Age of Decision: Pension Savings Withdrawal and Consumption and Debt Response*

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Abstract

This paper exploits an administrative regulation in Singapore that allows individuals to withdraw between 10 to 30 percent of their pension savings at age 55. We find a large and highly significant increase in individuals' bank account balances within the first month of turning 55, which declines by about a third by the end of twelve months. Consumers use the increase in disposable income to pay down credit card debt. Liquidity constrained individuals are significantly more likely to increase their spending upon turning 55 than unconstrained individuals – nonetheless, the spending response of constrained individuals is concentrated on non-durable and non-visible goods, rather than visible goods. We also provide evidence that withdrawal behavior is responsive to the prices of durable goods such as cars. Consumers appear willing to forego much higher interest rates in their retirement accounts by leaving a sizeable portion of their withdrawn savings in a low-interest accruing bank account for at least a year after withdrawal. We show that, for some consumers, part of this behavior may be due to the desire to invest in the property market when housing returns are high.

Keywords: Aging, Pension Savings, Consumption, Spending, Debt, Credit Cards, Household Finance, Banks, Loans, Durable Goods, Discretionary Spending, Liquidity Constraints, Credit Constraints

JEL Classification: D12, D14, D91, E21, E51, E62, G21, H31, J26

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1. Introduction

The existing literature on life-cycle consumption and saving suggests that households save significantly for retirement from their early forties (Gourinchas and Parker, 2002). Countries rely on pension savings to meet individuals' retirement needs.[1] Moreover, with the sole exception of the United States, major developed countries in the world have made their defined-contribution pension system overwhelmingly illiquid before age 55 (Beshears et al., 2015). A key question arises as to whether individuals should be allowed flexible access to pension savings. On one hand, easier access has the benefit of allowing households to use pension savings to buffer against negative shocks (Argento, Bryant, and Sabelhaus, 2015). The flexibility associated with easier access may make pension savings more attractive, generating more savings overall and higher retirement income. On the other hand, there is concern that access to one's pension savings can result in excessive present consumption at the expense of future retirement security (Beshears et al., 2008). The question becomes more pertinent as countries are discussing or implementing early access options. For example, the UK government announced in the 2014 Budget a nationwide policy change that allows near-retirees (i.e., those reaching age 55) a more flexible early access to the defined contribution pension.[2]

Despite the importance of this issue for policy formulation, the evidence remains limited on the effects of early access to pension savings, as can be illustrated in the call-for-evidence by the UK Treasury in December 2010,

"…Early access to pension savings is one such option. It could encourage more pension savings, or provide flexibility for individuals facing financial hardship. It could give more choice during the accumulation of pension savings, and so complement the reforms to remove unnecessary restrictions on accessing retirement savings in later life. However, early access also poses potential risks to retirement outcomes, and evidence on the likely impact of early access is currently limited…."

A number of studies theoretically and empirically explore the determinants of early access to pension savings in the U.S. context. Almost half of the eligible households have used 401(k) loans to withdraw their pension savings to potentially fund current consumption (Beshears et al., 2011). Others have documented withdrawal from pension savings upon job separation (e.g., Amromin and Smith, 2003; Hurd and Panis, 2006). In addition, the empirical evidence suggests that demographics (Beshears et al., 2011), liquidity constraints (Amromin and Smith, 2003; Lu et al., 2014), and economic and demographic shocks (Argento, Bryant, and Sabelhaus, 2015; Armour, Hurd, and Rohwedder, 2015) are important determinants

[1] For example, see Whitehouse (2007) for an in-depth comparison of retirement-income systems across countries.
[2] In general, individuals from 55 and over will have more flexibility over how much they can access their pension savings (e.g., in the size and the tax rate of the withdrawal). Details can be found in the following link: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301563/Pensions_fact_sheet_v8.pdf.

of the withdrawal decision. A relatively large literature has also examined what consumers do with pre-retirement pension withdrawals, with mixed findings. For example, Basset, Fleming, and Rodrigues (1998) find that nearly half of workers who had a pension plan report taking a lump-sum distribution from the plan before retirement age, and about 46% of the dollars withdrawn are used for non-retirement savings purposes. In contrast, analyzing data from the 1992-2000 Health and Retirement Survey, Hurd and Panis (2006) document that over 75% of cashed-out funds were either invested or used to pay off debt, and the vast majority was preserved for retirement income security.

While these studies provide important descriptive evidence on the financial behavior of consumers given the existing U.S. pension system, they are not able to address the causal question of how consumers would respond if they were allowed unrestricted early access to their pension funds. For example, 401(k) loans are not offered to everyone or to randomly selected individuals. Moreover, existing studies cannot shed light on what consumers actually do with the withdrawal funds due to data limitations. To assess the effect of early pension savings access on consumer behavior, the ideal quasi-experiment would involve examining the financial and consumption decisions of individuals who, for exogenous reasons, had access to their pension savings.

In this paper, we exploit an administrative regulation in Singapore that allows us to approximate this ideal experiment. Specifically, in Singapore, individuals are allowed to cash out a fraction of their pension savings on the day that they turn 55. Prior to turning 55, individuals have more limited access to their retirement savings. This implies that the ability to access retirement funds increases discretely in the month that an individual turns 55. We use this natural experiment to address a number of issues that are important for understanding how aging consumers make financial decisions: First, do consumers take advantage of the early access option and withdraw from their pension savings? Second, how does it affect the consumption and savings decision of these consumers? Lastly, what motivates the withdrawal decisions of these aging consumers?

Singaporeans and permanent residents contribute to the Central Provident Fund (CPF), a compulsory savings plan that can be used to fund an individual's retirement, healthcare, and housing needs. Employees contribute 20 percent of their gross monthly salary while employers contribute an additional 16 percent of the employee's salary to the fund (subject to a cap).[3] It is important to note that while the total contribution rate seems quite high, 15-25% of the CPF contributions are credited to a retirement-exclusive account (a portion of which that can only be withdrawn at age 55), while the remaining can be

[3] The employer contribution is subject to a monthly cap of SG$1,000 in dollar contribution. These CPF are for prime-age employees (50 years or less). The CPF contribution rates differ slightly for older workers. The details regarding the CPF can be found in the Appendix (Table A3).

used at any point in time for housing purchases and mortgage payments, eligible education and medical expenses, insurance purchases, and approved investments. Since individuals can use the non-retirement portion of their CPF savings at any point in time, we interpret the administrative regulation at age 55 as essentially allowing individuals to tap into the portion of the CPF contributions that have been specifically earmarked for retirement purposes.[4]

During our sample period from April 2010 to March 2012, individuals were entitled to withdraw 10 percent to 30 percent of their CPF cash balance upon reaching age 55.[5] CPF withdrawals are not subject to tax or other costs. The remaining CPF balances are disbursed to individuals monthly on reaching age 65. While we do not have access to CPF data on how much individuals are eligible to withdraw at age 55, we can estimate the amount that various groups of consumers are eligible to withdraw based on aggregate statistics reported by the CPF. Specifically, the CPF reported that among those aged 45 to 54 in 2010, the median CPF balance was $45,000,[6] indicating that the median consumer could withdraw about $13,500 at age 55. The 25th percentile could withdraw approximately $2,700 and the 75th percentile could withdraw $30,000.[7]

Our paper seeks to provide direct evidence on pension savings access and subsequent consumption behavior. We utilize a unique panel dataset of monthly individual-level financial data to study how consumption and debt responds when consumers gain access to their pension savings. The richness of the administrative data enables us to examine the response in bank account balances (a proxy for the withdrawal decision and amount), credit card spending, debit card spending, as well as the change in credit card debt, using a large representative sample of consumers. Furthermore, we can directly study whether there are salient dynamics in the consumption and debt responses in the months before and after an individual is eligible to withdraw a portion of their pension savings.

Consumer credit plays an important role in Singapore. Moreover, debit and credit cards are important mediums of disposable consumption in Singapore, with approximately 30 percent of aggregate personal consumption in the country being purchased via credit and debit cards (Agarwal and Qian, 2014).[8] Given our interest in the consumption and debt dynamics of households resulting from pension savings access,

[4] Additional details on the CPF scheme are provided in Section 2 and in the Appendix.
[5] The proportion of CPF balances that could be withdrawn at age 55 decreased from 30% in 2010 to 20% in 2011 and 10% in 2012.
[6] CPF Trends, June 2011: https://www.cpf.gov.sg/Assets/members/Documents/CPFTrendsNetCPFBalances.pdf
[7] The exchange rate was about 1 Singapore dollar to 0.78 USD during our sample period.
[8] The remaining 70 percent of consumption is transacted via checks, direct transfers, and cash. Consumers with recurring payments like mortgages payment, rent payments, and auto loans payments use instruments such as checks and direct deposit.

we are particularly interested in credit and debit card usage as these represent an important source of unsecured credit for most households (Japelli, Pischke and Souleles, 1998).

Our analysis is based on an event-study design that exploits the sharp differences in the access to pension savings caused by the age-55 withdrawal rule. In other words, we use the age 55 threshold as the exogenous event and observe the impulse response of bank account balances, credit card spending, debit card spending, and debt. The key identifying assumption is that all observed and unobserved determinants of consumption and savings decisions other than pension savings access trend smoothly across the age-55 threshold. One potential confounding feature, which we will discuss in greater detail in Section 5, is that employer CPF contribution rates change at several age cut-offs (including age 55). We provide several robustness checks to address these concerns. First, we show that there is virtually no change in individuals' bank account balances in the 3 to 6 months prior to turning 55, suggesting that the pre-treatment trend assumptions are satisfied. Second, we present falsification tests using similarly aged foreigners who are ineligible for pension funds, and Singaporeans at the age-50 threshold who are subject to similar CPF policy changes in their birth-month, but are not entitled to access their pension funds. We also show that taking into account of the change in disposable income due to the change in CPF contribution rates does not affect our results both qualitatively and quantitatively.

We find that, on average, as individuals became eligible to cash out a fraction of their retirement savings, their bank account balances rose by over $15,000 (approximately 2.5 times that of average monthly income in our sample, and 32% of their pre-55 bank account balance) one month after they turned 55. Cumulative credit and debit card spending rose by over $650 during the twelve months after consumers turned 55 while credit card debt declined by close to $200. On average, the increase in bank account balances reduced by about one third after twelve months, with the balance remaining significantly higher (about $10,000) at the end of our sample period. Consistent with the idea that part of the consumption response is likely to occur through cash spending which we are unable to directly observe in the data, we find a 4.5% average monthly increase in the number of cash and check transactions in the twelve months after turning 55.

We find heterogeneity in the consumption response across individuals. Low-income and low-liquidity (as proxied by pre-period bank balance scaled by income) consumers appear to have a much larger spending response relative to higher-income and higher-liquidity consumers. For example, low-liquidity consumers withdraw, on average, about $18,000 (322% of their pre-55 account balance) from their pension savings one month after turning 55 and their bank account balances decline by about 50% of the initial increase after twelve months. Approximately 30% ($2,500) of this decline can be accounted for by an increase in

credit and debit card spending, while an additional 4% was used to reduce credit card debt. Low-liquidity consumers also significantly increase the number of cash and check transactions post-55. We observe similar responses among low-income individuals.

To shed some light on whether the increase in spending, particularly among low-liquidity consumers, is due to credit constraints or discretionary spending, we utilize detailed information on credit card spending to examine whether the consumption response varies systematically across spending categories such as durable vs. non-durable goods and visible vs. non-visible goods. Consistent with the idea that credit constraints may be driving part of the consumption response to pension funds access, we observe that the increase in spending post-55 is more pronounced for non-durable and non-visible goods, relative to spending on visible goods. This is especially true for liquidity-constrained individuals. Moreover, constrained consumers disproportionately increase their spending on non-durable and non-visible goods, relative to less-constrained consumers. We also provide some evidence that the CPF withdrawal decision also appears responsive to the price of non-luxury car ownership, which suggests that consumers may be using part of their pension saving to alleviate credit constraints in consuming durable goods such as cars.[9]

Even though consumers have flexibility on the withdrawal timing and the withdrawal process is fast and efficient; consumers, on average, withdraw a sizeable amount of their retirement savings immediately, and appear willing to forego much higher interest rates in their retirement accounts by leaving a non-trivial portion of their withdrawn savings ($10,000) in a low-interest accruing bank account for at least a year after withdrawal. We show that part of this cash-holding behavior may be explained by the availability of market investment opportunities – specifically, consumers withdraw a significantly higher amount in periods of high-housing price growth (i.e. when the observed housing price return exceeds the interest rate offered by the government retirement savings account).

Overall, our results suggest that consumers' response to early pension savings access is largely consistent with a rational response to liquidity constraints as well as market investment opportunities. We find limited evidence that consumers in our sample react to early pension savings access by increasing discretionary spending. A sub-group of consumers, in particular those with high-income and high liquidity, appear to respond to the early access option in a sub-optimal way by choosing to forego a much higher interest rate on their retirement savings account. For this group of consumers, early access to pension savings may result in sub-optimal saving decisions. While restricting access to pension savings may help reduce the behavioral "mistakes" of the latter group of consumers and, this has to be balanced

[9] As credit cards cannot be used for car purchases in Singapore, this aspect of durable spending cannot be captured in the credit card data.

against the potential for early access to enable low-liquidity and low-income households to ease their financial constraints and greater flexibility for consumers pursue alternative market investment opportunities.

An important limitation of our study is that it focuses on the financial decisions of older individuals. We are not able to present evidence on the effects of access to pension savings on the consumption and saving responses of younger individuals, which would be needed for a complete assessment of the implications of easier access to pension savings. Nonetheless, our estimates for this margin of behavior are a relevant input for the set of policies currently being discussed by policy-makers, such as shifting (partial) access to pension funds to slightly earlier in the lifecycle.

The rest of the paper proceeds as follows. The next section discusses the institutional details of the Central Provident Fund and retirement savings in Singapore. Sections 3 and 4 describe the data and the empirical strategy. The results are presented in Section 5 and Section 6 concludes.

2. The Central Provident Fund and Retirement Savings in Singapore

The Central Provident Fund is a comprehensive pension savings system in Singapore that covers retirement, healthcare, home-ownership, family protection and asset enhancement. All working Singaporeans and their employers are obliged to make monthly contributions to the CPF that go into three accounts. The Ordinary Account (OA) can be used for housing, insurance, investment, and education, the Special Account (SA) can be used for investment in retirement-related financial products and the Medisave account can be used for hospitalization and approved medical insurance. Individuals can apply to use the funds in their Ordinary and Medisave accounts to fund housing purchases and medical expenses throughout their lifecycle. The SA is exclusively for retirement purposes and typically cannot be withdrawn until age 55. The intention is that the funds in the SA will be sufficient to cover an individual's retirement needs.

The exact CPF contribution rates for employees and employers differ by age and over time, but in general, for prime-age working individuals, the employee contribution rate is 20 percent of their gross monthly salary and the employer contribution is approximately 15 percent.[10] The share of CPF contributions allocated to each account also changes over the life cycle of a working individual, in line with their changing needs over time. Approximately 15-25 percent of the CPF contribution is credited to the SA for retirement purposes. For the remaining CPF contributions, individuals have some flexibility in

[10] Employers and employees do not need to pay CPF on income beyond the Ordinary Wage (OW) cap. During our sample period, the monthly income cap was $4,500 until 31 Aug 2011 and $5,000 from 1 Sept 2011 to 31 Aug 2012.

the use of funds on eligible expenses on education, medical care, and home mortgages. The CPF contribution and rates of allocation to the various accounts in 2010 are detailed in the Appendix.

Upon reaching 55, individuals are entitled to withdraw a portion of their CPF savings for unrestricted use based on their available CPF balances.[11] Part of the remaining CPF balances are used to form a new Retirement Account (RA), and collectively all un-withdrawn CPF accounts typically earn 2.5 percent to 4 percent guaranteed interest per annum (since 1999).[12] Until December 31, 2008, individuals were allowed to withdraw 50 percent of their available CPF balances. At the National Day Rally in 2003, it was announced that the government was planning to gradually phase out the 50 percent withdrawal rule. With rising retirement ages, the government wanted to ensure that CPF savings were not depleted prior to when individuals actually retired. To allow CPF members sufficient time to adjust to the new changes, these changes were phased in gradually. Starting in from 2009, the amount that could be withdrawn at 55 was reduced gradually by 10 percent each year.[13] Since the changes in withdrawal rates were announced well before they were implemented, it seems reasonable to assume that these changes were fully anticipated.

The CPF board typically sends individuals an advance withdrawal invitation with details on the withdrawal procedure about two months before their 55th birthday. Upon application, the processing time ranges from two to ten working days, and the receipt of the withdrawal is through direct transfer to the designated bank account of the member. CPF withdrawals are not subject to income tax. Individuals who do not withdraw their full entitlement in their 55th birth year are eligible to withdraw the remainder of their eligible sum yearly, on or after their birthday each year. The remaining CPF balances are disbursed to individuals monthly on reaching age 65 (drawdown age). More details on the CPF and the withdrawal rules can be found in the Appendix.[14]

[11] The withdrawal rule at age 55 is partly historical – when the CPF system began in 1955, members were allowed to withdraw a lump sum at age 55, which was then the retirement age in most private companies. With rising retirement ages, the government introduced the Minimum Sum (MS) and 50% withdrawal rule starting in 1987. The MS would provide post-retirement payments to the individual. The idea was to safeguard retirement savings to ensure they were not exhausted before an individual actually retires. More details on the CPF policy can be found in Tan (2004). Technically, the withdrawal of the CPF cash balances is also dependent on whether an individual has met the Minimum Sum (MS). The MS applicable during our sample period can be found here: http://mycpf.cpf.gov.sg/CPF/my-Cpf/reach-55/Reach55-2.htm. Note in 2010-2012 (our sample period), if an individual has CPF cash balances in excess of the minimum sum, they are entitled to withdraw all funds in excess of the MS. Individuals with total cash balances less than the minimum sum can still withdraw 10-30% of the available cash balance.

[12] The Ordinary Account currently pays interest of 2.5% per annum while the Special Account, Medisave Account and Retirement Account pay interest of 4% per annum. More details on the interest rates across different CPF accounts can be found in the Appendix.

[13] Tan (2004) provides a concise summary of the historical role of the CPF and the major changes initiated in 2003.

[14] There are also a number of studies that look at the CPF account structure in Singapore and the associated investment implications (Koh, Mitchell, Tanuwidjaja, and Fong, 2007; Koh, Mitchell, and Fong, 2008, 2011; Koh and Mitchell, 2010).

3. Data

We use a unique proprietary dataset obtained from Singapore's leading bank, which has more than four million customers, or 80 percent of the entire population of Singapore. The entire data set contains consumer financial transactions of more than 180,000 individuals, which is a random, representative sample of the bank's customers, for a 24-month period between April 2010 and March 2012. For individuals in our sample, we have monthly statement information about each of their bank accounts, credit cards and debit cards with the bank. The information includes the bank account balance, total debit and credit amount (for bank accounts), spending (for credit and debit cards), and credit limit, payments and debt (for credit cards).[15] The data also contain disaggregated transaction-level information about the individual's credit card and debit card spending, including the transaction amount, transaction date, merchant name, and merchant category. The data also contain a rich set of demographics about each individual, including age, gender, income, property type (public or private housing), property address, postal code, nationality, ethnicity, and occupation.[16] This will allow us to examine heterogeneity in consumers' consumption upon reaching the withdrawal age.

This data set offers several advantages relative to traditional household spending data sets such as the Survey of Consumer Finance (SCF) or Consumer Expenditure Survey (CEX). Our sample is larger with little measurement error, and allows high frequency analysis. Compared to existing studies that use micro-level credit card data (e.g. Gross and Souleles 2002, Agarwal et al. 2007, Aaronson et al. 2012), this data set has more complete information on the consumption of each individual in the sample. For example, rather than observing a single credit card account, we have information on every credit card, debit card, and bank account that each individual has with the bank. Moreover, key demographic information (e.g., age, income, nationality) is verified by the bank, as opposed to being self-reported. Nonetheless, there are two important limitations of our data. First, we do not observe cash withdrawals, non-card payments, and

[15] The specific banking products that we study (credit card, debit card, and bank checking account) are similar to those used in the United States. Consumers are typically eligible to obtain a bank checking account, and they can conduct banking transactions using branches, Automatic Teller Machines (for cash withdrawals, transfers, or bill payment), checks, or online methods. The typical banking fees and other costs are quite standard, similar to those of a typical US bank, and moreover they are comparable with banking costs at other major banks in Singapore. Debit cards are linked to the bank account, and debit card transactions are drawn on the bank account balance. Similarly, credit cards are granted upon application to consumers who have met the bank's criteria (e.g., income, age, and credit profile). One interesting difference for credit cards is that all credit card holders with the bank have the same prevailing interest rate of 24% per annum, regardless of the credit card limit. The other important observation is that savings in bank accounts in Singapore typically accrue at close to zero interest rates. For example, various types of accounts in our bank have a maximum of 0.1% annual interest rate, and thus we aggregate the balance across all bank accounts for the same individual.

[16] Unlike the United States, where a zip code represents a wide area with a large population, a postal code in Singapore represents a building. A unique postal code is assigned to a single house or a building with 10 apartment units.

transfers to other accounts (e.g. investment accounts). Therefore, our estimates of the direct consumption response are likely to be smaller than if we had information on consumer's cash spending and non-card payments. The second limitation of our data is that we do not have information about accounts individuals have with other banks in Singapore. Nevertheless, it is likely that the measurement error is quite small given the market share and the representativeness of the bank. For example, an average Singaporean consumer has three credit cards, which is also the number of credit cards an average consumer has in our data set. Hence, we are confident that we observe almost virtually all the consumption through credit and debit cards of these consumers from their spending accounts with this bank.

For our analysis, we restrict the main sample to Singaporeans who turned 55 in the sample time frame. We further exclude dormant/closed accounts that remained inactive (i.e. with no transactions in at least six months in our 24-month sample period). We also restrict the sample to Singaporeans who hold all accounts with this bank (bank account, credit card, and debit card), as these individuals are more likely to have an exclusive relationship with the bank.[17] For these consumers, the withdrawal of retirement savings as well as spending and debt responses can be better identified. With these restrictions, the resulting sample size is 2,654 individuals and 56,957 person-month observations over the sample time period.

We aggregate the data to the individual-month level. Credit card spending is computed by adding monthly spending over all credit card accounts for each individual. Credit card debt is computed as the difference between the current month's credit card payment and the previous month's credit card balance. Debit card spending is computed by adding monthly spending over all debit card accounts for each individual. For the bank account, we define the number of cash & check transactions as the aggregate number of debit (outflow) transactions for each individual every month. The summary statistics for the key demographic and financial variables used in the analysis are reported in Table 1.

[Insert Table 1 about Here]

Figure 1 provides a graphical representation of the means of the main financial and demographic information for individuals in our sample by age (in year-months). In the cross-section of individuals, the average bank account balance in the months before 55 is about $47,000. Figure 1A provides strong suggestive evidence that bank account balances are significantly higher for individuals just over 55 than those just below. Individuals, on average, have $9,500 more in their checking accounts in the month that they turn 55, which further increases by an additional $5,000 one month after turning 55. Figure 1B shows that the average monthly spending in credit and debit cards in the months before age 55 is $1,060.

[17] Our results are robust to alternative sample selection criteria. Results are available upon request.

We observe that spending begins to rise for individuals just prior to turning 55. Spending among individuals older than 55 remains slightly higher than that for individuals younger than 55. Figure 1C shows the patterns of monthly credit card debt by age – monthly credit card debt declines from about $520 to $420 for individuals aged 52.5 years to 54.5 years. Among individuals six months prior to turning 55, we observe a gradual increase in debt, followed by a sharp decline in debt of about $116 among individuals who have just turned 55. Even though these results are simple cross-sectional comparisons of different individuals, the jumps in account balance, spending and debt in the month an individual turns 55 are striking. These patterns are unlikely the result of spurious differences among individuals as we might expect individuals to have similar observable and unobservable characteristics in the months just before and after turning 55. For example, Figures 1D shows that monthly income does not appear to change sharply at age 55.

Overall, the graphical patterns suggest that individuals respond strongly to the withdrawal option, which, in turn, appears to have a small effect on their consumption and debt behavior in the months that follow. These empirical patterns will be examined more rigorously in the sections that follow.

[Insert Figure 1 about here]

4. Empirical Strategy

On the day that they turn 55, individuals in our sample are entitled to withdraw between 10 percent and 30 percent of their CPF cash balances. The withdrawal rates applicable to different individuals in our sample are summarized in the table below:

The day you turn 55	Withdrawal of cash balances
1 Jan – 31 Dec 2010	30%
1 Jan – 31 Dec 2011	20%
1 Jan – 31 Dec 2012	10%

We examine the response of bank account balances, credit and debit card spending and debt to reaching the withdrawal age. Our empirical strategy exploits monthly individual-level data and the fact that the withdrawal age is birthdate-specific. To estimate the average response, we begin by estimating the following model:

$$Y_{i,t} = \delta_t + \alpha_i + \gamma D_{i,(-3m,-1m)} + \beta D_{i,(0m,12m)} + \epsilon_{i,t} \qquad (1)$$

The dependent variable $Y_{i,t}$ represents the dollar amount of the bank account balance, total card spending, debit card and credit card spending and credit card debt held by individual *i* at the end of month *t*. δ_t represents a vector of year-month fixed effects and α_i represents a vector of individual fixed effects. We cluster the standard errors of our estimates at the individual level. $D_{i,(-3m,-1m)}$ is an indicator variable for the one to three months *before* an individual turned 55 and $D_{i,(0m,12m)}$ is an indicator variable for the zero to 12 months *after* an individual turned 55 in our sample. The omitted period includes the fourth and earlier months before individuals turn 55, the benchmark period against which our estimated response is measured.

To analyze the dynamic responses, we estimate the following distributed lag model:

$$Y_{i,t} = \delta_t + \alpha_i + \sum_{s=-3}^{12} \beta_s D_{i,(sm)} + \epsilon_{i,t} \qquad (2)$$

where $D_{i,(sm)}$ is an indicator variable for the each of the months before and after an individual turned 55. For example, $D_{i,(0m)}$ is an indicator variable for the exact month that an individual turned 55, while $D_{i,(-1m)}, D_{i,(-2m)},$ and $D_{i,(-3m)}$ are indicator variables for each of the three months *before* an individual turned 55. Similarly, $D_{i,(1m)}, \dots, D_{i,(12m)}$ refer to each of the 12 months *after* an individual turned 55. As in equation (1), the omitted period is the fourth and earlier months before an individual turns 55.

Our empirical strategy essentially compares the outcomes of individuals before and after they turn 55. Because the withdrawal age is birth-month specific, we can include a full set of year-month fixed effects (δ_t) to control for seasonal variation in consumption expenditures as well as the average of all other concurrent aggregate factors. The individual fixed effects (α_i) control for time-invariant differences in consumption preferences at the individual level.

Following Agarwal et al. (2007) and Agarwal and Qian (2014), the results can be interpreted as an event study. The coefficient β_0 measures the immediate dollar response to reaching the withdrawal age of 55, relative to observations in the fourth and earlier months before turning 55. The post-55 coefficients $\beta_1, \dots, \beta_{12}$ capture the change in each of the twelve months after an individual turns 55, relative to the fourth and earlier months. Similarly, the pre-55 coefficients $\beta_{-3}, \dots, \beta_{-1}$ capture the difference in the outcomes in each of the three months prior to when an individual turns 55, relative to the omitted period, and capture any pre-withdrawal-age trends in bank account balances or anticipatory effects in spending or debt response.

A key test of the validity of our empirical design is that assuming that the exact month in which individuals turn 55 in our sample is approximately random,[18] for bank account balances, the pre-period coefficients, $\beta_{-3}, \ldots, \beta_{-1}$ should be economically and statistically insignificant. In some specifications, we will consider a lead period of up to 6 months. To quantify the impact of pension savings access on spending and debt, we define the *cumulative* coefficients $b_s \equiv \sum_{t=-3}^{s} \beta_t$ that describe the cumulative response in spending (or debt change) after s months, $s \leq 12$. The coefficient b_s captures the cumulative response of spending and debt change from month -3 (i.e. three months before turning 55), thus, the cumulative effect of the spending (or debt change) at month s upon turning 55 is $b_s - b_{-1} (\equiv \sum_{0}^{s} \beta_t), s \geq 0$. For example, if spending rises by $\beta_0 = 100$ in the month that an individual turns 55 and after one month spending rises by $\beta_1 = 90$, then the cumulative spending effect one month after pension access (turning 55) is $b_1 - b_{-1} = 190$. For debit and credit card spending, our test of whether an individual is smoothing consumption would amount to testing whether the b's are significantly different from zero. Significant increases in the cumulative spending in the months just before and after turning 55 would imply that individuals are not smoothing their consumption and are responding to the anticipated increase in liquidity through access to CPF balances. In terms of debt response, if individuals are smoothing consumption, we might expect that in the run-up to the withdrawal age, individuals may start to increase their debt (by borrowing against future expected income) and would systematically decrease their debt as they reach 55 and beyond.

5. Results

5.1 Average Response of Account Balances, Spending and Debt

We begin by examining the average change in account balance, spending and debt as an individual reaches the CPF withdrawal age of 55. Table 2 reports the estimates from Equation (1) which capture the monthly change in each of the outcomes for individuals three months prior to turning 55 (γ) and individuals zero to twelve months after turning 55 (β), relative to the individuals' outcomes four months and earlier prior to turning 55 (omitted group).[19] All the specifications include individual fixed effects to capture time-invariant sources of unobserved heterogeneity across individuals and year-month fixed effects to capture aggregate and seasonal patterns in consumption and spending. The standard errors are clustered at the individual level.

[18] We show in Appendix Figure 1 in the Appendix that the calendar months in which Singaporeans turned 55 in our sample period are evenly distributed. Recall also from Figure 1 that all major demographics (e.g., gender, marital status, proportion of Chinese) are smooth functions around age 55.

[19] Appendix Table 2 shows that the results are similar if we extend the pre-period to six months prior to turning 55 and compare monthly changes in each of the outcomes relative to individuals' outcomes seven months and earlier prior to turning 55. This suggests that there are no pre-period trends in the outcomes prior to turning 55.

The estimates in column (1) indicate that individuals in our sample experience a large and statistically significant increase of $12,766 in account balances on average in the year after turning 55 relative to four months and earlier prior to turning 55. The estimate in the first row of column (1) indicates that this increase in account balance only takes effect *after* the individual turns 55 – in the three months *prior* to turning 55, there is no significant change in the account balance (the coefficient estimate is $1,045, with a t-statistic of 1.2). These results strongly show that the increase in balances only occur after an individual reaches the withdrawal age, and that account balances are stable in the months prior to age 55. The magnitude of this increase in account balance is roughly in line with the reported CPF balance available for withdrawal for the median consumer age 45 to 54 in 2010 of $13,500 (CPF Trends, 2011), suggesting that the average consumer in our sample withdraws a significant portion of the pension funds that they are eligible to withdraw shortly after turning 55.

[Insert Table 2 about Here]

Columns (2) to (4) examine the effects of reaching the withdrawal age on total spending (credit plus debit), credit spending and debit spending, respectively. The estimates in column (2) indicate that in the three months *prior* to consumers' turning age 55, their total monthly card spending rises, albeit very modestly, by $61, relative to four months or earlier prior to turning age 55. After consumers turn 55, total card spending rises by an additional $103 per month. Columns (3) and (4) indicate that in the three months prior to turning 55, both monthly debit and credit spending rise by similar amounts ($25-$36), while the increase in total spending after turning 55 is mostly concentrated in debit card spending. Column (5) of Table 2 examines the debt response. There is little change in debt in the three months prior to turning 55; however, consumers begin to pay down credit card debt after they reach the withdrawal age, with individuals reducing their average debt by a statistically significant $117 per month.[20] As our dataset does not contain information on the magnitude of cash withdrawals and other non-card modes of payment or transfers (e.g. online transactions, ATM cash withdrawals, and checks), we use the number of monthly cash and check transactions to proxy for increased spending activity through these channels.[21] We find that the number of monthly cash and check transactions increases modestly after an individual turns 55, suggesting that the spending responses based on debit and credit cards alone are likely to underestimate the full consumption response.[22]

[20] This finding is consistent with Agarwal et al. (2007) and Agarwal and Qian (2014).
[21] Another possibility is that pension savings withdrawal may be used to provide family support (e.g. spending on other family members (Battistin et al., 2009)). Unfortunately, we are not able to directly observe this aspect of spending in our data.
[22] The results are qualitatively similar if we scale all the dependent variables of interest in Table 2 by the pre-55 average monthly income. These results are available on request.

5.2 Potential Confounders and Falsification Tests

Before turning to additional results on the response dynamics and heterogeneous effects, in this subsection, we address several key concerns with our empirical strategy. One concern with attributing changes in financial behavior of consumers at age-55 to the CPF withdrawal policy is that other unobserved changes that occur at age 55 could confound the results. One potentially important confounding policy change is the discrete change in the employer and employee contribution rate at several age cut-offs (see section C in the Appendix for details). In particular, at age 55, the CPF contribution rate for employees declines by 5.5 percentage points (from 18% to 12.5%) while the CPF contribution rate for employers declines by 3 percentage points. The decline in CPF contribution rate for employees essentially increases income by requiring employees to contribute less pre-tax salary to the CPF, while the latter decline in CPF contribution rate for employers implies an overall decline in income in the form of lower pension contributions from employers.[23] A priori, therefore, it is not clear how consumption would respond.

Despite the ambiguous predictions, we explore this issue by performing a falsification test among Singaporeans at age 50 who are subject to CPF contribution rate changes but do not experience a change in the CPF withdrawal option. At age 50, employee CPF contributions fall from 20% to 18% and employer CPF contributions fall by 4 percentage points. Panel A of Table 3 reports the estimates of Equation (1) on the sample of Singaporeans in the months just before and after individuals turn 50. The point estimates indicate a small rise in account balances ($643) that is not statistically significant. The coefficients on the post-50 indicator variables for total spending and debt are economically small and statistically insignificant. Overall, these patterns provide some evidence that the patterns of consumer behavior are not strongly affected by changes in the age-specific CPF contribution rates, reinforcing our claim that the responses that we observe around age 55 are likely to capture the causal response to the CPF withdrawal policy.[24]

[23] The increase in disposable income of 5.5 percentage points amounts an increase of at most $275 per month (5.5% of the OW cap of $5,000).

[24] We also compute the take-home salary by subtracting the CPF contribution from the reported monthly income, and include this as an additional control variable in the main regression. The estimates for all the outcome variables –withdrawal, spending, debt, and number of cash and check transactions—are very similar, both qualitatively and quantitatively, to the estimates we report in Table 2. It is worth noting that the income control also takes into account of the change in labor income after turning 55, since the bank's data are able to capture the changes in income (after turning 55, we observe about 64% of individuals in our sample with a change of income). Therefore, the results below provide reassuring evidence that our findings are not driven by the increase in disposable income or confounded by potential labor supply responses. The results are reported in the Appendix Table 1.

Finally, to allay concerns that our estimate may be picking up other unobserved lifecycle changes that affect consumers around age 55, we examine the responses of account balances, spending and debt among foreign consumers. Since foreigners are not subject to the CPF policy, if our identification assumptions are satisfied, we should not observe any changes in their account balances, spending or debt patterns around age 55. As individuals are classified as foreigners based on nationality and since non-Singaporeans could also be permanent residents (who are also subject to the CPF policy), we remove ethnic Chinese, Indians, and Malays from the sample of foreigners.[25] Panel C of Table 3 reports the estimates of Equation (1) on the foreigners in our sample. Reassuringly, we do not find any evidence of significant changes in the account balance, spending patterns or debt for the sample of foreigners. These findings suggest that our results are unlikely to be picking up unobserved changes in consumption patterns around age 55.

[Insert Table 3 About Here]

5.3 Response Dynamics

To further sharpen the results in Table 2, we examine the average monthly response of account balance, spending and debt to the reaching of the withdrawal age. We investigate the dynamic evolution of the responses over a sixteen-month period, beginning in the three months prior to turning 55 and following individuals for up to 12 months after they turn 55. Table 4 reports the coefficients from the estimation of Equation (2). The magnitude of the coefficients should be interpreted relative to when individuals were at least four months prior to turning 55 (omitted group). Figure 2 graphs the entire path of the (estimated) response dynamics, along with the corresponding 95 percent confidence intervals. The results can be interpreted as an event study, with month zero being the time when an individual turns 55 in event time.

[Insert Figure 2 about Here]

Column (1) of Table 4 reports the point estimates for account balances. In the three months prior to an individual turning 55, we find little change in consumers' monthly account balances – the coefficients on each of the indicator variables for the months prior to age 55 are small and not statistically significant.

[25] It is possible that the sample still includes permanent residents who are non-Chinese, non-Indian, or non-Malay. These individuals would also be subject to the CPF policy – this would tend to reveal an effect at age 55. Nevertheless, we expect that most of the non-Chinese/Indian/Malay foreigners in our sample are not Singaporeans/PRs. 80% of permanent residents in Singapore are Chinese or Indian nationals. Please refer to Table 1 in the Census of Population 2010 for the detailed statistics. (http://www.singstat.gov.sg/publications/publications_and_papers/cop2010/census_2010_release1/cop2010sr1.pdf), and only 3.3% of Singapore citizens and PRs were non-Chinese/Indian/Malay in 2012 (Department of Statistics, Singapore).

This reinforces the exogeneity of pension withdrawal eligibility induced by the CPF withdrawal age rule. On an individual's 55th birthday (at *s*=0), we find that account balances increase by $9,503, which is statistically significant at the 1% level. One month later, account balances rise further, and are now about $15,000 higher than before the withdrawal age. Starting from the second month after turning 55, the account balance starts to decline gradually, plateauing at about $9,000 to $10,000 six months after turning 55.[26]

We also repeat the analysis with the natural logarithms of the account balance, spending, and credit card debt variables as the dependent variables (see Appendix Figure 2). The estimated coefficients represent the proportional changes in those variables relative to the benchmark values measured at four or more months before turning 55.[27] For example, the account balance increases by 42% in the month that an individual turns 55, and by 60% one month after turning 55. Six months after turning 55, the account balance is 34% higher than the benchmark, and by the 12th month, the account balance remains 25% higher than in the four or more months prior to turning 55.

[Insert Table 4 about Here]

Column (2) shows the evolution of the total spending response from credit and debit cards. In the two to three months prior to individuals' turning 55, their credit and debit card spending is not significantly different from that at least four months prior to their turning 55. Monthly spending increases by about $117 on reaching 55 and $121 one month after turning 55. Total spending continues to increase for about three months after turning 55 before gradually declining. As observed in Figure 2B, the cumulative spending response up to twelve months after turning 55 is approximately $650. Consistent with the results in Table 2, most of this increase in spending is driven by an increase in debit card spending, with little or no significant change in credit card spending (see Appendix Figure 3).

Although the magnitude of the spending response appears to be quite small relative to the change in account balances, column (3) shows that consumers appear to increase the number of cash and check transactions after turning 55. Figure 2C indicates that in the twelve months after turning 55, consumers perform about six more transactions, which represents about a 3% monthly increase relative to before

[26] Individuals that do not withdraw their CPF at 55 may apply to do so anytime. Individuals who had previously withdrawn their CPF upon reaching 55 will be eligible to withdraw yearly, on or after their birthday. Some individuals may apply for another withdrawal within their birthday year if they have been unemployed or if they are self-employed and have not been continuously working or receiving income in any business or trade for six months before the date of the CPF withdrawal application.

[27] Specifically, an estimated coefficient X for log of account balance, spending, or credit card debt is interpreted as a percentage change of exp(X) – 1.

turning 55.[28] Consumers also appear to respond to pension savings access by reducing debt – in the months prior to turning 55, consumers' monthly credit card debit remains largely stable; however, upon reaching 55, consumers begin to pay down debt, decreasing their debt by $167 one month after turning 55. Over the next twelve months, credit card debt remains about $185 lower. This is an economically significant change considering that average credit card debt was about $400 in the three months prior to turning 55. Appendix Figure 3 shows that these findings are not sensitive to specifying the outcomes in levels – qualitatively similar results are obtained when we consider log changes in account balances, total spending, and debt.

Taken together, the results in Table 4 and Figure 2 indicate that in response to the CPF withdrawal age, consumers withdrew a sizeable proportion of their eligible pension funds almost immediately and, on average, monthly account balances declined by about a third one year after the withdrawal age.[29] Nonetheless, on average, account balances remained about $10,000 higher one year after the withdrawal age. We find some evidence that consumers use the extra liquidity to increase their credit and debit card spending and to decrease their credit card debt. Although we are unable to observe consumption responses through non-card purchases, we provide some suggestive evidence that consumers do increase the number of transactions that they perform using cash and checks, suggesting that the spending responses that we capture through the credit and debit card data is a lower bound of the full consumption response.

5.4 Heterogeneity in Response across Consumers

Next, we examine whether different consumers had heterogeneous responses to the access to pension savings induced by the CPF withdrawal age policy. Previous literature has documented that low-income and low-liquidity consumers may respond more strongly to positive disposable income shocks (e.g. Agarwal et al., 2007; Jappelli and Pistaferri, 2010; Gross and Souleles, 2002; Agarwal et al., 2016). We use two different proxies for liquidity constraints in our data. The first proxy is based on liquid wealth (pre-period checking account balance divided by montly income) while the second proxy is based on reported monthly income. Consumers are divided into three groups (low, medium and high) based on their pre-sample period proxies and we examine whether the responses of each group varies in the months

[28] While this might seems like a small change, note that the percentage change is based on the total number transactions which could include non-discretionary spending such as the automatic payment and deduction of government fees and taxes. In other words, the percentage change could be larger if we exclude the transactions that include non-discretionary spending.

[29] Appendix Figure 4 shows that similar dynamics of the changes in account balances post-55 are observed for consumers at various quantiles (25th percentile, median, and 75th percentile) of the distribution of account balances.

just before and after turning 55. Specifically, we use the first three months in our sample period (2010:04 – 2010:06) as the pre-sample period to define the proxies and exclude these months from our analysis. We also remove Singaporeans who turn 55 during these three months. To study heterogeneous responses on the basis of liquidity constraints, we estimate the following dynamic specification:

$$Y_{i,t} = \delta_t + \alpha_i + \sum_{s=-3}^{12} \beta_s D_{i,(sm)} + \sum_{s=-3}^{12} \beta_{s,L} D_{i,(sm)} \times 1_L + \sum_{s=-3}^{12} \beta_{s,H} D_{i,(sm)} \times 1_H + \epsilon_{i,t} \qquad (3)$$

where 1_L and 1_H are indicator variables for individuals in the low or high groups, respectively. The coefficients of interest (β) capture the change in the outcome in each of the months from each of the months from three months prior to turning 55 to thirteen months upon turning 55, relative to four months or earlier prior to turning 55 (omitted group). β_s indicates the baseline effect for the middle group, while $\beta_{s,L}$ and $\beta_{s,H}$ capture the incremental effect for the low and the high group, respectively, relative to the middle group. To save space, we do not report the marginal effect coefficients.[30] Instead, we plot the (cumulative) response coefficients for the low ($\beta_s + \beta_{s,L}$) and high groups ($\beta_s + \beta_{s,H}$), along with the associated 95 percent confidence intervals in Figure 3.

[Insert Figure 3 about Here]

A. Low Monthly Income vs. High Monthly Income

Our first proxy for liquidity constraints is based on monthly income during the first three months in our sample period We define low (high)-income consumers as those whose average pre-sample period monthly income is in the bottom (top) tercile of the distribution, or $2,809 ($10,667). Figure 3A shows the comparison in the path of account balances, spending, and debt for these two groups of consumers.

Similar to the patterns observed in Figure 2, there is a sharp spike in account balances for both low- and high-income consumers on reaching the withdrawal age. High-income consumers experience a larger spike in account balance (approximately $20,000, or 28% of their pre-sample account balance) relative to low-income consumers (approximately $10,000, or 35% of their pre-sample account balance) one month after turning 55. The difference in magnitude likely reflects the fact that high-income consumers have a larger CPF cash balance available for withdrawal. On average, twelve months after turning 55, the average account balance among low-income consumers decline by about $5,200, or 50% of the initial increase in funds. Over the same period, account balances for high-income consumers decline by about

[30] The results are available on request.

$3,200, or 16% of the initial increase. At the end of the sample period, bank account balances of high-income consumers remain about $17,000 higher than before turning 55. A formal statistical test of the difference in account balance between the first month after turning 55 and the twelfth month indicates that the decline in account balances is statistically significant at the 5% level (p=0.031) for low-income consumers, but not statistically significant (p=0.505) for high-income consumers.

Turning to the cumulative spending response, low-income consumers appear to increase their total credit and debit card spending upon turning 55, with the point estimate indicating cumulative total card spending of about $1,000 at the end of the 12-month period. This represents about a 10% increase in low-income consumers' monthly debit and credit card spending. There is also a statistically significant increase in the number of cash and check transactions by low-income consumers of about 8 transactions.

We observe much smaller increases in cumulative total card spending ($200) and the cumulative number of cash and check transactions (1-2) for high-income consumers. The magnitude of these point estimates suggest that low-income consumers increase their spending more via debit and credit cards than high-income consumers. Both low- and high-income consumers use the increased liquidity to decrease debt – twelve months after turning 55; credit card debt for both groups fall by $160-180.

B. Low Liquid Wealth vs. High Liquid Wealth

Our second proxy for liquidity constraints is a measure of the individual's checking account balance scaled by reported monthly income.[31] Consumers with low (high) liquid wealth are those whose (income-scaled) bank balance in the pre-sample period are in the bottom (top) tercile of the distribution. Consumers classified as having low liquid wealth have monthly income of about $5,809 and pre-sample account balance of about $5,494. Consumers with high liquid funds have monthly income of about $5,866 and pre-sample account balance of about $107,700. The fact that consumers with low vs. high liquid wealth do not differ that much in terms of their monthly income suggests that this cut provides us with additional information about liquidity constraints beyond the subsample analysis by monthly income. Moreover, this suggests that income alone is unlikely to be a good measure of liquidity.

[31] One concern is that by conducting the analysis at the individual level, we may not be appropriately capturing the relevant liquidity constraints and financial decisions at the household level. While we are not able to match spouses in our dataset, we are able to observe joint account holders (about 51% of consumers in our sample have a joint account and these accounts are typically shared bank accounts between spouses). In results available on request, we show that the baseline results as well as heterogeneous responses by liquidity constraints are similar when we restrict the sample to joint account holders. Furthermore, we also obtain similar results when we restrict the sample to single consumers (who are more likely to comprise the entire household). These results suggest that the liquidity measures at the individual level serve as a reasonable proxy for liquidity constraints at the household level.

Figure 3B shows that the increase in account balance is significantly larger among individuals with low liquid wealth, relative to those with high liquid wealth. Bank account balances increase by $17,686 (or 322% of their pre-55 account balance) for the low-liquidity consumers one month after turning 55, compared to an increase of about $10,300 (or 10% of their pre-55 account balance) among high-liquidity consumers. By the end of the sample period, the increase in bank account balance one-month post-55 declines by 50% for the low-liquidity group. This decline is highly statistically significant ($p<0.001$). Nonetheless, bank account balances remain significantly higher at $8,787 relative to the months prior to turning 55. The trends in bank account balances for the high-liquidity group are somewhat noisier, while it declines in the first six months after individuals' turn 55, it appears to recover between months 9 to 12, eventually stabilizing at $8,000 higher than the benchmark level. The difference in the account balance twelve months after turning 55 and one month after turning 55 is not statistically significant ($p=0.664$) for consumers with high liquid wealth.

Similar to the results for low vs. high-income consumers, the cumulative change in total card spending is almost entirely driven by the response of low-liquidity consumers. Consumers with low total liquid funds significantly increased their debit and credit card spending by about $2,500 over the twelve-month period, which accounts for about 30% the decline in account balances over the same period. Consumers with high liquid wealth, on the other hand, do not experience any increase in their card spending. A formal statistical test indicates that the cumulative spending difference between low and high liquid wealth consumers are significantly different – both economically and statistically. Twelve months after turning 55, the cumulative spending difference between the two groups is about $3,000 ($p<0.001$). We also find evidence of a significant increase in the number of cash and check transactions among low-liquidity consumers, suggesting that part of their spending response is likely to occur through cash withdrawals and other payment modes. Both groups of consumers use the increased liquidity to pay down credit card debt — low-liquidity consumers see a $278 decline in debt at the end of the twelve-month period, while high-liquidity consumers reduce their debt by $113 and the decrease is statistically indistinguishable from zero.[32]

Finally, we examine the persistence of the response over the extended 24-month period after individuals turn 55. Appendix Figure 6 shows that the spending and credit card debt responses are persistent up to two years after individuals turn 55. Bank account balance remains high and there appears to be another

[32] Appendix Figure 5 depicts the heterogeneity in response dynamics of account balances, total card spending, and debt using alternative measures of liquidity constraints such as credit card limit (Panel A) and credit card utilization (Panel B). The overall patterns using these alternative measures of liquidity constraints are qualitatively similar to that based on monthly income and liquid wealth.

increase in the balance in the second year (months 18 and 19) after individuals turn 55. However, the magnitude is small relative to the increase during the first two months after the 55th birth month. This suggests that the most significant withdrawal occurs immediately when the option becomes available.[33]

5.5 Credit Constraints vs. Discretionary Spending? Evidence from Credit Card Spending and Car Purchases

Overall, these results suggest that the consumption response to pension savings access at 55 is larger among low-income and low-liquidity consumers. We consistently find larger increases in their total card spending, and the number of cash and check transactions among the low-income and liquidity constrained subgroups relative to their unconstrained counterparts. Furthermore, we observe that a larger fraction of the increase in bank account balances appears to have dissipated after twelve-months for low-income and low-liquidity consumers (50%) as compared to unconstrained consumers (20%). These findings are consistent with existing studies using US data that demonstrate that low-income consumers have higher marginal propensities to consume in response to an exogenous relaxation of credit (Gross and Souleles, 2002; Agarwal et al., 2016).

From a policy perspective, it is important to understand whether the increase in spending, particularly among low-liquidity consumers, is due to credit constraints or discretionary spending. To shed light on this issue, we utilize detailed information on credit card spending to examine whether the consumption response varies systematically across different spending categories such as (1) durable vs. non-durable goods and (2) visible vs. non-visible goods. The durable vs. non-durable classification follows Agarwal and Qian (2014) while the visible and non-visible classification is based on the definitions used by Charles, Hurst and Roussanov (2009).[34]

Table 5A reports the estimates of the average spending response for each of the four spending categories (durable good, non-durable goods, visible goods, and non-visible goods) in the three months before turning 55 and 12 months after, relative to individuals' outcomes four months and earlier prior to turning

[33] We focus our main analysis on the 12-month window after individuals turn 55. This is because of our short time series in the panel data: we only observe the 13th month after the 55th birth month for less than half of the treated individuals in the dataset, and information on the 24th month after the 55th birth month is available for around 100 individuals in our sample. This makes the point estimates for the later event months very noisy and less reliable (as can be seen from the wide confidence intervals particularly in the later months in Appendix Figure 6).

[34]Charles, Hurst and Roussanov (2009) define "visible goods" as expenditures on apparel (including accessories such as jewelry), personal care, and vehicles (excluding maintenance). We use the merchant categories in the credit and debit card transaction data provided by the bank to identify those goods. The one exception is vehicles, which are not included in this analysis. Given the high cost of vehicles in Singapore, consumers purchase cars through checks or bank transfers instead of credit or debit cards, as a result of which our transaction data do not include spending on vehicles.

55. Similar to Table 2, all the specifications include individual fixed effects as well as year-month fixed effects and standard errors are clustered at the individual level. We find that the increase in spending post-55 is more pronounced on durable and non-visible goods, with little increase in spending on visible goods. In Table 5B, we further examine whether these spending patterns vary by liquidity constraints (using the proxy based on liquid wealth). We find that although liquidity-constrained consumers largely drive the post-55 increase in spending across the different categories, the increase in spending among constrained consumers is significantly larger for non-durable and non-visible goods, relative to visible goods.[35] These results suggest that consumers do not appear to be using the extra liquidity from pension savings access to primarily fund discretionary purchases (which are typically associated with visible goods).

An important limitation of the credit card data is that it may not fully capture large durable purchases that are typically paid for using direct debits, cash, or checks. One such example in the Singapore context is car purchases, which cannot be paid by credit cards. To further study the durable spending response to the CPF withdrawal age, we exploit variation across time in the cost of car purchase in our sample period. In Singapore, a significant portion of the cost of owning a car is the Certificate of Entitlement (COE), which is a quota license that represents the right to vehicle ownership and usage for a period of ten years. The price of the COE is determined in open market auctions that occur twice a month. To the extent that an increase in COE prices tightens the liquidity constraints for consumers who plan to purchase cars, we would expect to observe a positive correlation between COE price and the CPF withdrawal decisions when individuals turn 55.

We examine this hypothesis in Table 6 by studying the effect of COE prices on the bank account balance increase within two months of turning 55– the coefficient of interest is the interaction between the dummy indicating 0 to 1 month post-55 and COE prices. We define COE prices in two ways – first, we use a standardized measure based on last month's COE price subtracting the mean COE price during the sample period, and dividing by the standard deviation of the COE prices in the sample period. Second, we use a binary measure indicating whether the COE price last month was above or below the median COE price of the same category during the sample period. We create these measures separately for the small and large car categories.[36] Columns (1) and (2) of Panel A present the estimates using the standardized COE price measure for small and large cars, respectively, while Columns (3) and (4) of Panel A present similar estimates using the dummy variable indicating "high" COE prices. The interaction terms are all

[35] The p-value for the F-test of the difference between visible and non-visible spending response among the constrained consumers is 0.000.
[36] Small-sized cars are those up to 1,600cc and 97kW while large-sized cars are those above 1,600cc and 97kW.

positive, indicating that consumers withdraw more post-55 when COE prices are higher. These effects are larger and statistically significant at the 10 percent level for COE prices of small-sized cars, suggesting that consumers are somewhat more responsive to increases in the price of small-sized cars relative to larger (more luxurious) cars. Moreover, as observed in Panel B, we find that consumers with low liquid wealth are significantly more responsive to increases in the COE prices of small-sized cars, relative to less constrained consumers. Overall, these findings are consistent with the constrained spending hypothesis – pension savings access enables liquidity-constrained consumers to make deferred durable purchases such as standard cars.

5.6 Why Do Individuals Hold Cash?

The results above suggest that part of the withdrawal and spending response by low-liquidity consumers appears to be consistent with the constrained spending hypothesis. Nevertheless, both groups of consumers appear to leave a significant portion of their withdrawn funds in their low-interest checking accounts (less than 0.1 percent) for up to one year after withdrawal at the expense of a 2.5 percent to 4 percent guaranteed interest rate offered on their retirement account by the CPF. This is particularly true for high-liquidity consumers – if they do not invest the withdrawn and unconsumed funds in other investment instruments, the dominant strategy would have been to withdraw the excess funds in their bank account one year after eligibility, as they would still be entitled to withdraw the same funds on their 56^{th} birthday.

One possibility is that individuals' withdraw their pension savings with the intention of taking advantage of market investment opportunities in the stock market or the housing market. Since it may take some time for investors to make these investments (e.g. buying property), this could potentially explain why consumers choose to withdraw their pension funds and let it sit in their checking accounts for up to a year after withdrawal. We address this possibility by examining whether consumers make larger withdrawals in response to higher stock market returns and housing price growth. We create dummy variable indicating that an individual faces "high stock market returns" if Singapore's stock market index return in the month before an individual turns 55 is greater than the interest rate offered by the CPF in the retirement savings account. We create a similar dummy variable for "high housing price growth" if the growth in the housing price index (for the public housing market) in the quarter before an individual turns 55 is greater than the interest rate offered by the CPF. The outcome of interest is the bank's checking account balance in the two months after an individual turns 55 in the sample. The results of this exercise are reported in Table 7. Similar to Table 6, the variables of interest are the interactions between the

dummy indicating 0 to 1 months post-55 and the dummy variable for high stock market returns (Column (1)) and high housing price growth (Column (2)).

Consistent with the idea that individuals' withdrawal and cash-holding behavior is related to market investment opportunities, both interaction terms are positive, indicating that bank account balances in the months post-55 are higher when the stock market return and housing price growth is above the CPF interest rate. Nevertheless, only the coefficient on the interaction term for housing price growth is statistically significant (at the 10 percent level). The magnitude of the estimates also suggests that withdrawal decisions are more responsive to housing price growth than stock market returns. Given the time it takes to transact in the property market, this could potentially explain why individuals leave the withdrawn funds in their low-interest bearing checking accounts.

Overall, we view these findings as suggestive evidence that individuals' decisions to withdraw their pension savings does appear to respond to market investment opportunities. On the other hand, the fact that we still observe a relatively large increase in bank account balance in the 12 months post-55 even among consumers who face low stock market returns and low housing price growth remains somewhat puzzling.

One reason why those individuals choose to withdraw their CPF cash balances on turning 55 rather than to leave their money in higher interest yielding CPF accounts may be government policy regarding the treatment of CPF funds. However, the CPF withdrawal rule is specific and fixed within the same birth cohort. This means that even if the policy changes in the future, the same cohort turning 55 in year 2010 is always eligible to withdraw 30 percent of the available CPF balances, whether they decide to make the first withdrawal at age 55 (i.e., in year 2010) or at age 56 or later (i.e., in year 2011 or later).

Alternatively, consumers may find it appealing to withdraw and deposit in a liquid bank account despite the lower savings rate due to the restricted withdrawal option. Although individuals who do not withdraw their *full* entitlement in their 55th birth year are eligible to withdraw it in the future, they are only allowed to do so once a year, on their next birthday. This restricted access to funds is likely to increase transaction costs, especially for individuals with high liquidity needs (e.g., for emergency expenses).[37] Albeit plausible, these concerns are unlikely to completely explain away the withdrawal decision for the following reasons. First, they have the option to withdraw the funds any time in the first year upon

[37] Previous literature has pointed out that households may choose to hold low-interest checking balances in addition to high-interest credit card debt and other alternative investment savings, because these demand deposits, credit cards and other forms of investment savings are not perfect substitutes and generally differ in transaction utility (Lehnart and Maki, 2002; Gross and Souleles 2002)

reaching 55, and it is fairly convenient and efficient to withdraw the CPF savings: the application is easy and the processing takes no more than 10 working days. Therefore, there appears no urgent need to immediately exercise the withdrawal option upon turning 55 with little use of the money; compared with the alternative that keeps the savings in the CPF earning a higher interest rate until the need (to either spend or invest) arises. Second, CPF savings are partially liquid. Individuals can still tap the withdrawn funds in the Ordinary Account for investment and housing expenses and use the remaining funds in their Medisave Account for healthcare expenses. Taken together, this suggests that a segment of the consumers in our sample might be making savings and investment mistakes by failing to exploit arbitrage opportunities (Gross and Souleles, 2002; Choi, Laibson and Madrian, 2011).

6. Conclusion

This paper exploits an administrative regulation in Singapore that allows individuals to cash out a fraction of their pension savings at age 55, in combination with a unique panel dataset of consumer financial transactions, to identify the causal effect of the access to pension savings on consumers' withdrawal, consumption, and savings decisions. During our sample time period from April 2010 to March 2012, individuals were entitled to withdraw 10 percent to 30 percent of their pension savings.

Individuals, on average, cashed out $15,000 within the first two months of turning 55, and this amount declines to about $10,000 within one-year after turning 55. Low-income and low-liquidity consumers accounted for most of the increased spending via debit and credit cards fueled by this extra liquidity. Moreover, the decline in withdrawn funds over the twelve-month period was most pronounced among these constrained individuals – almost 50% of the increase in bank account balances within the first two months of turning 55 had dissipated from their accounts. The corresponding number for high-income and high-liquidity consumers was 15%. We show that the response by low-liquidity consumers appears to be more consistent with the constrained spending hypothesis – the spending response for these consumers are largely concentrated on non-visible consumption, as opposed to visible goods (which are more typically associated with discretionary spending). Furthermore, we show that pension withdrawals are larger when the price of owning a car increases, supporting the idea that consumers may be using the extra liquidity to fund deferred durable purchases such as cars.

We also document that a large amount of the withdrawals remains sitting in individuals' bank accounts without being consumed or invested. We show that this can partly be attributable to the fact that individuals may be withdrawing and holding on to the funds with the intention of exploiting investment opportunities in the housing market. Nonetheless, we find that a segment of the consumers, in particular

those with high-income and high-liquidity, appear to be making a mistake (in a financial sense) by making sub-optimal withdrawal decisions.

Overall, our findings suggest that while early access to pensions may lead some individuals to make sub-optimal savings decisions, the major concern of consumer overspending with the withdrawn savings may be unwarranted: on the contrary, in our context, we find that providing some degree of access to pensions savings may allow liquidity-constrained consumers to better smooth consumption.

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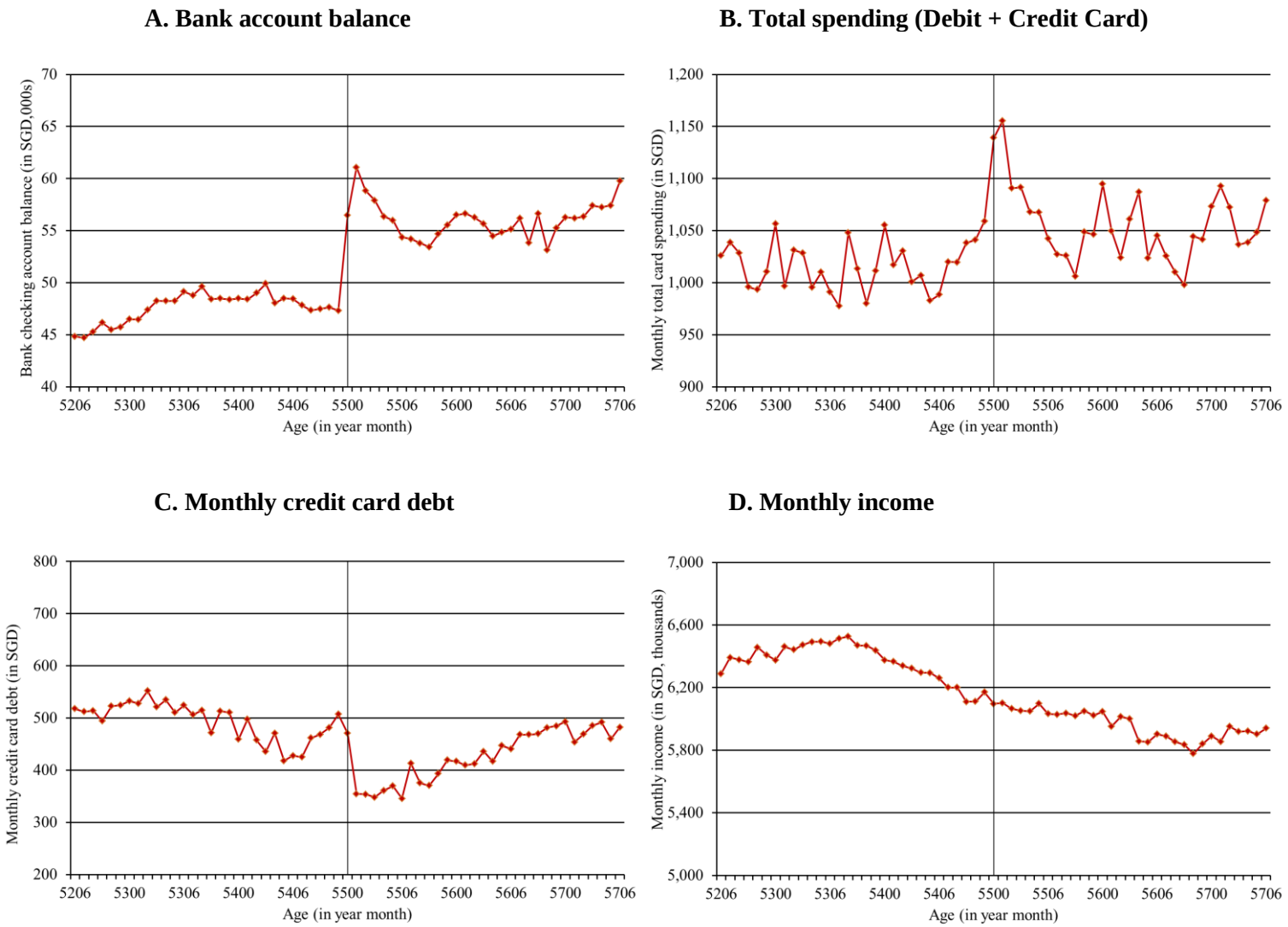
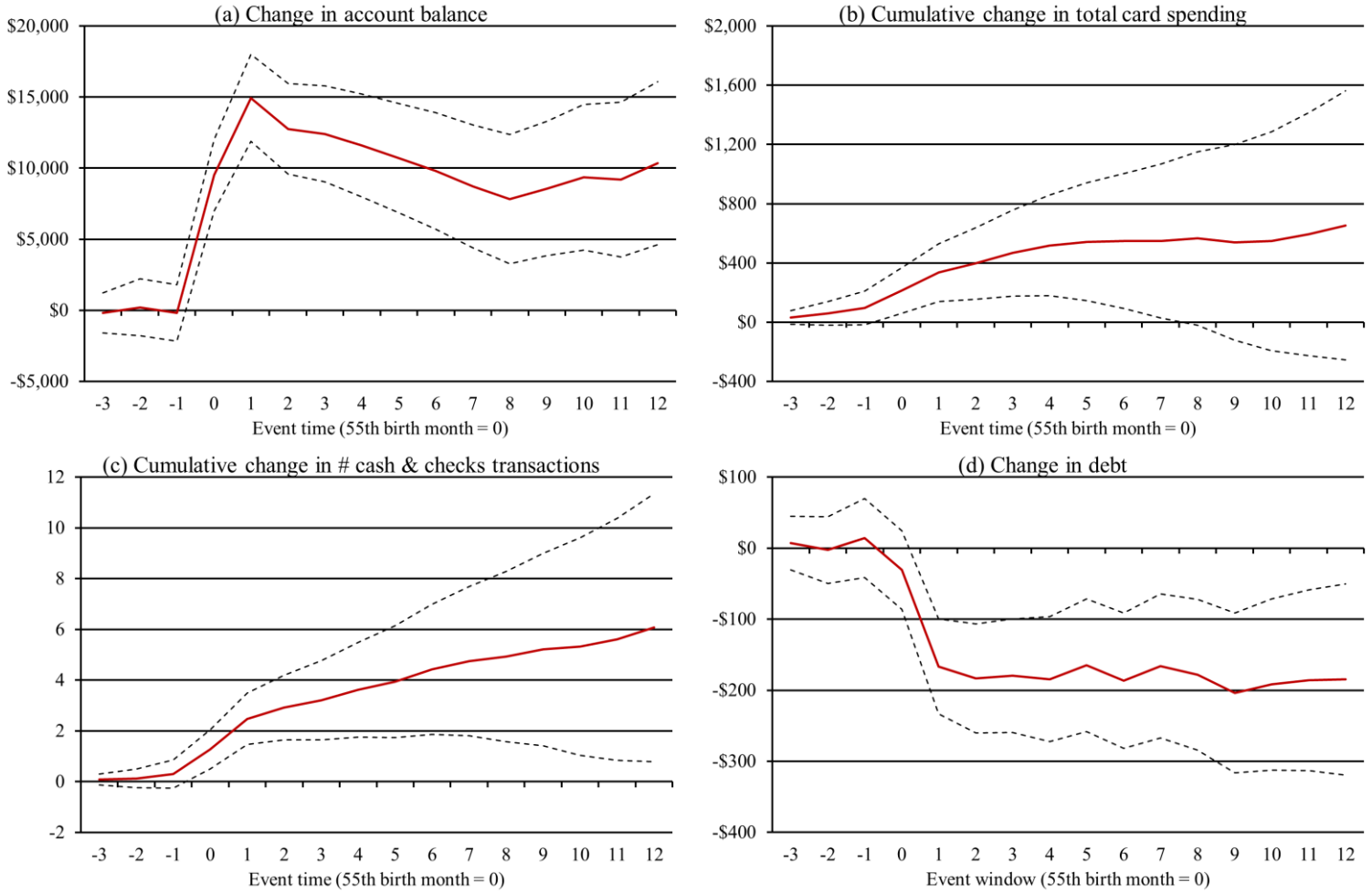
Figure 1: Sample Statistics by Age



Note. Each panel plots the variable means by the age (in year-months). The sample includes all Singaporean individuals who turned 55 from April 2010 to March 2012. The vertical line indicates individuals in the sample who are age 55 and 0 months.

Figure 2: Dynamic Responses of Account Balances, Spending and Debt

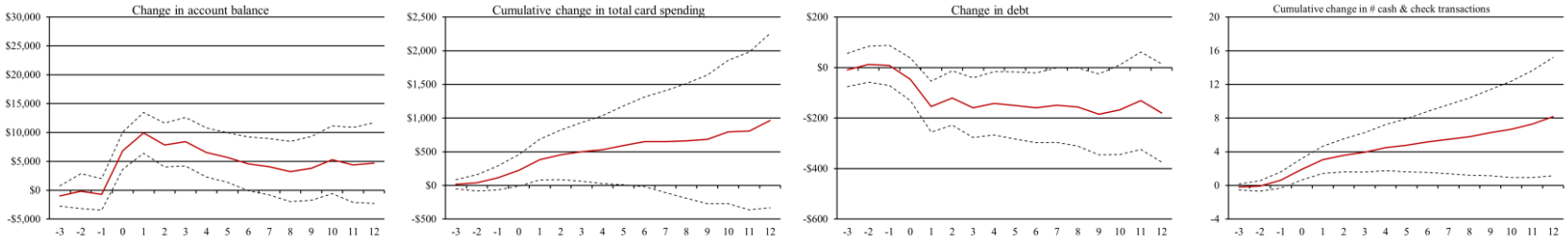


Note. This figure plots the entire path of coefficients from the estimation of Equation (2) for the three months before an individual turns 55 and up to twelve months after an individual turns 55, along with the corresponding 95 percent confidence intervals. For account balance and credit card debt, the figure indicates the change in balance and debt in each month, relative to the period four to six months before an individual turns 55. For spending, the figure plots the cumulative coefficient to derive the cumulative total spending at each point in time (also relative to the period at least four months before an individual turns 55). The marginal effect coefficients are reported in Table 4. The x-axis denotes the *i*th month after an individual turns 55 and the y-axis indicates the response in Singapore Dollars.

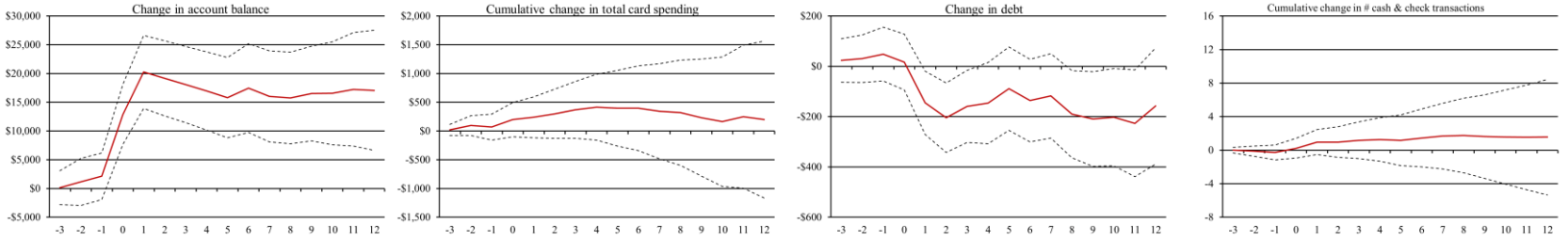
Figure 3: Dynamic Responses of Account Balances, Spending and Debt by Liquidity Constraints

Panel A: By income

Low income



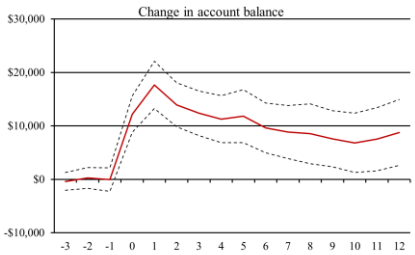
High income

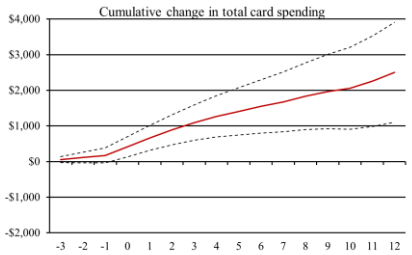


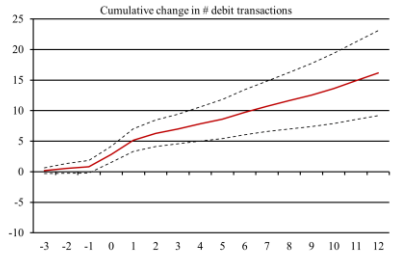
Note. This figure plots the dynamic responses of account balance, cumulative card spending, cumulative # of cash and checks transactions, and debt for low-liquidity and high-liquidity consumers. Panel A uses income as a proxy for liquidity constraints, and Panel B measures liquidity constraints with the amount of the checking account balance (divided by monthly income). For this heterogeneity analysis, we use the first three months in our sample period to create the high and low threshold, and we drop the first three month observations as well as Singaporeans reaching 55 during those three months in this analysis. Those who are in the bottom/top tercile of the income (bank balance) distribution are used to construct the Low/High income (bank balance) group. The construction of the figures is similar to that in Figure 2.

Panel B: By pre-period bank account balance (scaled by income)

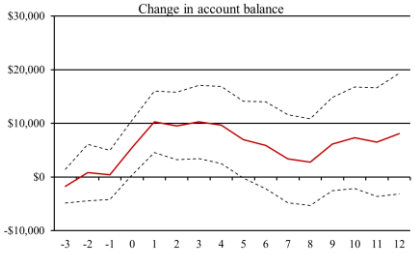
Low bank balance

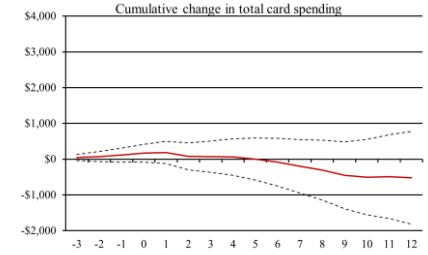


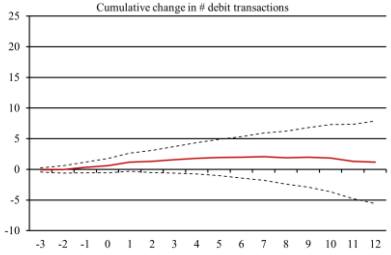




High bank balance







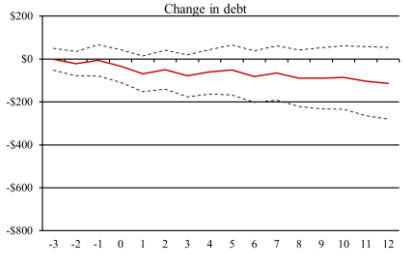


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Table 1: Summary Statistics

Panel A: Individual-level characteristics

	Mean (1)
Demographics (N=2,654)	
Chinese (%)	88.3
Female (%)	40.5
Married (%)	60.5
College degree (%)	8.7

Panel B: Monthly financial characteristics

	3 months before 55 (1)	12 months after 55 (2)	Diff. (2)-(1)
Account balance	46,867	57,966	11,098***
Total card spending	1,050	1,111	61**
Total debit card spending	339	387	48***
Total credit card spending	711	724	12
Total credit card debt	475	396	-79*
# of cash &check transactions	17.8	17.9	0.2
Income	6,115	6,218	103

Note: This table reports the summary statistics of our sample in the main analysis—Singaporeans who turn 55 during the period from 2010:04 to 2012:03 in the bank dataset. *Total card spending* is the sum of debit card spending and credit card spending for each individual in a month. *Total debit card spending* is computed by adding monthly spending over all debit card accounts for each individual. *Total credit card spending* is computed by adding monthly spending over all credit card accounts for each individual. *Total credit card debt* is computed as the difference between the current month's credit card payment and the previous month's credit card balance. For the checking account, we compute *# cash & check transactions* as the aggregate number of checking account's outflow transactions for each individual every month. All the dollar amounts are in the local currency (SG$), and 1SGD = 0.78 USD as of February 2011.

Table 2: Average Effect of Withdrawal Age on Account Balance, Spending and Debt

	Account balance (1)	Total card spending (2)	Debit card spending (3)	Credit card spending (4)	Credit card debt (5)	# of cash &check transactions (6)
Before age 55						
(-3,-1 month) window	1,045.245	61.299***	24.562***	36.737**	31.223	0.299***
	(853.54)	(17.97)	(7.83)	(15.80)	(21.43)	(0.09)
After age 55						
(0,12 months) window	12,765.678***	103.458***	76.804***	26.654	-117.154***	0.854***
	(1,375.88)	(23.03)	(11.06)	(19.80)	(30.66)	(0.13)
Observations	56,992	57,038	57,038	57,038	57,038	56,992
R-squared	0.835	0.470	0.504	0.449	0.688	0.838

Note. Each column is a separate regression of the outcome on a dummy equal to 1 when individuals are 3 months before they turn 55 and a dummy equal to one when individuals are between 0 to 12 months after they turn 55. The effects are estimated relative to the omitted group which comprises individuals when they are at least 4 months prior to turning 55. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 3: Falsification Tests

	Account balance	Total card spending	Debit card spending	Credit card spending	Credit card debt	# cash & check transactions
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Sample: Singaporeans around age 50			
Before age 50						
(-3,-1 month) window	-199.307	-3.859	-0.546	-3.313	-4.857	0.050
	(616.51)	(14.29)	(6.62)	(12.68)	(19.33)	(0.08)
After age 50						
(0,12 months) window	643.248	-9.274	-0.456	-8.817	25.659	0.076
	(887.38)	(19.24)	(8.81)	(17.07)	(27.36)	(0.11)
Observations	75,481	75,539	75,539	75,539	75,539	75,481
R-squared	0.852	0.481	0.512	0.465	0.752	0.844
			Panel B. Sample: Foreigners around age 55			
Before age 55						
(-3,-1 month) window	-113.983	218.512	-1.774	220.286	194.588	0.859
	(3,170.06)	(146.85)	(41.25)	(133.71)	(228.29)	(0.58)
After age 55						
(0,12 months) window	517.123	246.405	58.181	188.224	38.861	1.126
	(4,870.42)	(168.61)	(53.28)	(158.17)	(304.06)	(1.07)
Observations	2,055	2,089	2,089	2,089	2,089	2,055
R-squared	0.823	0.579	0.584	0.593	0.715	0.770

Note. Each column is a separate regression of the outcome on a dummy indicating individuals 3 months before they turn 55 and a dummy indicating individuals zero to 12 months after they turn 55. The effects are estimated relative to the omitted group which comprises individuals when they are four to six months prior to turning 55. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 4: Response Dynamics to Reaching the Withdrawal Age

	Account balance	Total card spending	# of cash & check transactions	Credit card debt
	(1)	(2)	(3)	(4)
- 3 months	-174.32	31.72	0.09	7.21
	(714.59)	(23.92)	(0.11)	(19.19)
- 2 months	214.06	27.76	0.04	-2.66
	(1,020.93)	(26.04)	(0.11)	(23.99)
- 1 month	-189.39	37.48	0.18	14.09
	(1,013.48)	(26.37)	(0.14)	(28.45)
Age 55	9,503.18***	116.51***	0.96***	-30.86
	(1,276.15)	(28.13)	(0.15)	(28.21)
+ 1 month	14,944.07***	121.36***	1.20***	-166.66***
	(1,560.54)	(31.08)	(0.18)	(34.05)
+ 2 months	12,756.25***	61.85**	0.45***	-183.17***
	(1,623.70)	(31.23)	(0.17)	(39.17)
+ 3 months	12,416.49***	70.80**	0.29	-179.47***
	(1,716.02)	(33.17)	(0.19)	(40.81)
+ 4 months	11,610.78***	51.42	0.40**	-184.37***
	(1,845.34)	(34.03)	(0.19)	(44.72)
+ 5 months	10,709.43***	24.48	0.32	-164.84***
	(1,960.65)	(36.85)	(0.20)	(47.56)
+ 6 months	9,808.76***	5.59	0.48**	-186.75***
	(2,082.94)	(37.55)	(0.21)	(48.60)
+ 7 months	8,710.40***	0.02	0.33	-165.81***
	(2,202.50)	(41.09)	(0.23)	(51.68)
+ 8 months	7,815.31***	16.44	0.18	-178.30***
	(2,316.27)	(42.34)	(0.24)	(53.99)
+ 9 months	8,563.98***	-26.14	0.28	-203.99***
	(2,410.68)	(45.15)	(0.26)	(57.41)
+ 10 months	9,360.05***	8.11	0.12	-191.82***
	(2,609.33)	(49.04)	(0.28)	(61.39)
+ 11 months	9,203.28***	47.07	0.29	-185.90***
	(2,778.39)	(51.00)	(0.29)	(64.96)
+ 12 months	10,362.13***	59.41	0.46	-184.90***
	(2,924.13)	(53.70)	(0.30)	(68.59)
Observations	56,992	57,038	56,992	57,038
R-squared	0.835	0.470	0.839	0.689

Note. Each column is a separate regression of Equation (2) on different outcome variables. The effects are estimated relative to the omitted group which comprises individuals when they are at least four months prior to turning 55. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 5A: Total Spending Response by Spending Type

	Total card spending on			
	Durable goods	Non-durable goods	Visible goods	Non-visible goods
	(1)	(2)	(3)	(4)
Before age 55				
(-3,-1 month) window	13.849***	49.559***	10.485*	53.338***
	(5.29)	(17.03)	(5.46)	(15.08)
After age 55				
(0,12 months) window	21.460***	82.748***	12.678*	99.206***
	(6.98)	(21.51)	(6.85)	(19.68)
Observations	55,890	55,890	55,890	55,890
R-squared	0.175	0.458	0.347	0.470

Note. Each column is a separate regression of the outcome on a dummy indicating individuals three months before they turn 55 and a dummy indicating individuals zero to 12 months after they turn 55. The effects are estimated relative to the omitted group that comprises individuals when they are at least four months prior to turning 55. The dependent variables are the monthly total card spending on durable goods (column 1), non-durable goods(column 2), visible goods (column 3), and non-visible goods (column 4) for each individual in our sample. Merchant type descriptions are provided in the debit and credit card transactions, from which we group them into the above eight categories. We follow Agarwal and Qian (2014) to define spending categories into durables and non-durable goods, and use the classification in Charles, Hurst and Roussanov (2009) and Heffetz (2011) to define visible and non-visible spending types. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 5B: Heterogeneity in Spending Response by Spending Type and Liquidity Constraints

	Total card spending on			
	Durable goods	Non-durable goods	Visible goods	Non-visible goods
	(1)	(2)	(3)	(4)
Before age 55				
(-3,-1 month) window	13.455**	62.487***	14.688**	59.259***
	(6.63)	(20.65)	(6.57)	(18.72)
After age 55				
(0,12 months) window	6.737	-9.182	-7.466	29.904
	(9.72)	(29.43)	(9.18)	(26.54)
(0,12 months) window x Low bank balance	26.090***	212.766***	41.364***	176.669***
	(9.42)	(30.67)	(9.19)	(28.11)
Observations	37,199	37,199	37,199	37,199
R-squared	0.176	0.446	0.353	0.463

Note. See notes to Table 5A. *Low bank balance* is a dummy equal to 1 if an individual's checking account balance (divided by monthly income) in the first three months of the sample period is in the bottom tercile of the bank balance distribution. The sample includes only individuals in the bottom and top tercile of the bank balance distribution i.e. we omit the middle tercile from the analysis. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 6: The Impact of Car License Fee on Account Balance

Dependent Variable: Account Balance				
Panel A	(1)	(2)	(3)	(4)
(-3,-1 month)	87.46	87.55	82.08	91.21
	(848.34)	(848.10)	(848.12)	(848.06)
(0,1 months)	12,143.14***	12,215.31***	10,481.31***	11,431.31***
	(1,368.53)	(1,374.98)	(1,531.91)	(1,566.40)
(0,1 months) x Std. COE for small sized cars	2,101.27*			
	(1,096.04)			
(0,1 months) x Std. COE for large sized cars		1,615.88		
		(1,108.74)		
(0,1 months) x High COE for small sized cars			3,222.78*	
			(1,766.23)	
(0,1 months) x High COE for large sized cars				1,630.09
				(1,744.10)
Observations	36,564	36,564	36,564	36,564
R-squared	0.873	0.873	0.873	0.873
Panel B	(1)		(2)	
(-3,-1 month)	510.84		495.74	
	(1,130.97)		(1,131.82)	
(0,1 months)	12,264.42***		10,632.37***	
	(1,749.85)		(2,042.88)	
(0,1 months) x Std. COE for small sized cars	361.70			
	(2,077.71)			
(0,1 months) x Std. COE for small sized cars x low bank balance	4,893.85*			
	(2,514.57)			
(0,1 months) x High COE for small sized cars			-1,059.51	
			(2,704.32)	
(0,1 months) x High COE for small sized cars x low bank balance			8,730.00***	
			(2,928.73)	
Observations	24,362		24,362	
R-squared	0.893		0.893	

Note. In Panel A, each column is a separate regression of the outcome on a dummy indicating individuals three months before they turn 55, a dummy indicating individuals within two months after they turn 55 as well as its interactions with the level of car license fees in the month before individuals reach 55. The effects are estimated relative to the omitted group that comprises individuals when they are at least four months prior to turning 55. In Panel B, we study the role of liquidity constraints and restrict our sample to the most constrained (i.e., bottom tercile of pre-55 income-scaled bank balance) and least constrained (i.e., top tercile of pre-55 income-scaled bank balance) consumers. The dependent variable is the dollar amount of the bank's checking account balance for each individual up till one month after turning 55 in our sample. We obtain the monthly COE data for each car category from https://coe.sgcharts.com (the data source is from the Singapore Land Transport Authority). *Std. COE for small sized cars* is the last month's COE price (for cars up to 1,600 cc and 97kW) minus the mean COE during our sample period (between 2010:03:2012:02), divided by the standard deviation of the COE prices in the sample period. *Std. COE for large sized cars* is the last month's COE price (for cars above 1,600 cc and 97kW) minus the mean COE during our sample period, divided by the standard deviation of the COE prices in the sample period. *High COE for small sized cars* is a dummy equal to 1 if the last month's COE price (for cars up to 1,600cc and 97kW) is above the median COE price of the same car category during the sample period (between 2010:03:2012:02). *High COE for large sized cars* is a dummy equal to 1 if the last month's COE price (for cars above 1,600cc and 97kW) is above the median COE price of the same category during the sample period (between 2010:03:2012:02). All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Table 7: The Impact of Asset Returns on Account Balance

	(1)	(2)
	Account balance	
(-3,-1 month)	95.932	13.246
	(850.05)	(846.27)
(0,1 month)	11,577.018***	5,882.617
	(1,710.00)	(3,651.16)
(0,1 month) x High stock market return	1,664.853	
	(2,002.54)	
(0,1 month) x High housing price growth		6,701.120*
		(3,682.64)
Observations	36,564	36,564
R-squared	0.873	0.873

Note. Each column is a separate regression of the outcome on a dummy indicating individuals three months before they turn 55, a dummy indicating individuals within two months after they turn 55 as well as its interactions with the asset returns in the month before individuals reach 55. The effects are estimated relative to the omitted group that comprises individuals when they are at least four months prior to turning 55. The dependent variables is the dollar amount of the bank's monthly checking account balance for each individual up till one month after turning 55 in our sample. *High stock market return* is a dummy equal to 1 if Singapore's stock market's index return in the previous month is greater than the savings rate should individuals leave the funds at CPF. *High housing price growth* is a dummy equal to 1 if Singapore's house price index (for the public housing market) in the previous quarter grows at a greater rate than the savings rate should individuals leave the funds at CPF. The stock market data is from the historical Straits Times Index (STI) obtained from https://www.investing.com/indices/singapore-straits-time-historical-data. The housing price data is based on the HDB Resale Price Index and obtained from the Department of Statistics Singapore (http://www.singstat.gov.sg/statistics/visualising-data/charts/hdb-resale-price-index). All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Appendix

A. Overview of CPF

The Central Provident Fund (CPF) is a comprehensive social security savings plan covering the areas of retirement, healthcare, home ownership, family protection, and asset enhancement.

Working Singaporeans and their employers make monthly contributions to the CPF and these contributions are credited into the following three accounts:

1. Ordinary account (OA) – savings that can be used to buy a home, pay for CPF insurance, investment, and education
2. Special account (SA) – savings that can be used for old age and investment in retirement-related financial products
3. Medisave account – savings that can be used for hospitalization expenses and approved medical insurance

There are no age restrictions for the usage of funds in the OA and Medisave accounts as long as the savings in these accounts are used for their intended purposes. Savings in the SA can only be used to fund certain CPF-approved investment products (such as fixed deposits, government bonds and treasury bills, and selected insurance products) aimed at enhancing retirement assets. Importantly, all profits accrued to investment products[38] financed using funds from the SA is credited to the SA and can only be withdrawn as part of an individual's retirement benefits at age 55 and 65. Details on the CPF contribution rates and the allocation rules over an individual's lifecycle can be found at the following website: http://mycpf.cpf.gov.sg/Members/Gen-Info/Con-Rates/ContriRa.htm

B. Details on the Withdrawal rule at age 55

i. CPF Savings at 55

- *Overview*

At 55, two important changes occur to an individual's CPF savings. First, a retirement account (RA) is created to set aside the CPF Minimum Sum. Second, individuals are entitled to withdraw a portion of their CPF savings.

The retirement account (RA) is created by transferring the savings from an individual's Special Account (SA), Ordinary Account (OA), and then Medisave Account (MA) to make up the CPF Minimum Sum (MS) (see Section (iii) below for key details on the CPF Minimum Sum scheme). This amount will pay individuals a monthly income from their draw-down age (around 65).

[38] Information on the instruments that can be invested using CPF funds can be found here: http://mycpf.cpf.gov.sg/NR/rdonlyres/DCD118FF-473E-4A5C-8A0F-322687316646/0/INV_InstrumentsunderCPFIS.pdf

The amount that can be withdrawn at age 55 depends on an individual's date of birth according to the table below. During our sample period from 2010 to 2012, the applicable withdrawal rule is 10 percent to 30 percent of available CPF cash balances. Note the withdrawal percentage rule is fixed within the same birth cohort. For example, those turning 55 in 2010 will *always* be able to withdraw 30 percent of the available CPF balances, even if they start their first withdrawal at age 56 (i.e., in year 2011) or after. CPF withdrawals are not subject to tax.

A: **Withdrawal of cash balances at 55**

The Day You Turn 55	Applicable Withdrawal Rule (%)
On or before 31 Dec 2008	50%
1 Jan 2009 - 31 Dec 2009	40%
1 Jan 2010 - 31 Dec 2010	30%
1 Jan 2011 - 31 Dec 2011	20%
1 Jan 2012 - 31 Dec 2012	10%
On or after 1 Jan 2013	Cash balances can only be withdrawn after setting aside both the CPF Minimum Sum and Medisave Minimum Sum

The withdrawal rule during our sample period is applied independently of the CPF Minimum Sum Scheme. Individuals are entitled to withdraw their available cash balances based on the applicable withdrawal rule *whether or not* they meet the CPF Minimum Sum. Individuals with an MS shortfall will use a portion of their future CPF contributions to make up for the shortfall in their Retirement Account. An individual with cash balances in excess of the CPF Minimum Sum will be allowed to withdraw the excess cash balances. Note that individuals who meet the CPF Minimum Sum in their retirement accounts and are still making monthly CPF contributions will continue to have an Ordinary Account (OA). CPF cash balances in excess of the prevailing CPF Minimum Sum will also be held in the OA.

- *Applicable Interest Rates on CPF Savings*

The Ordinary Account currently pays an interest of 2.5 percent per annum while the Special Account, Medisave Account, and Retirement Account pay interest of 4 percent per annum.[39] In addition, the first $60,000 of an individual's combined balances (with up to $20,000 from the OA) earns an extra 1 percent per annum. All CPF accounts (OA/SA/MA/RA) earn a minimum interest of 2.5 percent. This is guaranteed by the Government and provided for in the CPF Act.

- *Application for CPF Savings Withdrawal at Age 55*

[39] From 1 Jan 2010, Retirement Account (RA) savings are invested in Singapore Government Securities (SGS) which earn a fixed coupon equal to either the 12-month average yield of the 10-year SGS plus 1% at the point of issuance, or 4%, whichever is the higher, adjusted yearly. Historically, the 10YSGS yield is lower than 4% hence RA savings have earned a fixed coupon of 4% (floor rate) since July 1999. Information on CPF interest rates and the historical series of CPF interest rates can be found here: http://mycpf.cpf.gov.sg/Members/Gen-Info/Int-Rates/?wbc_purpose=Bbp.

The withdrawal application can be submitted two months before an individual's 55th birthday. Individuals can apply to withdraw their CPF either online or by submitting a physical copy of the application form to the CPF board. The withdrawal application form can be found at this link: http://mycpf.cpf.gov.sg/NR/rdonlyres/3E499AEF-7351-48B7-A408-D6AC8E2D25DF/0/FORM_RSD55.pdf

The application form prominently states that it takes 10 minutes to fill in the form. The CPF board also sends an advance withdrawal invitation with details on the withdrawal procedure to individuals about two months before their 55th birthday. Monthly talks (in multiple languages) are held at the CPF board on the withdrawal option for those reaching 55.[40] Upon application, the processing time typically ranges from two to ten working days (upon turning 55), and the receipt of the withdrawal is through direct transfer to the designated bank account of the member (and the member only).

- *Subsequent withdrawal post-55*

An individual who has not withdrawn their CPF at age 55 may do so anytime. If an individual has previously withdrawn from their CPF upon reaching 55, they will be eligible to withdraw yearly, on or after their birthday each year. In some cases, individuals may apply for another withdrawal within their birthday year. These exceptions include unemployment, or if an individual is self-employed and has not been continuously working or receiving income in any business or trade for six months before the date of the CPF withdrawal application. For the next withdrawal, individuals can withdraw all their *eligible* cash balances in their Retirement Account (the leftover portion based on their eligible cash balances at 55) as well as all cash balances *in excess* of the CPF Minimum Sum (MS) and Medisave Minimum Sum (MMS) prevailing at the time of withdrawal.

- *CPF Savings upon death*

Upon death, the CPF savings will be paid to the Public Trustee for distribution to the deceased family according to the intestacy laws. Individuals who wish to distribute their CPF savings differently from the intestacy laws can make a CPF nomination. There are no estate taxes in Singapore for deaths on or after 15 Feb 2008. CPF savings are not taxable in the event of death. The procedures for applying for withdrawal for the beneficiaries are similar to those for the CPF members (as mentioned above).[41]

ii. Minimum Sum Requirements

- *CPF Minimum Sum (MS)*

The CPF Minimum Sum (MS) scheme was introduced in 1987 to provide CPF members with a monthly income to support a basic standard of living during retirement. CPF members can

[40] Schedules of talks can be found here http://www.cpf.gov.sg/seminar/default.asp.
[41] Please see the linked document for details (http://mycpf.cpf.gov.sg/NR/rdonlyres/439094CA-A0E6-4624-B371-0CB395611CAE/0/DistributionofCPFSavingsuponDeathofaCPFMember.pdf).

apply to commence their monthly payouts from their Retirement Account when they reach their applicable Draw Down Age. The MS is adjusted each year to account for inflation, longer life expectancies and post-retirement needs. Individuals who are not able to set aside the full MS in cash can use their property, bought using CPF savings to pledge for up to half of the MS. The remaining MS shortfall will be met using a portion of future CPF inflows.

Table A1: CPF Minimum Sum

55th birthday on or after	MS (in 2003 dollars)	MS (after adjustment for inflation)
1 July 2003	$80,000	$80,000
1 July 2004	$84,000	$84,500
1 July 2005	$88,000	$90,000
1 July 2006	$92,000	$94,600
1 July 2007	$96,000	$99,600
1 July 2008	$100,000	$106,000
1 July 2009	$104,000	$117,000
1 July 2010	$108,000	$123,000
1 July 2011	$112,000	$131,000
1 July 2012	$113,000	$139,000
1 July 2013	**$115,000**	**$148,000**
1 July 2014	To be announced	To be announced

- *Medisave Minimum Sum (MMS) and the Medisave Contribution Ceiling (MCC)*

The Medisave Scheme comprises two important features: the Medisave Minimum Sum (MMS) and the Medisave Contribution Ceiling (MCC). The MMS is the amount a member needs to retain in his Medisave Account whenever he makes a CPF withdrawal at age 55 and above. In our sample, this Medisave MS is non-binding in the sense that individuals are entitled to withdraw 10-30 percent of their available cash balances before the MMS is set aside. Future withdrawals of excess cash balances over the CPF MS are subject to the Medisave MS.

The MCC, which was implemented on 1 April 1986, is the maximum amount that a member can contribute to and maintain in the Medisave Account. This is set at $5000 above the Medisave MS. Any monies in the Medisave Account in excess of the MCC will be transferred to their Special Account (for members below 55 years old) or their Retirement Account (for members aged 55 and above). Both the MMS and the MCC are adjusted yearly to keep up with healthcare inflation.

Note that unlike the CPF Minimum Sum (MS), which is fixed for the group turning 55 in a particular year, the Medisave MS is adjusted annually to keep up with medical inflation. Information on the MMS amounts is summarized in the table below.

Table A2: Medisave Minimum Sum and Contribution Ceiling

	Minimum Sum	Contribution Ceiling
2009	$32,000	$37,000
2010	$34,500	$39,500
2011	$36,000	$41,000
2012	$38,500	$43,500
2013	$40,500	$45,500

C. Other Changes to the CPF Policy at Age 55

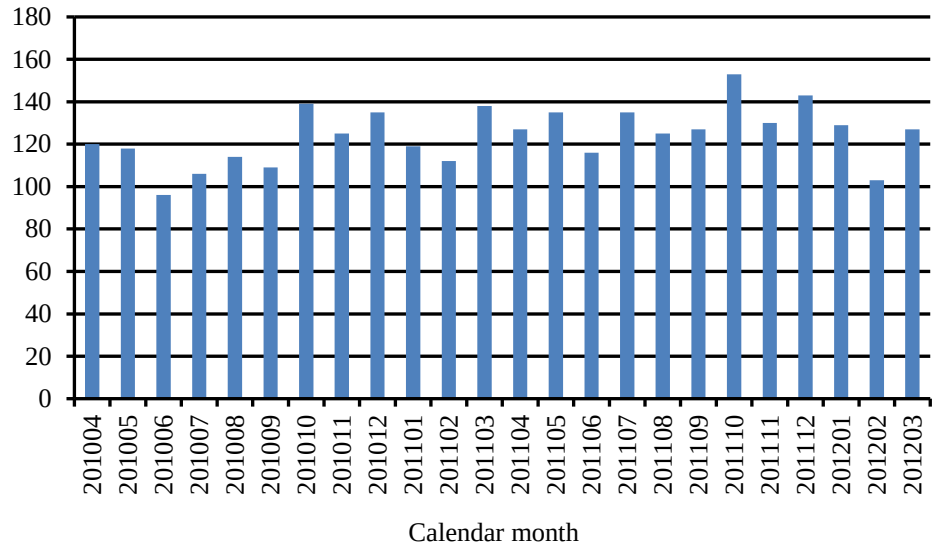
CPF Contribution Rates

The CPF contribution rates are also a function of an individual's age. The table below summarizes the CPF contribution rates in our sample period (Source: http://mycpf.cpf.gov.sg/Members/Gen-Info/Con-Rates/).

Table A3: CPF Contribution Rates in Sample Period

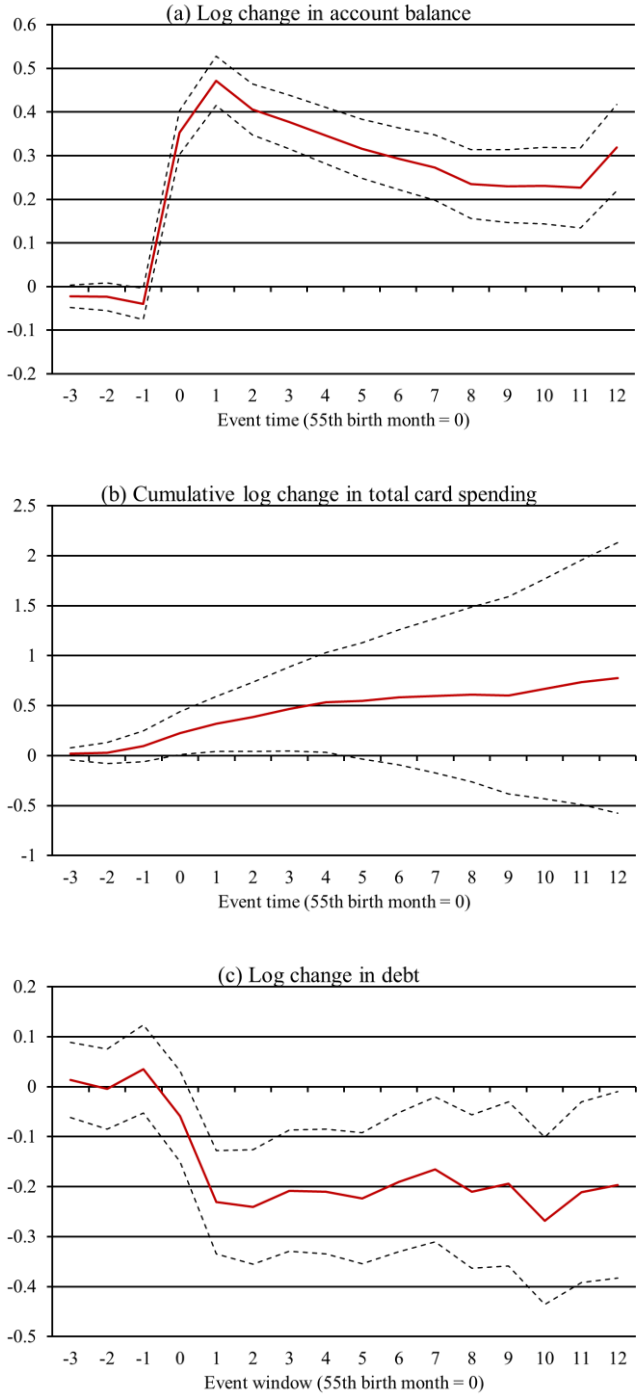
Employee Age	April 2010-Aug 2010			Sept 2010-Feb 2011			March 2011-Aug 2011			Sept 2011 to Aug 2012		
	Employer	Employee	Total	Employer	Employee	Total	Employer	Employee	Total	Employer	Employee	Total
<=35 years	14.5	20	34.5	15	20	35	15.5	20	35.5	16	20	36
35-45 years	14.5	20	34.5	15	20	35	15.5	20	35.5	16	20	36
45-50 years	14.5	20	34.5	15	20	35	15.5	20	35.5	16	20	36
50-55 years	10.5	18	28.5	11	18	29	11.5	18	29.5	12	18	30
55-60 years	7.5	12.5	20	8	12.5	20.5	8.5	12.5	21	9	12.5	21.5
60-65 years	5	7.5	12.5	5.5	7.5	13	6	7.5	13.5	6.5	7.5	14
> 65 years	5	5	10	5.5	5	10.5	6	5	11	6.5	5	11.5

Appendix Figure 1.Time Distribution of 55th Birth Month



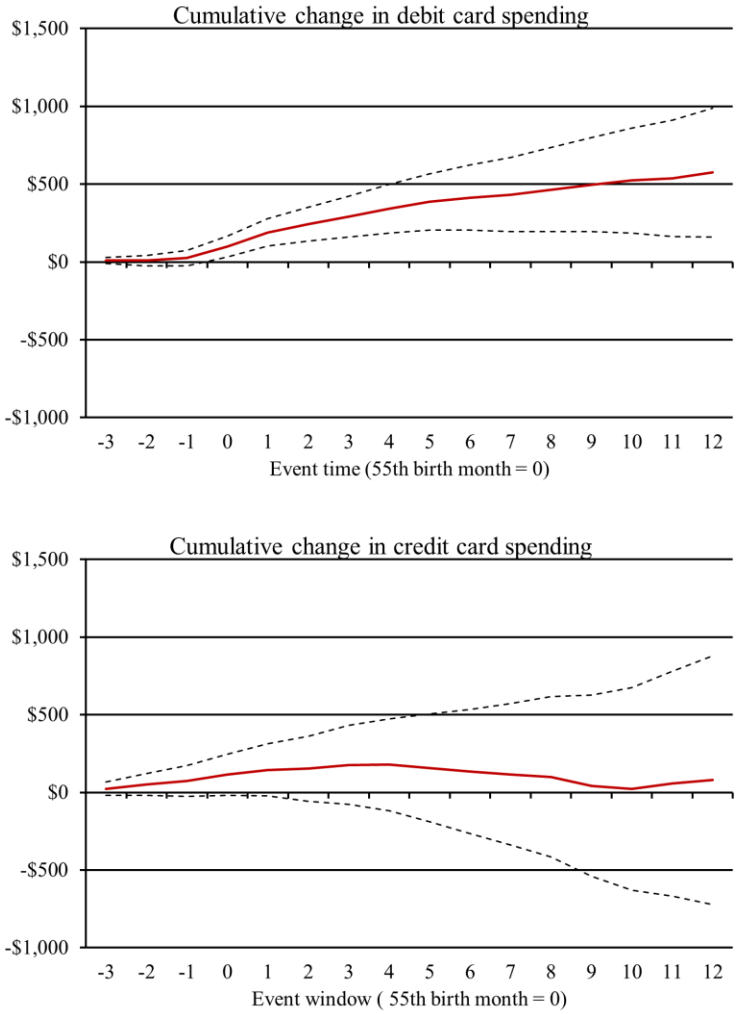
Note: This figure plots the histogram of the calendar months in which Singaporeans in our sample reach age 55. The x-axis denotes the 24 months in our sample (2010:04-2012:03), and the y-axis denotes the number of Singaporeans reaching age 55 in each month.

Appendix Figure 2: Dynamic Responses of Account Balances, Spending and Debt - Log changes



Note. This figure plots the entire path of coefficients from the estimation of Equation (2) for the three months before an individual turns 55 and up to twelve months after an individual turns 55, along with the corresponding 95 percent confidence intervals. In comparison with Figure 2, the dependent variables in this plot are in natural logarithms. The x-axis denotes the *i*th month after an individual turns 55 and the y-axis indicates the (log) response. The coefficients indicate log changes relative to the period at least four months before an individual turns 55.

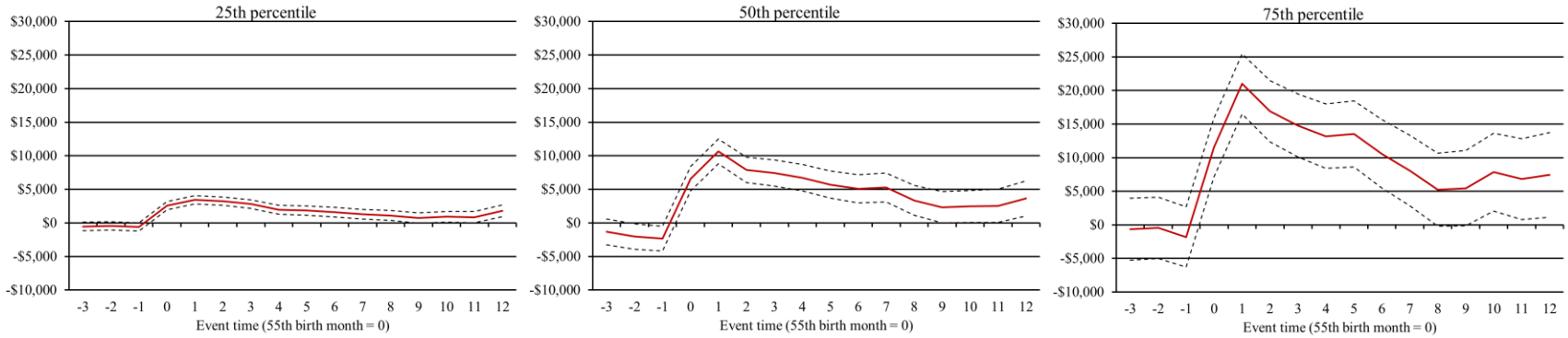
Appendix Figure 3: Dynamic Responses of Spending - By Spending Instrument



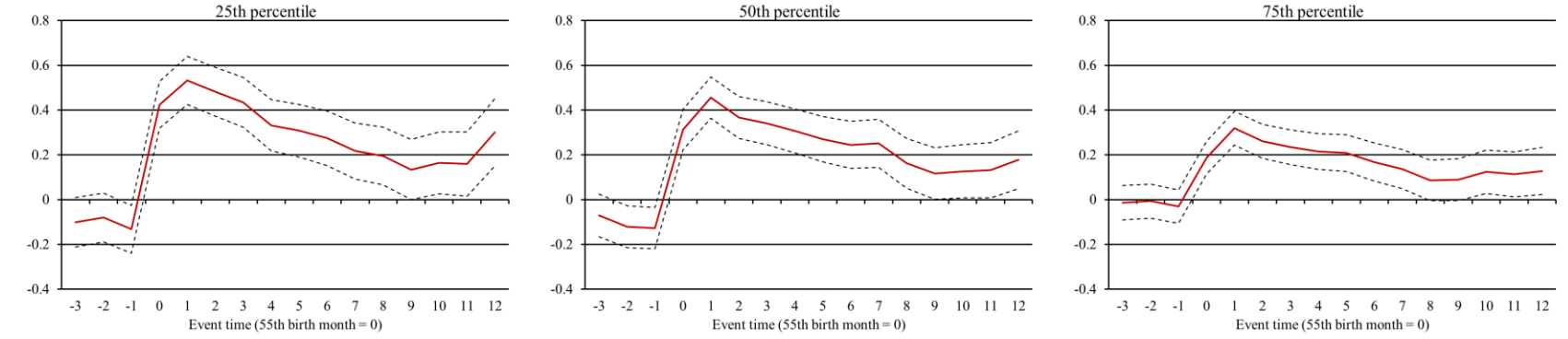
Note. This figure plots the entire path of coefficients from the estimation of Equation (2) for the three months before an individual turns 55 and up to twelve months after an individual turns 55, along with the corresponding 95 percent confidence intervals. Dependent variables are the amount of debit card spending (top panel) and credit card spending (bottom panel). The x-axis denotes the *i*th month after an individual turns 55 and the y-axis indicates the response in Singapore Dollars. The coefficients indicate changes relative to the period at least four months before an individual turns 55.

Appendix Figure 4: Change in Account Balance - By Quantiles

Panel A: Level change



Panel B: Log change

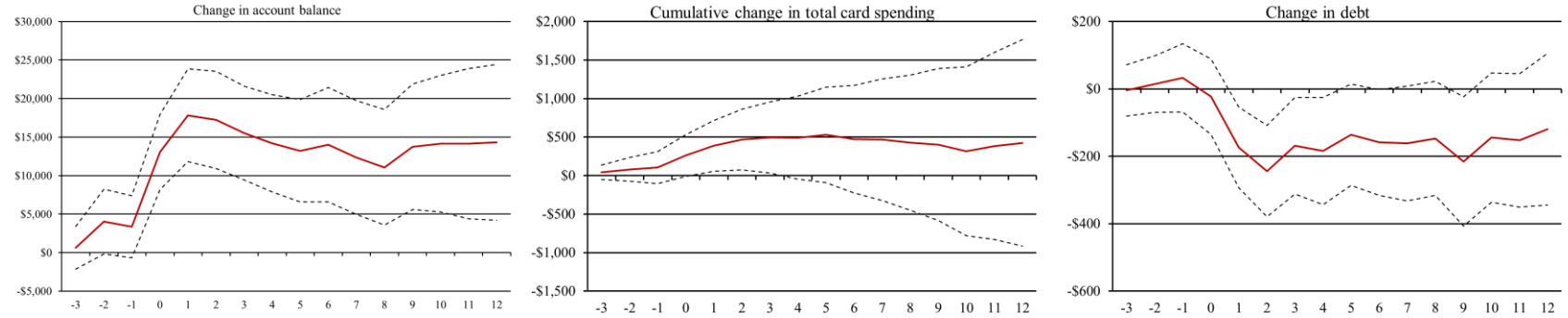


Note. This figure plots the entire path of coefficients from the quantile regression estimation (at 25th, 50th, and 75th percentiles) of account balance for the three months before an individual turns 55 and up to twelve months after an individual turns 55, along with the corresponding 95 percent confidence intervals. Panel A plots the level changes and Panel B plots the log changes in the account balance. The x-axis denotes the *i*th month after an individual turns 55 and the y-axis indicates the (log) response. The coefficients indicate changes (Panel A) or log changes (Panel B) relative to the period at least four months before an individual turns 55.

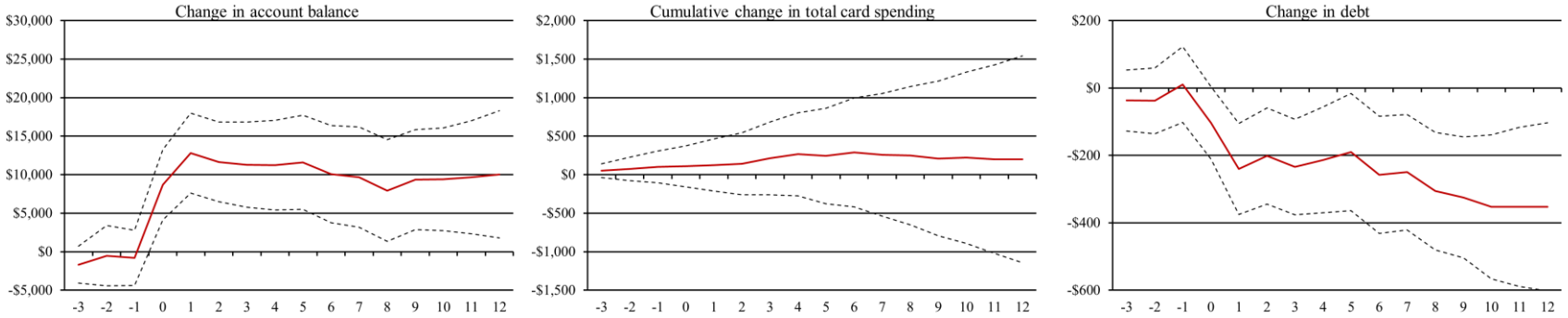
Appendix Figure 5: Dynamic Responses of Account Balances, Spending and Debt - Alternative Measures of Liquidity Constraints

Panel A. By credit card limit

Low Credit Limit



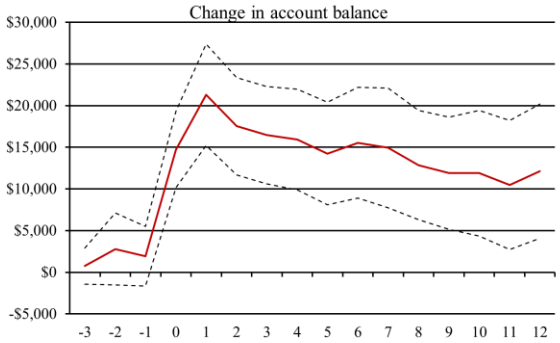
High Credit Limit

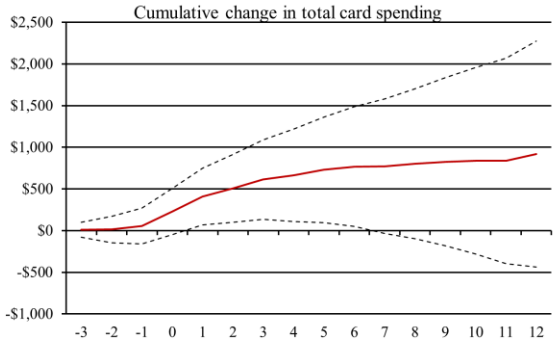


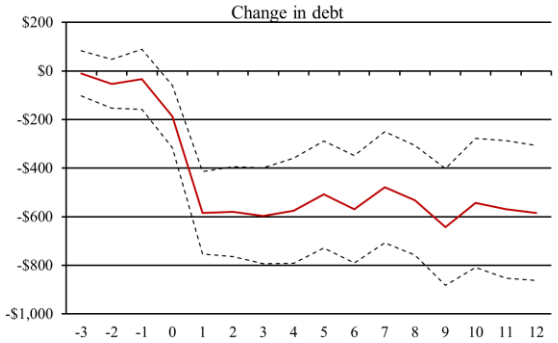
Note. This figure plots the dynamic responses of account balance, cumulative card spending, and debt using alternative proxies to measure low-liquidity and high-liquidity consumers. Panel A uses credit limit (scaled by monthly income) as a proxy for liquidity constraints, Panel B uses the credit card utilization rate (i.e., used credit divided by the contractual credit limit). For the heterogeneity analysis in Panel A and B, we use the first three months in our sample period to create the high and low threshold. Those who are in the bottom/top tercile of the credit limit/checking account balance/credit card utilization distribution are used to construct the Low/High credit limit/utilization group. We drop the first three month observations as well as Singaporeans reaching 55 during those three months in this analysis. The construction of the figures is similar to that in Figure 2.

Panel B: By credit card utilization

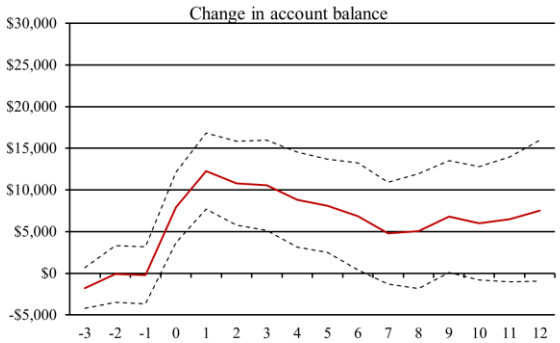
High utilization

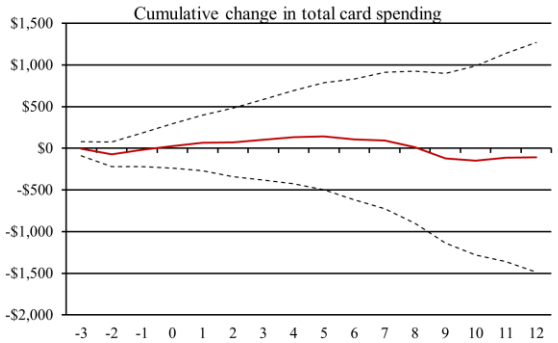


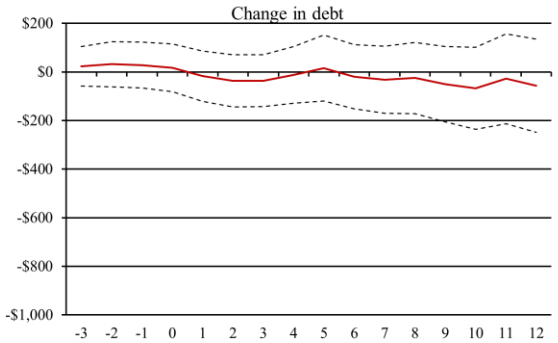




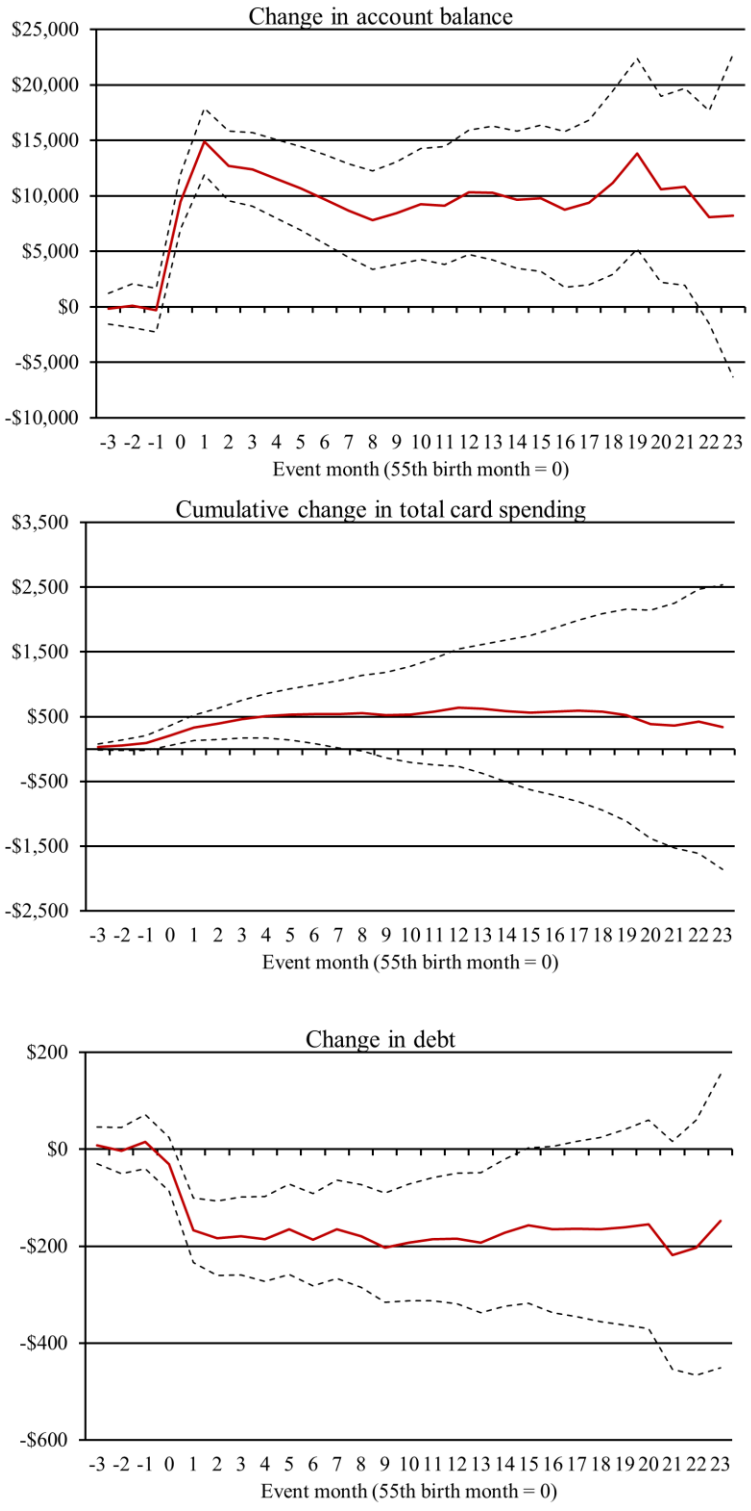
Low utilization







Appendix Figure 6: Post-55 Two Year Responses of Account Balances, Spending, and Debt



Note. This figure extends the dynamics in Figure 2 to the 24 month period after turning 55. The x-axis denotes the *i*th month after an individual turns 55 and the y-axis indicates the response in Singapore Dollars.

Appendix Table 1: Average Effect – Controlling for Disposable Income Change

	Account balance (1)	Total card spending (2)	Debit card spending (3)	Credit card spending (4)	Credit card debt (5)	# of cash &check transactions (6)
Before age 55						
(-3,-1 month) window	982.901	61.082***	24.248***	36.834**	30.019	0.306***
	(856.41)	(18.06)	(7.89)	(15.85)	(21.57)	(0.09)
After age 55	12,419.578***	93.703***	72.995***	20.708	-114.626***	0.835***
(0,12 months) window	(1,406.85)	(23.40)	(11.18)	(20.25)	(31.07)	(0.13)
	982.901	61.082***	24.248***	36.834**	30.019	0.306***
Log (monthly income	6,410.569*	96.692	56.571***	40.122	-109.143	0.297
after CPF contribution)	(3,684.40)	(63.30)	(18.20)	(57.11)	(73.15)	(0.22)
Observations	56,453	56,499	56,499	56,499	56,499	56,453
R-squared	0.835	0.466	0.506	0.443	0.689	0.839

Note. Each column is a separate regression of the outcome on a dummy equal to 1 when individuals are 3 months before they turn 55 and a dummy equal to one when individuals are between 0 to 12 months after they turn 55. The effects are estimated relative to the omitted group which comprises individuals when they are at least 4 months prior to turning 55. *Monthly income after CPF contribution* measures the disposable income after contributing to the CPF savings, and we use the monthly income provided in the bank's dataset to multiple by (1 – the CPF contribution rate for that particular age). All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.

Appendix Table 2: Average Effect of Withdrawal - Alternative Pre-treatment Period

	Account balance	Total card spending	Debit card spending	Credit card spending	Credit card debt	# of cash & check transactions
	(1)	(2)	(3)	(4)	(5)	(6)
Before age 55 (-6,-1 month) window	1,322.727	51.795***	33.704***	18.091	23.116	0.301***
	(978.96)	(18.30)	(8.18)	(15.88)	(23.14)	(0.10)
After age 55 (0,12 months) window	13,529.184***	118.195***	97.809***	20.387	-113.456***	0.982***
	(1,610.24)	(27.25)	(13.14)	(23.14)	(35.46)	(0.15)
Observations	56,992	57,038	57,038	57,038	57,038	56,992
R-squared	0.835	0.470	0.504	0.449	0.688	0.838

Note. Each column is a separate regression of the outcome on a dummy equal to 1 when individuals are 6 months before they turn 55 and a dummy equal to one when individuals are between 0 to 12 months after they turn 55. The effects are estimated relative to the omitted group which comprises individuals when they are at least 7 months prior to turning 55. All specifications include individual fixed effects and year*month fixed effects. Standard errors clustered at the individual level are reported in parentheses. ***significant at 1 percent, **5 percent, *10 percent.