-constrained households. Since health is a stock, avoiding doctor consultation and using over-the-counter drugs for self-medication may negatively influence health in the long run.

6.2 Chronic Conditions

Health is a stock variable and can be invested by inputs such as doctor's visits and medical services (Grossman, 1972). Individual's the preferences for healthcare services depend on their health needs. To explore this mechanism, I divide the sample into two groups: households that have members with at least one chronic condition[8] and households without such members.

Table 10 presents the estimation results. Receiving top-up significantly increases the probability of doctor visits among households without chronic conditions. No significant effects are found among households that have members with a chronic condition. At the same time, households that have a member with a chronic condition increase their monthly spending on healthcare by 43.26 SGD while no effects are found in the no-chronic condition group.

The results imply that households spend the cash transfers on healthcare services that are most efficient in producing health capitals based on their needs. For households with chronic conditions, seeking diagnosis is no longer the priority; instead, these households require resources to fund medical spending. On the other hand, for households without chronic conditions, preventive care produces more utility than curative care. Therefore, receiving additional cash for healthcare makes them more likely to consult doctors.

Table 11 shows the estimation results for different subcategories of healthcare demand. Receiving the top-up has few effects on spending on prescription medication for either group. Interestingly, receiving cash transfers in a Medisave account significantly decreases spending on over-the-counter medication for households with chronic conditions. On average, receiving cash transfers decreases monthly spending on over-the-counter medication by 6.9 SGD. For outpatient spending, receiving a cash transfer increases outpatient expenditure for households with chronic conditions by on average 8.24 SGD every month. However, for households without chronic conditions, receiving a cash transfer decreases their monthly household spending on outpatient services. Since receiving a cash transfer increases the probability of doctor consultation among households without chronic conditions, the result suggests there are underlying health benefits resulting from more frequent consultation. For inpatient services, receiving top-ups leads to an average 35.93 SGD increase in monthly inpatient expenditure among households with chronic conditions, although this finding is statistically insignificant.

In summary, receiving cash transfers encourages households without chronic conditions to consult doctors more and to reduce spending on outpatient services. For

[8] Chronic conditions include hypertension, diabetes, cancer, heart problem, stroke, and arthritis.

households with chronic conditions, receiving cash transfers increases household health expenditure but decreases spending on over-the-counter medication.

7. Robustness Checks

In this section, I discuss the sensitivity of the results to alternative bandwidths and discuss evidence of discontinuities at alternative birthdate cut-offs.

7.1 Bandwidth Sensitivity

The regression results of healthcare utilization using different bandwidth (see Appendix Table 5) are qualitatively similar for a wide range of bandwidths. The magnitude of the healthcare spending estimates decreases with the bandwidth, suggesting that the relatively small bandwidth captures the program effects accurately. When the bandwidth includes only 6 months on either side of the birthdate cut-off, the difference in monthly healthcare expenditure is 13.27 SGD, which is qualitatively very similar to the main results, although statistically insignificant. However, when the bandwidth includes 18 months on either side of the birthdate cut-off, the difference in monthly healthcare spending drops to 8.578 SGD.

Similarly, when the bandwidth increases to 36 months on either side of the birthdate cut-off, the estimate drops to negative. The results indicate that the estimation of the program effects on healthcare spending is sensitive to the selection of the bandwidth. An overly large bandwidth may attenuate the estimation of the program's true effects.

For health outcomes, the estimates are considerably similar for a wide range of bandwidths, especially for a number of new chronic condition diagnoses. The estimated program effects are largest in magnitude for the baseline benchmark bandwidth, although they are qualitatively similar across the range from 6 months to 36 months before and after the birthdate cut-off.

7.2 Alternative Birthdate Cut-off

As a falsification test, I examine the result using an alternative birthdate cut-off: being born in 1957. I do not anticipate treatment differences, economically and statistically significant jumps of magnitude similar to the baseline estimates. The results are reported in Appendix Table 4.

Regarding healthcare utilization, the alternative birthdate cut-offs not only do not reveal convincing discontinuities but also deliver the wrong signs. Similar results are found for the health outcomes. No significant effects are found at the alternative birthdate cut-offs. In summary, I find significant discontinuities in healthcare utilization and the probability of new

chronic condition diagnoses at the baseline birthdate cut-off but less convincing differences at other points of the distribution. These results support the validity of the main findings.

8. Discussion and Conclusions

This study provides evidence that cash transfers to an individual's HSA increases healthcare utilization. Much of the increase takes place within the first five-month period upon receiving the transfer. The program's effects in improving health conditions and life satisfaction are proven to be limited, partially owing to the short study period. However, receiving cash transfers to an individual's HSA does lead to increases of newly diagnosed chronic conditions, which indicates its potential long-term benefits.

Substantial heterogeneity exists in responses to healthcare demand based on household liquid wealth. I find that the expenditure responses are largest for middle-income households while modest for the low-income. Middle-income households are more likely to respond to cash transfers due to liquidity constraint and high liquidation costs. Due to high expected future health expenditure, low-income households prefer to save up the cash transfers. The findings in this study suggest that many medium income households hold little or no liquid wealth despite owning sizeable quantities of illiquid assets. Therefore, they demonstrate the highest propensity to consume out of additional income. The findings suggest that government cash transfer programs benefit not only the poor but also the middle-class by providing additional liquidity.

The results also show that households have different preferences for healthcare services based on their liquidity. Liquidity-constrained households have a strong preference for consuming pharmaceutical products, especially over-the-counter medication. However, non-constrained households prefer to consult a doctor and consume medication from the doctor's prescription. Future policies that aim to encourage utilization of preventive services and physician consultation should consider differences in healthcare demand based on liquidity.

In addition, the healthcare demand responses of receiving cash transfers to HSA differ by household characteristics. Receiving top-ups leads to increases in healthcare spending for households with chronic conditions and increases in probability of consultation for households without chronic conditions. The findings imply that cash transfers to HSA encourages households to optimize healthcare utilization based on their preferences and needs.

The findings suggest that transferring cash directly to individual HSA is effective in increasing healthcare utilization. Households, upon receiving the Medisave top-ups, do not

consume all the rebates immediately but instead save a high proportion of them, especially households with low liquid wealth or low income. Most of the increase in healthcare utilization arises from the growth of doctor consultations. Lacking detailed data on the types of consultation, it is difficult to determine the underlying mechanisms.

Finally, my findings are not necessarily limited to Singapore or CDHP settings. The intuition from households' healthcare demand responses to cash transfers could be extended to other contexts in which the policy target is increasing healthcare utilization without incurring inefficiency. Compare to policies that provide insurance access or alternate cost-sharing schemes, providing cash transfers to HSA incentivizes consumers to take charge of their own healthcare decisions based on preferences and needs.

This study has some limitations that are not fully addressed. First, lacking access to administrative data, I cannot not examine the program's effects on specific treatments and procedures. Second, I use self-reported data on health and healthcare spending. Therefore, the estimates are not free from measurement errors. Since the potential biases caused by the measurement errors are random, the estimates presented in this study should be interpreted conservatively due to attenuation bias. Third, without a full structural model underlying the mechanisms of the observed findings, I cannot conclude that future cash transfers to HSA would necessarily generate the same results. Lastly, I am unable to estimate the long-term benefits owing to the short survey history. It would be both interesting and significant to examine the healthcare demand responses to cash transfers over long periods especially after the 5-Year Medisave Top-up Plan ends in 2019.

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Tables

Table 1. Comparison between Medisave plus MediShield Life, and CDHP

Panel A. Individual Savings Account		
	Medisave	Health Savings Account
Maximum annual contribution	4,213 –5,530 USD	3,350–6,750 USD
Taxable	No	No
Withdrawal of funds for non-medical purposes?	No	Yes
Share among family members	Yes	Yes
Panel B. Insurance		
	MediShield Life	High Deductible Health Plan
Annual premium	95 – 1,120 USD	816 – 1,404 USD
Minimum deductibles	1,097 – 2,194 USD	1,300–2,600 USD
Maximum out-of-pocket	NA	6,550–13,100 USD
Coinsurance rate	10%	10%

Source: Ministry of Finance, Singapore and Healthcare.gov

Table 2. The 5-Year Medisave Top-up Schedule

Annual Value of Home as at December 31 2013	Up to 13,000 SGD	Above 13,000 SGD or owns more than one property
Singaporean citizens born between January 1, 1950 and December 31, 1959	200 SGD/year	100 SGD/year

Source: Ministry of Finance, Singapore

Table 3. Summary Statistics

	Non-eligible	Eligible
Panel A. Demographics		
Female	0.516	0.527
	(0.50)	(0.50)
Married	0.823	0.822
	(0.382)	(0.383)
Chinese	0.811	0.844
	(0.392)	(0.363)
Malay	0.082	0.088
	(0.275)	(0.284)
Indian	0.072	0.053
	(0.258)	(0.225)
Primary	0.169	0.174
	(0.375)	(0.379)
Secondary	0.412	0.474
	(0.492)	(0.500)
Post-secondary	0.420	0.352
	(0.494)	(0.478)
Private insurance	0.557	0.6
	(0.498)	(0.491)
Panel B. Household characteristics		
Monthly medical spending	406	369
	(1022)	(661)
Monthly non-medical spending	4640	4353
	(4952)	(4796)
Household financial wealth (in 1,000 SGD)	198.4	177.7
	(416)	(418)
No. of observations	741	713

Note: all monetary values are adjusted by CPI in 2017 Singaporean dollars.

Table 4. Effects of Medisave Top-ups on Healthcare Utilization

	Any Doctor Visit Last Month		Monthly Healthcare Spending		Percentage of Monthly Health Spending in Total Household Expenditure	
	I	**II**	**III**	**IV**	**V**	**VI**
Born before birthdate cut-off	0.041***	0.042***	6.143	27.62***	0.00249**	0.00385***
	(0.007)	(0.007)	(9.911)	(10.35)	(0.001)	(0.001)
No. of observations	29815	29669	29815	29669	29696	29641
R-square	0.007	0.018	0	0.009	0.001	0.006
Mean of control group	0.334	0.334	146	146	0.041	0.041
Controls	No	Yes	No	Yes	No	Yes

Note: The regressions in Columns II, IV and VI control for date of birth and its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses.
* p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Table 5. Effects of Medisave Top-ups on Self-rated Health and Life Satisfaction

	Self-rated health is excellent or very good		Life satisfaction is very satisfying or satisfying	
	I	II	III	IV
Born before birthdate cut-off	-0.056	-0.055	-0.064	-0.068
	(0.064)	(0.066)	(0.063)	(0.065)
No. of observations	30945	30875	30960	30890
R-square	0.004	0.007	0.009	0.030
Mean of control group	0.673	0.673	0.597	0.597
Controls	No	Yes	No	Yes

Note: The regressions in Column II and IV control for wave fixed effects, date of birth and its square and cubic, marital status, race, and education. Standard errors are clustered at age in months. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Table 6. Effects of Medisave Top-ups on Chronic Condition Diagnosis

	Probability of having any chronic condition diagnosis		Number of chronical conditions diagnosis	
	I	II	III	IV
Born before birthdate cutoff	0.070***	0.073***	0.105**	0.110*
	(0.024)	(0.026)	(0.044)	(0.048)
No. of Observations	32060	31885	31885	32060
R-square	0.004	0.015	0.004	0.015
Mean of control group	0.156	0.156	0.226	0.226
Controls	No	Yes	No	Yes

Note: The regressions in Column II, IV and VI control for wave fixed effects, age, age square, age cubic, marital status, race, and education. Standard errors are clustered at age in months.

Table 7. Effects of Medisave Top-ups based on Income Groups

Panel A. Probability of Doctor Visits			
	Low	Intermediate	High
Born before birthdate cut-off	-0.007	0.050***	0.072***
	(0.015)	(0.011)	(0.014)
No. of observations	6384	12019	9637
R-square	0.015	0.027	0.012
Panel B. Monthly Healthcare Spending			
	Low	Intermediate	High
Born before birthdate cut-off	-15.99	47.03***	18.14
	(14.45)	(12.44)	(27.04)
No. of observations	6384	12019	9637
R-square	0.005	0.008	0.007
Median income	1158	3590	12084

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Table 8. Effects of Medisave Top-ups based on Liquidity Assets

Panel A. Probability of Doctor Visits			
	Low	Intermediate	High
Born before birthdate cut-off	0.023*	0.057***	0.039***
	(0.012)	(0.012)	(0.013)
No. of observations	9871	10633	9170
R-square	0.026	0.019	0.012
Median wealth	0	10,000	100,000
Panel B. Monthly Healthcare Spending			
	Low	Intermediate	High
Born before birthdate cut-off	-13.31	65.22***	1.377
	(16.38)	(13.99)	(23.4)
No. of observations	9871	10633	9170
R-square	0.012	0.009	0.012
Median wealth	0	10,000	100,000

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Table 9. Effects of Medisave Top-ups on Healthcare Spending

Panel A. Monthly Spending on Prescribed Medication			
	Low	Intermediate	High
Born before birthdate cut-off	3.331	8.132***	5.193
	(2.828)	(2.13)	(3.187)
No. of observations	9572	10515	9133
R-square	0.018	0.018	0.047
Panel B. Monthly Spending on Non-prescribed Medication			
Born before birthdate cut-off	1.396	2.216	-6.962***
	(1.957)	(1.576)	(2.142)
No. of observations	9573	10508	9137
R-square	0.016	0.011	0.02
Panel C. Monthly Spending on Outpatient Services			
Born before birthdate cut-off	-4.281	6.474*	-4.655
	-3.506	-3.323	-5.626
No. of observations	9574	10513	9136
R-square	0.025	0.016	0.022
Panel D. Monthly Spending on Inpatient Services			
Born before birthdate cut-off	-13.2	49.64***	6.608
	-15.16	-12.36	-20.66
No. of observations	9563	10498	9130
R-square	0.003	0.003	0.002

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Table 10. Effects of Medisave Top-ups based on Chronic Conditions

Panel A. Probability of Doctor Visits		
	With Chronic Conditions	Without Chronic Conditions
Born before birthdate cut-off	0.000920	0.0153**
	(0.00160)	(0.00660)
No. of observations	4869	25732
R-square	0.005	0.018
Panel B. Monthly Healthcare Spending		
Born before birthdate cut-off	43.26	0.342
	(44.03)	(8.804)
No. of observations	4869	25732
R-square	0.016	0.008

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

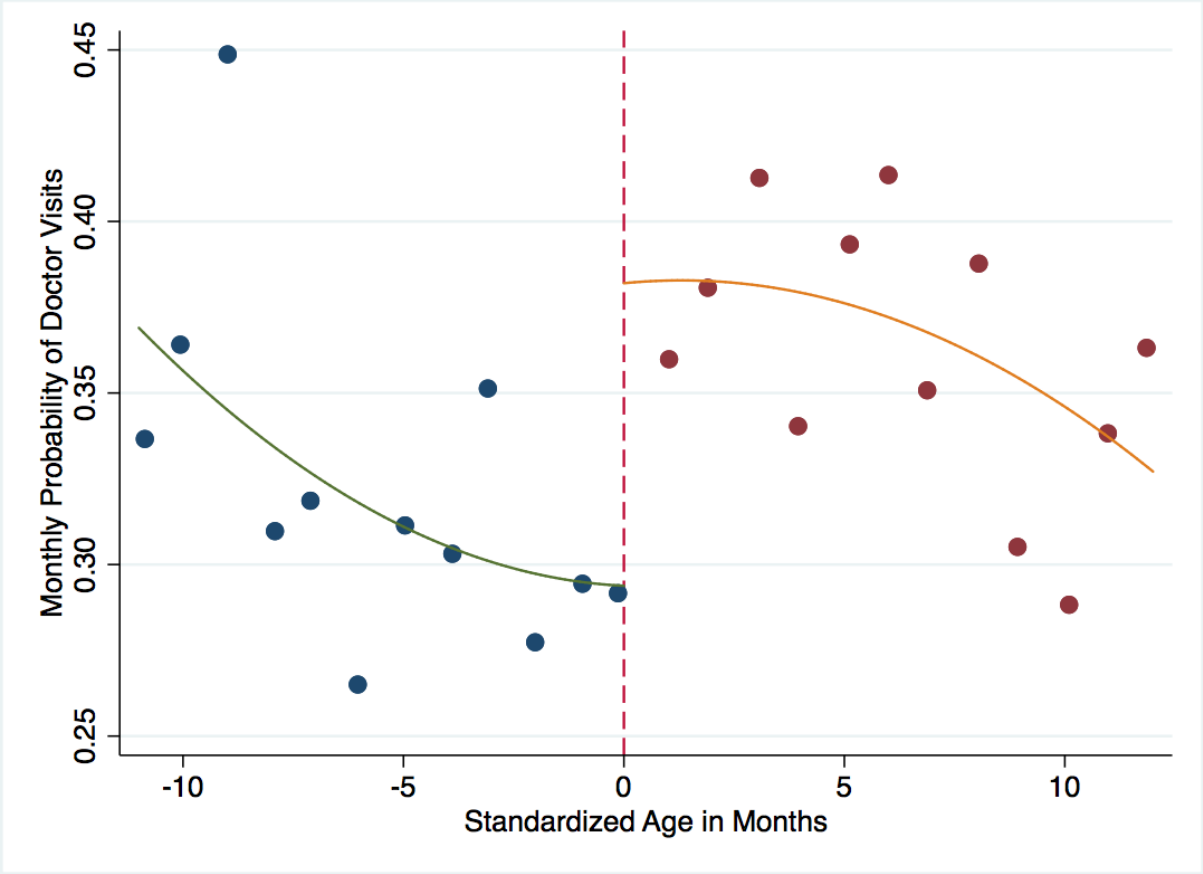
Table 11. Effects of Medisave Top-ups on Healthcare Spending based on Chronic Conditions

Panel A. Monthly Spending on Prescribed Medication		
	With Chronic Conditions	Without Chronic Conditions
Born before birthdate cut-off	1.665	2.141
	(6.056)	(1.361)
No. of observations	4815	25327
R-square	0.056	0.014
Panel B. Monthly Spending on Non-prescribed Medication		
Born before birthdate cut-off	-6.902*	-1.039
	(3.698)	(1.052)
No. of observations	4810	25331
R-square	0.022	0.013
Panel C. Monthly Spending on Outpatient Services		
Born before birthdate cut-off	8.243	-4.021*
	(8.028)	(2.349)
No. of observations	4808	25338
R-square	0.038	0.021
Panel D. Monthly Spending on Inpatient Services		
Born before birthdate cut-off	35.93	4.415
	(40.63)	(7.780)
No. of observations	4798	25313
R-square	0.004	0.001

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

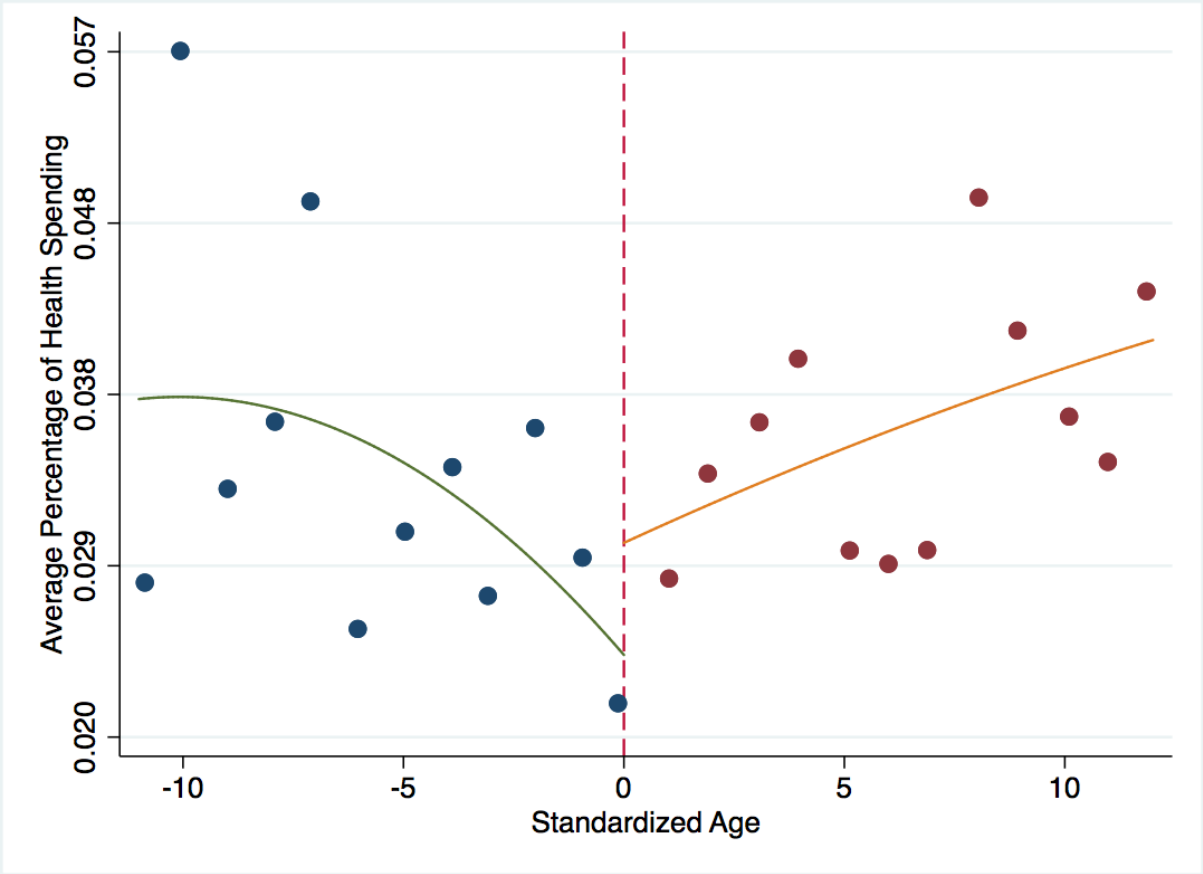
Figures

Figure 1. Effects of Medisave Top-ups on Probability of Doctor Visits



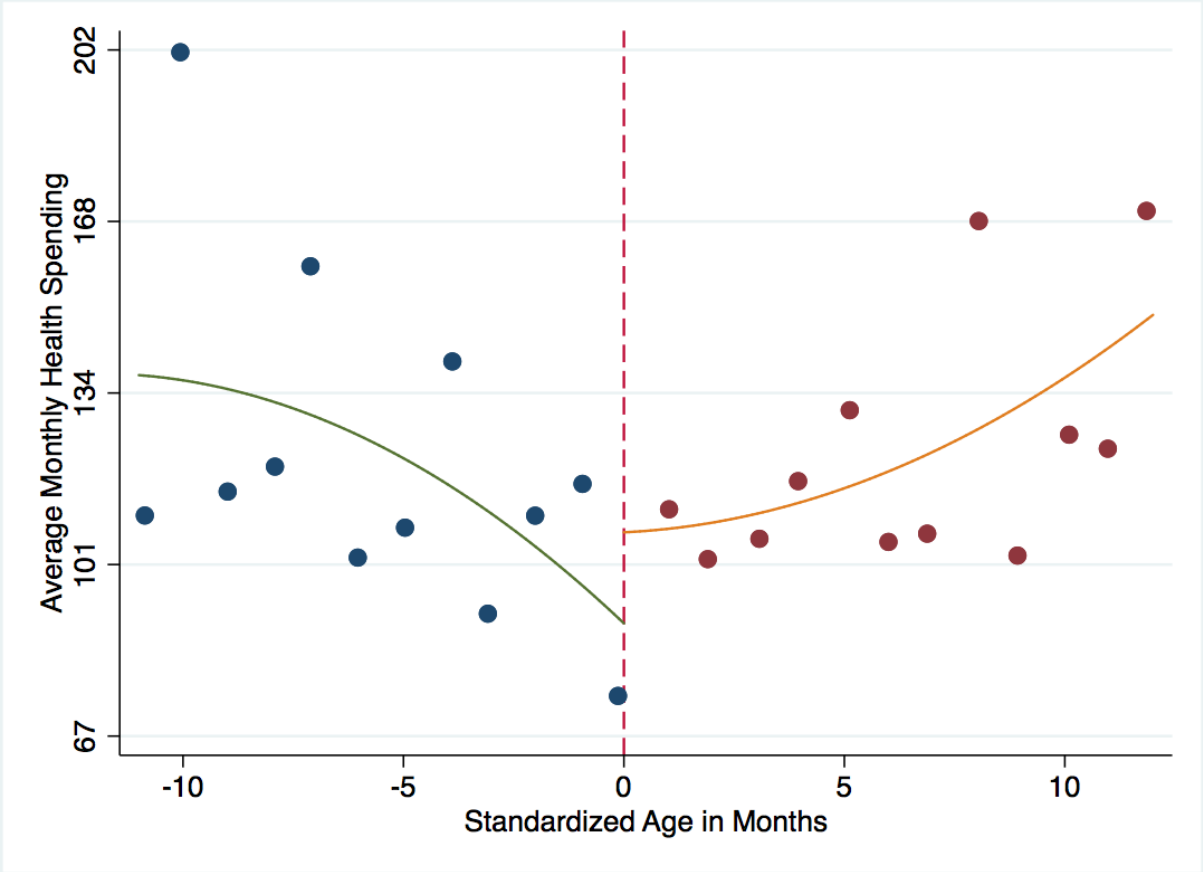
Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average probability of having a doctor visit in the survey month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Figure 2. Effects of Medisave Top-ups on Monthly Health Spending



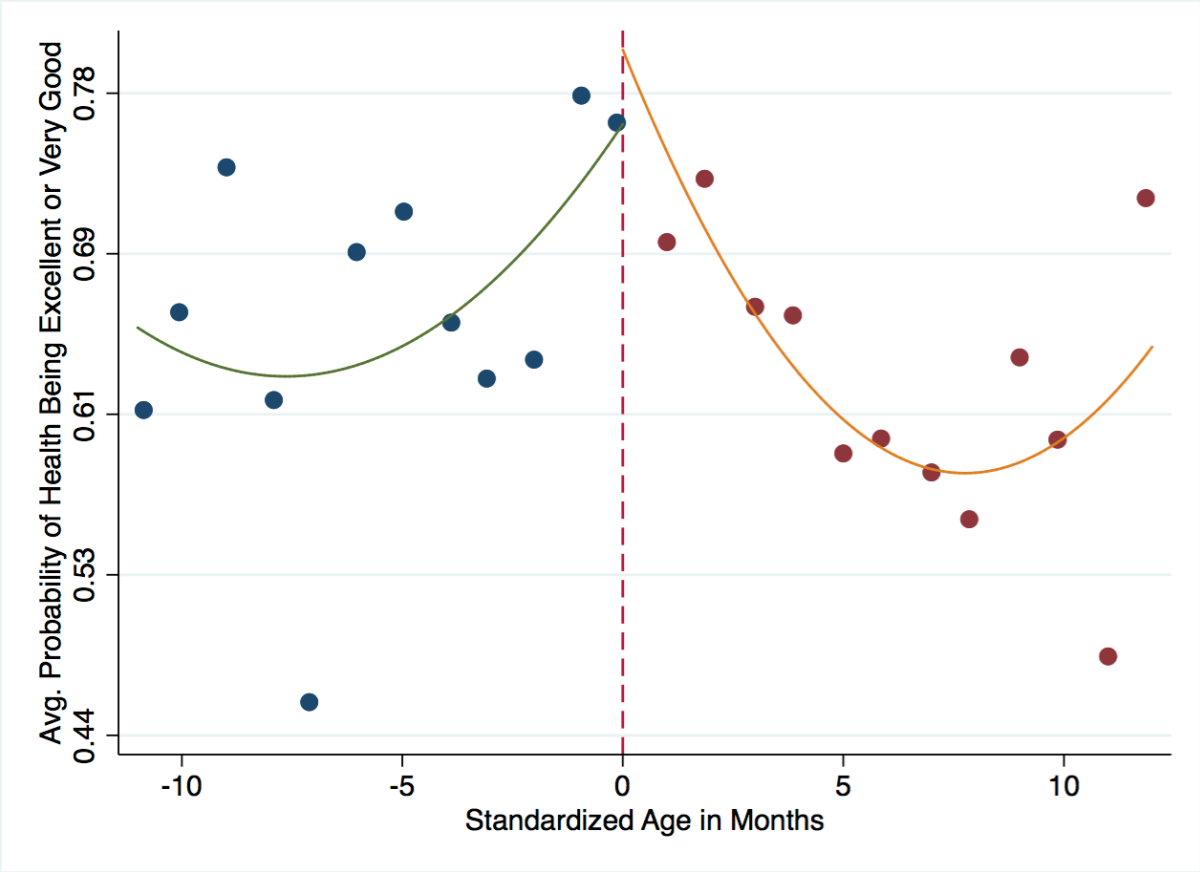
Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average spending on health in a survey month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Figure 3. Effects of Medisave Top-ups on Percentage of Health Spending in Total Household Consumption



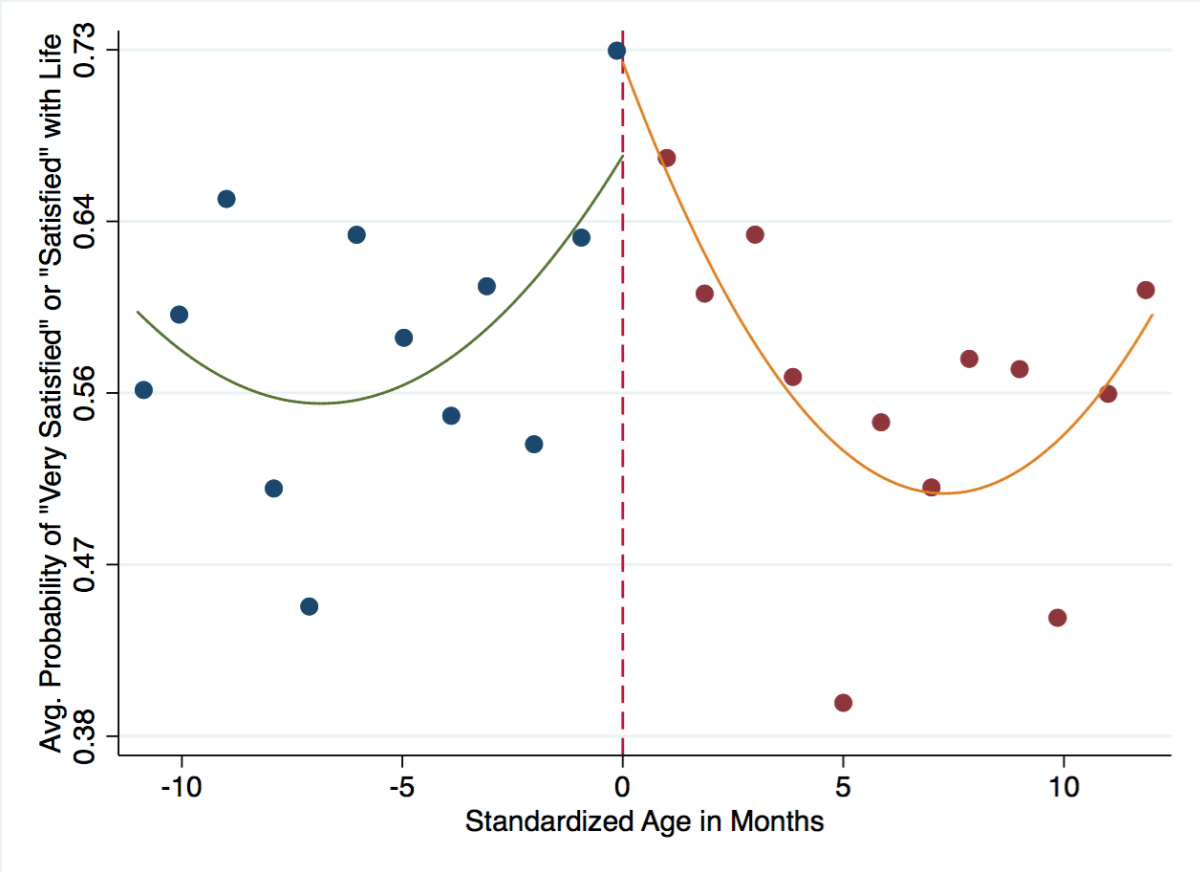
Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average percentage of health spending in total household consumption in the survey month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Figure 4. Effects of Medisave Top-ups on Self-rated Health Being Excellent or Very Good



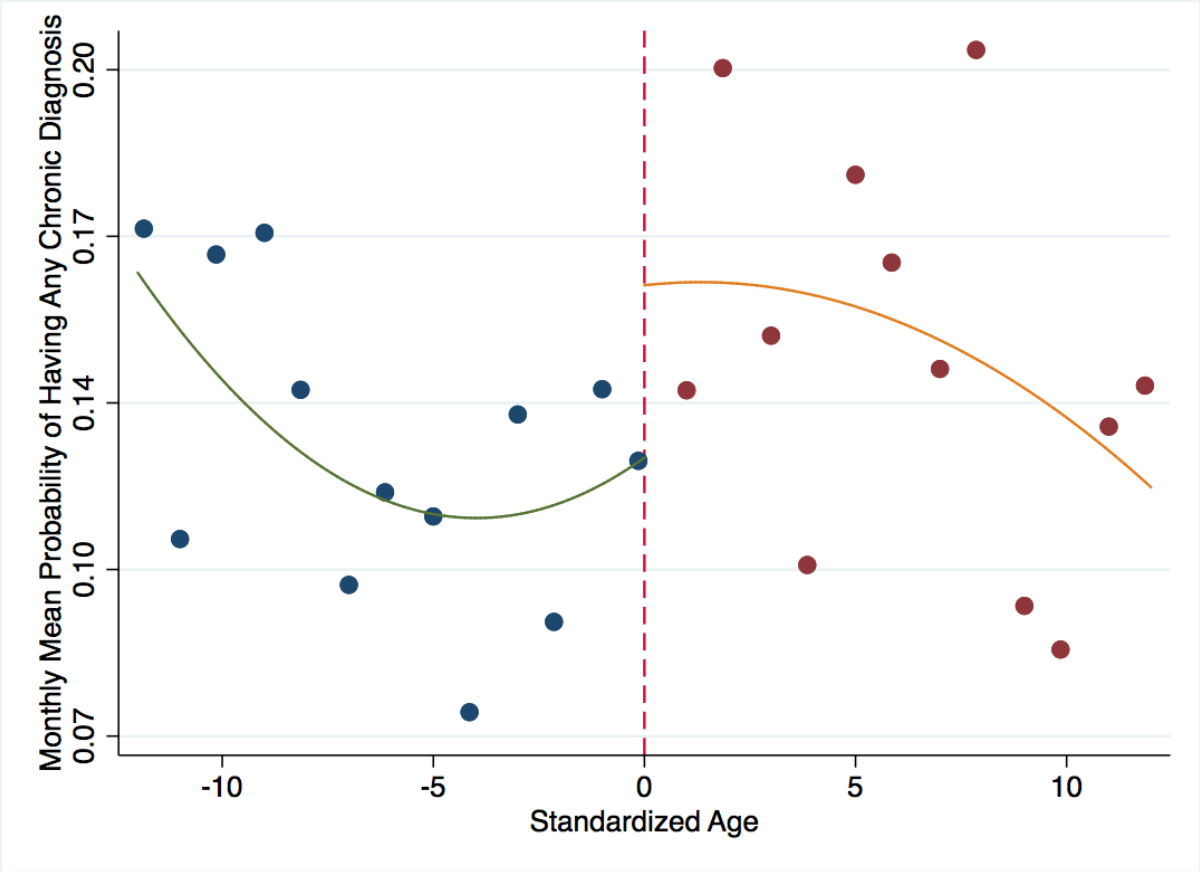
Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average probability of self-rated health being excellent or very good in that month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Figure 5. Effects of Medisave Top-ups on Life Satisfaction Being Very Satisfied or Satisfied



Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average probability of self-rated life satisfaction being very satisfied or satisfied in that month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Figure 6. Effects of Medisave Top-ups on Probability of Having Any Chronic Condition Diagnosis in A Survey Month



Note: I pool monthly data from October 2015 to July 2018 from the SLP. The markers represent the average probability of having any diagnosed chronic conditions in that month. The lines represent fitted regressions from models that assume a quadratic birthdate profile. Age is standardized at December 31, 1959. Positive values represent the number of months by which individuals were born before the cut-off and negative values represent the number of months after.

Appendix

Appendix Table 1. Marital Status and Spouse Records in the SLP

Status	N
Single and has no spousal information in SLP	2,729
Married but has one item of spousal information in SLP	7,203
Married and has both items of spousal information in SLP	2,114
Single but has spousal information in SLP	50

Appendix Table 2. Regression Results for Number of Waves in which a Respondent Participated

	Number of waves in which a respondent participated
Age	0.087
	(0.056)
Gender	0.009
	(0.076)
Married	-0.14
	(0.096)
Malay	-0.167***
	(0.142)
Indian	-1.395***
	(0.168)
Secondary education	1.732***
	(0.109)
Post-secondary education	2.46***
	(0.112)
No. of observations	31,885
R-square	0.094

Note: The regressions control for wave fixed effects.

Appendix Table 3. Regression Results for Confounding Variables

	No. of living children	Chinese ethnicity	Malay ethnicity	Indian ethnicity	Father still alive	Mother still alive
Born before birthdate cut-off	0.057	-0.019	0.0414	0.0038	0.076	-0.103*
	(0.085)	(0.054)	(0.035)	(0.025)	(0.054)	(0.051)
No. of observations	1502	1503	1503	1503	1501	1502
R-square	0.004	0.017	0.005	0.031	0.006	0.004

Note: The regressions control for wave fixed effects, date of birth, its square and cubic, marital status, race, and education. Standard errors are clustered at age in months.

Appendix Table 4. Program Effects based on a Different Birthdate Cut-off

Panel A. Healthcare Utilization

	Probability of doctor visits	Monthly healthcare spending
	Cut-off: 1957	
Born before birthdate cut-off	0.0396***	-24.00***
	(0.00677)	(8.984)
No. of observations	28171	28171
R-square	0.015	0.006

Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

Panel B. Health

Birthdate Cut-off: 1957				
	Self-rated health is excellent or very good	Life satisfaction is very satisfying or satisfying	Number of chronic conditions	Probability of having any chronic condition diagnosis
Born before birthdate cut-off	-0.0375	0.0171	-0.00626	0.024
	(0.0376)	(0.0424)	(0.113)	(0.020)
No. of observations	29232	29237	9742	29273
R-square	0.026	0.035	0.057	0.012

Note: The regressions control for wave fixed effects, date of birth, its square and cubic, marital status, race, and education. Standard errors are clustered at age in months.

Appendix Table 5. Program Effects on Healthcare Utilization based on Different Bandwidth

Bandwidth	**6 months**	**18 months**	**24 months**	**36 months**
Probability of Doctor Visits				
Born before birthdate cut-off	0.0471***	0.0421***	0.0476***	0.0411***
	(0.00873)	(0.00608)	(0.00567)	(0.00518)
No. of observations	15400	43321	56416	81651
R-square	0.023	0.018	0.016	0.014
Healthcare Spending				
Born before birthdate cut-off	10.83	3.684	4.669	-5.024
	(10.81)	(8.416)	(7.359)	(7.002)
No. of observations	15400	43321	56416	81651
R-square	0.011	0.008	0.008	0.008

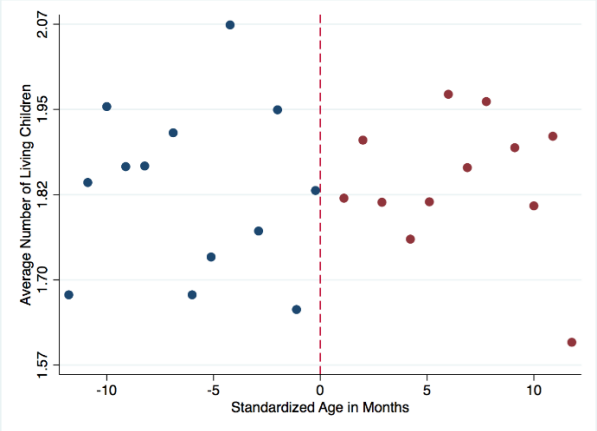
Note: The regressions control for date of birth, its square and cubic, marital status, race, education of the household member with most financial knowledge, and wave fixed effects. Robust standard errors are reported in parentheses. * p-value < 10%, ** p-value < 5%, *** p-value < 1%.

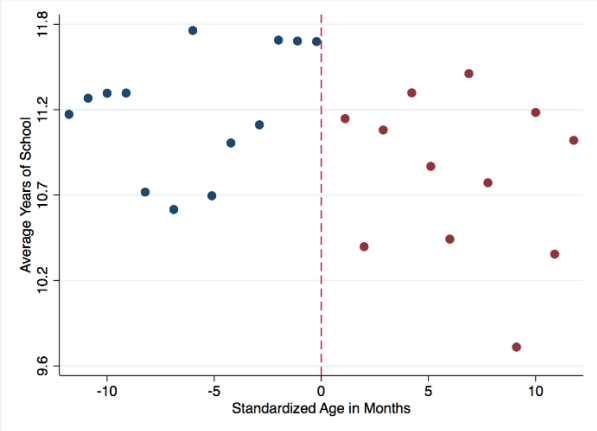
Appendix Table 6. Program Effects on Health based on Different Bandwidth

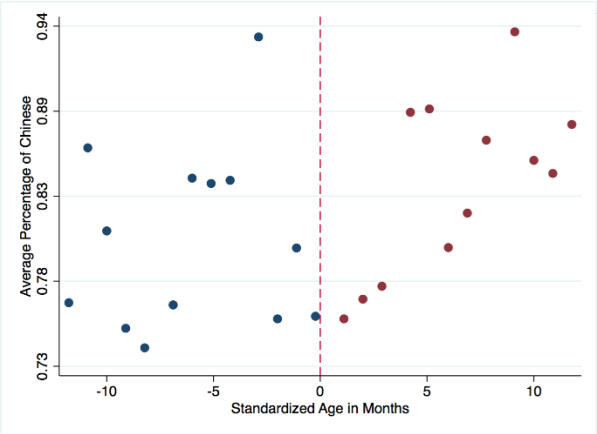
Bandwidth	**6 months**	**18 months**	**24 months**	**36 months**
Self-assessed Health				
Born before birthdate cut-off	-0.0107	-0.0628	-0.0750*	-0.0516
	(0.0770)	(0.0521)	(0.0419)	(0.0342)
No. of observations	15815	45355	59506	87735
R-square	0.017	0.011	0.012	0.012
Life Satisfaction				
Born before birthdate cut-off	-0.0292	-0.0620	-0.0676*	-0.0621**
	(0.0730)	(0.0503)	(0.0385)	(0.0307)
No. of observations	15823	45369	59533	87769
R-square	0.038	0.029	0.030	0.029
Number of Chronic Conditions				
Born before birthdate cut-off	0.215	0.188*	0.146*	0.127*
	(0.148)	(0.103)	(0.0798)	(0.0665)
No. of observations	4828	14582	19321	28355
R-square	0.041	0.040	0.044	0.043
Probability of Having Any Chronic Condition				
Born before birthdate cut-off	0.053	0.055**	0.050***	0.034**
	(0.031)	(0.021)	(0.016)	(0.014)
No. of observations	16331	46845	61481	90641
R-square	0.012	0.012	0.011	0.010

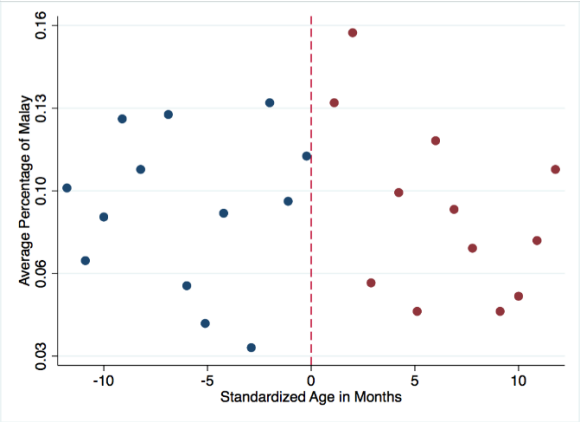
Note: The regressions control for wave fixed effects, date of birth, its square and cubic, marital status, race, and education. Standard errors are clustered at age in months.

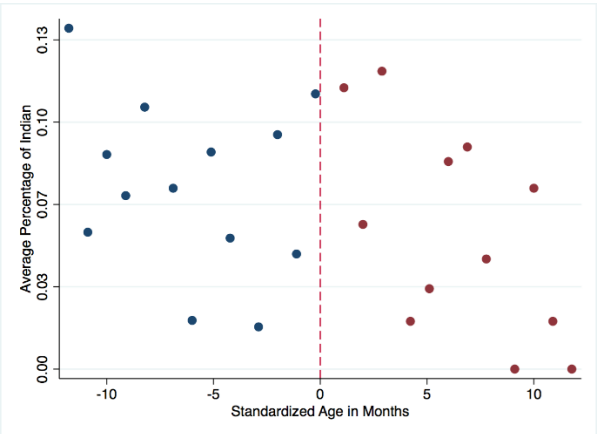
Appendix Figure 1

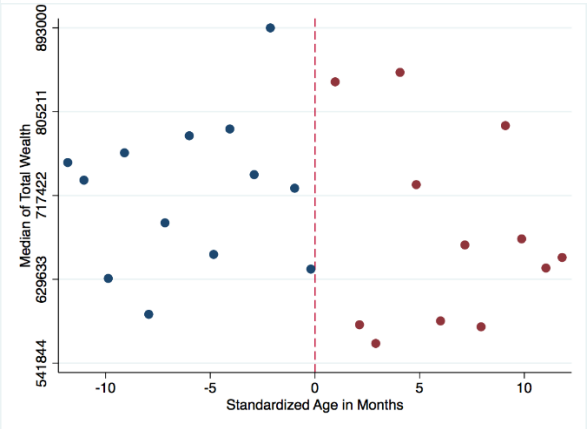












Appendix Figure 2