DEPRESSION AND THE FINANCIAL PLANNING HORIZON

by

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(Under the Direction of SWARN CHATTERJEE)

ABSTRACT

With greater numbers of people living longer, the question of how to prepare for financial security is an important issue. However, there is a noticeable increase in the prevalence of mental disorders, which deteriorates financial well-being in later life. Especially, depression is amongst the most common psychological disorders in older adults. People with depression have great difficulty tackling the task of planning and are more likely to make short-sighted financial decisions. Designing and managing a long-term financial plan can be particularly challenging for depressed people. To mitigate this problem, there is a growing need for research on factors that may affect the financial time preferences of older adults who suffer from depression. This is because financial time preference plays a vital role in determining the choices that people make when deciding between their saving and consumption trade-offs within the constraints of their financial resources and time horizon. Previous literature has found that people with depression have a lower preference for long-term economic benefits than healthy people when they face intertemporal choices. Depressed people's abnormal time perception, insufficient resources, and negative expectations with regards to the future have a significant influence on their time preference. Hence, financial decision making for the future with a far-sighted perspective is especially needed for older adults who suffer from depression. However, there exist scant studies

on the extent to which the financial planning horizon shifts with the onset of depressive symptoms. To fill this gap in the literature, this study utilized a five-category financial planning horizon measure in the Health and Retirement Study (HRS) and estimated regression models that identify depression as a determinant of the financial planning horizon. The purpose of this study is to explore whether depression contributes to greater preference for a shorter financial planning horizon of individuals. The result from the empirical analyses of this study finds that depression is negatively associated with the financial planning horizon. The implications of this finding can have ramifications for individuals with depression who need a long-term financial plan for the future.

INDEX WORDS: Depression, Mental Health, Financial Planning Horizon, Intertemporal Choice, Financial Time Preference

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CHAPTER 1

INTRODUCTION

1.1 Background

The portion of the United States population aged 65 and older reached 52 million in 2018 and is expected to nearly double by the year 2060[1]. The Centers for Disease Control and Prevention (CDC) data shows that the average life expectancy of the US population was about 78.6 years in 2017 (Arias & Xu, 2019)[2]. Moreover, the life expectancy of older adults aged 65 was about 19.5 years, which means that people expect to live longer than the average expectancy. With greater numbers living longer into old age, the question of how to prepare for financial security is an important issue that has implications for an individual's quality of life upon retirement. As the baby boomer generation continues to transition into retirement, the continued rises in health-related expenses combined with longer life expectancy increase the risk of financial ruin and threaten the financial well-being of households who have not adequately planned for retirement. Recent research and policy decisions have focused on identifying factors that can help households make normative financial decisions and improve their financial well-being across time (Choi et al., 2011; Lusardi & Mitchell, 2007).

However, as the population ages, there is a noticeable increase in the prevalence of mental disorders, which deteriorates the quality of life. Arguably, depression is amongst the most common psychological disorders in older adults. Indeed, a vast amount of literature has shown important links between old age and depression (Alexopoulos, 2005; Blazer, 2003; Blazer et al.,

[1] US Census Bureau, 2017. Population Projections
[2] United States life tables, 2017. National vital statistics reports (June 24, 2019).

1991; Snowdon, 2001; Wu et al., 2012; Yang, 2007). Older people are more vulnerable to depression than younger people because they are susceptible to greater depression-related risks, such as aging, physical disability, cognitive impairment, and changes in socioeconomic status (Blazer, 2000). For example, most people experience a decline in their social and economic status in their old age. In addition, older adults are commonly exposed to feelings of loss and stress caused by the deaths of meaningful people, including spouses and friends (Eaton & Kessler, 1981). For these reasons, depression in later life is accelerated.

It is estimated that about 8% to 16% of older adults suffer from depression, and 1% to 4% have symptoms consistent with a diagnosis of a major depressive disorder (Blazer, 2003; Blazer & Williams, 1980). Although depression is prevalent across generations, late-life depression is of particular concern because it may have devastating consequences (Fiske et al., 2009). It has been revealed that higher levels of depression are associated with a decreased quality of life (Cesar & Chavoushi, 2013; Doraiswamy et al., 2002). It is, therefore, essential to understand the definition of late-life depression and its impact on later life. Late depression, as defined by the American Psychiatric Association's Diagnostic and Statistical Manual (DSM-IV) and the International Classification of Disease (ICD-10), occurs in adults over 65 years of age (Alexopoulos, 2005; Shelton, 2019). Late depression can have disastrous effects on older adults, including dysfunction in daily life, increased suicide risk, and mortality (Blazer, 2003; Pezawas et al., 2002).

Moreover, late depression can affect financial well-being in later life, making late depression even more notable. Specifically, older adults with depressive symptoms might be exposed to more serious financial risks (Fiske et al., 2003). Previous research has shown that mental health disorders have been linked to slower cognitive processing (Beats et al., 1996;

Butters et al., 2004). There is evidence that depressed elderly patients exhibit impairment in cognitive function (Köhler et al., 2010), and people with depression particularly have great difficulty with the task of planning (Beats et al., 1996). As a result, older adults with depression who have limited ability to plan could be hampered in making sound financial decisions. Hence, older adults with depressive symptoms are more likely to make short-sighted financial decisions (Lerner et al., 2013). In other words, older adults who are depressed could find it difficult to make long-term financial decisions due to their increasingly myopic time preference.

There is also evidence that people who retired early due to depression experience greater financial instability compared to people without depression (Schofield et al., 2011). Studies have shown that post-retirement poverty experienced by people with mental illness is mainly due to poor financial decision-making, resulting in a lack of savings for retirement (Waghorn & Lloyd, 2005). Depression also brings additional financial burden because health- or medical-related costs for individuals with mental illness will be greater than for healthier individuals. Therefore, it is reasonably assumed that older adults with depressive symptoms may be at a higher risk of experiencing financial hardship than non-depressed people, because designing and managing a long-term financial plan can be particularly challenging for depressed people with limited assets.

To mitigate this problem, there is a growing need for research on the financial time preferences of older adults with depression, since financial time horizon is a vital consideration for financial decision-making (Dow, 2013). There is evidence that time horizon plays a crucial role in determining an individual's intertemporal financial decisions (Wittmann & Paulus, 2008). The preference for a long-term financial horizon over a short-term financial horizon determines the quality of life after retirement. Generally, people who take a long-term view of their financial situation make sound investments and savings in advance. The long-term planning mitigates any

unexpected illness in the future and reduces their risk of financial ruin. In contrast, those who conduct short-term financial planning are less likely to have sufficient savings for their future needs.

Previous literature has found that people with depression have a lower preference for long-term economic benefits than healthy people when they face financial intertemporal choices (Bech, 1975; Blewett, 1992; Mezey & Cohen, 1961; Mundt et al., 1998). Depressed people are more likely to prefer immediate financial outcomes (Pulcu et al., 2014) because their bleak expectations about the future lead them to have make decisions that are consistent with a shorter time preference (Dilling & Rabin, 1967). In this vein, financial decision-making for the future with a far-sighted perspective is especially needed for older adults who suffer from depression. Having a long-term financial horizon can help people with depression to prepare for medical expenses that might occur as a result of mental illness. The association between the financial planning horizon and depression is of particular importance, since it can have ramifications for individuals with depression who need a long-term financial plan.

1.2 Definitions

Time preference

The concept of time preference refers to the relative preference between the present and the future. Frederick et al. (2002) defined the term "time preference" as "the preference for immediate utility over delayed utility." In general, a higher time preference rate means that payoff in the present period is preferred over the expected future payoff. As the time duration for future gratification increases, the perception of the value of goods or services to be acquired in the future decreases, and people show a preference for what they can own now rather than delay

their rewards. Generally, rewards received sooner are preferred over the rewards received later because the subjective value of the future rewards is determined by the discount rate (Ainslie, 1975). The rate of time preference, which is also called the discount rate, is used to convert the future value to the present value.

Financial planning horizon

The financial planning horizon has been used as a measure of financial time preference in several previous studies (Browing & Finke, 2015; Caliendo & Aadland, 2007; Ingersoll & Jin, 2013; Fulda & Lersch, 2018; Smith, 1995). The financial planning horizon generally indicates individuals' important time periods when they make financial decisions. Based on the length of the planning horizon, individuals with a long-term financial planning horizon are more likely to have long-term goals for their financial needs, indicating a lower rate of time preference. Conversely, individuals with a short-term financial planning horizon are less likely to have long-term goals for their financial needs, indicating a higher rate time preference (Fisher & Montalto, 2010).

Depression and clinical depression

Depression is defined as a disorder that is associated with a persistent feeling of sadness and loss of interest (Alexopoulos, 2005). Clinical depression is a form of depression that is severe and more persistent (Patten & Juby, 2008). Clinical depression which is also called major depression may require treatment or counselling from trained medical or psychiatric professionals depending on the severity of the symptoms.

1.3 Purpose of the Study

No previous study has examined the association between depression and the financial planning horizon among individuals. Although several previous studies have identified an association between mental health and individuals' decision-making ability (Cseh, 2008; Cutler et al., 2006; Gollier, 2002), very few studies have examined the linkage between depression and financial intertemporal decisions (Choi et al., 2011; Christelis et al., 2010). To my knowledge, this will be the first study to shed light on the association between depressive symptoms and financial planning horizon.

This study attempts to fill this gap in the literature by investigating whether depression is associated with a short-term financial planning horizon. This dissertation extends the theoretical framework developed by Laibson (1997), O'Donoghue and Rabin (1999), and Zauberman (2003) to propose that depressed individuals assign a lower subjective weight to their future financial planning needs and empirically show that depressed individuals are negatively associated with having a long-term financial planning horizon. Moreover, unlike most previous studies that used either cross-sectional datasets or primary datasets with small sample sizes, this study uses a panel constructed from the nine most recent waves of the Health and Retirement Study (HRS) datasets spanning a period of 16 years (1998–2014). The primary purpose of this study is to explore whether depression contributes to individuals' financial time preference in the context of financial decision-making.

1.4 Structure of the Study

The primary objective of this study is to establish an association between depressive symptoms and time-oriented preferences in financial decision-making. Therefore, this study

explores older adults' depressive symptoms and its association with their financial planning horizon, and empirically investigates whether an individual's financial planning horizon is affected by depressive symptoms using longitudinal panel data. The main specifications include an individual fixed effects model that is applied to empirically test the hypotheses. The expectation based on the hypotheses is that the short-term financial planning horizon will be associated with depressive symptoms.

This dissertation is organized into five chapters. Chapter 1 introduces the background, purpose, and structure of the study. Chapter 2 reviews the literature and presents the mechanism, conceptual framework, and hypothesis development for the association between depression and financial time preference. Chapter 3 describes the research methods. The results are presented in Chapter 4. Chapter 5 discusses the significance of the findings and its implications, limitations, and future research directions.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the relevant literature from psychology and economics to provide the context of the study. In section 2.1, the extant literature on time preference and intertemporal choice is presented. Section 2.2 describes previous research on time preference and depression. This section introduces different time perceptions that depressed people experience and shows how this difference affects depressed people's rate of time preference. Since the purpose of this study is to explore whether depression contributes to individuals' greater preference for a shorter financial planning horizon, in the context of their financial decision-making, section 2.3 provides a review of various control factors that may correlated with individuals' time preference. In this context, the literature on demographic and socioeconomic factors is presented first, and then research that highlights the psychological factors is described. Section 2.4 presents the conceptual framework of this study, and section 2.5 provides hypothesis development using the theoretical framework.

2.1 Time Preference in Intertemporal Choice

In everyday life, people are faced with the choice of immediate or delayed gratification, known as intertemporal choice (Keren & Roelofsma, 1995; Loewenstein & Prelec, 1992; Loewenstein & Thaler, 1989). For example, people might have an opportunity today to eat sweet chocolates or healthy salads. A student also might choose to study today for an upcoming exam or instead to have a good time with friends. The choice to defer current consumption or increase

future savings for retirement is another well-known example of intertemporal choice (Brown et al., 2015). Faster but lower rewards that are familiar in these scenarios include the pleasure derived from eating delicious but less healthy foods, the happiness of spending time with friends, and the satisfaction of present consumption. On the other hand, maintaining good health, passing the exam, and having a successful retirement are later but higher rewards that increase individuals' well-being. As shown in the examples above, intertemporal choice includes a variety of situations ranging from meaningful life-related decisions such as health, education, and economics, to everyday decisions. The importance and impact of intertemporal choice have been recognized in many academic fields and have been studied extensively.

Intertemporal choice and financial planning horizon are crucial to households when making financial decisions over their life cycle (Wittmann & Paulus, 2008). The decisions about present and future value can be explained by time preference. Some people may prefer immediate benefits and have a shorter financial planning horizon during which they prioritize their financial choices, while others may have a longer financial planning horizon and make choices that increase the potential to receive greater benefits in the future. Some people may not have a preference for either option. Those who show a greater preference for current consumption show a higher preference for the present, while those who are willing to postpone their current consumption in favor of future consumption manifest a higher preference for the future.

2.2 Time Preference and Depression

Previous studies have found that individuals with depressive symptoms are more likely to devalue delayed rewards at a much higher rate than others due to differing preferences of time.

Since those with emotional disorders have a different time experience than healthy people, considerable literature has examined the effect of depression on time perception or time experience. Hence, the question of how people with depression perceive time differently and how this difference can affect intertemporal choices could be an essential question for this study.

In reality, time always flows at a constant speed, but the flow of time that people perceptually experience is variable and relative. Research examining the association between intertemporal decision-making and depression has found that depressed patients perceive time to flow more slowly; therefore, they discount longer-term economic outcomes more than healthy people (Bech, 1975; Blewett, 1992; Hawkins et al., 1988; Mezey & Cohen, 1961; Mundt et al., 1998).

Bschor et al. (2004) found that the subjective time of patients with depression passed slowly compared with non-depressive subjects. Wyrick and Wyrick (1977) demonstrated that depressed patients not only feel that time passed slowly, but they also dwell in the past and focus less on the present and the future. Specifically, depressed people tend to be more obsessed with distant past and closer future events. This result is in agreement with Dilling and Rabin's (1967) study, in which depressed groups avoided a future-oriented perspective. Straus (1947) illustrated how depressed patients responded to the survey questions about time perception. Most respondents with depression felt that the future is remote and hopeless, which makes them obsessed with the past. These traits of depression can be a barrier for depressed people that keeps them from looking forward to the future. The future seems to be interpreted as hopeless and inaccessible, and this fear of the future leads to myopic decisions of depressed people. Mezey and Cohen (1961) also recorded the expression of time perception of depressed patients ("Every hour seems a year to me", "It is terribly slow", "Time? It is standing still"). These expressions

show how people with depression perceive and estimate time differently. Therefore, this body of research concludes that the subjective speed of time has been found to be slower in depressed people.

Why would depression make people feel that time flows so slowly that they make present-oriented decisions? Discovering the time preference of depressive symptoms has been of particular concern to researchers across the fields of psychology and medicine. There is disagreement on whether depressed patients overestimate or underestimate time intervals, but most studies agree that depressed people perceive that time moves slowly.

Some studies have suggested that depressed patients underestimate and slow the passage of time (Gil et al., 2009; Mezey & Cohen, 1961; Tysk, 1984). For example, Tysk (1984) found that people in bipolar depression groups counted the time intervals more slowly, so time was underestimated, whereas the other group of affective disorders over-estimated time by counting it too fast. In a similar approach to Tysk's, other studies have also shown that patients with depression underestimate time (Bschor et al., 2004; Droit-Volet, 2013; Grinker et al., 1973; Kuhs et al., 1991). On the other hand, other studies have identified that people with depression overestimate time. These studies have described that individuals with depression expect time to pass by more quickly than it actually does (Dilling & Rabin, 1967; Guan et al., 2015; Mundt et al., 1998; Wyrick & Wyrick, 1977). Wyrick and Wyrick (1977) found that depressed patients overestimated time during the experiment and that depression was associated with a perceived slowing down of time. These findings are in line with Dilling and Rabin's (1967) argument that the future seems to be unnavigable for depressed patients, which is linked to their limited future-oriented behavior.

This perception of slowed-down time for depressed people is of importance because abnormal time perception has a significant influence on individuals' time preference. In other words, a higher time preference leads to myopic decisions in intertemporal tasks, which impairs quality of life over time (Wittmann & Paulus, 2008).

Beck (1987, 2005) explained three reasons why depression leads to a biased view: (1) a negative representation of the self, (2) a negative view of the personal world, and (3) a negative view of the future. Beck's cognitive triad model implies that depressed people have a negative opinion about the present as well as the future. With a negative perspective on the future and the present, depressed people make unchallenged life choices. The theory of helplessness also indicates that people who are depressed tend to deviate from normative behavior or give up mid-way through a behavior (Beck, 1987; Leahy, 1997). Meanwhile, Strulik (2019) found that depressed individuals saved less, made unhealthy choices, did not invest in their health, and exercised less than non-depressed individuals. These patterns of behavior became a factor in reducing the patients' appetite, sleep, energy, and longevity (Gorwood, 2010). Therefore, depression affects not only their short-sighted preference but also the quality of life (Mendlewicz, 2010).

MacLeod and Salaminiou (2001) also postulated two reasons for reduced positive future perception for people experiencing depression. First, on the cognitive side, depressed individuals find themselves inaccessible to a positive future expectation. Second, anhedonia, defined as a condition where an individual does not perceive pleasure in response to positive stimuli, leads to negative expectations (MacLeod & Salaminiou, 2001; American Psychiatric Association [APA], 2013; Moreira et al., 2019). Recently, studies have shown that about 40% of depressed people experienced severe anhedonia (Pelizza & Ferrari, 2009; Rømer et al., 2015; Spijker et al., 2001).

A lack of positive emotions is one of the factors of anhedonia seen in depression (Clark & Watson, 1991), and several experiments have tested the reduced positive response of depressed patients after presenting pleasant stimuli (Horan et al., 2006; Sloan et al., 1997; Sloan et al., 2001). MacLeod and Salaminiou (2001) argued that depressed people are reluctant to look forward to the future because of their inability to experience pleasure from an expected future positive event. Since depressive symptoms could be represented by anhedonia, the expected future rewards from a positive economic decision are likely to give little pleasure to depressed people (Lempert & Pizzagalli, 2010). Thus, financial decisions based on the expectation of future rewards may not motivate depressed patients, because the utility they might derive from future gains is negatively associated with depression. Therefore, depressed people find it difficult to positively anticipate the future because there is no expectation that future events will bring them a positive or pleasurable experience.

Depressed people who have negative views about the future (Abramson et al., 1989; Beck, 2002; Pietromonaco & Markus, 1985) might think of loss as an obvious outcome of the future and tend to avoid risky behavior (Leahy, 1997; Leahy et al., 2012). Leahy (1997) argued that depression produces a tendency to resist change because patients with depression tend to focus more on the probability of future failure than the probability of future success. Depressed individuals believe that both the future and the currently available resources are limited, unpredictable, and uncontrollable. Likewise, considering the potential for failure and not considering the potential for gain is assumed to be the default for depressed patients.

According to the modern portfolio theory, risk-taking individuals prefer diversifying into riskier asset classes with higher expected returns for the portfolio (Markowitz, 1952). A rational individual is willing to make a long-term plan and invest into riskier asset classes in anticipation

of future benefits. However, a depressed individual with insufficient resources is likely to be afraid of future failure and would be expected to refuse a long-term diversification strategy that involves risky asset allocation. In this vein, the expected value model in which people invest in their future with expectations about upcoming rewards seems to be less applicable to depressed people. Among patients with depression-related symptoms, myopic behavior is amplified by a desire to avoid future uncertainty (Halevy, 2004) and a preference for present-oriented and relatively more certain outcomes. Therefore, the demand for immediate short-term rewards is prioritized over the consideration of long-term investments that require a longer investment time horizon (Leahy, 1997). This preference for the present results in a divergence of investment planning decisions between depressed and healthy individuals.

To sum, the abnormal time perception of depressed people makes them feel that time is passing by very slowly. This tendency affects the direction of the financial decision-making of depressed people. Moreover, people with depression are discouraged from long-term investments due to their perception of negative expectations with regards to their future, which may lead to a considerable discount on future outcomes.

2.3 Correlates of Time Preference

Pulcu et al. (2014) examined whether depressed people show abnormalities in financial reward processing and found that patients with major depressive disorder were more likely to prefer closer financial rewards and greatly discounted future value. Rehm and Plakosh (1975) also investigated the preference for immediate reinforcement in depression and found that depressed individuals preferred immediate rewards to delayed reinforcement. Likewise, considerable literature has provided evidence of an association between depression and its

preference for short-term financial outcomes. A higher rate of time preference is assumed to be one reason why depressed people may receive greater utility from choosing short-term financial benefits over long-term financial benefits. Therefore, the most prominent determinants of the discounting rate have been the subjects of many previous studies across the fields of psychology and economics.

Demographic and socioeconomic factors

Individuals' time preference rates differ according to various demographic and socioeconomic determinants. Arguably, there is sufficient evidence of the important effects of one's age on the subjective time preference (Green et al., 1996; Lawrance, 1991; Rogers, 1994; Sozou & Seymour, 2003). Rogers (1994) found that people's preference for a specific time horizon for expected financial outcomes depends on age. They found that middle-aged adults had a different preference for future outcomes than younger adults or older adults. However, Sozou and Seymour (2003) provided a contrasting opinion to Rogers's inverted U-shaped relationship between subjective time preference and age. Sozou and Seymour (2003) suggested a U-shaped graph and showed that both younger and older adults manifested a short-sighted preference when compared with middle-aged adults. These studies confirmed that age is a critical factor associated with individuals' intertemporal financial decision-making.

Lawrance (1991) suggested four significant determinants of time preferences: households' age, education attainment, race, and income status. In particular, Lawrance (1991) found that college-educated households, higher-income households, and White households showed a lower preference for immediate utility than their counterparts. Dow and Jin (2013) showed that married people have a long-term financial planning horizon, indicating that marriage decreases their preference for present consumption. Fulda and Lersch (2018) also examined the

association between partnership status and the financial planning horizon and found that cohabiting individuals are more likely to have a long-term financial planning horizon. Wertheim and Schwarz (1983) first examined whether gender differences existed in immediate reward preferences. They found that males were generally more present-oriented in their financial decisions than females and were more likely to seek immediate gratification. Therefore, males are prone to be more present-biased than females in their intertemporal choice.

There is also strong consensus that income is a significant factor in intertemporal discounting (Becker & Mulligan, 1997; Brown et al., 2015; Green et al., 1996). Green et al. (1996) examined the association between income status and the preference for long-term financial behavior under delayed reward frameworks. They found that, among the different income groups, the lower-income groups are more impulsive than upper-income groups. This result indicates that people with a higher income showed a greater preference for future consumption (Brown et al., 2015). In other words, the lower the income, the higher the preference for immediate consumption. Some studies also have shown that income and net worth are crucial factors that affect individuals' financial decision making (Epley et al., 2006). Becker and Mulligan (1997) pointed out that time preference varies with individuals' income and wealth status. They indicated that people who have more assets displayed more patience than poor people. On the other hand, there is evidence that a higher rate of time preference is related to having debt. Individuals with debt are more likely to prefer immediate economic outcomes than those without debt (Dombrovski et al., 2011).

In addition, cognitive differences have been linked to individuals' differences in their rates of time preference for financial rewards. Bobova et al. (2009) found that a decrease in cognitive abilities contributed to a higher rate of time preference. Lower scores on intelligence

and working memory capacity were associated with a higher rate of time preference. Moreover, some papers have shown that lower intelligence levels are also related to the preferences for immediate rewards (de Wit et al., 2007). Another study suggested that, among the cognitive components, decreased working memory is also linked to a higher rate of time preference (Hinson et al., 2003; Hoffman et al., 2006). Consistent with this, Christelis et al. (2010) found that individuals with poor cognitive ability were less likely to make long-term-oriented investment allocation decisions.

There is also evidence of a strong association between an individual's health and time preference. Chao et al. (2009) examined the relationship between physical health and rate of time preference and found that individuals in very poor health groups were more likely to have a higher rate of time preference and make short-term-oriented financial decisions. This impatience of unhealthy people could be explained by a strong preference for immediate reimbursement. People with very poor health have to deal with more medical expenses or living expenses than healthy people. If this is the case, then the subjective rate of time preference of depressed patients, who are physically and mentally weakened, may be predicted to be higher than their healthier peers.

Conversely, Zagorsky (2005) found that individuals with relatively good health status are more likely to have a long-term financial planning horizon. Becker and Mulligan (1997) demonstrated that differences in health status could affect time preference because good health conditions increase life expectancy (Brown et al., 2015), which improves future utility. In this view, a mental disorder may shorten one's life expectancy and future utility. If people with poor mental health have an expectation of a lower quality of life in the future, it then becomes reasonable to predict that their distortion of time perception is likely associated with their myopic

preferences. Meanwhile, Farley and Wilensky (1985) found that people with health insurance prepare for future uncertainty with a long-term planning perspective.

In fact, previous studies have found that poor mental health has been associated with higher discount rates and a greater preference for present-oriented financial decisions or a higher rate of time preference (Danielson et al., 2003; Frederick, 2005). Indeed, several studies have examined the associations between the time horizon that people consider when making financial decisions and their psychological state of mind (Kirby & Petry, 2004; Kräplin et al., 2014; Milenkova et al., 2011). Milenkova et al. (2011) found that patients with Parkinson's disease made decisions that prioritized immediately obtained outcomes over delayed ones. They also revealed that pathological gamblers assigned a higher probability than healthy participants to shorter-term financial outcomes over longer-term payoffs when making financial decisions (Kräplin et al., 2014). Kirby and Petry (2004) provided evidence that drug abusers' discount rates are higher than those of healthy control subjects. Although a substantial amount of literature on the discount rate and mental health has been examined, less attention has been directed toward depression.

Psychological factors

A growing amount of literature highlights the psychological context in intertemporal tradeoffs. Studies in intertemporal research have revealed that positive emotion shapes patients' decisions (Ifcher & Zarghamee, 2011; Lane, 2017; Pyone & Isen, 2011). Ifcher and Zarghamee (2009) postulated that a happy mood reduces myopic decision-making. On the other hand, recent research has shown that negative emotions in intertemporal choice lead to a near-sighted decision at higher discount rates (Augustine & Larsen, 2011). In Augustine and Larsen's (2011) experiment, participants who were primed with negative affect words showed a larger discount

rate. Wertheim and Schwarz (1983) found that sadness with depression is associated with a preference for immediate gratification. Recent research exploring the effect of natural disasters on time preference has indicated that this traumatic experience affects individuals' short-sighted decisions (Engelmann et al., 2013). Li et al. (2011) compared the discount rate measured before and after an earthquake and found that the affected participants discounted the future at a higher rate after the earthquake. These results demonstrate that negative emotions affect individuals' delayed discounting.

Frederick et al. (2002) explained that the study of intertemporal choice should be accompanied by the role of individuals' emotional change. Depressive symptoms could increase the discount rate through several mechanisms. First, the myopic misery hypothesis explained why sadness makes people impatient and focused on present-biased decisions (Lerner et al., 2013). Lerner et al. (2013) examined the impact of negative emotion on time discounting and confirmed a myopic-misery hypothesis, which is evidence of how negative mood affects intertemporal choice. In their experiment, sad people were more likely to make impatient financial decisions and preferred immediate smaller rewards over larger delayed rewards. This study confirmed that people with negative emotions were more likely to make myopic decisions. Wertheim and Schwarz (1983) tested the hypothesis that depressed people offset negative thoughts by seeking immediate gratification. In their experimental study, they observed that those who suffered from depression struggled to delay gratification.

There is also neural evidence of the negative emotional effect on intertemporal preference. Using the International Affective Picture System (IAPS), Guan et al. (2015) studied how the primes of fear and joy make a difference in discounting behavior. The findings from Guan et al.'s (2015) experiment indicated that participants made far-sighted decisions in

response to temporary emotional stress. These results are consistent with previous studies, where emotional states affected individuals' preference for delayed discounting (Augustine & Larsen, 2011; Li et al., 2011; Liu et al., 2013). Eventually, several other studies indicated that intertemporal choice could vary according to emotional effect. More importantly, the influence of negative emotions leads to short-sighted decisions in the intertemporal tradeoff.

A large amount of literature has examined potential factors of individuals' time preferences that may occur with the onset of depressive symptoms. The failure of self-control may make individuals maximize immediate reinforcements over delayed reinforcements (Rehm, 1977; Rehm & Plakosh, 1975). Wittmann and Paulus (2008) showed that people who are poor at self-control choose more immediate outcomes than do more self-controlled individuals. On the contrary, people with strong self-control might wait for delayed rewards. Impulsive people might also choose immediate gratification (Barkley et al., 2001; Koff & Lucas, 2011) because impulse control is closely associated with self-control.

Impulsive tendencies have been found to be related to individuals' rate of time preference (Ainslie, 1975). Impulsiveness has attracted attention from researchers in psychology and economics because it is the most crucial factor preventing someone from making plans. Patton et al. (1995) revealed three factors of impulsiveness: attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness. Similarly, Corruble et al. (2003) showed three dimensions of impulsivity in depression: behavioral loss of control, non-planning, and cognitive. An experiment that examined the association between non-planning impulsivity of middle-age adults and delayed discounting rate (de Wit et al., 2007) measured participants' impulsivity using the Barratt Impulsivity Scale (BIS10-R; Barratt, 1985), which includes a scale for non-planning impulsivity. Their findings indicated that a score representing "failing to plan ahead" is

positively associated with the delayed discounting rate among the BIS10-R. These non-planning features of impulsiveness interfere with long-term perspective planning.

There is also evidence that binge drinkers, current smokers, people with ADHD, and heroin users who show higher impulsivity are more likely to have a higher rate of time preference (Baker et al., 2003; Demurie et al., 2013; Madden et al., 1999; Vuchinich & Simpson, 1998). Specifically, Petry (2001) reported that pathological gamblers have a higher rate of time preference and that gamblers with substance use disorders discounted future rewards at a higher rate than other gamblers. Reynolds (2006) also found that higher discounting rates were related to problematic behaviors, such as drug use and gambling. These papers have shown that impulsive people demonstrate higher rates of time preference. As a high level of trait impulsivity was found in depressive episodes (Corruble et al., 1999; Jakubczyk et al., 2012; Peluso et al., 2007; Takahashi et al., 2011), the unplanned nature of impulsivity is expected to lead to a higher rate of time preference in depression, because depression inhibits short-term impulse control (Gonzalez et al., 2011) and expectations for the future (Tice et al., 2001).

According to Abramson et al.'s (1989) hopelessness theory, depressed individuals seem reluctant to try something new because there is no incentive to expect a positive outcome. In addition, as hopeless individuals have negative expectations about the future, this negative expectation reinforces the feeling of sadness, which causes a vicious cycle that predicts a bleak future. Pulcu et al. (2014) found that people felt discouraged from long-term investments due to the perception of hopelessness with regard to their future. Hopeless people displayed a significant discounting rate for future events, which prevented them from investing with a long-term perspective. Meanwhile, MacGiollabhui et al. (2018) found that reduced hopelessness is related to future-orientation, particularly the ability to plan for the future.

Large numbers of studies have found that pessimistic people are more likely to manifest short-sighted behavior, given their negative outlook for the future (Abramson et al., 1989; Beck, 2002). An experiment conducted by MacLeod and Byrne (1996) distinguished the differences in future anticipation between anxious people and control participants. Their results indicated that the more anxious participants made negative predictions about upcoming events in a given future-thinking task. Alloy and Ahrens (1987) demonstrated that depressed people make pessimistic predictions about their uncertain future (Lefèvre et al., 2019) compared to those who are not depressed. Several studies observed that depressed subjects evaluate the situation negatively (Sweeney et al., 1986) and more pessimistically anticipate future events compared to their non-depressed counterparts (Lefèvre et al., 2019; Pyszczynski et al., 1987).

2.4 Conceptual Framework

The conceptual framework for this study was developed using the theoretical underpinnings drawn from past literature and applying the mechanisms of how depression is associated with individuals' financial time horizon. In the extant literature, people's decisions to plan their finances for the long term instead of the short term, or vice versa, have traditionally been explained using discounted utility theory (Bleichrodt & Gafni, 1996; Frederick et al., 2002; Loewenstein & Prelec, 1992). The discounted utility model was first proposed by Samuelson (1937) and has been widely used as a model for analyzing intertemporal choice. One of the reasons for the wide acceptance of this model in explaining intertemporal decision-making is that the discounted utility model is simple to apply and easily compares the present value with the future value. In addition, the consistency of preferences follows the principle of a rational model

in conforming to the principles of economics. The following simplified discounted utility function has been used to discount future utility to present value:

$$U_0 = \frac{U_t}{(1+\delta)^t} \tag{2.1}$$

where U is the utility in time period 0 and t, δ is the discount parameter per period of the time interval, and t is the number of time intervals in the delay. The utility in the future time period t is converted into the present value. A constant discount rate δ and time period t are applied to the discount, as shown in equation (2.1).

Despite previous literature's wide application of this theory when explaining intertemporal decision-making, a number of limitations have been found regarding the efficacy of the discounted utility model in consistently explaining household financial decision-making (Ariely & Carmon, 2002; Barberis, 2018; Frederick et al., 2002; Shefrin, 2010; Thaler, 2016). One major limitation of the discounted utility model is that it assumes the consistency of preferences. The discounted utility model assumes that people's intertemporal decision-making is determined at a stationary and uniform discount rate. This assumption implies that every individual consistently discounts future value with respect to the present value.

Adjusting for the differences in individuals' discount rates, some studies have suggested a model based on hyperbolic preference as an improvement to the discounted utility model. For example, the reason for a poor savings rate (Laibson, 1997; O'Donoghue & Rabin, 1999) or addictive behavior (Gruber & Köszegi, 2001; O'Donoghue & Rabin, 1999) could be explained by hyperbolic discounting. Equation (2.2) expresses the most commonly used hyperbolic

discount model (Mazur, 1987), which shows that the value of short-term tradeoffs is decreased more steeply, but the reducing rate gradually decreases.

$$V = \frac{A}{1 + kD} \tag{2.2}$$

where V is the present (discounted) value of a cash flow expected in the future, A is the amount of future cashflow, k is the discounting parameter, and D is the length of time. Equation (2.3) is a generalized hyperbolic discount function with an exponent (Angeletos et al., 2001; Loewenstein & Prelec, 1992; Mazur, 1987).

$$V = \frac{A}{1 + kD^{\beta}} \tag{2.3}$$

where D is increased to the power β. This exponent β indicates individuals' sensitivity to delay (Logue et al., 1984).

Although hyperbolic discounting can account for the inconsistencies in time preferences for individuals based on different situations and environments, the model is limited in its application because it does not consider individuals' subjective time preference (Zauberman et al., 2009). Furthermore, the discount rate may vary depending on other behavioral factors not explained by the discounted utility model or the hyperbolic discounting model.

People may have inconsistent preferences when determining the current or future value of an economic benefit (Frederick et al., 2002; Green et al., 1997; Loewenstein & Prelec, 1992; Loewenstein & Thaler, 1989; Thaler, 1981). Health-related (Cseh, 2008; Cutler et al., 2006),

cognitive, and mental health-related factors (Bartel & Taubman, 1986; Christelis et al., 2010; Ju et al., 2017; Pak & Babiarz, 2018) have been found to be associated with poor financial decision-making. A number of previous studies have either focused on physical health and economic outcomes (Berkowitz & Qiu, 2006; Fan & Zhao, 2009; Love & Smith, 2010) or looked at the association between mental health and portfolio allocation (Christellis et al., 2010; Ju et al., 2017). According to Becker and Mulligan (1997) and Pak and Choung (2017), poor physical health reduces an individual's perceived life expectancy and, as a result, affects their preference to save or plan for the long term. In other related studies, substance abuse has been associated with significantly higher discounting of future outcomes (Danielson et al., 2003; Kirby & Perry, 2004). Although previous studies have mainly focused on the effects of mental health on either financial decision-making or economic outcomes, it is expected that, consistent with these findings, depression could be associated with an individual's preference to discount the future at a much higher rate and negatively affect their preference to plan for the long term.

It is also possible that people suffering from depression expect higher health-related expenditures and therefore prefer the liquidity of their assets. Hence, they prefer to plan for the short term rather than for the long term. For example, previous studies have found that individuals suffering from mental health-related illnesses are more financially constrained than healthier individuals (Cseh, 2008; Kochar, 2004). The expected constraints in financial resources might result in individuals' preference for liquidity and, hence, their preference for a near-term financial time horizon.

Consequently, depressed individuals may be willing to receive smaller rewards sooner rather than receive larger rewards later. The future may seem further away for people experiencing depression, and the preference for current consumption and gratification is linked

to this limited future-oriented behavior (Dilling & Rabin, 1967). As a result, in this study, depression is expected to negatively affect individuals' long-term financial time horizon by affecting their ability to assess and optimize their financial decision-making across time.

Therefore, this study proposes that depression could affect individuals' financial planning horizon by diminishing their preference to plan for the future. In this context, accounting for people's subjective time discounting, the proposed theoretical model was adapted from the quasi-hyperbolic discounting model used in previous literature (Laibson,1997; O'Donoghue & Rabin, 1999; Zauberman, 2003). The model assumes that two time periods exist, where t_0=present and t_1=future. Based on an individual's available resources R_0^i in the current period, that individual may choose to consume a portion of this amount, c_0^i, and save the remaining amount for the future, s_0^i. It is also assumed that the amount that an individual saves for the future grows across time by earning a rate of return r. In the second period t_1, individuals will have resources R_1^i that include the amount they consume c_1^i and the wealth s_1^i that they have accumulated over time.

$$R_0^i \geq c_0^i + s_0^i \qquad (2.4)$$
$$R_1^i \geq c_1^i + s_0^i(1 + \mathrm{r})$$

Therefore, individuals will maximize their utility $U(c_t)$ within the constraints of their resources R^i, time period t, and the rate of return r. The individual can have either a short-term financial time horizon and consume c^i more in t_0, thereby saving s^i less to spend for the future, or they can have a longer time horizon and consume c^i less in the current period t_0 and save s^i

more for future consumption. Based on the work of Varian (2014) and Zauberman et al. (2009), the theoretical model at time t can be rewritten as:

$$U(c_0, .., c_t) = D(0)u(c_0) + \beta \sum_{t=1}^{T} D(t)u(c_t) \quad (2.5)$$

where the discounting function $D(t) = \left(\frac{1}{1+r}\right)^t$, β is the subjective discounting factor, and $0 \leq \beta \leq 1$. The subjective discounting factor is an indicator of an individual's rate of time preference. Based on this theoretical model, it is proposed that, as an individual's β decreases, their preference for future utility also reduces. Individuals who have a lower β are expected to have a short-term financial time horizon because they have a greater preference for immediate outcomes. Hence, individuals suffering from depression have β^{δ}, which is smaller than β ($\beta^{\delta} < \beta$). The final equation (2.6) applying a subjective discounting factor of an individual with depression is stated as:

$$U(c_0, .., c_t) = D(0)u(c_0) + \beta^{\delta} \sum_{t=1}^{T} D(t)u(c_t) \quad (2.6)$$

Depressed individuals are expected to have a lower perceived value of future gains and thus prefer a shorter financial time horizon than people who do not suffer from depression.

2.5 Hypothesis Development

The conceptual framework of this study suggests that depression will be negatively associated with the financial planning horizon, as depressive symptoms highly discount future outcomes. The review of the literature so far shows a paucity of research on the depression–time

preference correlation. Especially lacking are studies on the extent to which the financial planning horizon shifts with the onset of depressive symptoms. Although a few studies have linked mental illness to hyperbolic discounting, less is known about how depressive symptoms affect a longer-term financial planning horizon. To fill this gap in the literature, this study utilized a five-category financial planning horizon measure in the Health and Retirement Study (HRS) and estimated regression models that identify depression as a determinant of the planning horizon. Examining the financial planning horizon has an advantage over evaluating discounting factors because the financial planning horizon is based on a more intuitive scale and can be utilized as a quick assessment tool in financial planning practice.

Moreover, taking advantage of a large number of covariates in the HRS, this study investigates the potential heterogeneities between different demographic and socioeconomic characteristics. In addition, this study accounts for the potential confounding effects of emotional changes (e.g., hopelessness, pessimism, impulsiveness, and self-control) that may occur with the onset of depressive symptoms. In particular, this study demonstrates how the association between depression and financial planning horizon changes when the regressions account for psychological states. In this context, the following hypotheses are presented:

(H_1) A negative association exists between depressive symptoms and an individual's financial planning horizon across time after controlling for time-varying factors.

(H_2) The association between depressive symptoms and the financial planning horizon differs by demographic and socioeconomic characteristics (e.g., gender, race, education background income, and net worth).

(H_3) Depression is negatively associated with the financial planning horizon after controlling for the underlying emotional factors (e.g., hopelessness, pessimism, impulsiveness, and self-control).

CHAPTER 3

METHOD

This chapter describes the empirical strategy, the dataset, and the variables used in this study, along with other benchmark specifications. The data description of the HRS is presented in section 3.1. In sections 3.2 and 3.3, the explanatory and outcome variables are described in detail, respectively. These subsections discuss how this study measures depression and the financial planning horizon, which is our primary variable of interest. Section 3.4 presents the measures of covariates. Lastly, section 3.5 introduces the specification of the main regression model and robustness checks.

3.1 Data Description

The data used in this study originates from 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, and 2014 waves of the HRS. The HRS is a longitudinal study that has surveyed Americans aged 51 and older every other year since 1992. The initial wave in 1992 consisted of two separate cohorts: the HRS cohort whose birth dates lie between 1931 and 1941, and the Asset and Health Dynamics among the Oldest Old (AHEAD) cohort born between 1890 to 1923. The Children of Depression Age cohort (born 1924-1930) and War Baby cohort (born 1942-1947) entered the HRS in 1998, making the sample representative of individuals born in 1947 or before. Additional birth cohorts born between 1948 and 1953 (Early Baby Boomer cohort) and between 1954 and 1959 (Mid Baby Boomer cohort) were added to the ongoing HRS in 2004 and 2010, respectively. The baseline response rates range from 70% to 80%, followed by 85%–93%

response rates in the follow-up waves. The HRS collects data on a variety of different domains, including individuals' physical and mental health, financial status, socioeconomic status, and demographic characteristics. This rich set of longitudinal responses makes the HRS suitable data for exploring individuals' behavioral changes over a long period of time. Although the panel is unbalanced due to nonresponses and proxy interviews, the within variation in HRS is sufficiently large to exploit the longitudinal structure of data.

The HRS contains particularly detailed information on mental health-related details and also provides comprehensive information on individuals' financial behavior, which allows this study to take into account the association between depressive symptoms and financial planning horizon. Moreover, the duration of the HRS makes it exceptionally well-suited for examining dynamic changes in the financial planning horizon in response to changes in mental health status.

3.2 Measures of Depression

Our primary variable of interest is the individuals' depressive symptoms. Depression has been known to be the most prevalent psychiatric disorder among older people (Reiger et al., 1988). Considering depression's enormous impact on older adults, HRS has been continually analyzing it since the first wave. HRS provided two significant measures of depression: 1) Center for Epidemiologic Studies Depression scale (CESD), and 2) short form of the World Health Organization's Composite International Diagnostic Interview (CIDI-SF). The CESD scale is focused on psychological distress; the CIDI score is meant to measure major depressive episodes. In this study, these two different measures of depression are used as a proxy for depression and clinical depression, respectively.

CESD scale

First, the CESD scale is mainly used to measure the respondent's depression status. CESD has been widely used for measuring the frequency of depressive symptoms and is designed to be suitable for surveys (Radloff, 1977). In addition to HRS, numerous other datasets, including the National Health and Nutrition Examination Survey (NHANES), the Established Populations for Epidemiologic Study of the Elderly (EPESE), the National Longitudinal Surveys (NLSMature Women, NLS-Older Men, NLSY), and the Americans' Changing Lives study (ACL), include the CESD scale as an index of depression (Steffick et al., 2000). The widely selected CESD scale has proven its reliability[3] and validity. In the first wave of HRS, respondents had to evaluate 11 questions in four categories: 1) rarely/none of the time, 2) some of the time, 3) most of the time, and 4) all of the time. However, from the second wave, the questions were reduced to eight, and the answer was changed to a yes or no response. Since the sample in our study starts with the fourth wave, the eight modified questions are adopted for the analysis. "Yes" or "no" responses were collected from the respondents on all eight items. The detailed questions are presented in Table 1.

The CESD score is specified in the range of zero to eight, adding the number of times the respondents answered yes to the above eight questions. Because the questionnaire has six negative and two positive questions, the positive questions were coded inversely. The responses were then summed to yield a total scale ranging from zero to eight. A higher number of CESD scores resulted in more severe depressive symptoms (Schane et al., 2008). As an alternative measure, the CESD scales are also used to create a dichotomous variable for analysis. A score of three or higher (3–8) is assigned to a value of one, since these scores are considered to show a

[3] In the HRS dataset, the CESD scale has a reliability Cronbach's alpha score of 0.81 to 0.83 (Steffick et al., 2000).

higher likelihood of a clinical diagnosis of depression. A score of less than three (0–2) is assigned to a value of zero, indicating no depressive symptoms (Schane et al., 2008).

CIDI scale

Secondly, a short form of the CIDI[4] score was adopted for evaluating Major Depressive Episodes (MDE). The CIDI scales provide diagnostic criteria for a major depressive episode as defined by the *Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association*, revised third edition (DSM-III-R). Previously, this short form of CIDI was conducted to apply to the National Health Interview Survey (NHIS) (Steffick et al., 2000). The CIDI questionnaire structure is somewhat more complicated than the structures of the CESD scales. The respondents were investigated for symptoms after identifying the worst episodes in the last 12 months. Additionally, the persistence of symptoms was also estimated by questions employing the DSM-III-R criteria (Steffick et al., 2000).

The CIDI consists of a total of 33 questions, but not all questions are answered by respondents. Fig. 1 shows the detailed procedure for how the CIDI-SF questions are included in the HRS. If the respondents answered "no" to the first screen question, then the respondents continued to the second screen question. If the respondents responded "no" again, then the CIDI procedure was terminated. Specifically, the first screen question was about depressed mood dysphoria[5], and the second screen question was about anhedonia[6]. The respondents who answered "yes" to the first screen question immediately went to the question related to intensity (fraction of day with symptoms) and duration (how often during the episode) of symptoms. If the respondents answered "no" to either of the two questions, they moved to the second screen

[4] Cronbach's alpha for the CIDI score is 0.89 (Gigantesco & Morosini, 2008).
[5] Depressed mood (Steffick et al., 2000).
[6] The inability to experience pleasure from normally pleasurable activities (Steffick et al., 2000).

question. If they answered “yes,” then seven inquiries related to depressive symptoms were given. One question about anhedonia was included in these seven questions (Anhedonia, Low Energy, Loss or Increase of Appetite, Trouble Sleeping, Poor Concentration, Feel Worthless, Thought about Death).

The respondents who answered “no” to the first screen question and then reached the second screen question were asked about the intensity and duration of symptoms in the same way. Those who answered “yes” to both questions received the same six questions related to depressive symptoms, except for the anhedonia question (Low Energy, Loss or Increase of Appetite, Trouble Sleeping, Poor Concentration, Feel Worthless, Thought About Death). As for the question about intensity, “yes” indicated all day long or most of the day, and “no” meant less often. In terms of duration, “yes” implied every day or almost every day, and “no” indicated less often.

Finally, the CIDI score was determined by combining the symptoms of six dysphoria questions and one anhedonia question for those who passed the questions about intensity and duration. Therefore, these series of measures ranged from zero to seven, with higher scores indicating more severe episodes of depression. Using this CIDI variable, a dichotomous variable was created as an alternative summary variable. It is known that a score of three or more is clinically assessed as having severe distress, which is considered major depression (Nelson et al., 1998). Thus, a value of one was assigned to the respondents whose CIDI scores were three or higher (3–7), and a value of zero was assigned to the respondents whose CIDI scores were less than three (0–2).

Subjective well-being

Additionally, this study included subjective well-being as an explanatory variable representing an alternative to the opposite measure of depression. There is a voluminous amount of literature that suggests a negative correlation between subjective well-being and depression (Van Hemert et al., 2002; Zheng, 2016). Furthermore, there is also consistent evidence of a negative correlation between subjective well-being and clinical depression (Gargiulo & Stokes, 2009; Lagnado et al., 2017).

In HRS, the measure of global life satisfaction developed by Diener et al. (1985) was used as an indicator of subjective well-being. This variable provides a high level of internal consistency and reliability[7] (Diener et al., 1999; Diener et al., 2009). The respondents were asked to answer the following five questions: 1) In most ways my life is close to ideal, 2) The conditions of my life are excellent, 3) I am satisfied with my life, 4) So far, I have gotten the important things I want in life, and 5) If I could live my life again, I would change almost nothing. The response includes a seven-point scale, and it is coded with the value of one if strongly disagree, two if somewhat disagree, three if slightly disagree, four if neither agree nor disagree, five if slightly agree, six if somewhat agree, and seven if strongly agree. These questions were available for 2008, 2010, 2012, and 2014 waves but were not asked in 1998, 2000, 2002, 2004, 2006 waves. Thus, while the sample size is somewhat insufficient to take advantage of the panel, it would be worthwhile to test subjective well-being as another opposite definition of the depression measure.

[7] Cronbach's alpha for the subjective well-being score is 0.88 to 0.89 (Smith et al., 2017).

Distribution of explanatory variables

The distribution of CESD and CIDI scores is clearly illustrated in Figs. 2 and 3. These figures show the rough pattern of how the distribution of observations varies by depression scores. In Fig. 2, the range of the CESD score is presented in the x-axis, and the y-axis represents the sample size falling in that each category. This histogram graph is towards the left-most side, indicating right-skewed distribution. Hence, approximately 45% of respondents answered that they didn't feel depressed much of the time during the past week. According to Fig. 3, about 89% of respondents are screened out of the CIDI survey, since they answered "no" to both screen questions.

The distribution of subjective well-being scores is also illustrated in Fig. 4. This figure also shows the approximate pattern of how the distribution of observations varies by subjective well-being score and each wave. In Fig. 4, the range of the subjective well-being score is presented in the x-axis, and the y-axis represents the sample size falling into each category by each wave. This histogram graph is towards the right-most side, unlike in Figs. 2 and 3, indicating left-skewed distribution. Therefore, the distribution of subjective well-being shows comparable, but precisely the opposite distribution of, CESD and CIDI scores.

Summary statistics of explanatory variables

Table 2 reports the summary statistics for CESD and CIDI scores representing depressive symptoms and clinical depression, respectively. Table 2 shows that a large proportion of respondents answered that they have no depressive symptoms for both CESD and CIDI scores. Approximately 21% of respondents showed depressive symptoms, and 78% of respondents showed no depression based on the CESD score. According to the CIDI score, which diagnosed

clinical depression, approximately 9% of the respondents suffered from clinical depression, and 90% of respondents showed no clinical depression.

3.3 Measures of Financial Planning Horizon

Financial planning horizon

The financial planning horizon variable from the HRS dataset was selected as a proxy to examine time preference (Smith, 1995). To estimate the financial planning horizon, the respondents were asked about their planning horizon for saving and spending. The financial planning horizon variable has been included in most of the waves of the HRS dataset, with the exception of the 2008 and 2010 waves. Therefore, a total of seven waves were used in the analysis. Specifically, respondents were asked, "In planning your family's saving and spending, which of the following time periods is most important to you and your husband/wife/partner?" The response was gathered on a five-point scale and was coded with a value of one for the next few months, two for the next year, three for the next few years, four for the next 5-10 years, and five for longer than 10 years.

Before testing the impact of depression on the financial planning horizon, Table 3 describes how many participants with or without depression responded to the outcome variable each year. To compare between samples of those with and without depression, the full sample of 63,817 was divided into people without depression (Panel A with 49,896 observations) and people with depression (Panel B with 13,921 observations). Therefore, Table 3 outlines how many individuals with or without depression responded to the financial planning horizon question in each wave. Panel A represents samples without depression, and Panel B describes respondents with depressive symptoms. Interestingly, approximately 32% of respondents without

depression answered “next 5-10 years”, while 12% of respondents answered “next year.” On the other hand, approximately 26% of respondents with depression answered “next few months”, and only 11% of respondents answered “longer than 10 years.” Table 3 shows that respondents without depression are more likely to choose a long-term financial planning horizon on average. In contrast, respondents with depression are more likely to consider short-term financial planning horizons.

3.4 Covariates

The covariates of this study include age, age squared, marital status, number of households, the subjective health status, health insurance status, employment status, log-transformed income, and log-transformed net worth, which may affect the financial planning horizon choice (Chen, 2013; Cobb-Clark et al., 2019; Epley et al., 2006; Varian, 2014). The detailed information about this set of time-variant covariates is presented in this subsection.

Age

The sample was selected for individuals who are between the ages of 50 and 80 and who participated in the HRS survey in 1998 to 2014 waves. Since the primary outcome variable is about financial plans for the future, the samples aged over 80 were excluded from the analysis.

Age squared

To capture a possible non-linear correlation between age and financial planning horizon, a quadratic term of age is controlled for in the empirical model.

Marital status

The marital status was captured by a dummy variable: 1) married, 2) married, spouse absent, 3) partnered were assigned to married; 4) separated, 5) divorced, 6) separated/divorced

were assigned to separated or divorced; 7) widowed and 8) never married were assigned to widowed and single, respectively.

Number of households

The number of households represents the number of residents in the household, including the respondent.

Subjective health status

HRS also contains a self-reported health status and was originally coded with the value of one if excellent, two if very good, three if good, four if fair, and five if poor. The binary variable for this subjective health status indicates a value of one if respondents answered excellent, very good, or good.

Health insurance status

The binary indicators for health insurance status are included in the model. To check respondents' ownership status of health insurance, the respondents were asked to answer whether they were covered by 1) public health insurance, 2) employer-provided health insurance, 3) multiple insurances, 4) other kinds of health insurance, and 5) no health insurance.

Employment status

The binary variable for the labor force status of individuals is presented in five categories: 1) working full-time, 2) working part-time, 3) unemployed, 4) partly retired or retired, and 5) not in the labor force.

Income and net worth

Log transformed income and net worth was also included in the model. Household income and total net worth were converted to 2014 USD using CPI for all urban consumers (CPI-U) from the Bureau of Labor Statistics (BLS) to take inflation effects into account.

3.5 Empirical Specification

3.5.1 Main Regression Model

The main hypothesis in this study is that depression is associated with the financial planning horizon. Based on the theoretical framework, it is expected that depression will be negatively associated with the financial planning horizon. A significantly negative value of the depression coefficient (β_1) in the empirical specification below (eq. 3.1) would indicate a negative association with financial planning horizon for individuals who suffer from depression, thereby indicating a higher rate of time preference as compared with individuals who do not suffer from depression. Therefore, as suggested by the theoretical model and consistent with the first hypothesis of this study, it is expected that when compared with the reference group of individuals who do not suffer from depression, those individuals who suffer from depression are likely to derive a greater utility from receiving more immediate financial benefits.

To examine the main hypothesis (H_1), the individual fixed effects (FE) regression empirically explored the association between depressive symptoms and individuals' financial planning horizon, controlling for other variables that may potentially impact the outcome variable. The individual fixed effects (FE) model was estimated using the following equation:

$$FPH_{it} = \beta_0 + \beta_1 d_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it} \tag{3.1}$$

where FPH_{it} is the individual i's financial planning horizon at time t, and d_{it} is individual i's depression score at time t. The covariate matrix X_{it} includes age, age squared, number of households, marital status, subjective health status, health insurance status, employment status, log-transformed income, and net worth, which may affect the financial planning horizon choice.

All regressions include year-of-survey dummies (τ_t) to account for a time trend in outcome change. The time-invariant individual-specific effect (μ_i) is differenced out by de-meaning variables before estimation. The error term (ε_{it}) is assumed to be *i.i.d.*[8] and follows a normal distribution. Therefore, under this benchmark specification, this study focuses on the effect of depression on the financial planning horizon, which is captured by β_1 when controlling for demographic factors, socioeconomic status, health-related information, and income and wealth levels as control variables.

The individual fixed effects regression is indeed appropriate for analysis because unobserved time-invariant individual effects are eliminated, and the effect of omitted variable bias is also removed. Therefore, the fixed effects regression for the financial planning horizon allows this study to estimate the impact of within-individual changes in depressive symptoms on within-individual variations in the financial planning horizon.

3.5.2 Robustness Specifications

Ordered logit model

In the baseline specification, the individual fixed effects regression was used to estimate within-individual variation. One may argue that ordered logit regression is a better fit since the outcome variable of this study is an ordinal variable, which is defined into ordered categories ranging from one to five. More specifically, the answer for the outcome variable is coded with the value of one if next few months, two if next year, three if next few years, four if next 5-10 years, and five if longer than 10 years. The ordered logit regression is considered appropriate

[8] Independent and identically distributed

because the distance between categories is ambiguous, although higher numbers are assumed to correspond to longer outcomes.

To address this concern, ordered logit regression is explored as an additional analysis. The specific equations for ordered logit model are presented as below:

$$FPH_i^* = \beta_0 + \beta_1 d_i' + \beta_2 X_i + \varepsilon_{it} \tag{3.2}$$

where FPH_i^* is a latent variable that is not observable and determined only if it is equal to the observed ordinal variable FPH_i. To be specific, when FPH_i^* crosses thresholds, FPH_i is defined as:

$$FPH_i\text{=j, if } \alpha_{j-1} < FPH_i^* \leq \alpha_j \tag{3.3}$$

Therefore,

FPH_i=1, 0 < FPH_i^* ≤ next few months

FPH_i=2, next few months < FPH_i^* ≤ next year

FPH_i=3, next year < FPH_i^* ≤ next few years

FPH_i=4, next few years < FPH_i^* ≤ next 5-10 years

FPH_i=5, next 5-10 years < FPH_i^* ≤ longer than 10 years

The probability that the individual i will choose alternative j is specified as:

$$P_{ij} = P\ (\alpha_{j-1} < FPH_i^* \leq \alpha_j) \tag{3.4}$$

$$= F\ (\alpha_j - d_i'\beta)\ -\ F\ (\alpha_{j-1} - d_i'\beta)$$

Finally, the marginal effect of an increase in depressive symptoms on the probability of selecting a long-term financial planning horizon is calculated by the following equation:

$$\partial P_{ij} / \partial d_{ri} = \{F'\ (\alpha_{j-1} - d_i'\beta) - F'\ (\alpha_j - d_i'\beta)\}\ \beta_r \qquad (3.5)$$

Linear probability model

In the descriptive statistics (Table 4), the binary variable for the financial planning horizon was introduced as an alternative outcome variable with a value of zero if the respondents selected the next few months or next year, and with a value of one if the respondents answered the next few years, next 5-10 years, or longer than 10 years. Individuals' propensity for long-term planning and short-term planning was distinguished by using this binary variable. Therefore, a linear probability regression was adopted for robustness checks since a linear probability model (LPM) was employed when the outcome variable was binary. One may argue that the probit model would be more accurate for estimation. However, Heckman (1978) emphasized the simplicity of the linear probability model and recommended applying this model when the outcome variable is binary. Hence, Heckman's strategy was accepted for additional checks. A linear probability model was estimated using the following equation:

$$P(LFPH_i = 1|d_i, X_i) = \beta_0 + \beta_1 d_i + \beta_2 X_i + \varepsilon_i \qquad (3.6)$$

where $LFPH_i$ is a binary outcome variable for the financial planning horizon, and the primary explanatory variables of interest are the vector d_i, which includes CESD, CIDI, binary variable for CIDI, and subjective well-being, respectively. Vector X_i contains all covariates following the benchmark specifications.

Propensity score matching

It is widely acknowledged that propensity score matching is a popular method for causal estimation when there are treatment and control groups. In particular, this approach has been classically used to reduce the selection bias that frequently occurs in observational studies. Observational research, which is extensively used in medical research, shows the difficulty in avoiding selection bias because it selects samples without a random assignment (D'Agostino, 1998). Without a random assignment, treatment and control groups may have significant differences in the observed covariates, which leads to biased results. Recently, propensity score matching has been applied to various studies in which treatment and control groups exist, regardless of whether it is an observational or empirical study (Caliendo & Kopeinig, 2008; Dehejia & Wahba, 2002; Perkins et al., 2000). Because the matching approach evens out the level of covariates between the treatment and control groups, there is no bias in determining the difference in outcome between the two groups.

To deal with the possible selection bias, the propensity score matching approach was conducted under a panel data setting. As we know, there is a treatment group (respondents with depression) and a control group (respondents without depression) in this study. Moreover, propensity score matching can be appropriately applied because the sample size is concentrated in the control group rather than the treatment group. Therefore, accounting for possible selection bias, a propensity score matched regression was employed as a robustness check. This study

applied a kernel matching (KM) approach. The weighted average was to match the treatment and control group. Using the propensity score, which is estimated by logistic regression model, most of the covariates in control and treatment groups were balanced. Specifically, people with depression and people without depression both showed the same distribution on most of the variables after using propensity score matching.

Alternative outcome definition

In the baseline specification, this study focused on the financial planning horizon as a proxy for financial time preference. Intuitively, the long-term financial planning horizon was treated as future-oriented behavior; in contrast, the short-term financial planning horizon was interpreted as present-oriented behavior. Therefore, following previous studies (Chen, 2013; O'Loughlin & Szmigin, 2006; Sansone et al., 2013), alternative measures that can be used for future-oriented behavior or present-oriented behavior, such as 1) smoking behavior (present-oriented), 2) vigorous exercise (future-oriented), and 3) unsecured debt (present-oriented) were explored for robustness checks.

If the primary hypothesis of this study is correct, people with depression are more likely to avoid future-oriented behaviors than people without depression. Chen (2013) introduced a linguistic-saving hypothesis and revealed that linguistic differences affect individuals' future-oriented actions. He compared two different languages depending on whether they separate the future and the present terms grammatically. He pointed out that people speaking languages that use words that distinguish between the present and the future, such as English, feel the distance to future events; people speaking languages such as German, which does not have future tense, do not feel the distance of future events. These differences support the assumption that people

who speak English have a present-oriented preference, and German-speaking people have a future-oriented preference.

Chen's (2013) results indicated that the speakers of languages that express the future in present form are more likely to save and accumulate more retirement wealth. These findings extend to future-oriented behavior; for example, future-oriented people smoke less, have safer sex, exercise more, and are less obese. Chen used data from SHARE, which is a sibling study of HRS, to collect these health-related variables. Therefore, the detailed questions about physical health measures in HRS allowed this study to investigate the impact of depression on future- or present-oriented behavior. Since Chen's (2013) results were based on economic behaviors that are linked to time preferences in intertemporal choice, smoking and exercise were tested for outcome variables as a proxy for the present- and future-oriented behavior, respectively. If depression truly affects individuals' financial planning horizon, then health behaviors that represent a present- or future-oriented attitude should also be affected by depression. Thus, Chen's (2013) approach was adopted to run a similar fixed effects regression for smoking and vigorous exercise as robustness checks.

First, the OLS regression of depressive symptoms on ever-smokers was examined using the linear probability models. The outcome variable was restricted to ever-smokers, indicating past smokers or current smokers. The following equations explain how the linear probability model is estimated by OLS:

$$\begin{aligned} \mathrm{S} &= P(Y = 1|X) + P(Y = 0|X) \\ &= E\ (y|X, \beta) + (1\text{- } E\ (y|X, \beta)) \\ &= \beta_0 + \beta_1 d_i + \beta_2 X_i + \varepsilon \end{aligned} \tag{3.7}$$

Second, an individual fixed effects regression was tested to explore the association between depression and vigorous exercise. Vigorous exercise was a categorical variable showing the frequency of vigorous exercise that ranges from one to five. More specifically, it was coded with the value of one for never exercise, two for 1-3 per month, three for 1 per week, four for greater than 1 per week, and five for every day. Therefore, as a proxy for future-oriented behavior, the outcome variable of vigorous exercise is tested as below:

$$VE_{it} = \beta_0 + \beta_1 d_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (3.8)$$

where VE_{it} is the individual i's vigorous exercise at time t, and d_{it} is individual i's depression score at time t. The covariate matrix X_{it} includes all baseline covariates. Year-of-survey dummies (τ_t), the time-invariant individual specific effect (μ_i), and the error term (ε_{it}) are also included in the model.

Lastly, unsecured debt was also explored as an outcome variable representing present-oriented behavior. Unsecured debt included credit card balances, medical debts, life insurance policy loans, and loans from relatives. Individual fixed effects regression was again examined following the below specifications:

$$\log(debt)_{it} = \beta_0 + \beta_1 d_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (3.9)$$

where $\log(debt)_{it}$ is the individual i's log-transformed unsecured debt at time t, and d_{it} is individual i's depression score at time t. The covariate matrix X_{it} includes all baseline

covariates. Year-of-survey dummies (τ_t), the time-invariant individual specific effect (μ_i), and the error term (ε_{it}) are added to the model.

Split Sample Analysis

To test the second hypothesis and explore the differences in association between depression and the financial planning horizon by demographic and socioeconomic factors, the split sample analysis was applied. Groups differentiated by gender, race, education, income, and net worth were tested to identify potential heterogeneities. Moreover, chi-squared tests were computed to reveal whether the difference in the depression effects between two different groups was statistically significant or not.

3.6 Summary of Method

This chapter describes the empirical specification of this study. First of all, individual fixed-effects regression was explored to test the first hypothesis. Based on the conceptual framework of this study, negative β is expected for depressive individuals. If depressed individuals have a lower discounting factor for their future financial planning needs, it is reasonably assumed that depressed people will have a short-term financial planning horizon. To check the robustness of the empirical findings, a series of robustness checks were conducted using a variety of techniques, including ordered logit regression, linear probability regression, and propensity score matched regression. Across all specifications using different measures, it was expected that the results would be consistent with the benchmark result.

Second, a split-sample analysis was employed to test the second hypothesis. Based on the previous literature, a chi-squared test verified the potential heterogeneities between different demographic and socioeconomic characteristics.

Lastly, to test the third hypothesis, this study included a regression model controlling for potential psychological factors. It is expected that the main results would be consistent after accounting for the potential emotion-related covariates.

CHAPTER 4

RESULTS

This chapter provides empirical evidence of the negative association between depression and financial planning horizon. The descriptive statistics are presented in section 4.1. The results of the depression effect on financial planning horizon from the benchmark specification are discussed in section 4.2. The series of robustness checks for the main findings are presented in section 4.3. In this subsection, four different specifications are examined: ordered logit regression, linear probability regression, propensity score matched regression, and regressions for smoking, exercise, and unsecured debts.

Section 4.4 explores the main results proffered by demographic and socioeconomic characteristics. A split sample analysis is conducted by gender, race, educational background, income, and net worth. In section 4.5, further investigation is conducted on whether the benchmark specification is driven by underlying emotions. To control for the effect of underlying emotions, the series of emotional variables, including hopelessness, pessimism, impulsiveness, and self-control, are included in the benchmark specifications.

4.1 Descriptive Analysis

To examine the impact of depressive symptoms on financial planning horizon, the primary sample draws from 1998 to 2014 waves for analysis. After dropping observations with no responses or miscoded values, the sample selection provides 21,488 individuals for a total of 63,817 observations that have no missing values on the regressor and the outcome variables.

Descriptive statistics in Table 4 contain average information on the key variables for the analysis sample. Descriptive statistics are weighted by sampling weights provided by the RAND HRS. As described in the previous chapter, HRS asked a question about the financial planning horizon to determine individuals' financial time preference, which is our primary variable of interest. The respondents were asked to select a number from one to five, and the smaller numbers indicated a shorter financial planning horizon. A binary variable for the financial planning horizon was also created with the value of zero if the respondents selected the next few months or next year, and one if the respondents answered the next few years, next 5-10 years, or longer than 10 years. The average score of the financial planning horizon was about 3.16, and approximately 73% of respondents reported having a long-term plan for the future.

The primary explanatory variable in this study is a score on the CESD scale. The CESD score ranges from zero to eight, and the bigger number represents depressive symptoms (felt depressed, everything an effort, sleep was restless, not happy, felt lonely, felt sad, could not get going, not enjoyed life). The binary variable for the CESD score was developed with a value of zero if the score was zero to two and one if the score was three to eight. In addition to the CESD score, CIDI scales and subjective well-being were also adopted as alternative explanatory variables. The CIDI score ranges from zero to seven, and the higher number represents clinical depression (anhedonia, low energy, loss or increase of appetite, trouble sleeping, poor concentration, feel worthless, thought about death).

The dichotomous variable for the CIDI scores was also made with a value of one representing clinical depression and zero representing not clinical depression. Subjective well-being, which is negatively correlated with depression, ranged from one to seven. The summary statistics reported that the average CES-D score was about 1.4, the CIDI score was 0.5, and the

subjective well-being was about 4.9. Since the survey on CIDI score and subjective well-being was conducted only for a few waves, the number of samples is limited to 20,915 and 7,961, respectively.

In Table 4, the average age of individuals was 62 years. Approximately 45% of the sample was reported as male, 80% were non-Hispanic white, 9% were non-Hispanic black, 7% were Hispanic, and 3% were other races. The dummy variable for education represents the years of schooling: About 13% were less than high school, 33% were high school graduates, 26% were some college, and 28% were college and above. The highest percentage of married respondents was about 68%, separated or divorced was 15%, widowed was 12%, and the single represents the smallest percentage of 5%. The average number of households was about 2.28.

According to the self-reported health status, 77% of the respondents had a positive answer regarding their subjective health status. Approximately 21% of the individuals were covered by public health insurance, 33% were covered by employer-provided health insurance, and 30% were covered by multiple insurances. Only 7% of individuals were uninsured.

Approximately 38% of observations had a full-time job, 44% were retired, and 7% had a part-time job. Only 2% were not employed, and 8% were not in the labor force. Finally, the average income of the final sample was about $99,263, and the average net worth was about $581,030. To be specific, the bottom 25% of the average income was about $30,386, while the top 25% of the average income was $113,500. In terms of total net worth, the bottom 25% of the average net worth was about $60,200, while the top 25% of the average net worth was $591,527.

4.1.1 Descriptive Analysis by Depression

To understand the descriptive statistics based on depression or clinical depression, descriptive statistics of groups of respondents with/without depressive symptoms are presented in Table 5. Depression status is classified using both the CES-D and CIDI scores. Summary statistics for respondents with/without depressive symptoms employing CESD scores are shown in the first two columns, and respondents with/without clinical depression applying CIDI scores are displayed in the next two columns. As described earlier, when the CES-D and the CIDI score is three or higher, it is coded with the value of one and is considered as depression/clinical depression, respectively. According to the CES-D score, 13,921 respondents showed depressive symptoms, while 49,896 respondents showed no depression. Based on the CIDI score, 2,084 respondents were revealed to have clinical depression, while 18,831 respondents had no clinical depression. As shown in Table 5, the proportion of people without depression was higher than that of people with depression.

The average score of the financial planning horizon for respondents without depression was longer than for those respondents without depressive symptoms. Specifically, respondents with depression showed an average financial planning horizon score of 2.83, and those without depression scored about 3.24 under CES-D settings. Similarly, based on CIDI score criteria, respondents with depression had an average score of 2.93 in their financial planning horizon, and respondents without depression scored about 3.25.

These descriptive statistics are consistent with our underlying assumption that depressed people focus more on the short-term plan. The summary statistics show that the average CES-D score was about 4.76, and the average CIDI score was 5.25, for respondents with depression. Approximately 76% of those without depression had a long-term plan for their financial goal,

while only 61% of respondents with depression decided on a long-term strategy. The average score of subjective well-being for non-depressed respondents was 5.19, while depressed respondents had a score of 3.66.

In terms of demographic statistics, 37% of respondents with depression were male, 73% were non-Hispanic whites, 13% were non-Hispanic black, 11% were Hispanic; 53% were married, 22% were divorced, 18% were widowed, and 7% were single. On the other hand, 47% of respondents without depression were male, 82% were non-Hispanic whites, 8% were non-Hispanic black, 6% were Hispanic; 72% were married, 13% were divorced, 10% were widowed, and 5% were single. Approximately 31% of those without depression received higher education, while only 17% of those with depression benefited from higher education. On average, compared to the respondents without depression, those with depression were relatively less likely to be male, white, married, or highly educated.

In terms of health status, as expected, 48% of respondents with depression were confident about their health, while 84% of respondents without depression measured their health as good or better. Among people with depression, had 32% had public health insurance, 24% employer health insurance, and 25% multiple health insurance. Employment status included 26% of those with depression who work full-time, 6% part-time, 49% retired, 3% unemployed, and 15% not in the labor force. On the other hand, for people without depression, 18% had federal health insurance, 35% employer health insurance, 32% multiple health insurance, 41% were fully employed, 7% partly employed, 43% retired, 2% unemployed, and 7% not in the labor force. On average, compared to respondents without depression, those with depression are more likely to have public health insurance and less likely to work full-time.

Finally, the average income of the sample with depression was about $66,885, and the average total net worth was about $322,941. In contrast, the average income of individuals without depression was about $108,561, and the average total net worth was about $646,999. Compared to respondents without depression, those with depression had a lower income and net worth.

4.2 Regression Results: H_1

Baseline Specification

Table 6 presents the results of specifications with individual fixed effects, regressing depressive symptoms on the financial planning horizon. Standard errors are heteroscedasticity-robust and clustered at an individual level. Regressions include a set of demographic and socioeconomic variables that could also affect the outcome variable, as described in the model specification. All time-invariant variables were wiped out from the estimated model.

The model in column (1) displays the estimation results of specifications where the explanatory variable is the CESD score, which is our primary interest. An increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.023 points, and it is statistically significant at the one percent level. Evaluated at the sample mean of financial planning horizon (3.16), the coefficient estimate of -0.023 represents an average of 0.73% reduction in the financial planning horizon. Therefore, the financial planning horizon is shorter for individuals with depressive symptoms than those without depressive symptoms.

The explanatory variable in column (2) is the CIDI score. Using this score, the binary indicator for clinical depression was also adopted as an explanatory variable in column (3). The coefficient of these two independent variables remained consistent after controlling for all

covariates. The regression model in column (2) indicates that an increase in the CIDI score by one point is associated with a financial planning horizon decrease of 0.028 points, and it is also statistically significant at the one percent level. Moreover, individuals with clinical depression scored 0.119 points lower on the financial planning horizon than the reference group, who were without clinical depression. Lastly, the explanatory variable for column (4) is subjective well-being. As expected, the result indicates that an increase in the subjective well-being score by one point is associated with a financial planning horizon increase of 0.075 points, and it is also statistically significant at the one percent level.

In terms of other covariates, the baseline column (1) indicates that age was negatively associated with financial planning horizon at the five percent significance level. Subjective health status, including fair, good, very good, and excellent, was positively associated with outcome variables. Individuals with public health insurance, employer-provided insurance, other insurance, and multiple insurances also showed a significant positive association with financial planning horizon. Interestingly, individuals who were not in the labor force showed a positive association with the outcome variable, and total net worth was also positively associated with financial planning horizon.

Overall, the fixed effects results imply that both depression and clinical depression are negatively associated with individuals' financial planning horizon. On the other hand, subjective well-being is positively associated with financial planning horizon over time.

4.3 Robustness Checks

The series of robustness checks for the main results are investigated with four specifications. First, ordered logit regression was used to explore the association between

depression and financial planning horizon. Second, linear probability regression was adopted, representing long-term planning as an outcome variable. Third, the propensity score matched regression was applied to accurately check the difference between the control group (individuals without depression) and the treatment group (individuals with depression). Lastly, on behalf of the financial planning horizon, future-oriented behavior or present-oriented behavior were used as alternative outcome variables for checking how depression affects these behaviors. Two health-related behaviors, smoking, and vigorous exercise, were adopted as an alternative outcome definition, and the amount of unsecured debt was also employed as an outcome variable.

4.3.1 Ordered Logit Model

Since the outcome variable of this study is an ordinal variable, ordered logit regression was first employed for a robustness check. Table 7 shows the results from the estimation of the ordered logit model, with an ordinal outcome representing the financial planning horizon as a dependent variable. The results in column (1) show that for a one-point increase in CESD score, a 0.061 decrease in the log odds of being in a higher level of financial planning horizon is expected, and this result is statistically significant at the one percent level. Likewise, the ordered logit model in column (2) shows that a one-point increase in CIDI scores is associated with 0.042 decreases in the probability of being in a higher financial planning horizon rating. This result is also statistically significant at the one percent level. The results from column (3) represent that individuals with clinical depression expected a 0.212 decrease in the log odds of being in a higher financial planning horizon level, and this result is statistically significant at the one percent level. Lastly, a positive association was found between subjective well-being and the

probability of being in a higher financial planning horizon score. Based on the results of the ordered logit regression, it was observed that individuals with depression are more likely to decrease their financial planning horizon. In contrast, individuals with higher subjective well-being scores are less likely to reduce their financial planning horizon, which is consistent with the main results above.

4.3.2 Linear Probability Model

The binary indicator for long-term financial planning was explored as an alternative measure of financial planning horizon. Therefore, Table 8 shows the results of the linear probability regression model, applying the long-term planning horizon as an outcome variable. The results in column (1) present that a one-point increase in the CESD score is associated with a 0.9 percent lower likelihood of long-term planning. Similarly, column (2) represents that a one-point increase in the CIDI score is associated with a 0.9 percent lower likelihood of long-term planning. Both results are statistically significant at the one and five percent levels, respectively. Column (3) also shows a negative coefficient, but the indicator of clinical depression is not statistically significant. The positive coefficient in column (4) indicates that a one-point increase in the subjective well-being score is associated with a 2.1 percent higher likelihood of long-term planning, and it is statistically significant at the one percent level. Therefore, the overall results of the linear probability regression are consistent with the main findings.

4.3.3 Propensity Score Matching Model

To prevent possible selection bias, this study also examined propensity scored matching regression as robustness checks. The results are presented in Table 9. Regressions were weighted

by a propensity score of the CESD score greater than zero, conditional on the covariates. To prevent a possible heteroscedasticity problem, the standard errors were clustered at the individual level. After matching, the model in column (1) displays that a one-point increase in the CESD score is associated with a financial planning horizon decrease of 0.021 points, and it is statistically significant at the one percent level. Evaluated at the sample mean of financial planning horizon (3.16), the coefficient estimate of -0.021 represents an average of 0.66% reduction in the financial planning horizon. The regression model in column (2) indicates that an increase in the CIDI score by one point is associated with a financial planning horizon decrease of 0.034 points, and it is also statistically significant at the one percent level. Moreover, individuals with clinical depression scored 0.135 points lower on the financial planning horizon than the reference group without clinical depression; these results are statistically significant at the one percent and 10% levels, respectively. Lastly, the model in column (4) indicates that an increase in the subjective well-being score by one point is associated with a financial planning horizon increase of 0.063 points, and it is statistically significant at the one percent level.

Overall, the fixed effect results imply that both depression and clinical depression are negatively associated with individuals' financial planning horizon. On the other hand, subjective well-being is positively associated with an increase in the financial planning horizon over time. These estimates are consistent with our main findings that depressive symptoms are associated with myopic decision-making. Therefore, estimatehs from the propensity score matched regression support the benchmark results' robustness.

4.3.4 Future-Oriented vs. Present-Oriented

This subsection also examines the association between depressive symptoms and an array of future- or present-oriented behaviors grounded in the literature (Chen, 2013; O'Loughlin & Szmigin, 2006; Sansone et al., 2013). Factors such as smoking, exercise, and unsecured debt outcomes are included to increase the robustness of the baseline findings. Table 10 presents the results from the linear probability models, which are the OLS regression of ever smokers on depressive symptoms. To prevent a possible heteroscedasticity problem, the standard errors were clustered at the individual level. As expected, individuals with depressive symptoms were more likely to be current or past smokers, and all these associations are statistically significant at the one percent level. To be specific, in column (1), an additional point of CESD score increases the probability of being a smoker by 1.3%. Column (2) indicates that an additional point of CIDI score leads to a 1.5% higher likelihood of having ever smoked, and column (3) also shows a positive coefficient. Lastly, subjective well-being shows a negative coefficient, meaning an additional point of subjective well-being score decreases the probability of being a smoker by 1.6%. As we know, smoking behavior is acknowledged as present-oriented behavior in which the person is choosing immediate gratification without considering future costs. Therefore, the results from Table 10 are consistent with the main findings that individuals with depressive symptoms are more likely to be present-oriented.

The regression results in Table 11 investigate whether depressive symptoms affect individuals' vigorous physical exercise. The model in column (1) shows that an increase in the CESD score by one point is associated with a vigorous exercise score decrease of 0.047 points, and it is statistically significant at the one percent level. The regression model in column (2) indicates that an increase in the CIDI score by one point is associated with a vigorous exercise

score decrease of 0.028 points, and it is also statistically significant at the one percent level. Moreover, individuals with clinical depression scored 0.158 points lower on the vigorous exercise score than the reference group without clinical depression. The negative coefficient for CESD, CIDI, and clinical depression shows that individuals with depression have less frequency of vigorous physical exercise than individuals without depression. As expected, the result in column (4) indicates that an increase in the subjective well-being score by one point is associated with a vigorous exercise score increase of 0.053 points, and it is also statistically significant at the one percent level.

Overall, the findings from the regression for vigorous exercise imply that both depression and clinical depression are negatively associated with individuals' vigorous exercise, and subjective well-being is positively associated with individuals' vigorous exercise. In the same context as smoking behavior, exercise behavior is considered to be future-oriented, because people with vigorous exercise invest their time for the future by giving up immediate gratification. The regression results are still consistent with the primary hypothesis of this study that depression prohibits future-oriented behavior.

The OLS estimation of log-transformed unsecured debt as an outcome variable is presented in Table 12. The first column in Table 12 reports that an additional increase in the CESD score is associated with an unsecured debt increase of about 5.9%. The second column indicates that an additional increase in the CIDI score is also associated with an unsecured debt increase of about 10.6%, and these results are statistically significant at the one percent level. Likewise, an additional increase in the subjective well-being score is associated with an unsecured debt decrease of about 17%, and it is statistically significant at the one percent level.

4.4 Regression Results: H_2

The second hypothesis of this study was that the association between depressive symptoms and the financial planning horizon will differ by demographic and socioeconomic characteristics. It is expected that the depression effect is heterogeneous across individuals' different characteristics. Therefore, the potential heterogeneities regarding gender, race, education status, income, and net worth are investigated in this subsection. Tables 13 to 17 present the split-sample analysis for each gender, race, education, income, and net worth.

4.4.1 Split Sample Analysis by Gender

The depression effect could differ based on gender differences. It is generally acknowledged that females are more risk-averse than males (Sapienza et al., 2009). Therefore, it is assumed that females with depression make long-term financial plans more than males with depression. Taking this into account, the possible heterogeneity across gender differences is explored in Table 13. The full sample consists of 38,284 females and 25,533 males. The models in columns (1), (2), and (3) show the results of individual fixed effect regression, and column (4) reports OLS results due to the sample limitation.

The regression in the first column applied the CESD score as an explanatory variable. The results for the female-only group are described in Panel A, and outcomes for the male-only group are described in Panel B. The regression results indicate that an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.023 points for women, and it is statistically significant at the one percent level. For men, an increase in the CESD score by one point was associated with a financial planning horizon decrease of 0.024 points, and it is also statistically significant at the one percent level. Therefore, the financial

planning horizon is shorter for both women and men with depressive symptoms than for those without depressive symptoms. The results for CIDI scores as an explanatory variable also show a negative coefficient. However, these results are not statistically significant for females. The result for the men is not statistically significant when applying clinical depression as an explanatory variable. Lastly, OLS results in column (4) show that an increase in the subjective well-being score by one point leads to an increase of 0.075 points in financial planning horizon for women, and it is statistically significant at the one percent level. In the case of men, the results are also statistically significant at the one percent level, which represents that high subjective well-being scores are determined to lead to longer financial planning horizon scores.

To test whether the difference in the depression effects between Panel A and Panel B are statistically significant, the linear restrictions are presented in the bottom of the table. The chi-squared test shows that the null hypothesis (H_0:$\beta_{\text{cesd (Panel A)}} - \beta_{\text{cesd (Panel B)}} = 0$) is not rejected. Therefore, this analysis finds that depression is negatively associated with the financial planning horizon, and the association between the CES-D score and financial planning horizon is no different by gender at the five percent significance level.

4.4.2 Split Sample Analysis by Education

To examine the heterogeneity across education level, the sample is divided into two groups according to educational background. The coefficients in Table 14 are used to predict the effects of depression on the financial planning horizon according to education achievement. The full sample consists of 30,327 individuals with higher education levels and 33,482 observations with lower education levels. Panel A is restricted to individuals with a college degree or those who have attended college but never graduated. Panel B includes individuals who have never

attended college. The regression results in columns (1), (2), and (3) show the results of individual fixed effect regression, and column (4) reports the OLS results due to the sample limitation.

Column (1) reports that an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.028 points for highly educated individuals, and it is statistically significant at the one percent level. According to the results, there are no significant changes in depression effect between the two different groups. For Panel A, an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.020 points, and it is also statistically significant at the one percent level. Therefore, the financial planning horizon is shorter for both Panel A and Panel B with depressive symptoms than for those without depressive symptoms. The results using CIDI scores as an explanatory variable also present negative coefficients for both groups. However, these results are not statistically significant for Panel B, whose participants never attended college. OLS results in column (4) represent that an increase in the subjective well-being score by one point leads to an increase of 0.081 points in the financial planning horizon for Panel A, and it is statistically significant at the one percent level. In the case of Panel B, the results are also statistically significant at the one percent level, which represents that high subjective well-being scores are revealed to lead to a longer financial planning horizon.

To test whether the difference in depression effects between Panel A and Panel B are statistically significant, the linear restrictions are presented in the bottom of the table. The chi-squared test rejects the null hypothesis (H_0:$\beta_{\text{cesd (Panel A)}} - \beta_{\text{cesd (Panel B)}} = 0$), at the five percent significance level. Overall, this analysis finds that depression is negatively associated with financial planning horizon, and this association is more pronounced for college graduates.

4.4.3 Split Sample Analysis by Race

Race differences could be another factor that can produce a heterogeneous depression effect. In Table 15, the impact of depression on the financial planning horizon is examined by race. Panel A represents the regression results of non-Hispanic whites, and Panel B indicates the regression results of all other races. The full sample consists of 45,157 non-Hispanic whites and 18,600 non-Hispanic black, Hispanic, and others. Columns (1), (2), and (3) show the results of the individual fixed effect regression, and column (4) reports the OLS results due to the sample limitation.

The regression results in column (1) indicate that an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.021 points for non-Hispanic whites, and it is statistically significant at the one percent level. The depression effects are not significantly different between both groups. For Panel B, an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.027 points, and it is also statistically significant at the one percent level. Therefore, the financial planning horizon is shorter for both non-Hispanic whites and other races with depressive symptoms than those without depressive symptoms. The results for CIDI scores as an explanatory variable also show a negative coefficient. However, these results are not statistically significant for non-Hispanic whites. The estimation from other races is also statistically significant when applying clinical depression as an explanatory variable. OLS results in column (4) represent that an increase in the subjective well-being score by one point leads to an increase of 0.075 points in the financial planning horizon for non-Hispanic whites, and it is statistically significant at the one percent level. In the case of other races, the results are also statistically significant at the one percent

level, which represents that high subjective well-being scores have a positive relationship with longer financial planning horizons.

To test whether the difference in depression effects between Panel A and Panel B are statistically significant, the linear restrictions are presented in the bottom of the table. The chi-squared test rejects the null hypothesis (H_0:$\beta_{\text{cesd (Panel A)}} - \beta_{\text{cesd (Panel B)}} = 0$) at the five percent significance level. Therefore, this analysis finds that depression is negatively associated with financial planning horizon, and this association is more pronounced for the other races.

4.4.4 Split Sample Analysis by Income

The fixed effects model was estimated for two different subsamples that were divided by income status. Panel A in Table 16 represents the regression results for individuals whose incomes were above average[9], and Panel B indicates the regression results for those who had less than average incomes. Columns (1), (2), and (3) show the results of the individual fixed effect regression, and column (4) reports OLS results due to the sample limitation.

The regression results in column (1) indicate that an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.016 points for Panel A, and it is statistically significant at the one percent level. For Panel B, an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.021 points, and it is also statistically significant at the one percent level. Therefore, the financial planning horizon is shorter for both income groups with depression than for those without depressive symptoms. The results for the CIDI scores as an explanatory variable also show a negative coefficient. However, these results are not statistically significant for Panel A. OLS results in column (4) represent that

[9] The average income of the full sample was $82,182.

an increase in the subjective well-being score by one point leads to an increase of 0.065 and 0.073 points in a financial planning horizon for Panels A and B, respectively. These results are statistically significant at the one percent level.

To test whether the difference in depression effects between Panel A and Panel B are statistically significant, the linear restrictions are presented in the bottom of the table. The chi-squared test shows that the null hypothesis (H_0:$\beta_{\text{cesd (Panel A)}} - \beta_{\text{cesd (Panel B)}} = 0$) is not rejected. Therefore, this analysis finds that depression is negatively associated with the financial planning horizon, and the association between the CES-D score and the financial planning horizon is no different by income level.

4.4.5 Split Sample Analysis by Net Worth

Lastly, the fixed effects model was examined separately for two net worth groups. Panel A in Table 17 represents the regression results for individuals whose net worths were above average[10], and Panel B indicates the regression results for those who had less than average net worths. Columns (1), (2), and (3) show the results of the individual fixed effects regression, and column (4) reports OLS results.

The regression results in column (1) indicate that an increase in the CESD score by one point is associated with a financial planning horizon decrease of 0.021 and 0.024 points for Panels A and B, respectively. These results are statistically significant at the one percent level. Interestingly, for Panel B, all coefficients are statistically significant at the one percent or the five percent level. Therefore, it is noted that the depression effects on financial planning are statistically significant for Panel B across all measures of depression. OLS results in column (4)

[10] The average net worth of the full sample was $519,116.

represent that an increase in the subjective well-being score by one point leads to an increase of 0.058 and 0.023 points in the financial planning horizon for Panels A and B, respectively. These results are statistically significant at one percent level.

To test whether the difference in depression effects between Panel A and Panel B are statistically significant, the linear restrictions are presented in the bottom of the table. The chi-squared test rejects the null hypothesis (H_0:$\beta_{cesd(Panel\ A)} - \beta_{cesd(Panel\ B)} = 0$), and it is statistically significant at the 10% level. Therefore, there is a difference in depression effect on both net worth groups. Overall, this analysis finds that depression is negatively associated with financial planning horizon, and this association is more pronounced for the people whose net worth is less than average.

4.5 Regression Results: H_3

The last hypothesis of this study was that depressive symptoms and the financial planning horizon will be associated after controlling for underlying emotions. In the previous chapter, several mechanisms were described as indicating emotional effects on myopic decision-making in discounting behaviors. These mechanisms allowed this study to examine the potential impact of depression-related psychological outcomes by controlling for these variables, including hopelessness, pessimism, impulsiveness, and self-control. Therefore, four possible mechanisms for depression effect are further examined in this subsection.

The hopelessness, pessimism, impulsiveness, and self-control variables were evaluated on a six-point scale, including 1) strongly disagree, 2) somewhat disagree, 3) slightly disagree, 4) slightly agree, 5) somewhat agree, and 6) strongly agree. The detailed questions are presented in Table 18. These emotional measures were defined using the leave behind modules in HRS

(Smith et al., 2019). First of all, the scale of hopelessness followed Everson et al.'s (1997) and Beck et al.'s (1974) approach. Secondly, the pessimism scale was adopted by Scheier et al.'s (1994) study. Lastly, the Multidimensional Personality Questionnaire (MPQ), proposed by Tellegen (1982), was adopted for impulsiveness and self-control measures. The MPQ is widely accepted for assessing individuals' personality and decision-making. As an alternative measure for self-control, self-control facet questions were tested but found no results due to the sample limit.

The results in Table 19 demonstrate how the correlation between depression and planning horizon changes when the regressions account for emotional states. The models in column (2) through (4) evaluate the potential mechanisms and whether the benchmark findings will remain significant after controlling for the emotions-related factors. To be specific, each column shows how the results change when hopelessness, pessimism, and impulsiveness/self-control variables are controlled for in the model. The regression in column (5) shows the result of controlling for all these emotional variables in the baseline model. The regression result in each column reports that individuals with depression have a negative association with the financial planning horizon when controlling for hopelessness, pessimism, impulsiveness, and self-control.

After controlling for each emotional variable, the result is consistent with the baseline estimates, which means the negative association between depression and financial planning horizon remains significant after controlling for the underlying emotions. Additionally, consistent with previous studies that have found negative associations between pessimism with future-oriented behavior, the results of this study also show that pessimism is negatively associated with financial planning horizon (Abramson et al., 1989; Beck, 2002). Across all five estimations, the last model in column (5) still shows statistically significant results that depressed

people are more likely to have a short-term financial planning horizon when controlling for emotional mechanisms.

4.6 Summary of Findings

All three measures of depression—CESD, CIDI, and clinical depression—were negatively associated with the financial planning horizon. Conversely, subjective well-being, the contrary measure of depression, was positively associated with the financial planning horizon. Among other covariates, age was negatively associated with the financial planning horizon. In contrast, perceived health status, health insurance coverage, not being in the labor force, and total net worth were positively associated with the financial planning horizon. Furthermore, the association between depression and short-term financial planning horizon is more pronounced for college-educated, non-White, and lower net worth groups. Finally, the benchmark specification is consistent after controlling for the potential emotional confounding effects. All the psychological controls (hopelessness, pessimism, and self-control/impulsiveness) were negatively associated with the financial planning horizon.

To check the robustness of our empirical findings, a series of robustness checks are conducted by using a variety of techniques including ordered logit regression, linear probability regression, propensity score matched regression in addition to benchmark regression. The results from all robustness checks confirmed that our initial findings are found to be quite robust across different specifications. Our results are also robust regarding alternative future or present-oriented behavior definitions, including smoking, vigorous exercise, and unsecured debt (Tables 7-12). To sum, across all specifications using different measures, it is observed that individuals

with depression show shorter financial planning horizons, which is consistent with the benchmark result. The summary of findings is illustrated in Table 20.

CHAPTER 5

CONCLUSIONS

5.1 Discussion of Findings

Based on the theoretical framework of this study, depression was expected to be negatively associated with having a longer-term financial planning horizon. The findings from the empirical analysis confirmed this hypothesis (H_1). The results show that depression is negatively associated with having a long-term financial planning horizon, indicating a lower subjective discounting factor ($\beta^{\delta} < \beta$) or a higher rate of time preference for individuals who suffer from depression. The negative association between depression and long-term financial planning horizon also confirms that individuals who suffer from depression are associated with deriving a greater utility from receiving more immediate financial benefits, because they have a higher rate of time preference than individuals who do not suffer from depression. This finding is consistent with results from previous studies that found a negative association between poor mental health status and financial behavior (Lester et al., 2006; Lindeboom & Meinychuk, 2015; Rosen & Wu, 2004). A number of previous studies have also associated unhealthy behavior (Story et al., 2014), smoking (Ida, 2014), and obesity (Richard & Hamilton, 2012) with a higher rate of time preference.

In addition to the negative association between depression and the financial planning horizon, other control variables show that individuals with relatively good health status and health insurance are more likely to have long-term financial planning horizon, which is consistent with previous literature (Farley & Wilensky, 1985; Zagorsky, 2005). However,

contrary to previous research (Aittomaki et al., 2010; Quadrini & Rios-Rull, 1997) that found a positive association among employment, income, and wealth, this study found that those not in the labor force are associated with a longer financial planning horizon. This result could be due to the older sample in the HRS. These individuals were probably able to save adequately to be ready to retire; as a result, they did not need to be in the labor force.

The results of this study found mixed support for the second hypothesis (H_2). To identify the potential heterogeneities, split-sample analyses were examined, and the results were stratified by gender, race, educational background, income, and net worth. Depression was negatively associated with the financial planning horizon for the college graduate group and the group with an educational attainment of high school or less. The chi-square test was significant, indicating that the association between depression and the financial planning horizon is more pronounced for college graduates. Previous studies have shown that educational attainment is associated with a greater financial sophistication and longer-term financial decision-making (Cooper & Zhu, 2016; Grable & Joo, 2004; Li, 2014; Van et al., 2011). It is possible that households with the educational attainment of high school or less had a shorter financial planning horizon, and the additional marginal effect of depression did not result in a significantly greater decrease in their financial planning horizon when compared with the group of college graduates. More research is needed in the future to understand the nuances of this difference.

The results also indicated that depression is negatively associated with the financial planning horizon for both non-Hispanic White and non-White households. In addition, the significant chi-square test of the difference between the two groups reported that the association between depression and the financial planning horizon was more pronounced for non-White individuals. This finding adds to the literature, which found racial differences in financial

decision-making (Grable et al., 2009; Gutter et al., 1999; Hanna et al., 2010; Yao et al., 2005) and showed that depression has a more negative association with the financial planning horizon of non-White individuals. Similarly, depression was also negatively associated with the financial planning horizon for both lower and higher net worth groups. The chi-square test was significant, indicating that the association between depression and the financial planning horizon was more pronounced for lower net worth individuals. This finding is in line with previous studies that found a higher rate of time preference associated with lower household wealth (Cairns, 1992; Ogaki & Atkeson, 1997).

The findings from this study also confirm the last hypothesis (H_3) that depression is negatively associated with the financial planning horizon after controlling for factors such as hopelessness, pessimism, and self-control/impulsiveness. Therefore, the main results were consistent after accounting for the potential emotional effects, which means depression is a prominent determinant of preference for the short-term financial planning horizon.

5.2 Implications

As 16% of older adults suffer from depression (Blazer, 2003; Blazer & Williams, 1980) and approximately 30% of U.S. adults suffer from other mental health-related issues (Kessler et al., 1994), whether and how depression affects the financial decision-making of aging households is an important policy issue. This dissertation contributes to the literature by empirically establishing a negative association between depression and the financial planning horizon. The negative association between depression and the financial planning horizon found in this study indicates that depression is likely to lower the amount of utility that individuals may derive from meeting financial needs in the future. Yet the results also indicate that individuals

suffering from depression experience greater utility from receiving more immediate financial benefits.

The findings from this study are consistent with the broader literature on depression that has shown that depression negatively affects the financial decision-making ability of households by reducing their ability to optimize their economic tradeoffs over time. The findings from this study suggest that depressed individuals are susceptible to myopic time preference. This needs attention from policymakers because, in previous literature, near-sighted financial time preference has also been associated with a number of other factors detrimental to individuals' financial well-being. These factors include a lower savings rate, lower amounts of retirement wealth, a lack of adequate insurance coverage, and a lack of long-term care planning (Bernheim et al., 2001; Fuchs, 1982; Gustman & Steinmeier, 2005; Kifman et al., 2010; Lawrance, 1991; Picone et al., 2004).

As more and more Americans transition into retirement, the proportion of individuals receiving social security benefits relative to the working-age adults contributing to it continues to increase. This constrains the ability of the social security system to adequately provide income to supplement the retirement needs of individuals (Christelis et al., 2011). It is, therefore, crucial for individuals to maximize their wealth accumulation opportunities. Financial planning for the long-term can play an important role in building financial security for individuals in their old age. However, depression, by affecting the ability of households to have a long-term financial planning horizon, could further worsen the affected individuals' odds of financial well-being and retirement security.

In this vein, the findings of this study have implications for financial planning practice. Individuals suffering from depression may benefit greatly from seeking the services of a

financial planner. A professional financial planner will be able to help individuals with depression plan for the long term (e.g., managing the individuals' portfolio or supporting estate-planning needs). However, many depressed individuals may not recognize this need to seek help from financial planners. One possible solution could be to encourage mental health professionals to refer their clients who suffer from depression to financial counselors. Conversely, financial planners should be encouraged to refer their clients who manifest signs of depression to mental health counselors.

Perhaps the emerging field of financial therapy can play an important role here. Financial professionals trained in both psychology and financial planning could implement communication and intervention strategies that help individuals suffering from depression better manage their financial risks in retirement. A more targeted strategy could be to require the presence of a financial planner early in the mental health counseling process of a patient suffering from depression, and similarly require financial planners to refer their clients to a mental health practitioner when they notice early signs of depression among their clients.

The finding that depression has a greater negative association with financial planning horizon for minorities and low net worth individuals is also concerning from a policy standpoint. Perhaps creating monetary incentives such as tax breaks or supporting subsidized services, where people with depression can be referred to financial counselors, would be beneficial for the well-being of people from economically disadvantaged and socially underserved groups in the long run.

The findings from this study also have implications for a behavioral economic intervention that more employers can support by setting up default options in the defined contribution retirement plans for their employees. A broader solution could be to emphasize

retirement savings for all individuals across their lifetimes and encourage employers to adopt programs that encourage and reward regular savings, such as Thaler and Benartzi's (2004) Save more tomorrow® program. Another potential policy intervention could be to offer greater annuitization options for retirees when they roll over their 401(k) plans upon retirement. Beshears et al. (2011) suggested providing rollover options that annuitize part of the retiree's wealth while discouraging lump-sum withdrawals by the individual as a way to protect the retiree's assets over the long term.

More research is needed to develop a better understanding of the association between depression and financial decision-making of households that can inform broader policy interventions to improve the financial well-being of a substantial proportion of the U.S. population experiencing depression. Overall, integrating the financial security-related implications of depression into the broader issue of mental health-related concerns is necessary to develop a holistic intervention system that can benefit people suffering from depression.

5.3 Limitations

This study has revealed a negative association between depression and the financial planning horizon, but not enough to establish a causal relationship. To verify the causal effect of depression on the financial planning horizon, the endogeneity problem has to be resolved. Specifically, omitted variable bias and reverse causality should be addressed to prevent the results from being biased. Omitted variable bias occurs when the key variables are affected by unobserved factors. On the other hand, if the financial planning horizon affects depressive symptoms, reverse causality arises. In order to address the omitted variable bias, this study used data from a national longitudinal survey (i.e., HRS) and applied the individual fixed-effects

regression model, as suggested in Wooldridge (2013). Thus, this study could look at the effect of depression upon each individual by obtaining multiple observations about each individual over the course of the nine waves of the HRS dataset.

By demeaning the variables using within-transformation, unobserved time-invariant individual effects were excluded from our model. This approach allowed this study to explore the within-individual variation over time. In order to address the issue of reverse causality, this study used lagged explanatory variables, meaning that there was a time difference between the outcome variable and the explanatory variable in our study. In particular, depression was measured prior to the financial planning horizon. In the political science field, this lagged explanatory variable strategy is widely used to adjust for the reverse causality-related concerns (Bellemare et al., 2017).

This study was amongst the first to establish an association between depression and the financial planning horizon among individuals by extending the theoretical model developed by previous researchers (Laibson, 1997; O'Donoghue & Rabin, 1999; Zauberman et al., 2009). This study found that depression was associated with a decrease in the subjective discounting factor or rate of time preference, as proxied by an individual's financial planning horizon. Future studies need to examine the reason why depressed individuals are likely to prefer a shorter financial planning horizon. It could be because they perceive time to pass more slowly and, therefore, discount future needs more than others who do not suffer from depression. It could be that they expect a shorter life expectancy and, therefore, discount their future financial needs, leading to a shorter financial planning horizon. It is also possible that those who suffer from depression expect greater out-of-pocket medical expenses, causing them to prefer more liquidity in the short term. Future studies need to examine these factors that might play a mediating role in reducing

the financial planning horizon of depressed individuals. It is possible that, along with depression, other factors could also reduce the subjective discounting rate of expected future financial needs for individuals. Future studies can apply the model developed in this study to examine these other factors that may be negatively associated with a longer financial planning horizon.

Table 1. Description of CESD Scale

Category	Questions
Negative questions	
Felt depressed	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt depressed. Would you say yes or no?"
Everything an effort	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt that everything you did was an effort. Would you say yes or no?"
Sleep was restless	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt sleep was restless. Would you say yes or no?"
Felt lonely	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt lonely. Would you say yes or no?"
Felt sad	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt sad. Would you say yes or no?"
Could not get going	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you could not get going. Would you say yes or no?"
Positive question	
Not enjoyed life	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you enjoyed life. Would you say yes or no?"
Not happy	"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of time this past week. Much of the time during the past week, you felt happy. Would you say yes or no?"

Table 2. Summary Statistics for Depression

	CESD score (0-8)		Depression (0,1)		CIDI score (0-7)		Clinical depression (0,1)	
	N	%	*N*	%	*N*	%	*N*	%
0	29,009	45.46	49,896	78.19	18,747	89.63	18,831	90.04
1	13,880	21.75	13,921	21.81	38	0.18	2,084	9.96
2	7,007	10.98			91	0.44		
3	4,327	6.78			184	0.88		
4	2,787	4.37			303	1.45		
5	2,233	3.50			476	2.28		
6	1,984	3.11			614	2.94		
7	1,604	2.51			462	2.21		
8	986	1.55						
Observations	63,817	100	63,817	100	20,915	100	20,915	100

Notes: Descriptive statistics are weighted by sampling weights provided by the RAND HRS. *N* is the number of observations.

Table 3. Number of Observations by Outcome and Year

Panel A:	Sample w/o depression							
	1998	2000	2002	2004	2006	2012	2014	Total
Financial planning horizon	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	(%)	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*
next few months (1)	503	147	622	1,939	1,724	937	1,402	7,274
	(14)	(14)	(13)	(16)	(14)	(15)	(14)	(15)
next year (2)	324	109	504	1,676	1,606	741	1,233	6,193
	(9)	(11)	(11)	(14)	(13)	(12)	(12)	(12)
next few years (3)	911	283	1,364	3,639	3,349	1,558	2,734	13,838
	(25)	(27)	(29)	(29)	(28)	(26)	(27)	(28)
next 5-10 years (4)	1,319	368	1,652	3,753	3,960	1,924	3,196	16,172
	(37)	(35)	(35)	(30)	(33)	(32)	(32)	(32)
longer than 10 years (5)	542	131	622	1,364	1,345	891	1,524	6,419
	(15)	(13)	(13)	(11)	(11)	(15)	(15)	(13)
Observations	3,599	1,038	4,764	12,371	11,984	6,051	10,089	49,896

Panel B:	Sample w/ depression							
	1998	2000	2002	2004	2006	2012	2014	Total
Financial planning horizon	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	(%)	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*	*(%)*
next few months (1)	204	76	326	911	875	518	700	3,610
	(24)	(25)	(24)	(28)	(25)	(27)	(25)	(26)
next year (2)	99	43	193	522	577	245	393	2,072
	(12)	(14)	(14)	(16)	(17)	(13)	(14)	(15)
next few years (3)	191	69	310	794	914	428	728	3,434
	(23)	(23)	(23)	(25)	(27)	(22)	(26)	(25)
next 5-10 years (4)	249	88	369	707	758	449	621	3,241
	(30)	(29)	(28)	(22)	(22)	(23)	(22)	(23)
longer than 10 years (5)	94	25	139	305	308	292	401	1,564
	(11)	(8)	(10)	(9)	(9)	(15)	(14)	(11)
Observations	837	301	1,337	3,239	3,432	1,932	2,843	13,921
Total	4,436	1,339	6,101	15,610	15,416	7,983	12,932	63,817

Notes: Descriptive statistics are weighted by sampling weights provided by the RAND HRS. *N* is the number of observations.

Table 4. Descriptive Statistics

	Mean	SD	25th Percentile	75th Percentile	*N*
Outcome variables:					
Financial planning horizon (1-5)	3.16	1.24	2	4	63,817
Long-term planning (0,1)	0.73	0.45	0	1	63,817
Depression indicators:					
CESD score (0-8)	1.40	1.97	0	2	63,817
Depression (0,1)	0.20	0.40	0	0	63,817
CIDI score (0-7)	0.50	1.59	0	0	20,915
Clinical depression (0,1)	0.09	0.29	0	0	20,915
Subjective well-being (1-7)	4.91	1.56	4	6	7,961
Covariates:					
Age (50-80)	62.85	8.98	56	68	63,817
Male (0,1)	0.45	0.50	0	1	63,817
Non-Hispanic White (0,1)	0.80	0.40	1	1	63,817
Non-Hispanic Black (0,1)	0.09	0.29	0	0	63,817
Hispanic (0,1)	0.07	0.26	0	0	63,817
Other races (0,1)	0.03	0.17	0	0	63,817
Less than high school (0,1)	0.13	0.34	0	0	63,809
High school graduate (0,1)	0.33	0.47	0	1	63,809
Some college (0,1)	0.26	0.44	0	1	63,809
College and above (0,1)	0.28	0.45	0	1	63,809
Married (0,1)	0.68	0.47	0	1	63,817
Separated or divorced (0,1)	0.15	0.36	0	0	63,817
Widowed (0,1)	0.12	0.32	0	0	63,817
Single (0,1)	0.05	0.22	0	0	63,817
Number of HH members	2.28	1.20	2	3	63,817
SR health: good or better (0,1)	0.77	0.42	1	1	63,817
Health insurance: public (0,1)	0.21	0.41	0	0	63,817
Health insurance: employer (0,1)	0.33	0.47	0	1	63,817
Health insurance: other (0,1)	0.08	0.28	0	0	63,817
Health insurance: multiple (0,1)	0.30	0.46	0	1	63,817
No health insurance (0,1)	0.08	0.27	0	0	63,817
Fully employed (0,1)	0.38	0.49	0	1	63,817
Partly employed (0,1)	0.07	0.25	0	0	63,817
Retired (0,1)	0.44	0.50	0	1	63,817
Unemployed (0,1)	0.02	0.15	0	0	63,817
Not in labor force (0,1)	0.08	0.28	0	0	63,817
HH income ($)	99,263	302,041	30,386	113,500	63,817
Total net worth ($)	581,030	1,436,694	60,200	591,527	63,817

Notes: Descriptive statistics are weighted by sampling weights provided by the RAND HRS. SD denotes sample standard deviation, and *N* is the number of observations. Household income and total net worth are converted to the 2014 US dollar using CPI for all urban consumers (CPI-U).

Table 5. Descriptive Statistics by Depression

	By depression		By clinical depression	
	Sample w/o depression	Sample w/ depression	Sample w/o clinical depression	Sample w/ clinical depression
Outcome variables:				
Financial planning horizon (1-5)	3.24	2.83	3.25	2.93
Long-term planning (0,1)	0.76	0.61	0.75	0.64
Depression indicators:				
CESD score (0-8)	0.53	4.76	1.06	4.27
Depression (0,1)	0.00	1.00	0.15	0.68
CIDI score (0-7)	0.19	1.80	0.01	5.25
Clinical depression (0,1)	0.04	0.33	0.00	1.00
Subjective well-being (1-7)	5.19	3.66	5.04	3.68
Covariates:				
Age (50-80)	62.86	62.84	63.06	61.40
Male (0,1)	0.47	0.37	0.47	0.34
Non-Hispanic White (0,1)	0.82	0.73	0.78	0.77
Non-Hispanic Black (0,1)	0.08	0.13	0.10	0.09
Hispanic (0,1)	0.06	0.11	0.09	0.10
Other races (0,1)	0.03	0.04	0.04	0.04
Less than high school (0,1)	0.11	0.23	0.10	0.12
High school graduate (0,1)	0.32	0.36	0.30	0.34
Some college (0,1)	0.26	0.24	0.27	0.30
College and above (0,1)	0.31	0.17	0.33	0.23
Married (0,1)	0.72	0.53	0.70	0.55
Separated or divorced (0,1)	0.13	0.22	0.14	0.22
Widowed (0,1)	0.10	0.18	0.09	0.14
Single (0,1)	0.05	0.07	0.07	0.09
Number of HH members	2.29	2.25	2.33	2.23
SR health: good or better (0,1)	0.84	0.48	0.81	0.44
Health insurance: public (0,1)	0.18	0.32	0.22	0.36
Health insurance: employer (0,1)	0.35	0.24	0.34	0.19
Health insurance: other (0,1)	0.08	0.08	0.07	0.06
Health insurance: multiple (0,1)	0.32	0.25	0.28	0.27
No health insurance (0,1)	0.07	0.11	0.09	0.12
Fully employed (0,1)	0.41	0.26	0.42	0.22
Partly employed (0,1)	0.07	0.06	0.07	0.06
Retired (0,1)	0.43	0.49	0.44	0.55
Unemployed (0,1)	0.02	0.03	0.03	0.05
Not in labor force (0,1)	0.07	0.15	0.04	0.12
HH income ($)	108,561	62,885	104,189	71,231
Total net worth ($)	646,999	322,941	592,436	290,703
Observations	49,896	13,921	18,831	2,084

Notes: Descriptive statistics are weighted by sampling weights provided by the RAND HRS. Household income and total net worth are converted to the 2014 US dollar using CPI for all urban consumers (CPI-U).

Table 6. Fixed Effects Regression for Financial Planning Horizon

Outcome variable:	Financial planning horizon (1-5)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.023***			
	(0.004)			
CIDI score (0-7)		-0.028***		
		(0.011)		
Clinical depression (0,1)			-0.119**	
			(0.058)	
Subjective well-being (1-7)				0.075***
				(0.010)
Age	-0.040**	-0.291**	-0.292**	0.033**
	(0.019)	(0.133)	(0.133)	(0.015)
Age squared	0.000	0.002*	0.002*	-0.000***
	(0.000)	(0.001)	(0.001)	(0.000)
Married	0.028	0.031	0.031	0.032
	(0.110)	(0.210)	(0.210)	(0.071)
Separated or divorced	-0.002	-0.050	-0.052	-0.075
	(0.112)	(0.207)	(0.207)	(0.078)
Widowed	0.098	0.150	0.144	-0.017
	(0.111)	(0.242)	(0.241)	(0.081)
Number of HH members	-0.001	0.017	0.017	-0.024*
	(0.008)	(0.018)	(0.018)	(0.013)
SR health: fair	0.084**	0.023	0.027	0.024
	(0.033)	(0.089)	(0.089)	(0.075)
SR health: good	0.104***	0.065	0.069	0.073
	(0.035)	(0.096)	(0.096)	(0.073)
SR health: very good	0.129***	0.030	0.034	0.157**
	(0.037)	(0.102)	(0.102)	(0.075)
SR health: excellent	0.159***	0.119	0.124	0.246***
	(0.042)	(0.114)	(0.114)	(0.084)
Health insurance: public	0.089***	0.102	0.102	0.048
	(0.032)	(0.070)	(0.070)	(0.064)
Health insurance: employer	0.095***	0.049	0.050	0.215***
	(0.031)	(0.064)	(0.064)	(0.062)
Health insurance: others	0.102***	0.077	0.077	0.094
	(0.037)	(0.124)	(0.124)	(0.077)
Health insurance: multiple	0.088***	0.027	0.027	0.138**
	(0.030)	(0.061)	(0.061)	(0.062)
Fully employed	0.025	-0.036	-0.035	0.025
	(0.032)	(0.084)	(0.084)	(0.072)
Partly employed	-0.007	-0.272***	-0.270***	0.003
	(0.037)	(0.090)	(0.090)	(0.086)
Unemployed	-0.034	-0.211**	-0.212**	-0.005
	(0.049)	(0.095)	(0.095)	(0.107)
Not in labor force	0.077***	-0.075	-0.076	0.132*
	(0.028)	(0.077)	(0.077)	(0.069)
Log(HH income)	0.003	-0.015	-0.015	0.038***
	(0.006)	(0.010)	(0.010)	(0.012)
Log(total net worth)	0.004**	0.004	0.004	0.018***
	(0.002)	(0.003)	(0.003)	(0.003)
Observations	63,817	14,310	14,310	7,961

Notes: Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 7. Ordered Logit Regression

Outcome variable:	Financial planning horizon (1-5)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.061***			
	(0.005)			
CIDI score (0-7)		-0.041***		
		(0.011)		
Clinical depression (0,1)			-0.212***	
			(0.058)	
Subjective well-being (1-7)				0.107***
				(0.015)
Observations	63,817	20,915	20,915	7,961

Notes: Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 8. Linear Probability Regression

Outcome variable:	Long-term planning (0,1)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.009***			
	(0.002)			
CIDI score (0-7)		-0.009**		
		(0.004)		
Clinical depression (0,1)			-0.027	
			(0.021)	
Subjective well-being (1-7)				0.021***
				(0.004)
Observations	63,817	14,310	14,310	7,961

Notes: Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 9. Propensity Score Matched Regression

Outcome variable:	Financial planning horizon (1-5)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.021***			
	(0.005)			
CIDI score (0-7)		-0.034***		
		(0.013)		
Clinical depression (0,1)			-0.135*	
			(0.070)	
Subjective well-being (1-7)				0.063***
				(0.015)
Observations	63,790	14,300	14,300	7,958

Notes: Regressions weighted by a propensity score of the CESD score greater than zero conditional on covariates. Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 10. Regressions for Current Smoking

Outcome variable:	Current smoking (0,1)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	0.013***			
	(0.002)			
CIDI score (0-7)		0.015***		
		(0.003)		
Clinical depression (0,1)			0.071***	
			(0.016)	
Subjective well-being (1-7)				-0.016***
				(0.005)
Observations	36,568	11,612	11,612	4,341

Notes: The sample is restricted to ever smokers (current smoking or past smoking). Regression models are estimated by the linear probability model. Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 11. Regressions for Vigorous Exercise

Outcome variable:	Exercise (1-5)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.047***			
	(0.003)			
CIDI score (0-7)		-0.028***		
		(0.005)		
Clinical depression (0,1)			-0.158***	
			(0.030)	
Subjective well-being (1-7)				0.053***
				(0.010)
Observations	51,850	20,853	20,853	7,944

Notes: Vigorous exercise is a categorical variable that ranges from 1 (never) to 5 (3+ per week). Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 12. Regressions for Unsecured Debt

Outcome variable:	Log(unsecured debt)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	0.059***			
	(0.010)			
CIDI score (0-7)		0.106***		
		(0.020)		
Clinical depression (0,1)			0.637***	
			(0.107)	
Subjective well-being (1-7)				-0.170***
				(0.032)
Observations	63,817	20,915	20,915	7,961

Notes: Unsecured debt includes credit card balances, medical debts, life insurance policy loans, loans from relatives. Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 13. Split-Sample Analysis by Gender

Outcome variable:	Financial planning horizon (1-5)			
Panel A:	Female			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.023***			
	(0.005)			
CIDI score (0-7)		-0.022		
		(0.013)		
Clinical depression (0,1)			-0.112	
			(0.071)	
Subjective well-being (1-7)				0.075***
				(0.013)
Observations	38,284	8,474	8,474	4,824
Panel B:	Male			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.024***			
	(0.007)			
CIDI score (0-7)		-0.040**		
		(0.020)		
Clinical depression (0,1)			-0.121	
			(0.103)	
Subjective well-being (1-7)				0.076***
				(0.016)
Observations	25,533	5,836	5,836	3,137
Linear restrictions:				
$H_0: \beta_{cesd(A)} - \beta_{cesd(B)} = 0$	0.001			

Notes: Standard errors are clustered at the individual level. The test for linear restriction is based on Chi-squared test. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 14. Split-Sample Analysis by Educational Background

Outcome variable:	Financial planning horizon (1-5)			
Panel A:	College educated			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.028***			
	(0.006)			
CIDI score (0-7)		-0.047***		
		(0.014)		
Clinical depression (0,1)			-0.176**	
			(0.076)	
Subjective well-being (1-7)				0.081***
				(0.014)
Observations	30,327	7,858	7,858	4,280
Panel B:	High school or less			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.020***			
	(0.006)			
CIDI score (0-7)		-0.012		
		(0.016)		
Clinical depression (0,1)			-0.061	
			(0.088)	
Subjective well-being (1-7)				0.065***
				(0.015)
Observations	33,482	6,452	6,452	3,681
Linear restrictions:				
$H_0: \beta_{cesd(A)} - \beta_{cesd(B)} = 0$	-0.008**			

Notes: Panel A is restricted to individuals with college degree or those who have attended college but never graduated. Panel B includes individuals who have never attended college. Standard errors are clustered at the individual level. The test for linear restriction is based on Chi-squared test. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 15. Split-Sample Analysis by Race

Outcome variable:	Financial planning horizon (1-5)			
Panel A:	Non-Hispanic White			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.021***			
	(0.005)			
CIDI score (0-7)		-0.014		
		(0.014)		
Clinical depression (0,1)			-0.042	
			(0.073)	
Subjective well-being (1-7)				0.075***
				(0.012)
Observations	45,157	7,402	7,402	5,256
Panel B:	Non-Hispanic Black, Hispanic, and Others			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.027***			
	(0.008)			
CIDI score (0-7)		-0.042**		
		(0.016)		
Clinical depression (0,1)			-0.200**	
			(0.092)	
Subjective well-being (1-7)				0.064***
				(0.018)
Observations	18,660	6,908	6,908	2,705
Linear restrictions:				
$H_0: \beta_{cesd(A)} - \beta_{cesd(B)} = 0$	0.006**			

Notes: Standard errors are clustered at the individual level. The test for linear restriction is based on Chi-squared test. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 16. Split-Sample Analysis by Income

Outcome variable:	Financial planning horizon (1-5)			
Panel A:	Income ≥ 82,182			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.016*			
	(0.009)			
CIDI score (0-7)		-0.010		
		(0.022)		
Clinical depression (0,1)			0.013	
			(0.107)	
Subjective well-being (1-7)				0.065***
				(0.017)
Observations	16,404	3,800	3,800	2,486
Panel B:	Income < 82,182			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.021***			
	(0.005)			
CIDI score (0-7)		-0.024*		
		(0.013)		
Clinical depression (0,1)			-0.107	
			(0.072)	
Subjective well-being (1-7)				0.073***
				(0.012)
Observations	41,710	8,448	8,448	5,475
Linear restrictions:				
H_0: $\beta_{cesd(A)} - \beta_{cesd(B)} = 0$	0.005			

Notes: Standard errors are clustered at the individual level. The test for linear restriction is based on Chi-squared test. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 17. Split-Sample Analysis by Net Worth

Outcome variable:	Financial planning horizon (1-5)			
Panel A:	Total net worth ≥ 519,116			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.021**			
	(0.010)			
CIDI score (0-7)		-0.021		
		(0.032)		
Clinical depression (0,1)			-0.086	
			(0.154)	
Subjective well-being (1-7)				0.058***
				(0.020)
Observations	14,415	1,948	1,948	1,855
Panel B:	Total net worth < 519,116			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.024***			
	(0.005)			
CIDI score (0-7)		-0.029**		
		(0.012)		
Clinical depression (0,1)			-0.129**	
			(0.064)	
Subjective well-being (1-7)				0.072***
				(0.012)
Observations	45,769	11,486	11,486	6,106
Linear restrictions:				
H_0:$\beta_{cesd(A)} - \beta_{cesd(B)} = 0$	0.003*			

Notes: Standard errors are clustered at the individual level. The test for linear restriction is based on Chi-squared test. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 18. Description of Psychological Factors

Category	Questions
Hopelessness	1) I feel it is impossible for me to reach the goals that I would like to strive for. 2) The future seems hopeless to me and I can't believe that things are changing for the better. 3) I don't expect to get what I really want. 4) There's no use in really trying to get something I want because I probably won't get it.
Pessimism	1) If something can go wrong for me it will. 2) I hardly ever expect things to go my way. 3) I rarely count on good things happening to me.
Impulsiveness	1) I keep close track of where my money goes. 2) I often stop one thing before completing it and start another. 3) I often act without thinking. 4)Before I get into a new situation, I like to find out what to expect from it. 5) I am often not as cautious as I should be. 6) I often prefer to "play things by ear" rather than to plan ahead.
Self-control	1) I am easily talked into doing silly things. 2) I often rush into action without thinking about potential consequences. 3) I rarely jump into something without first thinking about it. 4) I am careful with what I say to others.

Table 19. Regressions for Psychological Factors

Panel A:	Financial planning horizon (1-5)				
	(1)	(2)	(3)	(4)	(5)
CESD score (0-8)	-0.023***	-0.034***	-0.036***	-0.043***	-0.050***
	(0.004)	(0.007)	(0.006)	(0.015)	(0.016)
Hopelessness (1-6)		-0.025***			0.061**
		(0.009)			(0.030)
Pessimism (1-6)			-0.032***		-0.049*
			(0.009)		(0.029)
Impulsiveness/Self-control (1-6)				-0.017	0.001
				(0.030)	(0.031)
Observations	63,817	14,582	14,493	2,642	2,518
Panel B:	Long-term planning (0,1)				
	(1)	(2)	(3)	(4)	(5)
CESD score (0-8)	-0.009***	-0.012***	-0.012***	-0.011**	-0.012**
	(0.002)	(0.002)	(0.002)	(0.005)	(0.006)
Hopelessness (1-6)		-0.007**			0.019*
		(0.003)			(0.010)
Pessimism (1-6)			-0.009***		-0.017*
			(0.003)		(0.010)
Impulsiveness/Self-control (1-6)				-0.019*	-0.014
				(0.010)	(0.011)
Observations	63,817	14,582	14,493	2,642	2,518

Notes: Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.

Table 20. Summary of Findings

	Financial planning horizon
Depression	
CESD	-
CIDI	-
Clinical depression	-
Subjective well-being	+
Covariates	
Age	-
Subjective health status	+
Health insurance coverage	+
Not in labor force	+
Net worth	+
By groups	
College educated	-*
High school or less	-
Non-Hispanic White	-
Non-Hispanic Black, Hispanic, and Others	-*
Total net worth $\geq$ 519,116	-
Total net worth $<$ 519,116	-*
Psychological factors	
Hopelessness	-
Pessimism	-
Self-control/impulsiveness	-

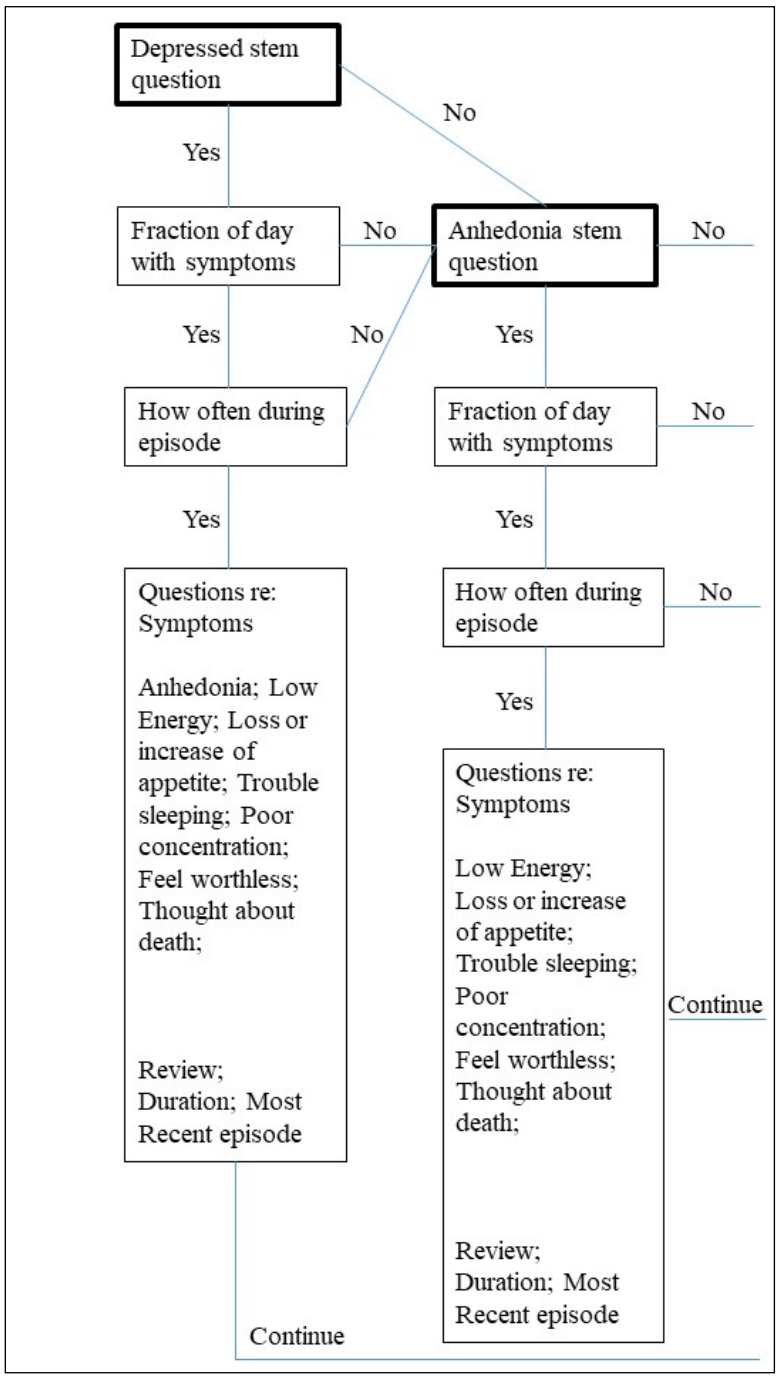

Figure 1. CIDI-SF Questions in the HRS

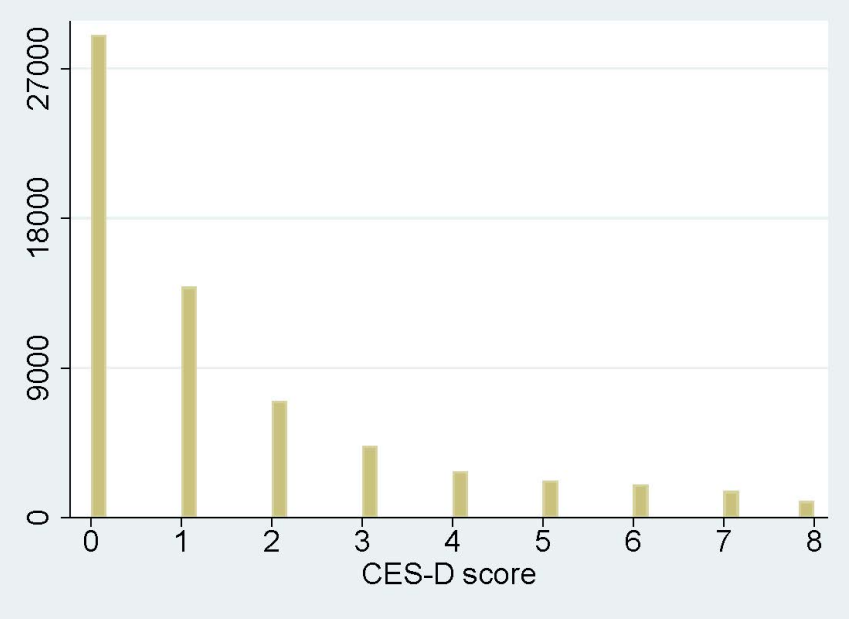

Figure 2. Distribution of CESD Scale

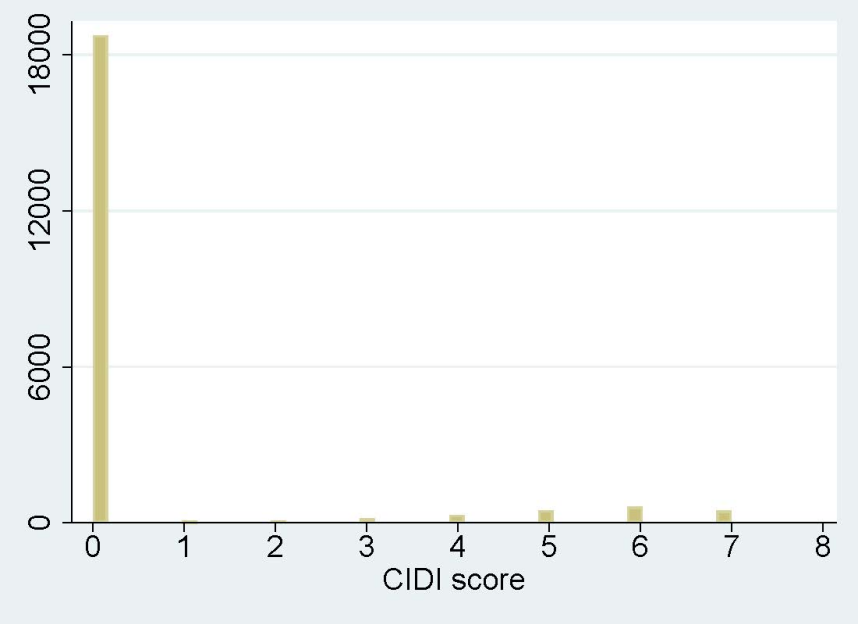

Figure 3. Distribution of CIDI Scale

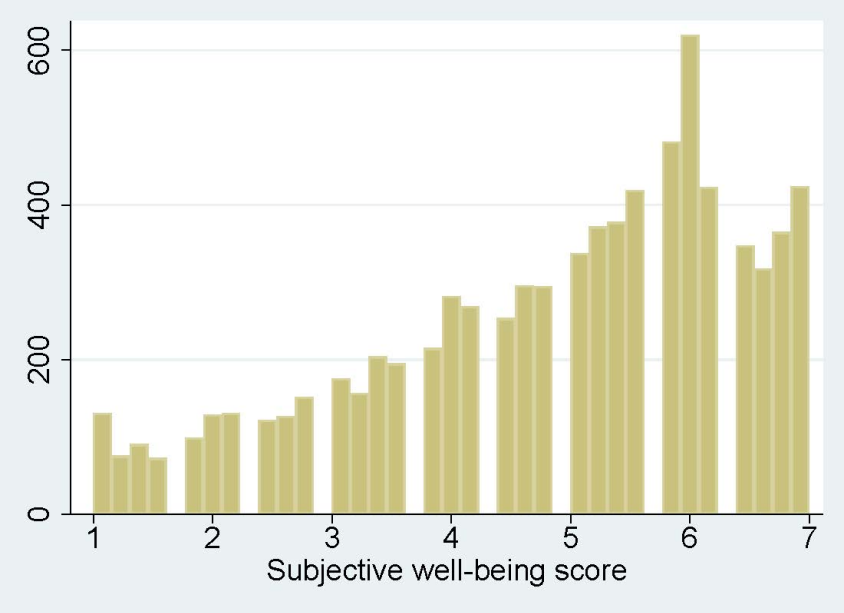

Figure 4. Distribution of SWB Scale

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APPENDIX A

Appendix A. Odds Ratio

Outcome variable:	Financial planning horizon (1-5)			
	(1)	(2)	(3)	(4)
CESD score (0-8)	-0.061***			
	(0.005)			
CIDI score (0-7)		-0.041***		
		(0.010)		
Clinical depression (0,1)			-0.212***	
			(0.055)	
Subjective well-being (1-7)				0.107***
				(0.014)
Observations	63,817	20,915	20,915	7,961

Notes: Standard errors are clustered at the individual level. Significance levels are indicated by *, **, and *** for 10, 5, and 1 percent significance level, respectively.