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Aims and objectives

With an increasing emphasis on individual capability in personal financial management as well as an increased focus on consumer protection and professionalism in financial services, growing the research base for financial planning has never been more important.

The financial planning profession needs an academic platform for discourse on the issues of individual personal financial planning and wealth management, where issues of practice and policy can be debated with rigour, independence and evidence. Prior to the *Financial Planning Research Journal* (FPRJ), no journals fitted into this niche to provide a forum for dissemination of research in the specific area of personal finance and investments in the Australian context.

The context of personal finance and investments for Australia is different from the rest of the developed economies because of the presence of mandatory superannuation, a large managed funds pool, unique characteristics of Australia's investment environment as well as our demographic profile, and a strong, but increasingly pressured, social security system. Because of these factors international journals in the area of personal finance and/or investments may not suit an Australian audience. In addition, the rapid developments in regulatory and professional standards within the context of personal finance suggest there should be some interest in, and need for, independent, peer-reviewed research in this area.

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Other submission requirements include:

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- The second page should repeat the title so that papers may be refereed anonymously. This page should also include an abstract and up to five keywords. The text of the article should begin on the third page.
- The abstract (not more than 100 words) should highlight the paper's relevance to the area of financial planning.
- Manuscripts should be submitted in Microsoft Word format, use 1.5 spacing, A4 paper size, 11 point Arial font, 2.5 cm margins on all sides, and be left-aligned (not justified). Number all pages consecutively beginning with the title page.
- Non-English words, such as et al., ex-post, ad hoc, per capita, Zeitgeist, or au fait, should be italicised.
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- Web page: National Library of Australia 2010, About the National Library, National Library of Australia, viewed 30 March 2010, <http://www.nla.gov.au>.

From the editors

There has been much activity in the financial advice space these last few months. While many financial advisers and their clients are still recovering and rebuilding from the impact of the global pandemic and spate of natural disasters, the rapid increase in inflation and interest rates and associated increases in the cost of living have presented a new set of challenges. However, with these challenges also comes opportunity. The drop in equity markets has created a fertile environment for investors looking for a bargain, while more risk-averse investors begin to reap favourable returns afforded to them by higher interest rates. At the same time, there are substantial changes on the horizon in the professional and regulatory space in Australia. The two largest professional bodies, the Association of Financial Advisers (AFA) and Financial Planning Association (FPA) have announced a merger, the findings of the Quality of Advice review are at the cusp of being released and there has been overwhelming support for advisers to use video Statements of Advice (SOAs) to supplement, and maybe even replace written SOAs.

On the ground, advisers continue to experience high advice demand and significant opportunities for growth, with a substantial rise in the search for talent across the sector. This has led to much discussion in the media (news media, social media, podcasts) about how the profession can better promote financial planning as a career path for high school leavers and university graduates.

It is with consideration of the current financial advice landscape that we deliver this next edition of FPRJ, the research journal of the Financial Planning Association of Australia. Each of the four papers contained in this edition are all directly relevant to the current opportunities and challenges faced by financial advice professionals and clients. With papers from Australia and the United States, this edition covers topics such as the use of personal budget management services in improving debt repayments, the association between retiree financial planning horizon and retirement satisfaction, motivating factors for choosing a career in financial planning, and efficient asset allocation for individual investors in the ETF world.

In the first article, Iqbal Madakkatel, Belinda Chiera and Mark D. McDonnell from University of South Australia investigate the use of personal budget management services provided by a financial institution on the undesirable debts of 4,256 households using an Australian dataset spanning three years. The authors find the program to have reduced debt repayments and debt repayment to income ratios of almost all participants while also increasing funds available for living expenses and savings, suggesting that setting goal-oriented budgets through personal budget management services may be beneficial for those who suffer from strong present-bias.

The second paper, by Blain M. Pearson and Donald Lacombe in the United States, uses longitudinal data collected from the U.S. Health and Retirement Study to examine retiree financial planning horizons and retirement satisfaction. Findings suggest that retirement satisfaction is more likely to be associated with long-term financial planning horizons, compared with short-term financial planning horizons. The authors highlight the importance of regular engagement of financial planners with

clients throughout their clients' retirement to best understand the unique circumstances of retirees and their financial goals and thus optimise retirement experiences for their clients.

The third article, by Michelle Cull, Csilla Skultety and Ryan Kumar at Western Sydney University is a timely article in that it provides practical insights for recruiting the next generation of financial advisers; something that is of pressing significance given the current labour market shortage and high demand for financial advice. Informed by career choice theory, the paper reports on empirical findings that show social learning through life experiences, along with the enjoyment of working with numbers and aspiration to help others are important factors influencing the choice to pursue a career in financial planning. The authors present a conceptual model to assist in understanding the factors influencing career choice in financial planning. The paper highlights the uniqueness of financial planning as a career that fulfils both agentic and communal goals which allows advisers to use their interest in numbers to help people, with authors suggesting the profession consider more heavily promoting financial planning as a career to 'help others', given its relevance to attracting the next generation who are known to be looking for a sense of purpose in their work.

The final article, by Riza Emekter, Benjamas Jirasakuldech and Robert Beaves from the United States, Research uses a decade of Bloomberg price data for 34 exchange-traded funds (ETFs) to demonstrate that constructing efficient ETF portfolios based on the average of optimized weights substantially improves ETF portfolio returns and increases the Sharpe ratio significantly as compared with ex ante mean-variance optimization. The authors conclude using average optimized weights in building portfolios made up primarily of ETFs can be beneficial for investors.

We hope you enjoy reading this edition of the FPRJ. Our thanks to the new FPRJ Editorial Board, our colleagues at the FPA, our editorial and design team, and the various other contributors to this edition. We will soon be calling for papers for a special issue of the journal and thank you for your advocacy in spreading the good word about the journal!

To make sure you don't miss our call for papers and for updates on the latest issues of the journal, please follow us on LinkedIn @Financial Planning Research Journal.

Professor Mark Brimble and Dr Michelle Cull

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CAN PERSONAL BUDGET MANAGEMENT SERVICES IMPROVE DEBT REPAYMENTS? A STUDY USING BUDGET DATA*

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Key words:

Personal debt, debt repayment, financial services, budget planning and management

ABSTRACT

We investigate the effect of personal budget management services provided by a financial institution on undesirable debts of 4,256 individuals and families over a period of one year using objective budget data spanning three years. Results from this study using an Australian dataset show that the majority of the participants reduced their debt repayments and debt repayment to income ratio over a period of one year. Our results also show that the majority of the participants had an increase in funds available for living expenses and savings.

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Introduction

According to the Australian Bureau of Statistics, household debts in Australia have been increasing in recent decades (La Cava and Simon, 2005, Lowe, 2017). The average household debt was just 30 percent of the annual disposable income in 1974 and rose by 10 percent to 40 percent of the total household income by 1984. Household debt has been exploding in Australia since the mid-1990s, and by 2014, it had hit 165 percent (Reserve Bank of Australia, 2021c). The debt to income ratio hit a new record high 187 percent in 2019 (Reserve Bank of Australia, 2021c). As of December 2019, the total household debt in Australia stood at 2.5 trillion dollars (Reserve Bank of Australia, 2021b). Data from Reserve Bank of Australia shows that there was a modest downward trend in household debt to income ratio, since 2019 and until June 2021 (Reserve Bank of Australia, 2021c), possibly due to the current COVID-19 pandemic. The growth in household debt has been larger than the growth in income and assets. Several factors, such as lower mortgage interest rates and financial deregulation have been cited for the aforementioned steady rise (Worthington, 2006, La Cava and Simon, 2005). Other factors include changes in attitudes of consumers toward credit use (Chien and Devaney, 2001) and credit becoming more acceptable and accessible (Livingstone and Lunt, 1992). Other studies show that amount of debt, including mortgage is directly linked to materialism, after controlling for income and money-management skills (Garðarsdóttir and Dittmar, 2012). The Australian Securities and Investments Commission (ASIC) reported in June 2017, that roughly one in six consumers (1.9 million people) were struggling to repay their credit card debts (ASIC, 2018), with the total nation-wide credit card outstanding amount reaching $50 billion in 2018 (Reserve Bank of Australia, 2021a). Credit card has become a preferred and acceptable payment method to make payment toward any type of purchase in recent times (Kamleitner and Kirchler, 2007).

The Consumer Finance Protection Bureau (CFPB), a U.S. government agency heavily involved in personal finance research defines financial well-being as "as a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future and is able to make choices that allow them to enjoy life" (Bureau, 2015). Increased availability of funds to meet living expenses can be seen associated with improved financial well-being from the definition. Studies have shown that good financial behaviours such as paying credit card outstanding in full each month and paying all bills on time and thus avoiding potential undesirable consequences arising from them are associated with improved financial well-being (Madakkatel et al., 2019). Studies on the negative effects of household debts have also been conducted. For example, in one study conducted in the UK using the British Household Panel Survey, it was shown that the heads of households with non-mortgage debts were less likely to report high levels of psychological well-being (Brown et al., 2005). In another study, Shen et al. (2014) follow a different approach to understand the relationship between debt and psychological well-being. Rather than using a single snapshot of data, this study used data collected monthly for 2 years and 5 months to investigate the relationship over time. The study finds that debt stress is more than double that of long-run debtors for short-run debtors. Recent meta-analysis studies have also shown the negative effects of debts on depression, anxiety, suicide ideation, completion, or attempt (Richardson et al., 2013, Amit et al., 2020). Studies on the relationship between over indebtedness and health have also been carried out. For example, Cuesta and Budría (2015) finds that non-mortgage debt repayments and debt arrears negatively affect people's health while Sweet et al. (2013) finds, after studying the longitudinal data of 8,400 young adults, that high financial debt relative to available assets is associated with higher perceived stress and depression, worse self-reported general health and higher diastolic blood pressure.

The connection between personal budgeting and consumer behaviour have been highlighted by several previous studies (Galperti, 2019, Beshears et al., 2016, Antonides et al., 2011, Bénabou and Tirole, 2004, Boobier, 2018). Current explanations of personal budgeting are based on the seminal paper by Thaler (1985), whereas the classic economic theory of consumption cannot explain the practice of personal budgeting. Most of the studies have shown that the main reason people resort to personal budgeting is to manage their self-control problems, often caused by present bias (Thaler, 1999, Ameriks et al., 2003, Antonides et al., 2011), even though some other researchers argue that personal budgeting is a technique to simplify household finance (Simon, 2013, Johnson, 1984). A recent study shows that self-control problems alone cannot explain the need for personal budgeting, but proposes a theory combining the need for self-control with the flexibility needed to accommodate uncertainty about intra-temporal trade-off between goods (Galperti, 2019). That study shows that consumers can strictly improve by employing good-specific budgets as a commitment device and highlights that personal budgeting services by third parties can play a role in helping consumers. However, people with short-term time orientation (impatient consumers) are less likely to use budget than those who have long-term time orientation (patient consumers), if they see the long-term benefit of it (Antonides et al., 2011, Galperti, 2019). In this study, we are using an anonymised subset of real personal budget data from an Australian financial institution with participants from all states and territories of Australia to study the effect of budget management services on debt repayment. This institution provides budget management services, targeted at families and individuals experiencing financial distress due to debts, difficulty in managing their financial affairs and those that need external assistance to improve their overall financial health. The services are centred around setting up a long-term financial plan, creating a detailed budget for spending and then actively managing it on behalf of its customers. The institution also offers the service of negotiating with creditors for temporary payment deferral, debt consolidation and arranging mortgage re-financing. To the best of our knowledge, there are no publicly available studies strictly using objective temporal financial data and reporting the effect of subscribing to budget management services, particularly on debt. This study fills that gap in the literature. Our goal in this study is to investigate the trajectories of debt repayments, living expenses and savings of individuals and families subscribed to the budget management services over a period of one year. In particular, we investigate changes in the levels of measures within a year for the whole working age participants as well as changes along families with or without children and single or joint accounts.

Background and related work

There are some studies using interviews and survey data in Australia on the effect of personal or family budget managed by consumers themselves on credit card debts. One such study shows that individuals and families with a written budget and follow that budget had better effective credit card usage as compared to those who had a written budget but rarely followed it (Ajzerle et al., 2015). Studies on the effects of counselling services on debts have established positive effects of counselling and can be seen a precursor to this study (Brackertz, 2012). Research has shown counselling services such as financial education, budget counselling, debt management plans (DMP) and bankruptcy referrals have improved financial behaviours of people with debt problems (Roll and Moulton, 2019). Delegating management of financial decisions is arguably effective in setting realistic financial goals and achieving them. For instance, Finke et al. (2009) finds that those who rely on financial planners are more likely to have adequate life insurance holdings.

Studies in personal finance using survey data greatly outnumber studies using financial data generated by financial organizations that may be commercial or not-for-profit. Surveys can be helpful in capturing a wide range of information (objective and subjective), which may not be easily available through other means. However, using surveys to collect data has its own challenges. It is not unusual for potential participants to refuse to take part in a survey. For instance, Kennickell (1998) reported that about one in three households selected for a standard sample declined to take part in the Survey of Consumer Finances (SCF) in 1995. Also, the bias in responses that the participants provide is a challenge in collecting data using surveys. Studies have shown, for example, that people tend to underestimate their future spending (Peetz and Buehler, 2009). Inconsistency in responses is another difficulty with using survey data. For instance, in a survey, a majority of participants who did not have a written budget or having a written budget but rarely following it, strongly indicated that they benefit from an interest free period on their credit cards but were carrying an outstanding balance on them (Ajzerle et al., 2015). Therefore, financial data produced by computerised budget management systems may be more useful in reporting more accurate findings.

Good financial management practices include budgeting (or expense planning), record keeping, comparing records to plan, estimating net worth, and saving on a regular basis. Budgeting includes identifying sources of income, expenditure (including future lump sum expenditure), and cost savings areas. The essential foundational financial principle behind budgeting is 'living within your means' (Guthrie and Nicholls, 2015). Income, tax, debt, and both short-term and long-term savings are considered within budgeting. Budgeting often involves carefully allocating disposable income to provide for the basic needs so that there is enough money to cover 'wants' (Guthrie and Nicholls, 2015). Even though there has been widespread agreement on the benefits of using financial management practices such as budgeting among personal finance researchers, studies show that few people actually follow them (Davis and Carr, 1992, Davis and Weber, 1990). In the United States, according to the Gallop Economy and Personal Finance Survey, only 32 percent of households prepared a detailed written budget or used computer software for developing a budget (Jacobe, 2013).

In this study, rather than consumers by themselves prepare and manage their budgets, the financial institution prepares a specific and tailored budget by analysing customer's finances, from income to debt and expenses, household characteristics and long-term financial goals. Each bill/invoice is ranked according to its importance (for instance, repayment of loans or paying utilities is more important than a subscription to an entertainment service) and a comprehensive budget foreseeing future payments is prepared for the next 12 months. Debt repayment, insurance premiums, accommodation, utilities (gas, electricity, telephone, water), food, clothing and footwear, household goods and services, health, travel, recreation, personal care and so on can be the spending categories of such a budget. If required, the institution offers the service of negotiating with creditors for payment deferral, debt consolidation and mortgage re-financing. If needed, the budget template is revised to meet the changed circumstances that a participant may face from time to time. An account is created by the financial institution for each customer to collect their income and from there, funds are distributed, as scheduled, to different third parties in order to satisfy the customers' financial obligations. Funds for living expenses are transferred to customers' personal accounts. A unique advantage of using flow data from the execution of such a budget is that it provides a full view of real income and expenses data of participants and reporting findings based on such data is a unique contribution of this study.

Methodology

Dataset

All individual identification data elements were de-identified by the financial institution before providing access to the data and only a limited number of sociodemographic variables were made available[†]. The resulting data represented 4,699 customers who subscribed to the services between July 2015 and May 2017 and had at least 13 months of relationship with the financial institution. In addition to verifying the service start date and termination date (if available), we also checked the inflows of income and outflows of expenses over the duration to ensure that the account was active for at least 13 months from the date of entering the service. For our analyses, we considered only debts used for personal consumption and various debt arrears, marked as undesirable debts by the financial institution. For instance, such debts did not include some loans such as mortgage loans and car loans. Around 90 percent of customers entered the service with at least one kind of debt. These debts included credit card debts (approximately 60% of customers), personal loans, instalment loans for appliances, loans from family members, pay day and pawn shop loans and other debts such as tax debts, various arrears, and fines. For this study, we considered only those participants who entered the service with such undesirable debts and were in the working age bracket (18-64), resulting in a dataset of 4,256 participants. We did not consider people 65 years and above due to a low number of participants (only 71) and different dynamics of spending and saving in their life. We were also provided with the count of adult account holders on the account (representing single, couple, a partnership, a parent and adult child or a carer and a guardian relationship), the age of account holder(s), number of children in the family unit, state and territory of residence, and annual income, as provided by the customers at the time of joining the service. Table 1 shows descriptive statistics on sociodemographic data and Table 2 shows descriptive statistics on inflows and outflows of funds.

[†]An ethics application was filed by the research team and was subsequently approved by University of South Australia (protocol number 201056, dated 30/5/2018).

Table 1. Descriptive statistics on the sociodemographic data provided by the financial institution and used for this study. There were in total 4,256 participants considered for this study.

Variable	Description	# Participants	Missing	Min	Max	Median (IQR)
Adults	Count of adult account holders on the account	4,256	-	1	2	1 (1-2)
	One adult	2,380				
	Two adults	1,876				
Children	Number of children in the family unit		-	0	8	1 (0-2)
	No child	1,991	-			
	One or more child	2,265	-	1	8	2(1-3)
Age	Age of main account holder	4,256	-	20	64	37 (31-46)
Initial Income	Expected annual income provided by participants at the time of joining	4,256	4	14,544	623,674	65,318 (47,779 – 90,483)

Table 2. Descriptive statistics (median value and IQR for each quarter, divided by three) on the income and expenses data provided. There were 4,256 participants considered for this study.

Variable	Q1	Q2	Q3	Q4
Income received	5,516	5,600	5,531	5,502
	4,028 - 7,762	4,060 - 7,760	4,000 - 7,729	3,968 - 7,718
Debt repayment	639	653	631	567
	327 - 1,116	311 - 1,145	271 - 1,133	229 - 1,060
Funds for living expenses/saving	2,624	2,756	2,740	2,821
	1,882 - 3,701	1,938 - 3,946	1,883 - 4,032	1,903 - 4,148

To avoid bias with respect to specific time (year and month) of joining the service, we arranged data in a way that the begin time (that is, time=0) is when the participant joined the service. This way of organizing data also nullifies seasonal effects, including, but not limited to calendar year beginning/ending, and financial year beginning/ending effects. Thus, the findings from the experiments are more robust and generic than otherwise.

Statistical analyses

We started with correlation analyses to understand the predictability of financial measures such as income received and debt repayment at the end of one year of service by using only the figures at the beginning of the service. A higher correlation indicated a higher association of ending measures with beginning measures and a lower correlation indicated a lower association, resulting correspondingly in higher/lower predictability. We did the correlation analyses for income, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio, between the first quarter after joining the service and the fourth quarter as month-to-month fluctuations are less likely to appear when quarterly figures are compared. The correlation of these measures with the age of the main account holder was also tested. The non-parametric method of Spearman's rho was used for correlation analyses as the variables tested were having non-normal distributions. We then proceeded with testing the differences in distribution of these variables along single and joint accounts, and participants with and without children using the non-parametric Mann-Whitney U test. The dynamics of spending and saving can be quite different between family units with and without children as additional expenses and possibly savings are needed when there are children in the family unit. We included testing the differences in distribution along number of account holders because we found significant difference in income (median income $51,000 versus $89,756) between single and joint accounts.

Our final set of statistical tests were to check whether customers reduced their income, debt repayment, debt repayment to income ratio after joining the service, and whether they increased the funds available for living expenses/saving and its income ratio. We used the non-parametric Wilcoxon signed rank test for testing these as the repeated measures tested had non-normal distributions. We chose Wilcoxon signed rank test instead of sign test as Wilcoxon signed rank test considers both the sign of the differences and the magnitude of the differences and is more powerful than the sign test.

Results

We calculated median of income received, debt repayments, debt repayment to income, funds for living expenses/saving and its income ratio for each month. Figure 1 shows the downward trend in median debt repayment and debt repayment to income ratio. Figure 2 shows the upward trend in median living expenses spending/saving and its income ratio.

Figure 1. Debt repayments median values in dollars over 12 months and debt repayment to income ratio in percent.

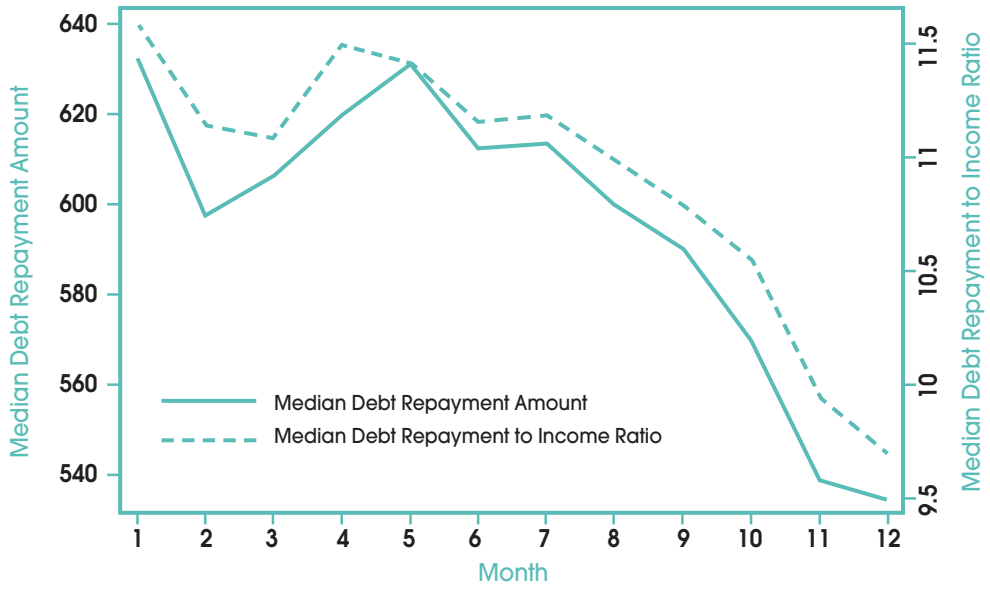

Figure 2. Median funds for living expenses/saving in dollars and its income ratio in percent.

As shown in Table 3, income received for the first quarter and the last quarter were highly correlated (*rho* = 0.84, $P < 0.01$). Income received for the first quarter and debt repayment for the first quarter were moderately correlated (*rho* = 0.45, $P < 0.01$). Beginning and ending funds available for living expenses/saving had a good correlation (*rho* = 0.75, $P < 0.01$). The correlation between age and income was weak but positive (*rho* = 0.21, $P < 0.01$). Correlation between age and debt repayment was nullifiable (*rho* = 0.04, $P < 0.01$). The correlation between the beginning and the ending debt repayment (*rho* = 0.59, $P < 0.01$) was less than the correlation for income received. This indicated that initial debt repayment status is less predictive of the future debt repayment status.

Table 3. Correlation coefficients for income, debt repayment, debt repayment to income ratio, funds for living expense/saving, its income ratio and age.

Variable 1	Variable 2	Spearman's rho
Income for the first quarter	Income for the fourth quarter	0.84**
Income for the first quarter	Debt repayment for the first quarter	0.45**
Debt repayment for the first quarter	Debt repayment for the fourth quarter	0.59**
Debt repayment to income ratio for the first quarter	Debt repayment to income ratio for the fourth quarter	0.55**
Income for the first quarter	Funds for living expense/saving for the first quarter	0.84**
Funds for living expense/saving for the first quarter	Funds for living expense/saving for the fourth quarter	0.75**
Funds for living expense/saving to income ratio for the first quarter	Funds for living expense/saving to income ratio for the fourth quarter	0.51**
Age of main account holder	Income for the first quarter	0.21**
Age of main account holder	Debt repayment for the first quarter	0.04**
Age of main account holder	Funds for living expense/saving for the first quarter	0.12**

*Two-tailed significance, ** – < 0.01*

Most of the Mann-Whitney tests conducted showed significant differences between different groups in income received, debt repayments, debt repayment to income and funds available for living expenses/saving (Table 4). Exceptions were in funds for living expense/saving to income for the fourth quarter ($Z = -0.63$, $P = 0.53$) and debt repayment for the fourth quarter between participants with children and without children ($Z = -1.17$, $P = 0.24$).

Table 4. Results of testing the differences in distribution of income, debt repayment, debt repayment to income ratio, and funds available for living/saving using Mann-Whitney *U* test.

Variable	Za	Zb
Income for the first quarter	-42.35**	-26.02**
Income for the fourth quarter	-40.32**	-23.62**
Debt repayment for the first quarter	-18.44**	-4.13**
Debt repayment to income ratio for the first quarter	-2.32*	-9.72**
Debt repayment for the fourth quarter	-13.21**	-1.17 ($P = 0.24$)
Debt repayment to income ratio for the fourth quarter	-3.59**	-9.84**
Funds for living expense/saving for the first quarter	-37.33**	-26.5**
Funds for living expense/saving to income ratio for the first quarter	-3.01**	-4.11**
Funds for living expense/saving for the fourth quarter	-33.33**	-22.02**
Funds for living expense/saving to income ratio for the fourth quarter	-0.63 ($P = 0.53$)	-3.36**

*Two-tailed significance, ** – <0.01*

Z^a – between single and joint accounts

Z^b – between having children or not in the family unit

Out of 4,256 participants only 1,770 (42%) increased their debt repayment for the quarter and 2,419 (57%) increased funds available for living expenses/saving. As shown in Table 5, the Wilcoxon signed rank test indicated that there was no significant difference in income received for the first quarter and for the fourth quarter for the whole dataset ($Z = -0.68$, $P = 0.49$). The only exception was for the group with children ($Z = -1.99$, $P < 0.05$). On the other hand, there were significant differences for debt repayment ($Z = -8.82$, $P < 0.01$), debt repayment to income ratio ($Z = -8.10$, $P < 0.01$), funds available for living expenses/saving ($Z = -12.25$, $P < 0.01$) and funds available for living expenses/saving to income ratio ($Z = -15.35$, $P < 0.01$) indicating that while there were no significant changes in income received, there were significant reductions in debt repayments within a year and increase in funds available for living expenses/saving. A similar pattern followed for groupings based on the single/joint account, whether participant had children or not. We provide median values for income received, debt repayment, funds available for living expenses/saving and their income ratios in Table 6.

Table 5. Comparing beginning (first quarter) and ending (fourth quarter) income received, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio.

Variable	Z (no grouping)	Z (single)	Z (Joint)	Z (no children)	Z (children)
Income received	-0.68 (P=0.49)	-0.11 (P=0.92)	-0.81 (P=0.42)	-1.44 (P=0.15)	-1.99*
Debt repayment	-8.82**	-4.53**	-7.86**	-4.03**	-8.20**
Debt repayment to income ratio	-8.10**	-4.24**	-7.58**	-3.71**	-7.82**
Funds available for living expenses/saving	-12.25**	-7.57**	-9.71**	-9.09**	-8.32**
Funds available for living expenses/saving to income ratio	-15.35**	-9.19**	-13.19**	-10.10**	-11.70**

*Two-tailed significance, * – <0.05, ** – <0.01*

Table 6. Beginning (first quarter) and ending (fourth quarter) income received, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio. Ratios are given in percent and we observed similar trends in mean values also.

Variable	Quarter	Z (no grouping)	Z (single)	Z (Joint)	Z (no children)	Z (children)
Income received	First	5,516	4,308	7,724	4,397	6,716
	Fourth	5,502	4,302	7,674	4,458	6,649
Debt repayment	First	639	513	863	598	673
	Fourth	567	478	732	563	570
Debt repayment to income ratio	First	11.63	11.97	11.30	13.28	10.40
	Fourth	10.57	11.21	9.93	12.62	9.11
Funds available for living expenses/saving	First	2,624	2,060	3,603	2,099	3,216
	Fourth	2,821	2,184	3,951	2,255	3,444
Funds available for living expenses/saving to income ratio	First	48.22	48.89	47.64	47.21	48.98
	Fourth	51.68	51.64	51.73	50.67	52.48

Discussion and conclusion

While there is publicly available research on personal budgeting in general (for example, (Heath and Soll, 1996, Antonides et al., 2011, Yin and Özdinç, 2018, Xiao and O'Neill, 2018, Galperti, 2019)), to the best of our knowledge there is no prior research addressing the effects (particularly on debt) of budget management services offered and actively managed by a financial institution. As expected, there was very high correlation between the income received for the first quarter and for the fourth quarter (*rho* = 0.84). It is interesting to note down that the correlation between the beginning and ending debt repayment (*rho* = 0.59) and the correlation between the beginning and ending funds available for living expenses/saving (*rho* = 0.51) were not as high as that of the correlation between the beginning and ending income received, possibly pointing toward the effect of spending in a budgeted fashion. It is also interesting to note down that the weak but positive correlation between age of the participants and their income (*rho* = 0.21) and even the weaker but positive correlation between age and funds available for living expenses/saving (*rho* = 0.12).

Also, as expected, among the groups compared (with or without children and single/joint accounts, as shown in Table 4) there were significant differences in levels of income, debt repayment and funds available for living expenses/saving and their income ratios. The exceptions were for the fourth quarter debt repayment and funds available for living expenses/saving for the groups with and without children.

Our key findings show 57% of individuals and families reduced debt repayments over a period of one year after subscribing to the services. They also reduced debt repayment to income ratio over a period of one year. On the other hand, the additional funds are diverted toward living expenses which includes various insurance payments, groceries, utilities, clothing, medical services, personal care, school fees, childcare, leisure, and savings. Although, we cannot obtain transactions depicting debt repayment or spending behaviours of these participants before entering the service, we are of the opinion that people who subscribed to the service (which incurs a recurring fee), have done so to resolve their financial issues and improve finance by curtailing unbudgeted spending and by prioritising certain bills over others. Our data spanned from July 2016 to April 2018. The publicly available data from Reserve Bank of Australia and Australian Bureau of Statistics show that household debt to income ratio for the nation continually increased from 175 percent to 185 percent during that period (Reserve Bank of Australia, 2021c). Also, for the same period, credit and charge card repayments steadily increased from 22.3 billion dollars to 23.7 billion dollars (Reserve Bank of Australia, 2021a), underscoring the fact that the overall trend during our data period was steadily increased household debt and debt to income ratio. Although a direct comparison is not strictly possible, our analyses show that the customers subscribed to the service had a reduction in debt repayment and debt repayment to income ratio during the period.

The improvement in debt repayment is noticeable across different participant types such as households with and without children and single and joint accounts. The decrease in median debt payment and debt repayment to income ratio as shown in Figure 1 is interesting, considering that the participant base had varying income (IQR 47,779 – 90,483 annually), age (IQR 31-46), different stages in life, family structure (single, couple, partnership, with and without children) and household styles (e.g., renting/owning property, owning a car or not). On the other hand, the income roughly remained the same during the period and the funds available for living expenses/saving increased

during the period (Figure 2). More importantly, these participants subscribed to the service at different points in time from July 2015 to May 2017 and our design of organising the data nullified the seasonal effects, resulting in more robust results.

Some previous studies have shown that lack of financial management practices and careless budgeting can lead to personal debts Lea et al. (1995), Lunt and Livingstone (1991) and Walker (1996). Hence, having a disciplined budget can help in this regard. In addition to the usual benefits of having a personal budget managed by consumers by themselves, budget management services provided by an external party with the added control on the access to the disposable income may help minimise the chances of overspending and can be a key differentiator for those with strong present-bias. Reduction in debt repayment for the majority of the participants may also indicate reduced indulgence in undesirable borrowing by the participants during the subscription period. Moreover, the spending carried out by the individual and families were mostly in a budgeted manner and thus curbing overspending as well as wasteful spending. Several studies have shown the link between materialism and debt that the chances of getting into debt is more for materialistic individuals (Nepomuceno and Laroche, 2015, Pirog and Roberts, 2007, Watson, 2003) and such individuals may also benefit from having a budget prepared with external help and actively managed by an external party. As noted by many participants in Ajzerle et al. (2015) that budgeting is time consuming and that they were not monitoring their level of income and expenses in a consistent manner, a budget actively managed by a financial institution on behalf of their customers can be helpful in that aspect as well.

No study is without limitations. It may be the case that our data is not representative of Australian working age population, or even the targeted population. Since we were provided with a small section of sociodemographic variables, we made a comparison with the 2016 census (Australian Bureau of Statistics, 2016) using median values for participant age and number of children in the family unit. The comparison shows no vast difference in the median (for age, census median: 47, sample median: 42, for number of children in the family, census median: 1.80, sample median: 2.02). Another limitation of our study is self-selection bias, that the characteristics (especially, willingness to seek external help and the degree of present bias) of the participants in the study may be different from that of non-participants. It may be possible that most of the participants shared some common traits differing from the non-participants. However, we are of the opinion that the study findings may find helpful to those undergoing financial difficulties, primarily due to debts and are willing to seek external help. Due to the nature of the raw data provided, we were not also able to separate funds for living expenses from funds allocated for savings, which would have enabled us to analyse saving behaviour separately. Future work can be in the direction of addressing these limitations and bringing further insights into the personal financial management services enabled by financial institutions.

Considering the effects of personal debts on the well-being of individuals and families and macro effects on the economy (Garman et al., 1996, Joo, 1998), some financial institutions have recognised the need for services such as budget management services to make necessary behavioural changes in matters affecting finance. We are of the opinion that public policy makers should make greater notice of such services and as a practical and hands-on approach, they should formulate plans to incentivise (such as paying service charges on behalf of participants) for those struggling with over-indebtedness to join such services. This can be done in addition to the existing practice of providing advice on money matters. In conclusion, in our first-of-its-kind investigation using 4,256

customers of budget management services and three years of real data of income and expenses, we investigated the trajectories of debt repayments and funds available for living expenses/saving over a period of one year. Our results show a reduction in debt for the majority of the participants within a year, across different customer groups and increase in funds available for living expenses/saving. Thus, this research adds insight into behavioural patterns of those customers subscribed to the service. We conclude that the service may be beneficial for those individuals and families in need of external help for setting up and follow through realistic and goal-oriented budgets and those who suffer from strong present-bias and higher degree of materialism.

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RETIREES, FINANCIAL PLANNING HORIZON, AND RETIREMENT SATISFACTION

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ABSTRACT

This study examines the association between retiree financial planning horizon and retirement satisfaction using longitudinal data collected from the Health and Retirement Study. The results indicate that retirees with long-term financial planning horizons, compared to retirees with short-term financial planning horizons, are more likely to be satisfied with their retirement. The findings and ensuing discussion highlight the need for long-term financial planning during retirement and the need for financial planners to regularly engage in financial planning throughout their clients' retirement.

Introduction

The growing body of literature dedicated to financial planning has continually emphasized the importance of completing and maintaining a long-term financial plan to prepare for an adequate retirement. Financial planning prepares individuals for retirement by optimizing individuals' unique circumstances to align with their retirement goal. Financial planning before retirement has been shown to be a vital determinate of retirement satisfaction (Braithwaite & Gibson, 1987; Fletcher & Hansson, 1991) and life satisfaction (Anderson & Weber, 1993).

Although the literature has well-documented that individuals may benefit from financial planning prior to retirement, very little is known about the financial planning needs of individuals after they transition into retirement. While financial planning horizon may be an essential element in preparing for retirement, there are many long-term financial planning considerations that retirees face during their retirement, such as retirement income strategies, Roth IRA conversion opportunities, and account consolidation and account distribution planning. Consequently, financial planning and maintaining a long-term financial planning horizon during retirement may be critical in supporting a satisfactory retirement.

An area of research largely overlooked by the current literature is the financial planning horizon of individuals in retirement. The number of individuals over the age of 65 is expected to account for 11.7 percent of the global population by 2030 and is expected to account for 15.8 of the global population by 2050 (Kühn et al., 2018). With the increasing number of individuals living longer, financial planning during retirement will become increasingly critical to promote a satisfactory retirement.

The objective of this paper is to examine retirees and their financial planning horizon. The authors posit that having a long-term financial planning horizon during retirement is associated with having a satisfactory retirement. Furthermore, this study sheds light on the financial planning complexities of retirement, an area that warrants research attention.

Background

Retirement Satisfaction

The determinants of retirement satisfaction have been well-documented. Researchers have found associations between retirement satisfaction and gender differences (Seccombe & Lee, 1986; Smith & Moen, 2004), marital status (Price & Joo, 2005; Szinovacz & Davey, 2005), whether retirees have migrated during their retirement (Pearson & Kalekoski, 2021), health (O'brien, 1981; Van Solinge & Henkens, 2008), participation in leisure and recreational activities (Pinquart & Schindler, 2009; Ragheb & Griffith, 1982), and social bonds (Oh, 2003). Pearson and Lacombe (2021) show that retirees who unlock home equity to finance consumption can improve retirement satisfaction. Wang and Matz-Costa (2019) found that social resources and social status affect retiree health and retirement satisfaction, ultimately concluding the need for social programs to improve retirement satisfaction. Pearson and Guillemette (2020) highlight that, absent of human capital, there is a lack of a theoretical justification for investment risk reduction when entering retirement, ultimately suggesting that retirement satisfaction may be hindered by decreasing investment risk during retirement. Elder and Rudolph (1999) find that, even when controlling for income, wealth, marital status, and health, retirement planning prior to retirement has a significant positive impact on retirement satisfaction.

Throughout the literature, a recurring determinant of a satisfactory retirement is the presence of a plan for retirement or a plan for asset consumption in retirement (Elder & Rudolph, 1999; Lee & Law, 2004; Principi et al., 2020). Intensifying the need to develop a plan for retirement is the global trend of employers shifting from defined benefit plans to defined contribution plans, placing both workers and retirees with unprecedented responsibility for their retirement. The daunting array of financial decisions that workers and retirees now face are further exacerbated by the alarming findings on financial literacy. Van Rooij et al. (2012) provides evidence linking financial literacy and its positive association with retirement planning. However, globally many individuals lack knowledge about basic financial concepts (Huston, 2010; Lusardi & Mitchell, 2007). In particular are the findings from Lusardi and Mitchell (2011), which reveal that financial literacy is lower among women, the less educated, and Hispanics and African-Americans. With low levels of financial literacy coupled with increased financial responsibility during retirement, research providing insight into financial planning during retirement is warranted.

Although the current literature has shown that there is a need for financial planning prior to retirement, very little is known about the need for financial planning during retirement. Furthermore, to the authors' knowledge, the literature has yet to explore retirees' financial planning horizon and its association with retirement satisfaction. In what follows, this paper analyzes the need of maintaining a long-term financial planning time horizon during retirement and discusses how financial planning can aid in promoting a satisfactory retirement.

Financial Planning Horizon

Several studies have examined financial planning horizon, most of which use a variable constructed from either the Survey of Consumer Finances (SCF) or the Health and Retirement Study (HRS).[12] Utilizing these data sets, researchers have found that individuals with short-term financial planning horizons are more likely to have an outstanding credit card balance (Kim & DeVaney, 2001), are more likely to rent their homes (James, 2009), and are less likely to perceive having adequate income for retirement (Malroutu & Xiao, 1995). Researchers have also found that individuals with long-term financial planning horizons are more likely to have a greater portion of wealth invested in equity assets (He & Hu, 2007), participate in employer sponsored retirement plans (Munnell et al., 2001), and are more likely to save (Rha et al., 2006) and have an emergency fund (Bhargava & Lown, 2006).

An argument can be made that the aforementioned findings suggest that financial planning horizon is a proxy for an individual's marginal rate of substitution between current and future consumption, or an individual's "time preference." Although many studies have utilized financial planning horizon as a proxy for an individual's "time preference," Hong and Hanna (2004) suggest that financial planning horizon is a situational factor. For example, individuals who are saving for a down-payment to purchase an automobile may have a short-term financial planning horizon. On the other hand, individuals who are saving for the college education of their newborn child may have a long-term financial planning time horizon.

Retirees and Financial Planning Horizon

As noted by Fisher amd Montalto (2010), individuals make saving and consumption decisions by varying time horizons, rather than basing their consumption decisions on lifetime income. Generally, individuals with long-term horizons are more likely to plan their consumption (Rutherford & DeVaney,

2009). Planned consumption may provide inherit utility-generating value in the form of increased economic stability and financial security. If planned consumption provides utility-generating value, then individuals who engage in financial planning may be more likely to have higher levels of retirement satisfaction.

This is the first study, to the authors' knowledge, to examine the financial planning horizons of retirees. Given the heterogeneity surrounding retirees' finances, retirees may continually need financial planning advisory services throughout retirement to promote a satisfactory retirement experience. This study hypothesizes that retirees who have a long-term financial planning horizon will be more satisfied with their retirement than retirees with short-term financial planning horizons. Furthermore, this study hypothesizes that retirees who have a short-term financial planning horizon will be less satisfied with their retirement.

METHODOLOGY

Data

Data collected from the Health and Retirement Study (HRS) are examined. Specifically, the 1992-2018 RAND HRS longitudinal file is used. Data and other information provided by the HRS are collected through survey questions and recorded responses. The purpose of the data collection effort is to provide data for research on health and aging of older Americans. Consequently, the HRS collects data from individuals over the age of 50. The data are unbalanced.

This study analyzes retiree satisfaction. Therefore, the sample is limited to those who answered "retired" when asked, "Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a homemaker, or what?" Observations with responses other than "retired" and missing values are dropped. As an additional measure, retirees who report earned income are dropped from this sample, as they are not considered fully retired. The number of observation is 34,878 from 17,642 groups.

Measures

Retirement Satisfaction

Retirement satisfaction is measured using the following HRS question: "All in all, would you say that your retirement has turned out to be very satisfying, moderately satisfying, or not at all satisfying?" Using a Likert method, the (N = 34,878) retirees rank their level of retirement satisfaction between 1 and 3. The data are recoded such that "3" represents very satisfied, "2" represents moderately satisfied, and "1" represents not at all satisfied.

[1]The SCF question asks, "In planning (your/your family's) saving and spending, which of the time periods—the next few months, the next year, the next few years, the next 5 to 10 years, or longer than 10 years—is most important to you/your family?"

[2]The HRS question asks, "Financial planning horizon is measured using the following HRS questions, "In planning your family's saving and spending, which time period is most important to you?" Respondents can answer: "1" Next few months, "2" Next year, "3" Next few years, "4" Next 5-10 years, and "5" Longer than 10 years.

Financial Planning Horizon

Financial planning horizon is measured using the following HRS question, "In planning your family's saving and spending, which time period is most important to you?" The possible answers that the survey participants could select from include: "1" Next few months, "2" Next year, "3" Next few years, "4" Next 5-10 years, and "5" Longer than 10 years. In wave 12, some survey participants were skipped if they were not a new survey participant.

Control Variables

The control variables utilized to test this study's hypothesis include age, age^2, net worth, income, education, marital status, white, male, and health. As individuals enter the beginning stages of retirement, aging is expected to initially increase retirement satisfaction. However, aging is also expected to reduce retirees' ability to participate in recreational and leisure activities during later stages of retirement. Decreases in the participation of recreation and leisure activities is expected to lower retirement satisfaction. The polynomial age^2 is examined because of the hypothesized non-linear relationship between aging and retirement satisfaction. Increases in net worth and income reduce retiree resource constraints. Decreases in resource constraints are expected to increase retirement satisfaction. Education is expected to provide retirees with consumption capital. Larger amounts of consumption capital are expected to increase retirement satisfaction. Marriage is hypothesized to be associated positively with retirement satisfaction. Becker's (1974) theory of marriage provides an explanation for the hypothesized association, where marriage allows for the sharing of household-public goods, increases in the availability of institutional benefits, risk sharing, and increases in household production. Health is also added as a control measure. It is expected that better degrees of health during retirement will provide retirees with retirement satisfaction.

Econometeric Model

Due to the ordered nature of the dependent variable, a random-effects ordered probit model is utilized to test this study's hypothesis. The random-effects part of our estimation strategy is designed to capture unobserved heterogeneity across the individuals. The following random-effects ordered probit model is estimated via maximum likelihood on the unbalanced panel:

$$SAT_{it}^{*} = \beta_{0i} + \beta_1 finpln_{it} + CV_{it} + \alpha_i + e_{it}$$

$$SAT_{it} = 0 \text{ if } SAT_{it}^{*} < \mu_1 \quad (Not\ at\ all\ satisfied)$$

$$SAT_{it} = 0 \text{ if } \mu_1 \leq SAT_{it}^{*} < \mu_2 \quad (Moderately\ satisfied\ )$$

$$SAT_{it} = 1 \text{ if } \mu_2 \leq SAT_{it}^{*} \quad (Very\ satisfied\ )$$

where SAT_{it}^{*} is a latent measure of retiree i's satisfaction in wave t. The unknown thresholds, μ_1 and μ_2, are to be estimated.

The variable $finpln_{it}$ is a categorical variable representing retirees' financial planning horizon. The category next few months is the reference category, to which next year, next few years, next 5-10 years, and longer than 10 years are compared. The matrix CV_{it} contains the control variables that are utilized in this model. The control variables included are age, age^2, net worth, income, education, married, white, male, and health. Age, age^2, net worth, and income enter the matrix as continuous variables. Education enters the model as a continuous variable, measured as the retirees' years of completed education. Married, white, and male enter the matrix as dichotomous variables, where each of the variables are coded as a "1" if the retiree is married, white, or male, respectively. A "0" is coded for married, white, or male, otherwise. Health enters the matrix as a categorical variable. The poor health category is the reference category that fair, good, very good, and excellent health categories are compared.

a_i is the unknown intercept for each retiree i. β_1 is the coefficient associated $finpln_{it}$. β_j is a vector of coefficients associated with the control variable matrix, CV_{it} . β_0 represents the y-intercept of the model. The intercept value for individual i can be expressed as $\beta_{0i} = \beta_0 + e_i$, where i = 1,…,N and E($e_i$) = 0 and Var(= σ_e^2). Below is the assumption concerning the composite error component:

$$e_i \sim N(0, \sigma_e^2)$$

$$E(e_i e_t) = 0 \text{ for } i \neq t$$

Average marginal effects provide the magnitudes for each of the effects on retirement satisfaction. Robust (sandwich) estimators are applied to correct for heteroskedasticity.

RESULTS

Retirement Satisfaction

Table 1 provides a frequency distribution of the retirement satisfaction variable and the financial planning horizon variable. Of the entire (N = 34,878) retiree sample, 3,695 (10.59%) report being very satisfied with retirement, 13,238 (37.96%) report being moderately satisfied with retirement, and 17,945 (51.45%) report being not at all satisfied with retirement. Of the entire (N = 34,878) retiree sample, 6,222 (17.84%) have a financial planning horizon of a few months, 5,037 (14.42%) have a financial planning horizon of next year, 9,484 (27.19%) have a financial planning horizon of the next few years, 9,703 (27.82%) have a financial planning horizon of 5-10 years, and 4,432 (12.71%) have a financial planning horizon of 10+ years.

Among the 3,695 retirees who report being very satisfied with their retirement, 1,198 (32.42%) have a financial planning horizon of a few months, 499 (13.51%) have a financial planning horizon of next year, 776 (21.00%) have a financial planning horizon of the next few years, 700 (18.95%) have a financial planning horizon of 5-10 years, and 522 (14.13%) have a financial planning horizon of 10+ years. Among the retirees who report being moderately satisfied with their retirement, 2,688 (20.31%) have a financial planning horizon of a few months, 2,106 (15.91%) have a financial planning horizon

of next year, 3,683 (27.82%) have a financial planning horizon of the next few years, 3,335 (25.19%) have a financial planning horizon of 5-10 years, and 1,426 (10.77%) have a financial planning horizon of 10+ years. Among the 17,945 retirees who report being not at all satisfied with their retirement, 2,336 (13.02%) have a financial planning horizon of a few months, 2,432 (13.55%) have a financial planning horizon of next year, 5,025 (28.00%) have a financial planning horizon of the next few years, 5,668 (31.59%) have a financial planning horizon of 5-10 years, and 2,484 (13.84%) have a financial planning horizon of 10+ years.

Table 1: Retirement Satisfaction by Financial Planning Horizon

	Very Satisfied	Moderately Satisfied	Not at All Satisfied	Total
Next Few Months	1,198	2,688	2,336	6,222 (17.84%)
Next Year	499	2,106	2,432	5,037 (14.42%)
Next Few Years	776	3,683	5,025	9,484 (27.19%)
Next 5-10 Years	700	3,335	5,668	9,703 (27.82%)
Next 10+ Years	522	1,426	2,484	4,432 (12.71%)
Total	3,695 (10.59%)	13,238 (37.96%)	17,945 (51.45%)	34,878

N = 34,878

Data collected from the Health and Retirement Study (HRS) are examined. The 1992-2018 RAND HRS longitudinal file is used

Descriptive Statistics

Table 2 reports the descriptive statistics of the sample. The average age, net worth, income, and years of education are 70.94, $150,712, $49,647, and 12.51, respectively. Retirees who report earned income were dropped from the sample, thus, income represents non-labor income, such as income from social security, annuities, and pensions. 57.18% of the retirees are married, 78.34% of the retirees are white, and 43.51% of the retirees are male. 10.99% report their health as poor, 24.18% report their health as fair, 31.60% report their health as good, 25.65% report their health as very good, 7.59% report their health as excellent.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Retirement Satisfaction				
Very Satisfied	0.1059	0.3078	0.0000	1.0000
Moderately Satisfied	0.3796	0.4853	0.0000	1.0000
Not at All Satisfied	0.5145	0.4998	0.0000	1.0000
Financial Planning Horizon				
Next Few Months	0.1784	0.3828	0.0000	1.0000
Next Year	0.1444	0.3515	0.0000	1.0000
Next Few Years	0.2719	0.4450	0.0000	1.0000
Next 5-10 Years	0.2782	0.4481	0.0000	1.0000
Next 10+ Years	0.1271	0.3331	0.0000	1.0000
Age	70.9422	9.6747	31.1667	102.8333
Age2	5,126	1,391	971	10,575
Net Worth	150,712	613,910	-3,636,749	28,400,000
Income	49,647	122,787	0.0000	10,000,000
Education	12.5133	3.0145	0.0000	17.0000
Married	0.5718	0.4948	0.0000	1.0000
White	0.7834	0.4119	0.0000	1.0000
Male	0.4351	0.4958	0.0000	1.0000
Health				
Poor	0.1099	0.3127	0.0000	1.0000
Fair	0.2418	0.4282	0.0000	1.0000
Good	0.3160	0.4649	0.0000	1.0000
Very Good	0.2565	0.4367	0.0000	1.0000
Excellent	0.0759	0.2648	0.0000	1.0000

N = 34,878

Data collected from the Health and Retirement Study (HRS) are examined. The 1992-2018 RAND HRS longitudinal file is used.

Main Results

Table 3 provides the results of a correlation analysis conducted to understand the correlates of retirement satisfaction. The correlation analysis reveals that retirement satisfaction is correlated with financial planning horizon (p = 0.1408). The strongest correlate of retirement satisfaction is health (p = 0.4005).

Table 3: Retirement Satisfaction Correlates

	Retirement Satisfaction	Financial Planning Horizon	Age	Age^2	Wealth	Income	Education	Married	White	Male	Health
Retirement Satisfaction	1										
Financial Planning Horizon	0.1408	1									
Age	0.1907	-0.0541	1								
Age2	0.1811	-0.0605	0.9965	1							
Wealth	0.1189	0.0913	0.0541	0.0529	1						
Income	0.1031	0.0733	-0.0307	-0.0314	0.198	1					
Education	0.1834	0.1046	-0.0195	-0.022	0.1775	0.1523	1				
Married	0.1573	0.1292	-0.137	-0.1476	0.0801	0.1364	0.0948	1			
White	0.1709	0.0733	0.175	0.1709	0.1019	0.0624	0.1398	0.1511	1		
Male	0.0287	0.044	0.0103	0.0069	0.02	0.0236	-0.0023	0.242	0.0343	1	
Health	0.4005	0.1607	0.0754	0.0656	0.114	0.1056	0.251	0.1293	0.1687	-0.0129	1

Data collected from the Health and Retirement Study (HRS) are examined. The 1992-2018 RAND HRS longitudinal file is used. Robust standard errors are utilized.

N = 34,878

Table 4 provides the average marginal effects from the ordered probit regression. The results for the not at all satisfied response suggest that when compared to the next few months financial planning horizon, next year, next few years, next 5-10 years, and next 10+ years are all associated negatively ($p < 0.001$) with average marginal effects of 0.0159, 0.0231, 0.0305, 0.0288, respectively. The results for the moderately satisfied category suggest that when compared to the next few months financial planning horizon, next year, next few years, next 5-10 years, and next 10+ years are all associated negatively ($p < 0.001$) with average marginal effects of 0.0173, 0.0265, 0.0367, 0.0342, respectively. The results for the very satisfied category suggest that when compared to the next few months financial planning horizon, next year, next few years, next 5-10 years, and next 10+ years are all associated positively ($p < 0.001$) with average marginal effects of 0.0332, 0.0496, 0.0673, 0.0631, respectively.

Other Results

The results for age suggest that a 1-year increase in age has an average marginal effect of -0.0127 ($p < 0.001$), -0.0159 ($p < 0.001$), and 0.0286 ($p < 0.001$) on being not at all satisfied, moderately satisfied, and very satisfied with retirement, respectively. Age^2 resulted in average marginal effects of 0.0001 ($p < 0.001$), 0.0001 ($p < 0.001$), and -0.0002 ($p < 0.001$) on being not all satisfied, moderately satisfied, and very satisfied with retirement, respectively. The results for Age and Age^2 suggest a non-linear relationship between age and retirement satisfaction.

A 1-year increase in educational attainment resulted in average marginal effects of -0.0048 ($p < 0.001$), -0.0060 ($p < 0.001$), and 0.0108 ($p < 0.001$) on being not all satisfied, moderately satisfied, and very satisfied with retirement, respectively. Being married resulted in average marginal effects of -0.0392

Table 4: Average Marginal Effects from Random-Effects Ordered Probit

	Not at All Satisfied	Std. Err.	Moderately Satisfied	Std. Err.	Very Satisfied	Std. Err.
Financial Planning Horizon (Next Few Months as Reference)						
Next Year	-0.0159***	0.0035	-0.0173***	0.0038	0.0332***	0.0073
Next Few Years	-0.0231***	0.0031	-0.0265***	0.0034	0.0496***	0.0065
Next 5-10 Years	-0.0305***	0.0032	-0.0367***	0.0037	0.0673***	0.0068
Next 10+ Years	-0.0288***	0.0037	-0.0342***	0.0046	0.0631***	0.0083
Age	-0.0127***	0.0013	-0.0159***	0.0016	0.0286***	0.0288
Age2	0.0001***	0.0000	0.0001***	0.0000	-0.0002***	0.0000
Net Worth	-0.0001	0.0000*	-0.0001	0.0000***	0.0000	0.0000***
Income	-0.0001	0.0000	-0.0001	0.0000	0.0000	0.0000
Education	-0.0048***	0.0004	-0.0060***	0.0005	0.0108***	0.0009
Married	-0.0392***	0.0026	-0.0494***	0.0032	0.0885***	0.0057
White	-0.0255***	0.0030	-0.0321***	0.0038	0.0575***	0.0068
Male	0.0008	0.0025	0.0009	0.0032	-0.0017	0.0057
Health (Poor as Reference)						
Fair	-0.0882***	0.0061	-0.0342***	0.0021	0.1225***	0.0074
Good	-0.1456***	0.0059	-0.1012***	0.0031	0.2467***	0.0078
Very Good	-0.1821***	0.0061	-0.1855***	0.0048	0.3675***	0.0089
Excellent	-0.1967***	0.0062	-0.2397***	0.0084	0.4364***	0.0119

*Significance is defined as follows: * significant at p < 0.05; ** significant at p < 0.01; *** significant at p < 0.001*

Data collected from the Health and Retirement Study (HRS) are examined. The 1992-2018 RAND HRS longitudinal file is used. Robust standard errors are utilized.

N = 34,878

Random-effects u_i ~ Gaussian

Integration method: mvaghermite

Wald chi2(16) = 3,880.25

(p < 0.001), -0.0494 (p < 0.001), and 0.0885 (p < 0.001) on being not all satisfied, moderately satisfied, and very satisfied with retirement, respectively. Being white resulted in average marginal effects of -0.0255 (p < 0.001), -0.0321 (p < 0.001), and 0.0575 (p < 0.001) on being not all satisfied, moderately satisfied, and very satisfied with retirement, respectively.

With respect to health, poor health serves as the reference category, to which fair, good, very good, and excellent health are compared. The average marginal effects for fair, good, very good, and excellent health on not at all satisfied are -0.0882 (p < 0.001), -0.1456 (p < 0.001), -0.1821 (p < 0.001), and -0.1967 (p < 0.001), respectively. The average marginal effects for fair, good, very good, and excellent health on moderately satisfied are -0.0342 (p < 0.001), -0.1012 (p < 0.001), -0.1855 (p < 0.001), and -0.2397 (p < 0.001), respectively. The average marginal effects for fair, good, very good, and excellent health on very satisfied are 0.1225 (p < 0.001), 0.2467 (p < 0.001), 0.3675 (p < 0.001), and 0.4364 (p < 0.001), respectively.

DISCUSSION

Discussion of Results

This study examined retiree financial planning horizon and its association with retirement satisfaction. The descriptive analysis highlights that of the 34,878 retirees in this study, only 4,432 (12.71%) have a financial planning horizon of 10+ years. Of additional note is the finding that only 6,222 of the retirees (17.84%) have a financial planning horizon of a few months. This suggest that an alarming number of retirees may not engage in long-term financial planning.

The average marginal effects estimated from the random-effects ordered probit regression suggest that as financial planning horizon increases from a few months to 10+ years, the average change in probability of being very satisfied with retirement increases by 0.0631. Moreover, as financial planning horizon increases from a few months to 10+ years, the average change in probability of being not satisfied at all with retirement decreases by 0.0288.

The key findings suggest that to increase the probability of having a satisfactory retirement, and decrease the probability of having an unsatisfactory retirement, retirees should engage in long-term financial planning. Long-term financial planning provides an outline for financial stability, and without financial planning engagement many retirees may compromise their chances for a satisfactory retirement experience. Developing and maintaining a long-term comprehensive financial plan can ensure retirees are positioned to meet their current and future financial needs.

When considering the results in a broad context, an implication garnered from the findings is that there is a need for financial planning during retirement to promote a satisfactory retirement experience. A long-term financial plan may be a critical determination of retirement satisfaction, especially when considering that as retirees age they may experience a decrease in their ability to engage in employment for purposes of labor income. Thus, financial planning considerations, such as account distribution planning and retirement income strategies, are paramount financial planning considerations for retirees, particularly during the latter-half of their retirement. Retirees who continually engage in financial planning throughout their retirement position themselves to achieve a satisfactory retirement experience.

As noted by Hong and Hanna (2004), individuals who have a short-term financial planning horizon, when many important goals are long-term, might be an indication of a high discount factor. However, ascertaining the goals and needs of individuals may be difficult and variation in the levels of goal importance and relativity are likely present. Thus, time discounting alone cannot fully explain an individual's financial planning horizon. As this relates to retirees, retirees may vary in areas that relate to their financial planning horizon. For example, there is likely to be variation in retirees' net worth and in both the types and amounts of their non-labor income, such as social security income, pension income, and annuity income. Because of the demographic and preference variation among retirees, there is additional situational relevancy when retirees consider their financial planning horizons. For example, a retiree that is relocating to another state may have a shorter financial planning horizon when compared to a retiree engaging in estate planning.

Limitations

One limitation to note is that the Health and Retirement Study (HRS) assesses an individual's financial planning horizon as a direct function of saving and spending planning. An issue is thus created when considering the broader financial planning landscape. For example, retirees may have provided a different response if they were asked about their financial planning horizon in other domains of financial planning, such as investment management or tax planning.

Implications

The results indicate that retirees with short-term financial planning horizons are vulnerable to experiencing a less than satisfactory retirement. Additionally, the results indicate that retirees with longer financial planning horizons are more likely to experience a very satisfactory retirement. These results suggest the need for individuals to place emphasis on having a long-term financial planning horizon during retirement. Financial planners and financial counselors should continually engage in financial planning with their retired clients to facilitate the attainment of their long-term goals.

Retirees face a different set of financial planning considerations that they may not have encountered prior to their retirement. As a result, retirees may be unaware of forthcoming financial planning considerations that may be challenging for retirees to navigate without a financial planner or financial counselor. For example, many retirees are likely to experience required minimum distributions, Roth IRA conversion opportunities, and need retirement income planning during their retirement. Consequently, financial planners and financial counselors should emphasize planning for their retired clients' long-term financial needs.

Conclusions

Many studies have highlighted the importance of financial planning in preparing for the transition into retirement. However, an overlooked domain of research is the understanding of how retirees can maintain an adequate retirement experience. The purpose of this study was to understand the association between retiree financial planning horizon and retirement satisfaction. Using longitudinal data collected from the Health and Retirement Study, the findings revealed that retirees with long-term financial planning horizons are more likely to experience a satisfactory retirement.

A fulfilling retirement is paralleled with individualized financial circumstances, such as required minimum distribution planning, social security optimization, asset management, and account consolidation and distribution planning. By understanding the unique circumstances of retirees and their financial goals during retirement, financial planning provides an opportunity to optimize retirement experiences. As such, the continuation of financial planning into retirement is a paramount consideration to promote a satisfactory retirement.

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FACTORS INFLUENCING THE MOTIVATION TO PURSUE A CAREER IN FINANCIAL PLANNING*

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ABSTRACT

This study presents a conceptual model to examine the factors influencing career choice in financial planning. Informed by career choice theory, the study uses questionnaires and interviews of financial advisers and financial planning students in Australia to find that social learning through life experiences, along with the enjoyment of working with numbers and aspiration to help others are important factors influencing the choice to pursue a career in financial planning. In addition, respondents scored highest on the agreeableness scale of the 'Big Five' personality test.

Contrary to popular media reports, results show that people choose financial planning as a career primarily because they want to help people. Findings also highlight the uniqueness of financial planning as a career that fulfils both agentic and communal goals which allows advisers to use their interest in numbers to help people. The study makes a valuable practical contribution to the development of financial planning by providing insights that may prove useful in recruiting the next generation of financial advisers. Our findings also have important implications for educators, regulators, and the profession more broadly. Further, it makes a theoretical contribution by providing a conceptual framework to aid in understanding the factors relevant to career choice, particularly in an emerging discipline such as financial planning where information on career choice is limited.

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Introduction

The last decade has seen much change in the financial planning environment and recent regulatory reform in Australia (Australian Securities & Investment Commission (ASIC), 2020) has assisted in financial planning developing further as a profession. The regulatory reform has also been aimed at providing greater consumer protection and encouraging more participation in the economy through more Australians seeking financial advice. As a result, financial planners[1] are and will be subject to more stringent educational and ethical requirements (O'Dwyer 2015). However, the reform presents many challenges for financial planning professionals that have been widely debated in the media, including a potential increase in demand for financial advice and a limited supply of qualified advisers. With one-third of advisers predicted to be leaving the profession by 2023 (Robertson 2018), and current figures showing adviser loss to be drastically outnumbering new entrants (Dastoor 2020; Pena McGough & Woods 2021, Sharpe 2021), the recruitment of new advisers and retention and progression of existing advisers is of significant concern to the profession. This study seeks to assist the profession in attracting new financial planners and progressing existing ones by examining the factors influencing the choice to pursue a career in financial planning. While career choice theory (Bandura, Barbaranelli, Caprara & Pastorelli 2001; Brown & Lent 1996; Ginzberg 1972; Holland 1959; Lent 2013; Lent, Brown & Hackett 1994; Lent, Lopez Jr, Lopez & Sheu 2008; Roe 1957; Super 1953) identifies a number of variables influencing the career choice process, there are no studies that empirically test the influence of variables on the motivation to pursue a career in financial planning.

Since the major collapses of financial planning firms in the early 2000s, the popular media in Australia have continued to portray financial advisers as untrustworthy, unethical, and self-serving (Collett 2009; Cull & Bowyer 2017; Cull & Sloan 2016; Dagge 2014; Ferguson 2015; Ferguson, Christodoulou & Toft 2016). The examples of wrongdoing within Australia's banking and financial services companies that were uncovered by the Royal Commission into Misconduct in the Banking, Superannuation, and Financial Services Industry further contributed to the lack of public trust in financial advisers, with only 17% of Australians aged 14+ rating the profession as 'very high' or 'high' for ethics and honesty, a drop of 8% since 2017 (Roy Morgan 2021). Globally, the 2021 Edelman Trust Barometer found financial services to have the lowest level of trust across all nine industry types (Edelman 2021). Given the poor reputation attributed to financial advisers, it is understandable that this may deter individuals from considering financial planning as a career and poses the question as to why someone would want to become a financial adviser. While some millennials may consider studying for a career in banking and finance when they finish secondary school, it is unlikely that they 'wake up and say, "I think I'll become a financial adviser"' (Trapnell 2022).

The last few years have seen a drastic need to attract new, qualified financial advisers as many existing advisers are leaving the industry, either due to new educational requirements or retirement. This demand is expected to increase in line with increasing needs of an ageing population, and amounts held in superannuation assets which have now increased to over $3.4 trillion (The Association of Superannuation Funds of Australia Limited 2021).

Despite significant developments in the financial planning landscape over the last 20 years, and the sheer magnitude of assets managed by financial planners, little is understood about the factors influencing the motivation to pursue a career in financial planning. To address the identified gaps in the literature and further consider these factors, we develop a conceptual framework, informed by

[1] The terms 'financial adviser' and 'financial planner' are used interchangeably in this paper.

four career choice theories (self-determination, social learning, goal congruence and personality), to examine the following research questions:

RQ1: What are the motivating factors for choosing to study financial planning?

RQ2: What factors influenced the motivation for financial advisers to pursue their chosen career?

RQ3: How has social learning influenced individuals to choose financial planning as a career?

RQ4: Is choosing a career in financial planning congruent with agentic or communal goals?

RQ5: Which personality trait is more common among individuals who choose to pursue a career in financial planning?

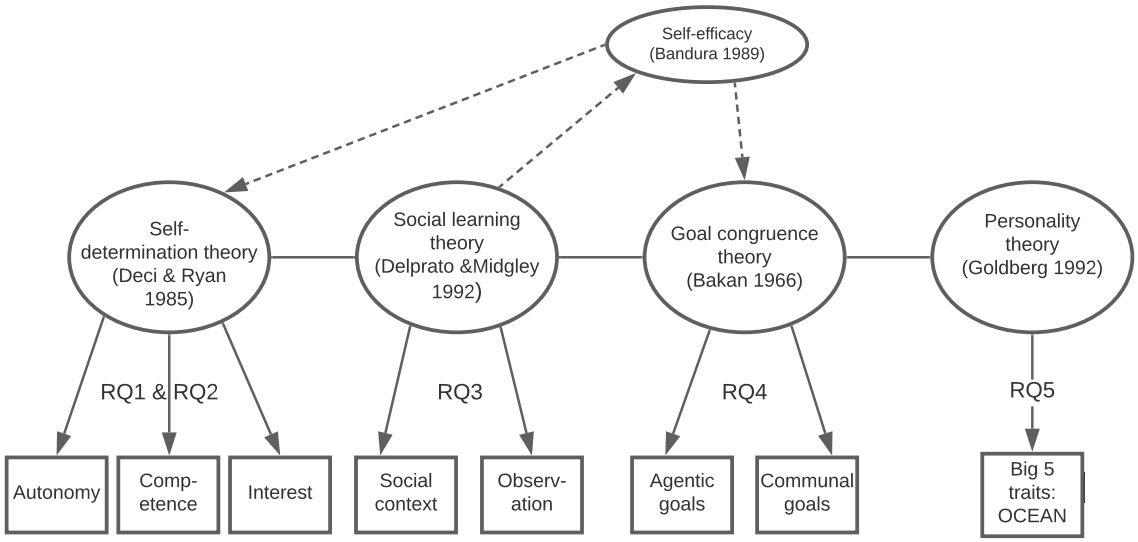
A mixed methods approach to data collection was employed to answer the research questions. The approach entailed the administration of an online questionnaire and interviews with financial advisers and financial planning students in Australia. While the focus of the study was on financial advisers, it was considered appropriate to also invite students who had chosen a career in financial planning to participate. It finds that the motivation to both study and work in financial planning is motivated by wanting to help people. A notable finding was the influence of social experiences, including observing and/or experiencing financial hardship, as well as work experience, which provided the opportunity to discover the benefits that could be afforded to others. Perceived competence in both numeric and people skills also influenced the motivation to become a financial planner, supported by the need to fulfil both agentic and communal goals. Extrinsic motivations such as working conditions and salary were found to be less influential, but a strong correlation was found between educational qualification and expected salary, suggesting that higher levels of study in financial planning may also be motivated by salary. Finally, the personality trait of 'agreeableness' was more likely to be found among financial advisers than other personality traits of the 'Big 5' inventory. The findings provide insight to further understand the motivation to choose financial planning as a career and to assist in the recruitment of the next generation of qualified financial advisers; particularly in Australia where demand exceeds supply. The results also make a valuable contribution to career choice theory with implications for careers counsellors, educators, financial planning firms, regulators, and the profession more broadly.

The next section of this article outlines the theoretical framework that informs our study, guided by a conceptual framework, and supported by relevant literature. This is followed by the research design before presenting the results of the study. The last section discusses the findings and offers concluding comments.

Theoretical framework

Career choice theory provides a useful theoretical framework to inform this study as it facilitates the influence of, and interplay between intrinsic motivation, career goals, social learning, and personality. We derive our conceptual model from the following career-choice theories: self-determination theory; social learning theory; goal congruence theory and personality theory, as presented in Figure 1 and discussed below.

Figure 1: Guiding conceptual model: factors influencing the motivation to pursue a career in financial planning



Self-determination theory

Self-determination theory (SDT) is an empirically verified psychological theory of human motivation and personality that assumes that individuals are intrinsically motivated by fulfilling their need for autonomy (relating to interest and choice) and competence (Ryan & Deci 2000) through learning, growth and challenge (Deci & Ryan 1985). While SDT is concerned with these specific needs, it also acknowledges the influence of the social environment (Deci & Ryan 1985) which we propose to further address through social learning theory, as shown in our conceptual model.

Autonomy around choice of career influences motivation with pessimistic views about an individual's control over the career decision-making process decreasing personal motivation to pursue a particular career. This is because the individual perceives it as unworthy of investment or pursuit, when measured against the perceived uncertain outcome or failure (Saka, Gati, & Kelly 2008). Conversely, those who have had the opportunity to self-direct their career choice in line with their own interests and abilities have been found to have enhanced intrinsic motivation (Deci & Ryan 1985; Frederick & Ryan 1995).

Intrinsic motivation concerns the internal reward of action/s taken by an individual. In public service careers, this has been characterised as feelings of happiness and satisfaction when engaging in work that impacts people and is aligned with their own value system (Chen,Chen & Xu 2018). Further, there has been considerable debate around whether tangible extrinsic rewards can undermine intrinsic motivation (Deci, Koestner & Ryan 1999; Eisenberger & Cameron 1996; Ryan & Deci 2000) with extrinsic rewards such as a high salary signifying what people 'want' as opposed to what they 'need' (Tang, Tang, & Luna-Arocas 2005).

SDT has been used to explain career choice by suggesting that individuals desire a role where they can express their own values, attitudes and personal abilities through engaging with problems. For example, Williams, Saizow, Ross & Deci (1997) found that 'interest' was the strongest variable regarding motivators of career-choice in a study on medical clerkship experiences. The study showed

that perceived interest in speciality choice increased the likelihood of selecting that residency or motivation to pursue a specific specialisation. Further, individuals in the study were provided with an opportunity to use personal abilities through engaging problems and those who perceived competence in solving these problems in a corresponding medical speciality were more likely to choose a career in that specialty. Likewise, it follows that individuals who have been provided with an opportunity to use their personal abilities to solve personal finance problems, and have done so successfully, may perceive themselves to be competent in this area and be more likely to pursue a career in financial planning.

Social learning theory

Social learning theory suggests that individuals learn through the observation of others in social contexts. The behaviours observed would be imitated, learned, or modelled through the result of the observed behaviour. For example, individuals can attempt to imitate positive behaviours through observation of a role model. Social learning developed from behaviourist theories and was first defined as personality consisting of learned habits (Delprato & Midgley 1992). Imperatively, social learning influences social normative beliefs (Flay & Petraitis 1994).

Social learning, regarding career choice, can affect attitudes, values, behaviours and, subsequently, motivation for choosing a career (Tones, Pillay & Kelly 2011). It is possible that social learning is responsible for the age of those entering the financial planning profession in Australia which is much higher than other comparable vocations such as accounting, banking and finance (Cull 2009) with 43 per cent of financial advisers aged over 50 years old (William-Smith 2017). Males also dominate the profession with only 20 percent of Australian financial planners identifying as female (De Gori 2019). Thus, it is likely that observations of others may influence the decision to choose (or not to choose) financial planning as a career. Further, as financial planning is not yet recognised in Australia as a stand-alone discipline, it is less likely to form part of career discussions during the school years and more likely to be considered as a career later in life once one has had an opportunity to be exposed to the discipline through further education, observation or life experiences. Additionally, the socialisation process that has seen males traditionally pursue careers requiring mathematical skills (Betz & Hackett 1981) may be responsible for more males choosing a career in financial planning than their female counterparts. Further, it follows that the number of females pursuing financial planning as a career have been influenced by traditional gender stereotypes that place the focus on men being the ones that oversee financial matters.

Social learning contexts can affect career choice through shaping individuals' values and perceptions. For example, Li (2017) found rural students scored higher than metropolitan students on self-development in a questionnaire on vocational values due to the social context of the students' geographic location, as farmers bore most social obligations yet had poorer welfare outcomes and lower self-esteem. Further, individuals are more likely to choose a career based on their experiences in certain geographic locations where they feel they are accepted (Datti 2009). This not only demonstrates associative experiences as a medium for social learning but cements how exposure to serendipitous events can affect motivation for entering a profession (Bright, Pryor, Wilkenfeld & Earl 2005).

Socioeconomic background is a powerful predictor of career choice, particularly where extreme poverty is involved as this can impact on other elements such as learning opportunities which are directly linked to aptitude, a key driver for developing strong self-efficacy which impacts on career

choice (Lent, Brown & Hackett 1994). The learning environment to which individuals are exposed may also be influenced by gender and ethnic based socialisation processes with educational access issues, faculty-student relations and social integration playing an important role (Hackett, Betz, Casas & Rocha-Singh 1992).

Finally, other environmental factors such as exposure to role models (Hackett, Esposito & O'Halloran 1989; Quimby & De Santis 2006); emotional and financial support (Lent, Lopez, Lopez & Sheu 2008; Rogers & Creed 2011), barriers (e.g. financial, personal, social/family) (Lent, Brown , Talleyrand, McPartland, Davis, Chopra, Alexander, Suthakaran & Chai 2002) and network contacts (Tümen 2017) can all exert influence on career choice.

Goal congruence theory

Agency and communion, also called the "big two" (Abele & Wojciszke 2014), are theoretical concepts representing two fundamental approaches to living one's life (Sheldon & Cooper 2008). While both are essential modes of functioning, individuals vary with respect to the strength of their preferred orientation. Agency refers to a person behaving as a separate individual while communion involves participation of the individual as part of a larger social unit (Bakan 1966). Agency is characterised by self-protection, mastery, self-promotion, and self-expansion with a focus on self-profitability and task-functioning, where in contrast, communion is characterised by cooperation, openness, care, and connection with others and involves a focus on other-profitability and social functioning (Abele & Wojciszke 2014; Howle et al. 2017; Sheldon & Cooper 2008). For example, a person who is primarily focused on agency will be concerned with finding a job that they perceive to have high status, where they have a reasonable amount of autonomy and can apply their skills to earn a high salary, whereas a person focused more on communion may be more concerned with finding a job where they can form relationships with others.

Researchers have sought to understand career choice using agency and communion through goal congruence theory. This theory holds that there are two types of careers that exist to fulfil agentic and communal goals: things-careers (e.g. engineering) and people-careers (e.g. nursing). Things-careers are perceived as fulfilling agentic career goals well, but not communal career goals, with the reverse applying for people-careers (Diekman, Brown, Johnston & Clark 2010; Diekman, Steinberg, Belanger & Clark 2017). As men are typically stereotyped as agentic and women as communal (Bell & Burkley 2014; Martin & Ruble 2004), it follows that there may also be gender differences in agentic (e.g. wanting status) and communal (e.g. wanting to help others) career goals (Tellhed, Bäckström & Björklund 2018). This was supported by Pohlmann (2001) who found women tended to rate communal career goals as more important than agentic goals and vice versa for men. Further, Eccles and Wang (2016) found that individuals who valued working with people (a communal career goal) in the final year of schooling, were less likely to choose a things-career ten years later. Studies have focused on careers that are seen as having either agentic or communal goals, with limited studies on careers that are observed to have both agentic and communal goals.

Underlying both agentic and communal goals is the concept of self-efficacy. Self-efficacy is the belief in one's ability to achieve goals. It has been known to affect motivation in career choice (Bandura et al. 2001) with studies confirming that perceived self-efficacy influences both educational and occupational endeavours (Hackett, 1995; Lent, Brown & Hackett 1994). However, perceived self-efficacy does not always match objective indicators of actual ability (Bandura 1989). For

example, evidence has shown that career interests of women are limited by their own views of their mathematical skills which they perceive as too weak for a number of traditionally male-dominated occupations even though measurement tests show their mathematical ability to be appropriate for such roles (Betz & Hackett 1981). Thus, self-efficacy beliefs have the power to eliminate potentially rewarding occupations from the career choice inventory, which can have several economic and psychological implications (Brown & Lent 1996). Further, those with a stronger sense of self-efficacy may not pursue certain careers if they perceive barriers to the entry or success of that career (Holland 1985; Mitchell & Krumboltz 1996). Self-efficacy is closely related to confidence (Rogers & Creed 2011; Betz, Klein & Taylor 1996) which is known to be influenced by social experiences and thus linked with social learning theory.

Personality theory – the 'big five' personality traits

Career choice theory suggests that individuals desire to work where they can express their personality (Holland 1959). The 'big-five' personality traits have been widely used in academic psychology to describe human personality and have often been referred to as the 'OCEAN' inventory, representing Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. While there have been a number of different instruments, names, and conceptualizations used to describe the 'big-five' (Costa & McCrae 1992; Digman and Inouye 1986; Goldberg 1990; Norman 1963; Trapnell & Wiggins 1990; Tupes & Christal 1961 reprinted 1992), they are all addressing the same phenomenon (Costa & McCrae 1992). To measure these big five personality traits, Goldberg (1992) developed the Big-Five Factor markers from an International Personality Item Pool (IPIP) being Extraversion, Agreeableness, Conscientiousness, Emotional Stability (the opposite of Neuroticism) and Intellect/Imagination (similar to Openness). This is often referred to as the Five-Factor Model (FFM) of personality.

Numerous studies have investigated the relationship between an individual's personality type and fields of career choice (Borow 1982). For example, higher conscientiousness has been associated with a greater likelihood of membership in the conventional-dominant profile (occupations generally following set routines and procedures) while individuals with a high realistic-dominant profile (occupations generally following practical and hands-on activities) indicated a 1 in 4 chance of STEM major choice (Perera & McIlveen 2018). Personality traits have also been found to be predictive of career choice behaviours in a range of occupational areas (Tomšik 2018; Tomšik & Gatial 2018) and linked to other career choice variables such as work attitude and values (Tokar, Fischer & Subich 1998). Similarly, the big-five personality traits have been found to affect motivation for choosing traditional careers. For example, 'conscientiousness' has been significantly correlated with all intrinsic motives for choosing teaching as a career (Tomšik 2018) and the personality trait 'neuroticism' has been found to be related to occupational choices involving routine, less complexity and less independent work (Spector, Jex & Chen 1995). Personality measures such as the big-five have also been found to be valid predictors of various job-related criteria (Tokar, Fischer & Subich 1998).

Research design

Sample

The sample includes two types of participants: financial advisers in Australia (71%) and students (29%) who are enrolled in an accredited financial planning unit recognised by the Financial Adviser Standards and Ethics Authority (FASEA). There was no incentive provided to participate in the research and the research project was approved by the Human Research Ethics Committee of the authors' affiliated university and conducted in accordance with the Declaration of Helsinki. The financial adviser sample was recruited via an announcement in an electronic newsletter issued by the Financial Planning Association of Australia[2] and students were recruited via notices from lecturers who were members of the Financial Planning Academic Forum (FPAF)[3]. Informed consent was obtained from all participants. Recruitment took place from the second half of 2019 to the beginning of 2020.

The sample included 125 individual questionnaire responses. Of these, 22 responses had missing information and were not usable, resulting in 103 usable responses. The survey sample consisted of 73 (71%) individuals who were currently working as financial advisers. The remaining 30 participants (29%) were comprised of professionals who held a professional designation but not currently working as an adviser (5.8%), individuals studying towards a degree and/or designation but not working as an adviser (17.4%), and those not currently studying or holding a professional designation (5.8%) (possibly recent graduates, para-planners, retired, or between jobs). Almost half of the total sample (48.5%) were currently studying towards a degree and/or designation. Fifty-four percent of the sample were male and 46% were female and 67% had a bachelor degree or higher, with 60% holding a professional designation (for example, Certified Financial Planner (CFP), Certified Practising Accountant (CPA)). English was predominantly the first language of the sample participants (89%) but across the sample were 11 different first languages. Respondents represented ages across all working age brackets; 18-29 year olds (14%), 30-39 year olds (21%), 40-49 year olds (33%)[4], 50-59 year olds (19%) and 60-69 year olds (13%), with the younger age groups holding a larger proportion of respondents not currently working as a financial adviser.

A summary of the demographic information for the sample is provided in Table 1 and an age distribution of the sample showing those currently working as a financial adviser is shown in Table 2.

[2] The Financial Planning Association of Australia is the leading professional association for financial planners in Australia, with over 12,000 members including practising advisers, professional associates, academics and financial planning students. For more information, see https://fpa.com.au/

[3] The Financial Planning Academic Forum (FPAF) is a community of over 130 full-time and casual academics from tertiary institutions in Australia who teach and/or research in financial planning.

[4] The average age of a financial planner in Australia is 47 years old (Adviser Ratings 2019)

Table 1: Demographic summary of survey sample

		Responses (N = 103)	Percent
Work status	Working as financial adviser	73	70.9%
	Professional designation and not working as a financial adviser	6	5.8%
	Studying and not working as an adviser	18	17.4%
	Not studying or working as an adviser	6	5.8%
Education (completed)	Diploma	13	12.6%
	Advanced diploma	13	12.6%
	Bachelor degree	47	45.6%
	Masters degree	22	21.4%
	No formal tertiary education	9	8.7%
Professional designation	Holds professional designation	62	60.2%
Study status	Studying towards a degree or designation	50	48.5%
	Not currently studying	53	51.5%
Study and work	Studying AND working as an adviser	30	29.1%
	Studying but NOT working as an adviser	18	17.4%
	Studying and holds a professional designation	2	1.9%
	Not studying and not working as an adviser	10	9.7%
	Not studying and working as an adviser	43	41.7%
Gender	Male	56	54.4%
	Female	47	45.6%
Language	English as first language	92	89.3%
	English as a second language	11	10.7%
Age	18-29 years old	14	13.6%
	30-39 years old	22	21.4%
	40-49 years old	34	33.0%
	50-59 years old	20	19.4%
	60-69 years old	13	12.6%

Table 2: Age group distribution for advisers and non-advisers

	Not currently working as adviser							
Age Group (years)	Student only	Not student	Holds prof desig	Total (not adviser)	Total (adviser)	Adviser %	Not adviser %	Totals
18 - 29	9	1		10	4	3.9%	9.7%	13.6%
30 - 39	5	2		7	15	14.6%	6.8%	21.4%
40 - 49	3	3	1	7	27	26.2%	6.8%	33.0%
50 - 59	0		4	4	16	15.5%	3.9%	19.4%
60 - 69	1		1	2	11	10.7%	1.9%	12.6%
Total	**18**	**6**	**6**	**30**	**73**	**70.9%**	**29.1%**	**100.0%**

In addition, there were 14 interviews undertaken as part of the study. Of these interviews, twelve were with practising financial advisers and two were with financial planning students who were not currently working as a financial adviser.

Method

To answer the research questions, the study adopted a mixed methods approach utilizing both a survey instrument and interviews. These were approved for use by the university's human research ethics committee. The anonymous survey instrument was administered online via Qualtrics and included demographic questions (e.g. age, education, gender, first language), whether the respondent was a student or financial adviser, questions relating to reasons for choosing to study and work in financial planning, salary expectations, and the perceived skills requirements of financial advisers. In addition, the survey instrument included fifty Likert scale questions using the Big-Five factor markers from the IPIP developed by Goldberg (1992) to measure Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Intellect/Imagination. The personality questions were scored in accordance with the IPIP scoring instructions (Goldberg 1992).

Participants were also asked to suggest ways to promote financial planning as a study option and/or future career via free response questions and were given an opportunity to provide any additional information they felt was relevant to the research via free response. Participants were asked to indicate their interest in participating in an interview and 'yes' responses were redirected to another Qualtrics survey to provide contact details (stored separately from the survey data) to allow them to be contacted for an interview. The survey instrument was tested on a small sample of three, including two industry professionals and one student and minor amendments to structure and wording of questions were made accordingly to ensure ease of completion and comprehensibility. A sample of the instrument is contained in the appendix.

The interview phase of the research involved semi-structured face-to-face, over-the-phone, or video-web interviews with participants (dependant on location of participant). Written consent was obtained from all participants to undertake the interviews which were recorded on a digital recording device and subsequently transcribed in preparation for thematic analysis. A total of fourteen interviews were conducted.

Data analysis

Data from the Qualtrics survey was downloaded and entered into Statistical Package for the Social Sciences (SPSS) version 25 for statistical analysis. The file was checked for missing data and accuracy of coding and screened for outliers. Frequency tables along with one-sample t tests, independent samples t tests and bivariate correlation analyses were used to interpret the data and answer the research questions. Free responses from the survey were subjected to thematic analysis which involved allocating codes for each major theme which were able to be included with the statistical analyses. Illustrative direct quotes from participants were electronically recorded in a coding document. Deductive coding was completed concurrently with inductive coding according to key concepts and theories. Coding was undertaken independently by two researchers and then reviewed by both researchers. Any inconsistencies during this process were discussed between the researchers to clarify conflicting interpretations and arrive at a joint decision (Barbour 2001; Campbell et al. 2013). The coding was tested for inter-coder reliability and no significant differences were noted.

A thematic analysis of the 14 interview transcriptions was conducted using the six phases of thematic analysis: data familiarization; generating initial codes; searching for themes; reviewing themes; defining themes; and producing a report (Braun & Clarke 2006). Major themes established from theories in the literature (social learning, personality theory, autonomy, and interest) were identified in the data and recoded in a coding document. Additional themes were also found in the data (unexpected events and benefits) which included explicit semantic themes and latent themes or concepts behind motivations. These were classified into categorical broad themes with sub-themes in each broad theme and coded accordingly. A database was compiled to record these themes and sub-themes along with illustrative direct quotes. The themes were subjected to an analytical narrative and tallied accordingly. A second researcher continually reviewed the codes and corresponding classification of themes and inter-coder reliability revealed no significant differences.

Both quantitative and qualitative data from the survey instrument and interviews were triangulated to provide richer data and more comprehensive responses to the research questions. Interviews allowed for a deeper understanding and interpretation of the quantitative responses provided in the survey. While statistical analyses can precisely measure variables, link causation and provide measures of significance, the qualitative data can assist in explaining why the results are significant and further confirm quantitative results (Neuman 2006; Veal 2005). The triangulation of the survey responses and interview transcripts further validated the data and allowed for a more holistic analysis of the factors that motivate an individual to choose a career in financial planning. Further, career choice theory, social learning theory and personality theory assisted in explaining the results and answering the research questions.

Results

Motivation to study financial planning

More than 91% of the survey sample had completed formal tertiary education and 48.5% were currently undertaking further study. To respond to RQ1, the survey instrument asked respondents what motivated them to choose financial planning as a study option. A summary of the responses is shown in Table 3.The highest frequency of responses was found for 'want to help others' (56.3% of respondents), closely followed by 'employment opportunities' (53.4%) and 'interest/enjoyment' (46.6%), providing support for the interest, enjoyment and inherent satisfaction aspects of SDT.

Table 3: Motivation to study financial planning

	Responses* N=103	Percent	Percent of Cases
Family	8	2.70%	7.80%
Regulatory Reform	9	3.00%	8.70%
Enjoy Working with Numbers	33	11.10%	32.00%
Help Others	58	19.50%	56.30%
Employment Opportunities	55	18.50%	53.40%
Life Experience	26	8.70%	25.20%
Interest/Enjoyment	48	16.10%	46.60%
Employment Requirement	12	4.00%	11.70%
Wanted to be a Financial Planner	43	14.40%	41.70%
Improve Knowledge	6	2.00%	5.80%
High school study and/or teacher	0	0.00%	0.00%
Total	**298**	**100.00%**	**289.30%**

*Respondents could choose more than one response

Noticeably, no respondents indicated that their motivation to study financial planning was influenced by high school studies or high school teachers. Further, the number of respondents who were encouraged by their family to study financial planning was very low, comprising only 2.7% of all responses. This indicates that financial advisers had a high level of autonomy in choosing their career, an important intrinsic motivation explained by SDT.

A significant difference in motivation was found between age groups, with a higher proportion of those aged 18-29 years motivated to study financial planning because they enjoy working with numbers, X^2 (1, N = 103) = 9.97, p = .04. This suggests that younger people who have less life experience and possibly less exposure to financial planning perceive that financial planning largely involves working with numbers and possibly are less aware of the 'people' side of financial planning and the ability of financial planning to help others. This age group also included a lower proportion of those currently working as a financial adviser (28.6% of the age group) compared to other age groups that ranged progressively from 68.2% (30-39 years) to 84.6% (60-69 years). These results support the possible influence of the competence aspect of SDT.

Considering that salary expectations have been cited as a possible extrinsic motivating factor for career choice, respondents were asked to indicate their annual salary expectation for a qualified financial adviser. Results showed the mean salary expectation to be $130,984 per annum, with a range from $40,000 through to $230,000. The mean salary expected by a working financial adviser (M = $139,462.74; SD = 50,807) was higher than respondents who were not currently working as a financial adviser (M = $110,354.60; SD = 32,947). Descriptive results can be found in Table 4. A t test revealed a statistically significant difference between salary expectations of those currently working as a financial adviser and those not currently working as a financial adviser, t(81.86) = -3.44, p = <.001. Table 5 shows the results of the independent samples t test. The manually calculated effect size (r^2 = .12) is between Cohen's (1988) guidelines for a medium effect (.09) and a large effect (.25).

Table 4: Descriptive statistics for expected salary of a financial adviser according to work status

Work status	N	Mean	Std. Deviation	Std. Error Mean
Not currently working as a financial adviser	30	110354.60	32956.756	6017.053
Currently working as a financial adviser	73	139462.74	50807.068	5946.517

Table 5: Independent Samples Test for expected salary by work status

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Expected Salary	**Equal variances assumed**	6.350	.013	-2.893	101	.005	-29108.140	10060.551	-49065.566	-9150.713
	Equal variances not assumed			-3.441	81.860	<.001	-29108.140	8459.669	-45937.547	-12278.732

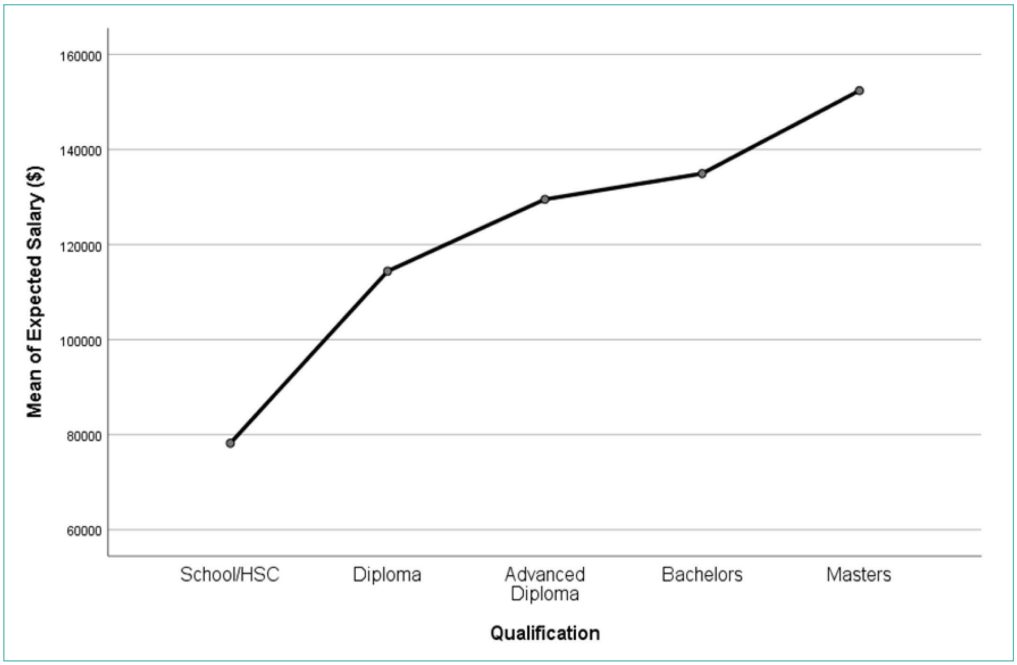
As the demand for qualified licensed financial advisers in Australia is much higher than supply, it is plausible that those currently working as financial advisers may also expect a higher salary than those who are not currently working as an adviser (e.g. full-time students, retiring advisers or new entrants). Further, as current financial advisers are now expected by law to undertake additional tertiary study, it follows that they may expect to be compensated for this through their salary. Pearson product-moment correlations were performed between qualification level (e.g. school level, diploma, advanced diploma, bachelor degree, masters degree) and salary expectation using an alpha level of .05. Scatterplots suggested the assumption of correlation was satisfactory. Table 6 shows a relatively strong, positive and significant relationship between qualification level and salary expectation, $r(101) = .38$, $p < .001$. This is further illustrated in Figure 2, suggesting that financial advisers expect to earn a higher salary as they obtain higher level qualifications. It follows that salary expectations may have some bearing on the motivation to pursue additional study in financial planning.

Table 6: Correlation between Qualifications and Salary Expectations

		Expected Salary	Qualification
Expected Salary	Pearson Correlation	1	.378**
	Sig. (2-tailed)		.000
	N	103	103

**Correlation is significant at the 0.01 level (2-tailed).

Figure 2: Correlation of qualifications and salary expectations



Motivation to become a financial adviser

In response to RQ2, the survey asked respondents who identified as currently working as financial adviser to explain via a free response, what factors motivated them to become a financial adviser. Results showed the main reason for becoming a financial adviser was 'to help others' (53.6%), followed by 'work experience' (33.9%) and 'interest' (26.8%) (see Table 5). These results mirror those for RQ1, with the main factors motivating an individual to study financial planning being the same major factors that motivated financial advisers to choose a career in financial planning.

Table 7: Motivation to become a financial adviser

	Responses* N= 56	Percent	Percent of Cases
Help others	30	29.13%	53.57%
Work experience	19	18.45%	33.93%
Interest	15	14.56%	26.79%
Enjoy working with people	11	10.68%	19.64%
Enjoy working with numbers	7	6.80%	12.50%
Working conditions	7	6.80%	12.50%
Enjoy working with both numbers and people	6	5.83%	10.71%
Employment opportunity	6	5.83%	10.71%
Financial stress	2	1.94%	3.57%
Total	103	100.00%	183.93%

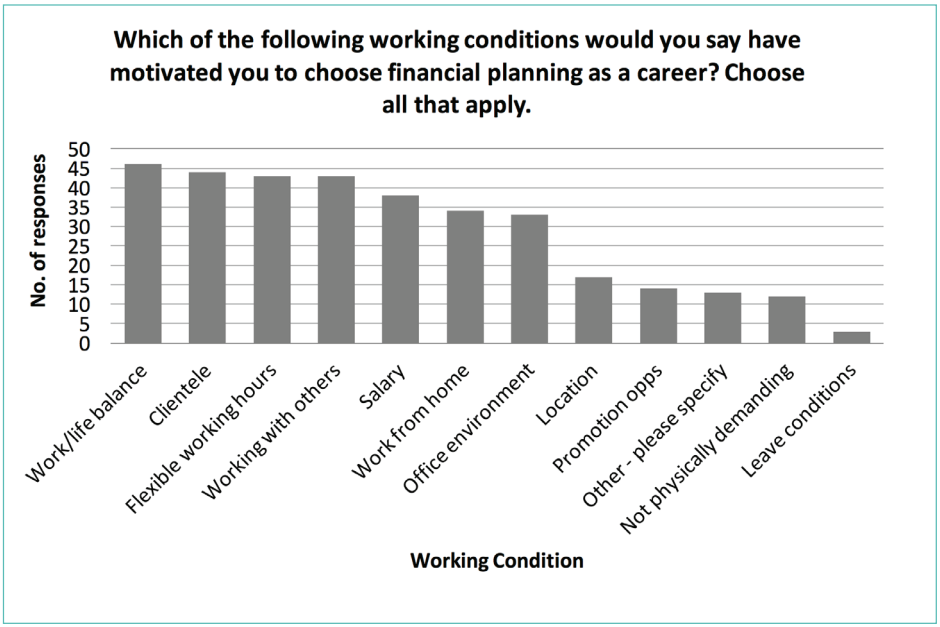
*Respondents could choose more than one response

The results also showed that 'enjoy working with people' rated higher than 'enjoy working with numbers' as motivating factors influencing the choice to pursue a career in financial planning. Many financial adviser respondents also indicated that 'working with both people and numbers' motivated them to become a financial adviser. Further, the category 'interest' returned some responses that highlighted the interest in working with numbers which was further supported by interview transcriptions. For example:

> *I grew up finishing high school at the point of the global financial crisis… So that really sort of kicked off an interest in all things finance, budgeting, investment. That kind of thing. So it was always a personal interest of mine and it was all about trying to find a career that I could enjoy and once I heard that financial planning existed, in my mind, the two married up as pretty much the exact same thing so I thought I could do a career doing exactly what I personally enjoy doing.*

While the results have shown intrinsic motivation to be an important factor in choosing a career in financial planning, the influence of extrinsic factors was also examined through a survey question about working conditions. While only 6.8% of free responses from financial advisers indicated that working conditions influenced the choice to pursue a career in financial planning, 100% of survey respondents chose at least one of the working conditions provided. The type of 'working condition' with the highest frequency was 'work/life balance' (62.5%), followed by clientele and flexible working hours. Figure 3 provides a visual representation of responses using a histogram.

Figure 3: Working conditions as a motivating factor in choosing financial planning as a career



Of the twelve working conditions influencing the motivation to choose a career in financial planning, the top four all related to working with clients and working flexibility. Interview findings supported the survey results and provided further insight into the flexible working conditions expected in financial planning, such as being able to set their own hours. The 'Other' category included ability to help others and skills diversification. While working conditions were initially viewed to be potential extrinsic motivations, these findings instead provide further support to more intrinsic motivations outlined in SDT such as autonomy and interest.

Salary ranked fifth out of 12 working conditions selected by participants, representing 37%. This was further supported by three of the fourteen interviewees who indicated that while not the main motivator, salary was a contributing factor in their career choice.

Social learning and life experiences

To respond to RQ3, there was an optional open-ended, free response question included in the survey asking what (if any) life experiences may have led to the motivation to pursue a career in financial planning. Interviews with respondents provided further insight as to the social learning that occurred through these life experiences. Thematic analysis identified four main themes being financial hardship; exposure to benefits provided by financial advisers through family or friends; engagement with the financial planning profession, and ability to help others. A summary of the frequency of responses pertaining to the influence of life experiences on choosing financial planning as a career from both the survey and the interviews are included in Table 8.

Table 8: Frequency of free responses: life experiences influencing career choice

	Financial Hardships	Observed Benefits	Help Others	Engagement w/ Profession	Other	Total
Survey (N = 103)	11	4	12	12	8	47
Interviews (N = 14)	6	1	2	3	2	14
Total	**17**	**5**	**14**	**15**	**10**	**61**

Financial hardship rated highly in both surveys and interviews as a motivational factor in choosing a career in financial planning. This was a somewhat unexpected but important finding and supports the survey findings in Table 3 and Table 5 that indicate the main motivation to pursue a career in financial planning is to help others.

Free responses from surveys and interview responses included several comments as to how financial hardship earlier in life had led respondents to consider a career in financial planning. Some interviewees also reflected on how their own parents' financial struggles impacted on them as a child and how that motivated them to work in financial planning:

> *…watching my own parents struggle with cash flow and things like that, really set me with the desire to be able to help people.*

> *I can tell you now, my life experience from the time I was about eight years old has led to a career of financial planning, definitely. I 100 per cent know that my early childhood and teen experience has picked my career. I was a child of immigrant parents, first generation. Money swung in and out of our lives. They were bankrupt.*

Other respondents experienced financial hardship as an adult. This occurred due to a myriad of reasons, including poor financial choices or a major life event, such as an economic recession, illness or divorce. For example:

> *Following separation and inability to meet obligations I was unsure where to turn for help - made me realise we needed more planners.*

> *I have experienced highs and lows, lived through recession, drought and good times. I have seen the positive difference that good advice can bring.*

Consistent with social learning theory, results suggested that choosing a career in financial planning is influenced by the observation of financial advisers in social contexts, such as observing the benefits provided by financial advisers to close family or friends. For example:

> *I've seen the benefits my family have gained from having a relationship with a financial planner.*

Similarly, interview findings indicate that serendipitous events exposing individuals to the financial planning profession can provide a medium for social learning and affect motivation to choose financial planning as a career. For example, two interview participants detailed unexpected offers to gain work experience in financial planning when they were students in a related (but not financial planning) university degree:

> *I think financial planning was only one elective back then. And I was a third year undergraduate and there was probably a need to work out what job I was going to do. And a friend's uncle ran a financial planning business. So I did some work experience…*

Another interview participant who was trained as an accountant found themselves out of work and was offered to work with a financial planner:

> *I was out of work and a friend of mine was a financial planner and he said 'why don't you come and work for me'.*

Life experiences across a range of social contexts were also responsible for highlighting that financial planners had the ability to help others. This was a common theme amongst both free responses and interviews where respondents indicated how their life experiences influenced their motivation to pursue a career in financial planning to help others. For example:

> *I grew up in Central Queensland out in the bush where people often didn't have a lot of money, and the experience of knowing a lot of people who were very, very poor and also watching my own parents struggle with cash flow and things like that, really set me with the desire to be able to help people.*

In responding to RQ3, the findings from this study reveal that social learning through life experiences has a significant bearing on the motivation to pursue a career in financial planning to help others. For some respondents, this was influenced by social situations involving financial hardship, or where

financial advice was provided with beneficial outcomes. To a lesser degree, some respondents pursued a career in financial planning due to job opportunities provided by their social networks. While these social experiences support social learning theory and previous empirical studies on career choice, the specific nature of the narratives provided by respondents in this study highlight the uniqueness of financial planning as the skill of working with numbers is able to be used to help others. It follows that the choice to pursue a career in financial planning may involve both agentic and communal goals.

Goal congruence

As discussed earlier, goal congruence theory holds that there are two opposing categories of careers that exist to fulfil one's goals in life: things-careers to fulfil agentic goals; and people-careers to fulfil communal goals. RQ4 asks 'Is choosing a career in financial planning congruent with agentic or communal goals?'. Responses to the previous research questions have highlighted that helping others was the strongest motivating factor for both choosing to study financial planning (RQ1) and to become a financial adviser (RQ2), as indicated by more than half of the respondents. Further, 32% of responses for those studying financial planning and 12.5% of financial adviser responses also suggested that they were motivated by an interest in numbers and 10.7% of free responses from financial advisers showed an interest in both working with both people and numbers (refer Tables 3 and 7). The results were further supported by interviewees who explained how being financially minded as well as helping people fitted well with financial planning:

> *Well, I think a lot of people – well, I guess virtually everyone I spoke to sort of like considered it for me a bit of a natural fit because they always thought that I was like financially minded and I did have some certain things happen in my life where you know I really had to devote a lot of my time and energy to helping other people.*

Pearson product-moment correlations were performed between enjoying working with numbers and helping others with $\alpha = .05$. The results strongly supported the dual motivation of enjoying working with numbers and helping people and were statistically significant, $r = .40$, $p < .001$. This suggests that those motivated to pursue a career in financial planning did so because of their interest in numbers as well as their interest in people. This is a significant finding as depending on the occupation, career choice theories and assessment tools tend to place more value on either numerical 'things' skills or people skills but not equal importance to both. For example, engineering is viewed as a career requiring numerical skills while those such as nursing and teaching are seen to value people skills more highly.

The findings of this study in determining the motivations for pursuing a career in financial planning have revealed a hybrid category of careers exists, that we will call people-things careers.

Personality

The Big Five personality test (Goldberg 1992) was administered as part of the questionnaire to determine if choosing a career in financial planning is more likely to be associated with any one personality trait, as posed by RQ5. The five factors: (1) Extraversion, (2) Agreeableness, (3) Conscientiousness, (4) Emotional Stability (Neuroticism) and (5) Intellect/Imagination were measured using questions from the IPIP developed by Goldberg (1992). Responses were made on a five-point Likert scale ranging from strongly agree (5) to strongly disagree (1), with ten questions for each of

the five factors. The personality questions were scored in accordance with the IPIP scoring instructions (Goldberg, 1992). The 50-item scale had acceptable internal consistency reliability with a Cronbach's alpha of .88.

Of the five personality factors measured, the sample showed the personality domain of 'agreeableness' to rank highly on the scale, with M = 41.43 and Mdn = 42 (out of a total score of 50). This was closely followed by 'conscientiousness' (M = 40.68, Mdn = 41). The total scores for each of the five personality domains are shown in Table 9.

Table 9: Descriptive statistics: the 'Big 5' personality factors

		Extraversion	Agreeableness	Conscientiousness	Emotional Stability (Neuroticism)	Intellect
N	Valid	79	79	79	79	79
	Missing	46	46	46	46	46
Mean		32.9747	41.4304	40.6835	33.2785	37.1899
Median		33.0000	42.0000	41.0000	34.0000	38.0000
Mode		34.00	41.00a	40.00	26.00a	38.00
Std. Deviation		7.09817	5.15076	5.01675	7.67937	5.45160

a. Multiple modes exist. The smallest value is shown.

Interviews supported this finding with 'agreeableness' ranking highest on the thematic analysis with 33 counts from a total of 64 (51.6%) for personality traits, as indicated in Table 10.

Table 10: Thematic analysis of interviews: factors influencing career choice

Major themes	Interest		Personality		Skills		Benefits/incentives		Social learning/ life experience	
Sub-themes	Passion	3	Openness	5	Finance/		Social Status	4	Exposure to	
	Finance*	15	Conscientiousness	7	Economics	6	Client Interaction	5	economics/	
	Autonomy	3	Extraversion	19	Technical	5	Stability	2	finance	5
	Client-Interaction	5	Agreeableness*	33	Communication*	12	Flexibility*	8	Personal*	9
	Help people	11	Neuroticism	0	Analytical	4	Salary	4	Unexpected	
	Other	3			Mathematical	3	Development		events	2
							Opportunities	4		
							Impact people	4		
							Other	5		
Total		**40**		**64**		**30**		**36**		**16**

*highest number of counts

Given that the personality trait of 'agreeableness' is characterised by altruism, helpfulness, optimism, and friendliness, it can be expected that the motivation to become a financial planner to help others would be related to a higher score for agreeableness.

Further, it follows that the personality trait of 'intellect' which involves curiosity, creativity and intelligence would be expected to be positively associated with the motivation to become a financial planner because one enjoys working with numbers. Using results for 'motivation to study financial planning' as a proxy for motivation to pursue a career in financial planning, bivariate correlation analyses were used to test the following hypotheses:

> *H1: Agreeableness will be positively and significantly related to the motivation to help others by choosing to pursue a career in financial planning.*
>
> *H2: Intellect will be positively and significantly related to the motivation to work with numbers by pursuing a career in financial planning.*

Pearson product-moment correlations were performed between agreeableness and helping others, and intellect and working with numbers, using an alpha level of .05. Results are shown in Table 11. A moderate positive relationship was found between agreeableness and wanting to help others (H1) with statistical significance at the .051 level ($r = .22$, $p = .051$), with those with an 'agreeable' personality more likely to be motivated to pursue a career in financial planning to help others than those with other personality traits.

Table 11: Correlations among agreeableness, helping others, intellect and enjoying working with numbers.

		Enjoy Working With Numbers	Help Others
Intellect	Pearson Correlation	.235*	.119
	Sig. (2-tailed)	.037	.295
Agreeableness	Pearson Correlation	.001	.221
	Sig. (2-tailed)	.996	.051
Enjoy Working With Numbers	Pearson Correlation	1	.395**
	Sig. (2-tailed)		.000

*p< .05 **p< .01

A moderate positive relationship was found between intellect and working with numbers (H2) with a high statistical significance ($r = .24$, $p < .05$) suggesting that those with the 'intellect' personality trait may be more likely to pursue a career in financial planning due to their enjoyment in working with numbers. The correlation analyses also showed enjoying working with numbers was strongly positively correlated with wanting to help others, with very high statistical significance ($r = .4$, $p < .001$) suggesting the enjoyment in working with numbers for those pursuing a career in financial planning also motivates them to use these skills to help others. This also assists in responding to RQ4, showing that a combination of both agentic and communal goals influence the motivation to pursue a career in financial planning.

The personality trait of agreeableness is often linked with careers such as nursing or teaching and other roles involving working with people where they are seen to be empathetic, and helpful. Conscientiousness on the other hand is more closely linked with technical more problem-solving roles requiring dependability and strong organisation skills such as those skills traditionally associated with accounting or engineering. The fact that those choosing to pursue a financial planning career scored highly across both personalities demonstrates the uniqueness of financial planning which requires characteristics of both agreeableness and conscientiousness. Interview respondents provided further insight to this phenomenon:

> *But financial planners themselves seem to need a personality that is quite people orientated. Definitely need a lot of empathy and the ability to connect with people and really find out what they like. What they're trying to achieve. And really connect to them on a personal level. So people skills is probably priority for a financial planner though all the technical skills need to underly that.*
>
> *Well there's probably a range of personalities that can do okay in financial planning. Definitely, there's space for a people person. If you can talk to people and win their confidence, get them to talk to you about their finances and what they want to achieve, so good people skills definitely helps. But you also need to have good technical ability and an ability with numbers.*
>
> *I think having the dual combination of being a people person and having technical aptitude for numbers and strategic thinking helps.*

With the literature often associating 'agreeableness' with careers that are dominated by females such as nursing and teaching, the findings for this study were surprising as financial planning is a career dominated by males.To test for gender differences within the sample, an independent t test was conducted on each of the personality domains for any significant gender differences. The results are displayed in Table 12.

Table 12: Independent samples t test: agreeableness by gender

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Agreeableness	**Equal variances assumed**	4.264	0.042	-2.393	77	0.019	-2.69820	1.12769	-4.94371	-0.45269
	Equal variances not assumed			-2.446	73.385	0.017	-2.69820	1.10313	-4.89653	-0.49986

A statistically significant difference was found between males and females, $t(73.39) = 2.45$, $p = 0.017$ for the personality domain of 'agreeableness'. The 'agreeableness' score was higher for females (M = 42.86, SD = 4) than it was for males (M = 40.17, SD = 5.73). This indicates that while financial planners in general were more likely to have the personality trait of 'agreeableness', females choosing to pursue a career in financial planning were more also more likely than their male counterparts to have the personality trait of agreeableness.

Discussion and conclusion

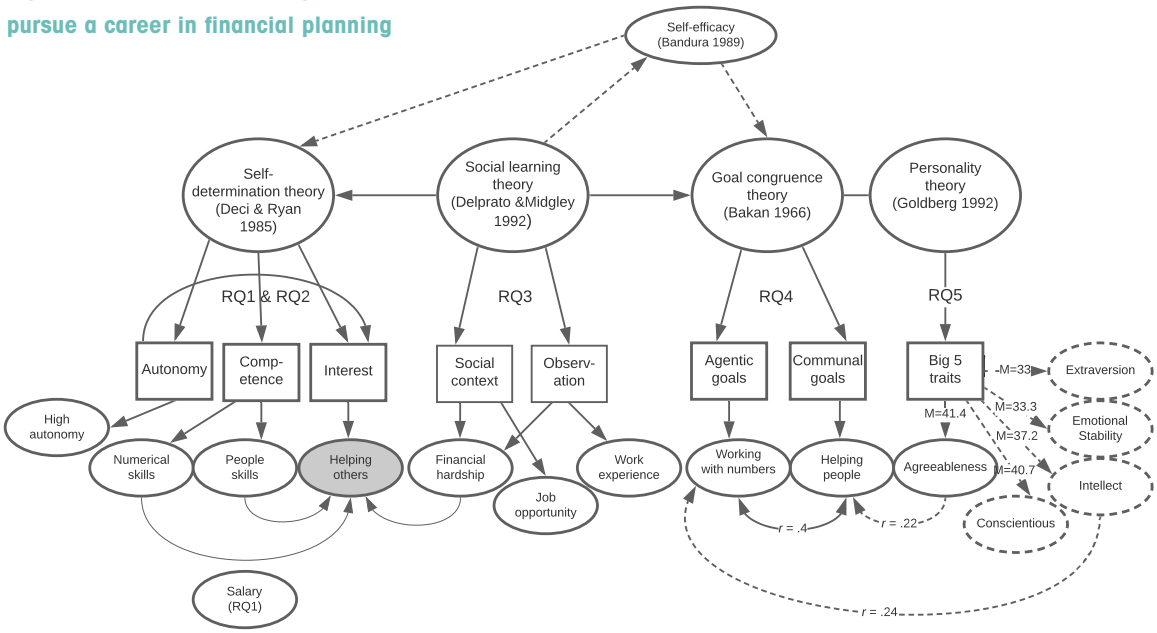
We now discuss our findings in relation to the theoretical framework and identify implications for education providers, financial planning firms, regulators, and the profession.

The results of this study support the guiding conceptual model derived from career choice theory, supporting the hypotheses that personality, along with self-determination, goal congruence and social learning all influence the motivation to pursue a career in financial planning, and are inherently interconnected. While the study found 'wanting to help others' to be the main overarching motivation for pursuing a career in financial planning, the results indicated that the following respective factors were all strong factors influencing the motivation to choose a career in financial planning:

- interest in working with numbers and people;
- employment opportunities;
- experiencing/observing financial stress, and
- wanting to help others.

Having an 'agreeableness' personality trait was also more likely among those who had chosen to pursue a career in financial planning (RQ5), which further supported the motivation to want to help others. An extension of the guiding conceptual model (refer Figure1) which includes the findings of the study is presented in Figure 4.

Figure 4: Factors influencing motivation to pursue a career in financial planning



In accordance with self-determination theory our results show that individuals are intrinsically motivated to choose a career in financial planning because of interest, autonomy and competence. Responses to our first two research questions found that an interest in helping others was the main reason for choosing to study (RQ1) and/or work (RQ2) in financial planning. Enjoying working with numbers and the enjoyment of working with people were both also found to influence the motivation to pursue a career in financial planning which is linked with perceived competence and self-efficacy (Bandura 1989; Bandura et al. 2001, Ryan & Deci 2000) as well as interest. Further, work experience and employment opportunities were also found to influence the motivation to choose a financial planning career, supporting SDT studies that suggest perceived competence when accompanied by autonomy of career choice and contextual support (such as that provided by work experience) will enhance intrinsic motivation (Fisher 1978; Reeve 1996; Ryan 1982). Extrinsic rewards in the form of working conditions and salary were not found to play a major role in influencing advisers to pursue a career in financial planning, with results suggesting this is more of a 'want' than a 'need'. However, the working conditions such as flexibility and working with people were the most popular among advisers, which further supported the intrinsic rewards of autonomy and interest identified by SDT. While salary did not rate highly as influencing the motivation to work as an adviser, the findings did indicate that a higher salary was expected by working advisers than non-working advisers. Further, the correlation between qualifications and salary suggest that in response to RQ1, financial advisers may be motivated by a higher salary to pursue further study in financial planning. This supports previous studies on education and career choice (for example, see Bernardo, Meller & Valdes 2017) and suggests that working financial advisers may value their human capital 'portfolio' and any expected returns in a similar way to valuing a wealth portfolio (Timmerman 2020).

Financial planning has traditionally been viewed as a career for mature age 'career changers' or something that people 'fall into'. This is partially supported by our empirical findings that a range of serendipitous events provided social learning experiences which influenced individuals to choose financial planning as a career. For example, our findings in response to RQ3 showed that personal experiences such as financial hardship, observing how a financial adviser has helped family members, or work opportunities in financial planning, have all influenced the choice to pursue a career in financial planning. A common theme running through these experiences is the social learning that revealed how financial planning was able to make a positive difference in the lives of others. With growing demand for financial planners in Australia, and limited supply, the profession must consider how to provide more positive social learning experiences involving financial planning to the next generation. This may be through offering a larger number of work-integrated learning experiences in financial planning to a broader range of students, or by including compulsory personal finance content in a broader range of courses. Consistent with social learning theory, greater exposure to financial planners as positive role models may also assist – whether this be through case studies, family interactions with financial advisers, guest lectures, literature, or the popular media.

Further, with financial planning now evolving into a profession with higher level entry requirements (such as degree level qualifications and ethics exam requirements, for example, in Australia), there has been a growing interest in graduate pathways and accessing a talent pool (Johnson, Brimble & Zanetti 2016) which may require a rethink around how to promote financial planning as a career to students at high school and university. As identified by this study, not one respondent reported being motivated to study financial planning because of any high school activities. In addition, it is

likely that many high school students have not had the social learning opportunities gained from life experiences to engage with the financial planning profession and thus may be unaware of financial planning as a career. An interview respondent from the study summed this up well:

> *I think it comes back to the financial literacy or having a course in schools and I think kids or students, kids in high school, could probably say I think I'd like to pursue a career in financial planning… I'm guessing that (when) someone goes to university, they're not going to choose financial planning unless they know something about it. I guess that idea's got to come by the time they reach Year 11, Year 12 in high school.*

The findings also make a valuable contribution to theory by demonstrating how the socialisation process of seeing males traditionally pursuing careers requiring mathematical skills (Betz & Hackett, 1981) may be balanced by seeing how mathematical skills can also be used to help others which has traditionally been associated with female stereotypes (Abele & Wojciske 2014; Bakan 1966; Betz & Hackett 1983). As the findings show the enjoyment of working with numbers to be a stronger motivation for those studying financial planning (refer Table 3) than those working as a financial adviser (refer Table 5), it may prove worthwhile to promote the role of financial planning in helping others to school leavers and university students who may view financial planning solely as a mathematical, or things-based career. Further, this may assist in breaking down stereotypes and attracting more females to the male-dominated profession of financial planning, with females in earlier studies on career choice found more likely to seek fulfilment from communal career goals (Diekman et al. 2010, 2017; Tellhed 2018) and less likely to show an interest in things-careers (Eccles & Wang 2016; Watt 2010).

By establishing that both helping others and enjoying working with numbers are important motivating factors in choosing to pursue a career in financial planning; the study has also answered RQ4, showing that financial planning has the ability to fulfil both agentic and communal goals; a noteworthy contribution to goal congruence theory. The findings provide empirical evidence to show that career choices do not have to be based on either things or people but that for some careers, such as financial planning, both are equally important. As part of this contribution, we propose a new hybrid category of careers, to be known as people-thing careers.

Further, by responding to RQ5 in support of personality theory, the combination of helping others and working with numbers through problem solving, as is required in financial planning, has meant that respondents scored higher on the agreeableness and conscientiousness scales. While females were also more likely to score higher on the agreeableness scale, findings also revealed that women were more likely than males to be motivated by 'wanting to help others' and 'interest/enjoyment' to pursue a career in financial planning. This supports gender studies on career choice and interest but also provides useful data that can be used to attract more females to the financial planning profession.

A limitation of this research is the sample size. A higher number of participants would have allowed for additional analyses between groups and allowed for testing of more significant results. Further, while the sample was not limited to members of any one professional association, promotion of the research through a newsletter of the Financial Planning Association of Australia may have drawn a larger sample from this association, affecting the generalisability of results. Additionally, it was not possible to ascertain the representation of universities for students who participated in the research which may also have limited the generalisability of results. While the study focussed on a career in

financial planning, an interesting follow-up to the study would be to source a larger sample across a range of professional -client relationship careers and compare the motivations for pursuing differing careers to determine any significant differences. Additionally, further research on the perceived career self-efficacy of financial advisers to support the connection between the motivation to help others and confidence in one's abilities would prove fruitful.

Although the study should be interpreted with these limitations in mind, the results underscore that the main motivation for choosing financial planning as a career is to help other people. This was explained using career choice theories of self-determination, social learning, goal congruence and personality as outlined in our guiding conceptual model (Figure 1) and reported in Figure 4. While there are areas of career choice that remain ripe for future research in financial planning, the findings from our study have major implications for a range of stakeholders including career counsellors, secondary and higher education providers, financial planning firms, regulators, and the profession more broadly. A summary of these implications is provided in Table 13.

Rather than focus on financial planning as a career in 'numbers', the profession should consider how it can be promoted as a career to 'help others'. This will be especially relevant to attracting millennials who are known to be looking for a sense of purpose in their work (Haworth 2017). This will require a collaborative effort of all stakeholders and may have the combined effect of increasing consumer trust in financial advisers. The Australian media has much to answer for in terms of tarnishing the reputation of financial advisers by characterising them as untrustworthy and motivated by the dollars to be earnt on a 'sale'. It is due time for financial advisers to be more accurately portrayed as people who are intrinsically motivated to use their interest and skill to help others.

Table 13: Implications for stakeholders

Stakeholder	Implications of findings
Profession	• Promote financial planning as a career of choice for those who both enjoy working with numbers and want to help people (RQ1, RQ2, RQ4). • Improve the reputation of financial advisers as professionals who want to help people (RQ2, RQ4). • Attract new clients to use financial advisers by portraying them as people who are likely to have a positive personality (RQ5). • Possibly encourage more females to study and work in financial planning by promoting that primary role of a financial adviser is to help people (RQ1, RQ2, RQ3, RQ4). • Collaborate with secondary and tertiary educators as well as industry to provide appropriate financial advising work experience programs and other engaged learning experiences/programs that introduce financial planning to students (RQ3).
Tertiary Educators	• Re-consider how financial planning and related degree programs are designed and delivered so that they expose more students to financial planning experiences. E.g. guest lecturers, internships, and other work-integrated learning activities (RQ3). • Offer compulsory personal finance courses (RQ3). • Increase the supply of financial planning students by promoting financial planning as a career that helps people (RQ1, RQ2). • Promote further studies in financial planning as way for current advisers to potentially earn a higher salary (RQ1). • Attract financial planning students by communicating the role of both numbers and people in financial planning (RQ4). • Advertise employment opportunities in financial planning (RQ3). • Incorporate both number skills and people skills into the financial planning curriculum (RQ1, RQ2, RQ3, RQ4).
Secondary Educators and Career Counsellors	• Design education programs that expose students to financial planning as a career. E.g. personal finance courses, case studies, competitions, financial adviser class visits/guest classes (business studies, commerce, economics, mathematics, personal development) (RQ3). • Improve the capacity of students to prepare for and engage in personal financial planning as a career by considering a stand-alone personal finance unit and work experience opportunities (RQ3) • Promote financial planning as a career that helps people (RQ1, RQ2). • Communicate the role of both numbers and people in a financial planning career (RQ1, RQ2, RQ4). • Highlight the strong demand for financial advisers and likely employment opportunities (RQ3).
Financial Planning Employers	• Increase the supply of financial planning candidates and encourage more females to apply for roles in financial planning by promoting financial planning as a career that helps people (RQ1, RQ2, RQ3). • Recruitment strategies to promote the dual role of working with numbers and people, in addition to autonomous and flexible working conditions (RQ1, RQ2, RQ4). • Retain existing financial advisers by ensuring there is ample opportunity to fulfil both agentic and communal goals (RQ4). • Promote relationships and collaboration with the secondary and tertiary educators to provide students with work experiences and knowledge of the benefits provided by financial advisers (RQ3). • Ensure that salary of financial advisers is commensurate with work experience and level of study (RQ1, RQ2). • Offer more internships and work experience opportunities to potential employees (RQ1, RQ3). • Consider conducting personality testing of potential candidates (RQ5).
Regulators	• Attract new students and others to the profession who will put the client first by promoting financial advisers as 'helping others' (RQ1, RQ2). • Ensure both number skills and people skills are included in financial planning education and professional year requirements (RQ1, RQ2, RQ3, RQ4). • Improve the reputation of financial advisers as professionals who want to help others (RQ2), and have an agreeable personality (RQ5), resulting in improved consumer confidence and trust in financial advisers and increased participation in the economy.

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Appendix: Survey Instrument

(Administered online in Qualtrics with a Participation Sheet)

Q1 What is your gender? Please select the appropriate box.

o Male (1)
o Female (2)
o Prefer not to say (3)

Q1.1 What is your age? Please select the appropriate box.

o 18 -29 years old (1)
o 30-39 years old (2)
o 40-49 years old (3)
o 50-59 years old (4)
o 60-69 years old (5)
o 70+ years old (6)

Q1.2 What is your postcode?

Q1.4 What language do you speak at home?

o English (1)
o Other - please specify (2)

Q2 From the list below, please select your highest completed qualification.

o School/HSC (1)
o Diploma (2)
o Advanced Diploma (3)
o Bachelor degree (4)
o Masters degree (5)
o PhD (6)

Q3 Select the most appropriate response from below regarding your current study situation.

o I am currently studying a postgraduate financial planning program e.g. Graduate Certificate, Graduate Diploma, Masters, Bridging unit, PhD (1)
o I am currently studying a bachelors degree in financial planning/with a major in financial planning (2)
o I am currently studying another qualification in a related area (3)
o I am currently studying towards a professional designation e.g. CFP, FChFP (4)
o I am not currently studying (5)

Q4 Tell us about when you first heard about financial planning as a study option

Q5 What motivated you to study financial planning? Choose all that apply.

o Encouragement from family (1)
o Regulatory reform (2)
o Enjoy working with numbers (3)
o Want to help others (4)
o To help secure a good job (5)
o High school study and/or teacher (18)

o Life experience (6)
o Interest/enjoyment (7)
o Employment requirement (16)
o Other (17) _____

Q6 How much, on average, do you expect to earn per year as a financial adviser?

o $40,000 o $59,000 o $78,000 o $97,000 o $116,000 o $135,000
o $154,000 o $173,000 o $192,000 o $211,000 o $230,000

Q7 What do you like about financial planning?

Q8 Thinking about professional designations, please select the most appropriate answer from below.
o I do not currently hold a professional designation (1)
o I currently hold a professional designation (2)
o I am currently studying towards a professional designation (3)
o I am not interested in holding a professional designation (4)
o I plan to study towards a professional designation in the future (5)

Q9 Are you currently working as a financial adviser?
o Yes (2)
o No (3)

Skip To: Q12 If Q9 = 3

Q10 Explain what motivated you to become a financial adviser.

Q11 How have your life experiences led you to a career in financial planning?

Q12 Rank, in order, your preferred type of employer
_____ Insurance company (1)
_____ Large bank (2)
_____ Small bank or building society/credit union (6)
_____ Superannuation fund (3)
_____ Large accounting firm (4)
_____ Small/Medium sized accounting firm (5)
_____ Large wealth management firm (7)
_____ Independent financial advising firm (8)
_____ Self-employed/own business (9)
_____ Other - please specify (10)

Q13 Which of the following working conditions would you say have motivated you to choose financial planning as a career? Choose all that apply.
o Office environment (1)
o Flexible working hours (2)
o Work/life balance (3)
o Leave conditions (4)
o Ability to work from home (5)
o Working with others (6)

- o Location (7)
- o Opportunities for promotion (8)
- o Not physically demanding (9)
- o Clientele (10)
- o Other - please specify (11)
- o None of the above (12)

Q14 In the last year, would you say your motivation to pursue a career in financial planning has:

- o Increased (1)
- o Decreased (2)
- o Stayed the same (3)
- o Unsure (4)

Q15 Primary reason for your response to your motivation level in the previous question?

- o Increasing age / too old (2)
- o Lack of enjoyment (3)
- o Cost of study (4)
- o Travel to/from work (5)
- o Family/Carer responsibilities (7)
- o Poor health / injury (8)
- o Mental health (14)
- o Financial situation (16)
- o Opportunity for promotion (15)
- o Working hours (13)
- o Performance at work (18)
- o Compliance (12)
- o Regulatory reform (17)
- o Other - please specify (10)

Q16 Describe what you would look for in a job to pursue your future career in financial planning.

Q17 This section relates to your personality which is useful for examining the relationship between personality and career choice. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age.

	Very accurate (16)	*Moderately accurate (17)*	*Neither accurate nor inaccurate (18)*	*Moderately inaccurate (19)*	*Very inaccurate (20)*
Am the life of the party. (1)	o	o	o	o	o
Feel little concern for others. (2)	o	o	o	o	o
Am always prepared. (3)	o	o	o	o	o
Get stressed out easily. (4)	o	o	o	o	o
Have a rich vocabulary. (5)	o	o	o	o	o
Don't talk a lot. (6)	o	o	o	o	o
Am interested in people. (7)	o	o	o	o	o
Leave my belongings around. (8)	o	o	o	o	o
Am relaxed most of the time. (9)	o	o	o	o	o

Have difficulty understanding abstract ideas. (10)	o	o	o	o	o
Feel comfortable around people. (11)	o	o	o	o	o
Insult people. (12)	o	o	o	o	o
Pay attention to details. (13)	o	o	o	o	o
Worry about things. (14)	o	o	o	o	o
Have a vivid imagination. (15)	o	o	o	o	o
Keep in the background. (16)	o	o	o	o	o
Sympathize with others' feelings. (61)	o	o	o	o	o
Make a mess of things (51)	o	o	o	o	o
Seldom feel blue (62)	o	o	o	o	o
Am not interested in abstract ideas. (59)	o	o	o	o	o
Start conversations. (60)	o	o	o	o	o
Am not interested in other people's problems. (20)	o	o	o	o	o
Get chores done right away. (21)	o	o	o	o	o
Am easily disturbed. (64)	o	o	o	o	o
Have excellent ideas. (63)	o	o	o	o	o
Have little to say. (24)	o	o	o	o	o
Have a soft heart. (25)	o	o	o	o	o
Often forget to put things back in their proper place. (26)	o	o	o	o	o
Get upset easily (66)	o	o	o	o	o
Do not have a good imagination.(65)	o	o	o	o	o
Talk to a lot of different people at parties. (29)	o	o	o	o	o
Am not really interested in others (70)	o	o	o	o	o
Like order. (69)	o	o	o	o	o
Change my mood a lot. (32)	o	o	o	o	o
Am quick to understand things (33)	o	o	o	o	o
Don't like to draw attention to myself. (34)	o	o	o	o	o
Take time out for others. (35)	o	o	o	o	o
Shirk my duties. (36)	o	o	o	o	o
Have frequent mood swings (37)	o	o	o	o	o
Use difficult words (38)	o	o	o	o	o
Don't mind being the centre of attention (39)	o	o	o	o	o
Feel others' emotions. (40)	o	o	o	o	o
Follow a schedule. (41)	o	o	o	o	o
Get irritated easily. (42)	o	o	o	o	o
Spend time reflecting on things. (43)	o	o	o	o	o
Am quiet around strangers. (71)	o	o	o	o	o
Make people feel at ease (45)	o	o	o	o	o
Am exacting in my work. (46)	o	o	o	o	o
Often feel blue. (47)	o	o	o	o	o
Am full of ideas. (48)	o	o	o	o	o

Q18 Select the column that best corresponds with how important you consider the following behaviours for a financial adviser.

	Extremely important (40)	*Very important (41)*	*Moderately important (42)*	*Slightly important (43)*	*Not at all important (44)*
(1)	o	o	o	o	o
Reliable (3)	o	o	o	o	o
Honest (4)	o	o	o	o	o
Empathetic (12)	o	o	o	o	o
Marketing Oneself (13)	o	o	o	o	o
Caring (14)	o	o	o	o	o
Professional (15)	o	o	o	o	o
Patient (16)	o	o	o	o	o
Communicative (17)	o	o	o	o	o
Listening (18)	o	o	o	o	o
Trustworthy (19)	o	o	o	o	o
Flexible (20)	o	o	o	o	o
Ethical (21)	o	o	o	o	o
Nurturing (22)	o	o	o	o	o
Benevolent (23)	o	o	o	o	o
Ethical (24)	o	o	o	o	o
Dependable (25)	o	o	o	o	o
Acting with Integrity (26)	o	o	o	o	o
Relationship Building (27)	o	o	o	o	o
Tactful (28)	o	o	o	o	o
Friendly/Approachable (29)	o	o	o	o	o

Q19 Select the column that best corresponds with how important you consider the following the skills for a financial adviser.

	Extremely important (66)	*Very important (67)*	*Moderately important (68)*	*Slightly important (69)*	*Not at all important (70)*
(1)	o	o	o	o	o
Numeracy (3)	o	o	o	o	o
Time Management (30)	o	o	o	o	o
Verbal Communication (31)	o	o	o	o	o
Written Communication (32)	o	o	o	o	o
Problem Solving (4)	o	o	o	o	o
Technical Knowledge (12)	o	o	o	o	o
Social/Ethical Awareness (13)	o	o	o	o	o

Q20 What would you say to a new school leaver about financial planning as a study option and/or future career?

Q21 What would you say to a non-school leaver/career changer about financial planning as a study option and/or future career?

Q22 Please use the space below to include any other information you feel is relevant to this study.

Q23 Are you interested in participating in a short telephone interview to discuss your motivation to choose a career in financial planning?

- o Yes (1)
- o No (2)

Thank you for your time completing this survey.

EFFICIENT ASSET ALLOCATION FOR INDIVIDUAL INVESTORS IN THE ETF WORLD

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Exchange traded funds, allocation, efficiency, portfolio optimization.

ABSTRACT

Research has shown that investment success is largely driven by asset allocation. With the dramatic growth in number of exchange-traded funds (ETFs), individual investors have gained access to a wide variety of funds including funds representing non-traditional asset classes. This proliferation of ETFs allows investors to take advantage of high return alternatives while maintaining an asset allocation that is well diversified. This paper explores the potential for creating efficient portfolios using ETFs exclusively. We use price data from 2007 to 2017 for thirty-four ETFs to demonstrate that a portfolio of ETFs based on an average optimal weight allocation has a higher Sharpe ratio than 85 percent of the ETFs studied. Constructing efficient portfolios based on the average of optimized weights improves this portfolio's returns by 370 basis points and increases the Sharpe ratio significantly as compared with ex ante mean-variance optimization. We conclude that investors can benefit from using average optimized weights in building portfolios made up primarily of ETFs.

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Introduction

Research has shown that investment success is largely driven by asset allocation (Brinson et. al (1991)). Although many investors choose exchange traded funds (ETFs) and mutual funds over individual stocks, most must make asset allocations because they hold multiple positions in their portfolios. One rule of thumb that is commonly used is to allocate 60 percent of the investable asset in stocks and 40 percent in bonds (Chaves et al. (2011), Brinson et al. (1991); and Ziemba (2013)). As ETFs have expanded beyond simply indexing equities or bonds to include indices based on currencies and commodities, it has become simple and affordable for investors to employ non-traditional asset classes to gain further diversification. In the aftermath of the 2008 global financial crisis, investors are looking to non-traditional investment alternatives to further diversify their portfolios. Simple allocation strategies such "60/40" are no longer valid to the extent they overlook the potential for further diversification. With a universe of some 2,792 ETFs available in 2021 (Bloomberg LP, 2021), investors have a wide variety of to choose from in gaining representation for many asset classes within their portfolios. The willingness of investors to use ETFs is reflected in the fact that ETF assets grew from less than one hundred billion in 2000 to seven trillion dollars in 2021 (Board of Governors of the Federal Reserve System US).

While many studies have shown that asset allocation is of more strategic importance than active security selection, few has examined efficient asset allocation within a portfolio made up exclusively of ETFs. This paper aims to create efficient portfolios using only ETFs and to compare the performance of these portfolios with naive allocation schemes. Producing efficient portfolios from EFTs alone is feasible given the acceptance of ETFs by the investor community and the proliferation of ETFs that make it possible to find an ETF for virtually any objective, focus, or asset class.

The motivation for this research study is to make useful and simple investment recommendations for individual investors. Although ETFs have received considerable attention among researchers and practitioners, there is little literature addressing asset allocation using ETFs. Only a few studies have used ETFs exclusively to provide allocation recommendations for individual investors. Our study attempts to fill this void in the literature by producing asset allocations among 34 ETFs using Markowitz's mean-variance optimization technique along with Ledoit and Wolf's (2004) modification for structured and unstructured covariance matrices. This study is a meaningful contribution to a very few research that seeks optimal asset allocations using ETFs exclusively. Our objective is to provide useful information for individual investors, particularly in the form of simple allocation recommendations. Individual investors often make arbitrary allocations among asset classes that result in poor diversification and higher management costs. At the same time, wealth management companies charge substantial fees for recommending efficient allocations. Efficient portfolios made up entirely of ETFs can provide exposure to broad indices for equities, bonds, as well as to non-traditional asset classes at a relatively low cost. Our expectation is portfolios that use an optimized allocation among several ETFs will provide individual investors with more effective diversification and potentially higher returns.

Based on ex-post analysis from 2012 to 2017, the top performing optimized portfolio produced an average annualized return comparable to that of the top performing ETF. Similarly, another optimized portfolio produced a higher Sharpe ratio than 85% of the ETFs in our study. Nevertheless, when the same optimization methods is implemented using ex-ante returns, the optimized portfolios do not provide superior future performance relative to the ex-post analysis and also underperforms the best

performing ETFs during the same time period. Further, these results are sensitive to the length of the historical time period used to determine the optimized allocation weights or the frequency of portfolio rebalancing. Using the modified shrinkage variance-covariance matrix to solve the issue of assigning excessive weight to certain ETFs (a general occurrence with the Markowitz optimization approach) improves the portfolio performance.

Section 2 of this paper provides an overview of the literature on ETFs and portfolio optimization. In section 3, the ETFs, the data sources, and the fund selection criteria are described with summary statistics. In section 4, the empirical model used to determine the optimal weights for the portfolio based on Markowitz Optimization is described. In section 5, the empirical results of optimized portfolio performance in comparison with the individual ETFs are presented. In addition, the performance of the optimized portfolio using the modified variance covariance matrix with shrinkage technique and average optimal weight are also evaluated. Concluding remarks are provided in section 6.

Literature Review

Asset allocation has often been cited as a more important factor than active security selection in contributing to investment success. Brinson et. al (1991) found that 91% of the variance in pension fund returns is explained by asset allocation. This result is also supported by Ibbotson and Kaplan (2000), who report that asset allocation alone explains 87.6% of mutual fund returns and 90.7% of pension fund returns. The literature addressing efficient allocation began with the seminal paper of Markowitz (1952), who demonstrated that allocating assets among indices provides superior return ex post. Over the years, many studies applied these principles to find an ideal portfolio allocation but with mixed results. An issue with the Markowitz model stems from its use of a historical variance covariance matrix to determine the efficient allocation. As a result, the Markowitz process often leads to so called "error maximization" which is reflected in the assignment of unusually high or low allocation weights driven by outliers in the data. Consequently, the weights produced are not stable and are very sensitive to the data.

Optimization process does not perform well out of sample. Therefore, alternatives and solutions are used in the literature to overcome these issues. One common alternative is to use naïve or simplistic approaches as an alternative to portfolio optimization. Some of these approaches are 60/40 equity/bond portfolio mentioned earlier and equal weighting. For example, Jacobs, et.al (2014) shows that simple heuristic allocations offer substantial benefits and often produce better results than classical Markowitz's optimization. There are many more studies show that the naïve portfolio allocation techniques outperform the mean-variance optimization (See: Chaves et al. (2011) and DeMiguel et al. (2009)).

The second branch of approaches attempt to fix issues with relying on historical variance-covariance matrix that leads to unstable estimates. Bayesian methods and factor models are used to overcome these problems. Recently, robust optimization technique is also used to solve the same problems. See Kolm et al. (2014) for a more thorough review of the literature. Bayesian methods allows a researcher or investor to input his/her view into parameter estimation. With this input, the estimation becomes more robust. Many different versions of Bayesian models are used in the literature. All these models essentially combine a structured covariance matrix with a sample covariance matrix. Putting all the weight in the sample covariance matrix would lead to an unbiased estimation with potentially large estimation error. On the other hand, putting all the weight in a structured matrix would

minimize the estimation error but increase the estimation bias potentially due to misspecification of the structured matrix. Single index models, for example, capital asset pricing model (CAPM) is an example of a model with a highly structured covariance. The other extreme would be regular Markowitz optimization with an unstructured covariance. Also, sample covariance model could be considered a multi-factor model considering each asset in the sample as a unique factor. A significant part of the literature searches for the sweet spot between these two extremes (Marakbi 2016). Examples of such models are Treynor and Black (1973) and Black and Litterman (1992) models. All Bayesian or shrinkage models differ because of the different weights chosen between the structured and unstructured covariance matrixes (also called shrinkage constant) and the composition of the structured covariance matrix. For example, Frost and Savarino (1986) obtained a better out of sample performance using Bayesian approach to optimization. Ledoit and Wolf (2003 and 2004) offers a widely accepted shrinkage methodology. Our paper also utilizes this approach. The weight put into structured matrix is called the shrinkage constant. This approach helps to overcome the error maximization and the invertibility of variance covariance matrix. In other words, the number of assets could be more than the number of periods. Out of the sample performance with the shrinkage approach is better than the performance obtained from using only sample covariance in optimization process.

Minimum-Variance Portfolio (MVP) strategies are studied by many papers. It may not be desirable by many investors to have a low-risk portfolio (since usually the return will be lower also) initially. However, estimation problems we mentioned above is a lesser problem with a global minimum portfolio. In other words, theoretically, minimum variance portfolio may have a low return expectation, but in practice its return could be better than even a tangency portfolio. (Clarke et al. (2011), Frahm (2010), and Richardson (1989)).

There are some papers which study the portfolio allocation using exclusively mutual funds like our approach in this paper limiting the allocation to ETFs. Given the longer history of mutual funds, these results would provide a good perspective of the potential of portfolios constructed exclusively with ETFs.

Pastor and Stambaugh (2002) used equity mutual funds to create better portfolios. The study finds that investing in active mutual funds along with passive indexes could increase the Sharpe ratio of the portfolio. Louton and Saraoglu (2008) also used exclusively mutual funds to find out how many mutual funds is necessary for a well-diversified fund. Their findings suggest that 10 to 12 mutual funds are required to get reduction of most of the risk and drawn down in the portfolio. They did not offer an allocation strategy. Moreno and Rodríguez (2013) find that most of the actively managed mutual funds are not well diversified. The study used several optimization techniques to minimize the idiosyncratic risk. The optimal portfolio that minimizes the idiosyncratic risk had a good out of sample performance and this allocation provided the best alpha for the overall portfolio. Saraoglu and Detzler (2002) recommends using the analytic hierarchy process (AHP) to make asset allocation decisions using mutual funds. The study does not offer an out of sample performance result.

Using 36 Swiss ETFs, Milonas and Rompotis (2006) find that ETFs underperform their underlying indices in terms of both risk and return. Miffre (2007) compares the performance of country-specific ETFs with that of open or closed-end country funds and finds that ETFs are superior due to lower costs, lower tracking error, and being more tax efficient.

More closely related to our paper, Ma, MacLean, Xu, and Zhao (2011) employ a regime-switching risk factor in determining that sector ETFs allocations perform better than naïve allocation strategies. Furthermore, DiLellioa and Stanley (2011) state a similar conclusion after comparing several ETF strategies with the Standard and Poor's 500 index as well as other benchmarks and finding that the ETF strategies outperform the benchmarks. Agrrawal (2013) demonstrates that multi asset class ETF portfolios dominate stock only investment options. Utilizing neural networking models, Zhao, Stasinakis, Sermpinis, & Shi (2018) are able to improve the portfolio efficiency of three ETFs compared to traditional mean-variance optimization.

Hlawitschka and Tucker (2008) used exclusively ETFs to test whether stock selection has any merit in addition to optimal asset allocation. The study finds a justification for investors to choose active stock selection over asset allocation strategies.

Data

This study uses monthly price data obtained from Bloomberg for the period beginning August 2007 and ending December 2017. Because portfolio optimization is typically based on 60 monthly observations, it was necessary to limit the number of ETFs in this study. There are too many ETFs with similar objectives. In fact, some of the ETFs dominates others if it compared in most important categories (see Brown et.al. (2021)). The optimization process computes the ETF weights based on the sample covariance. For the solution, the inverse of the sample covariance matrix is necessary. The sample covariance matrix could be singular if the number of observations is less than the number of variables. In other words, there will not be a solution and the weights can't be computed. Therefore, the number of ETFs used needs to be under 60 which is the number of observations used in the estimation. However, by modifying the covariance matrix, this issue can be resolved. For example, Moore-Penrose inverse can be used to solve this problem (Pappas, Kiriakopoulos, and Kaimakamis (2010)). In choosing a subset for our study from the 2,792 or so U.S. ETFs, we applied three screening criteria. First, the largest ETFs by market cap were selected because they are popular and meaningful from an investor's perspective. Second, this study includes the ETFs with the longest possible history. The final criteria implemented is to include ETFs from as many asset categories as possible to improve the diversification potential of our portfolios. Where possible at least one ETF is included from each category within an asset class. For example, if two ETFs tracked the performance of the S&P 500 index, the larger of the two is included in the study and the other is eliminated. By applying the three criteria, we selected 34 ETFs for our study. Table 1 provides information on key characteristics of the 34 ETFs included in the study. Among 34 ETFs under investigation, SPDR S&P 500 ETF Trust (SPY) is the largest ETF in the US with more than 420 billion dollars in assets (in December 2021) and has been in the market for the longest period of time, for about 27 years. The ETF with the smallest market capitalization is the United States Oil Fund (USO) which tracks U.S. crude oil prices. Currently, the USO has a total asset value of about 2 billion dollars. The fund with the shortest history in our sample, Vanguard FTSE Developed Markets ETF (VEA) has been around for 10 years. Despite its short life, VEA is among the top four ETFs in our study in terms of market capitalization. VEA targets the performance of the FTSE Developed All Cap ex US Index and tracks stocks in developed market other than the U.S.

Table 1: Lists and Characteristics of Exchange Traded Funds (ETFs) (June 2007 to December 2017)

	Ticker	Name	Total Assets (million Dollars)	Fund Objective	Fund Geographical Focus	Fund Asset Class	Fund Strategy	Market Cap Focus	History Length (Days)
1	SPY	SPDR S&P 500 ETF TRUST	272,676	Large-cap	United States	Equity	Blend	Large-cap	9107
2	VTI	VANGUARD TOTAL STOCK MKT ETF	93,194	Broad Market	United States	Equity	Blend	Broad Market	6063
3	EFA	ISHARES MSCI EAFE ETF	85,325	International	International	Equity	Blend	Large-cap	5985
4	VEA	VANGUARD FTSE DEVELOPED ETF	69,281	International	International	Equity	Blend	Large-cap	3816
5	VWO	VANGUARD FTSE EMERGING MARKE	68,452	Emerging Markets	International	Equity	Blend	Broad Market	4684
6	QQQ	POWERSHARES QQQ TRUST SERIES	57,747	Large-cap	United States	Equity	Growth	Large-cap	6876
7	AGG	ISHARES CORE U.S. AGGREGATE	53,629	Aggregate Bond	United States	Fixed Income	Aggregate	N.A.	5215
8	IJH	ISHARES CORE S&P MIDCAP ETF	44,841	Mid-cap	United States	Equity	Blend	Mid-cap	6433
9	IWM	ISHARES RUSSELL 2000 ETF	42,166	Small-cap	United States	Equity	Blend	Small-cap	6433
10	IWD	ISHARES RUSSELL 1000 VALUE E	41,631	Large-cap	United States	Equity	Value	Large-cap	6433
11	IWF	ISHARES RUSSELL 1000 GROWTH	40,961	Large-cap	United States	Equity	Growth	Large-cap	6433
12	LQD	ISHARES IBOXX INVESTMENT GRA	38,431	Corporate	United States	Fixed Income	Corporate	N.A.	5642
13	GLD	SPDR GOLD SHARES	35,343	Precious Metals	Global	Commodity	Precious Metals	N.A.	4796
14	VNQ	VANGUARD REIT ETF	34,626	Real Estate	United States	Equity	Blend	Broad Market	4846
15	TIP	ISHARES TIPS BOND ETF	24,339	Inflation Protected	United States	Fixed Income	Inflation Protected	N.A.	5145
16	BSV	VANGUARD SHORT-TERM BOND ETF	23,884	Aggregate Bond	United States	Fixed Income	Aggregate	N.A.	3923
17	VEU	VANGUARD FTSE ALL-WORLD EX-U	23,484	International	International	Equity	Blend	Large-cap	3956
18	VGK	VANGUARD FTSE EUROPE ETF	18,598	European Region	European Region	Equity	Blend	Large-cap	4684
19	HYG	ISHARES IBOXX USD HIGH YIELD	17,946	Corporate	United States	Fixed Income	Corporate	N.A.	3922
20	PFF	ISHARES US PREFERRED STOCK E	17,653	Preferred	United States	Fixed Income	Preferred	N.A.	3934
21	BIV	VANGUARD INTERMEDIATE-TERM B	15,303	Aggregate Bond	United States	Fixed Income	Aggregate	N.A.	3923
22	VBR	VANGUARD SMALL-CAP VALUE ETF	12,763	Small-cap	United States	Equity	Value	Small-cap	5089
23	MBB	ISHARES MBS ETF	11,859	Mortgage-Backed	United States	Fixed Income	Mortgage-Backed	N.A.	3948
24	SHY	ISHARES 1-3 YEAR TREASURY BO	11,261	Government	United States	Fixed Income	Government	N.A.	5642
25	IWS	ISHARES RUSSELL MID-CAP VALU	11,125	Mid-cap	United States	Equity	Value	Mid-cap	6009
26	IWO	ISHARES RUSSELL 2000 GROWTH	9,188	Small-cap	United States	Equity	Growth	Small-cap	6370
27	IWP	ISHARES RUSSELL MID-CAP GROW	8,615	Mid-cap	United States	Equity	Growth	Mid-cap	6001
28	SHV	ISHARES SHORT TREASURY BOND	8,057	Government	United States	Fixed Income	Government	N.A.	4012
29	TLT	ISHARES 20+ YEAR TREASURY BOND	7,185	Government	United States	Fixed Income	Government	N.A.	5642
30	SLV	ISHARES SILVER TRUST	5,454	Precious Metals	Global	Commodity	Precious Metals	N.A.	4270
31	RWX	SPDR DJ INTERNATIONAL REAL E	3,765	Real Estate	International	Equity	Blend	Broad Market	4039
32	EFG	ISHARES MSCI EAFE GROWTH ETF	3,600	International	International	Equity	Growth	Large-cap	4536
33	DBC	POWERSHARES DB COMMODITY IND	2,292	Broad Based	Global	Commodity	Broad Based	N.A.	4354
34	USO	UNITED STATES OIL FUND LP	2,077	Energy	United States	Commodity	Energy	N.A.	4288

Notes: The trading price observations of each ETF is obtained from Bloomberg from June 2007 to December 2017. Out of approximately 2,200 funds, the 34 ETFs funds are used based on three screening criteria including funds with the largest market capitalization, longest history, and within each category asset class. The ETFs are ranked from the largest size to smallest size in terms of total assets value expressed in billion dollars.

Beginning in June 2007 and ending in December 2017, a total of 126 monthly prices were obtained for each of the study's 34 ETFs. Using the monthly price observations ($P_{t,i}$) of each ETF, the monthly returns for a given ETF i on day t are calculated, $r_{i,t} = \ln(P_{t,i}/P_{t-1,i})$. As shown in Table 2, the best performing ETF during the study period with an average annualized return of 11.4 percent is QQQ (Powershares Trust Series). QQQ is a U.S. large cap growth ETF tracking the Nasdaq 100 index with total assets of approximately 58 billion dollars. Of the 34 ETFs under investigation, the worst performing was USO (United States Oil Fund) with -15.2 percent annualized return. USO, an oil commodity fund, is the smallest ETF in the study. Among the study ETFs, SHV (iShares Short Treasury Bond) has the least risk with a standard deviation (0.33 percent) and the lowest positive average annual return of (0.06 percent). SHV invests in 1-3 year U.S. Treasury securities has assets of approximately 11 billion dollars. SLV and USO were the riskiest ETFs in the study with standard deviations of approximately 34.00 percent. SLV (iShares Silver Trust) tracks the performance of silver as a precious metal investment. Note that USO has one of the highest standard deviations (33.77 percent) yet produced the lowest annualized average return (-18.5 percent) among the study ETFs.

Table 2: Historical Performances of Exchanges Traded Funds (August 2007 to December 2017)

	Ticker	Name	Mean	Standard Deviation
1	QQQ	POWERSHARES QQQ TRUST SERIES	11.4000	18.0800
2	IWF	ISHARES RUSSELL 1000 GROWTH	8.0300	15.3500
3	IWO	ISHARES RUSSELL 2000 GROWTH	7.9000	20.1800
4	IJH	ISHARES CORE S&P MIDCAP ETF	7.7200	17.7100
5	IWP	ISHARES RUSSELL MID-CAP GROW	7.4300	18.0600
6	IWM	ISHARES RUSSELL 2000 ETF	6.5400	19.6100
7	VBR	VANGUARD SMALL-CAP VALUE ETF	6.2700	19.6000
8	VTI	VANGUARD TOTAL STOCK MKT ETF	6.1900	15.5900
9	GLD	SPDR GOLD SHARES	6.0600	19.0600
10	SPY	SPDR S&P 500 ETF TRUST	5.8100	15.0600
11	IWS	ISHARES RUSSELL MID-CAP VALU	5.6600	17.9600
12	IWD	ISHARES RUSSELL 1000 VALUE E	3.9000	15.7400
13	TLT	ISHARES 20+ YEAR TREASURY BOND	3.5500	13.9300
14	VNQ	VANGUARD REIT ETF	2.3300	25.5100
15	SLV	ISHARES SILVER TRUST	2.1300	34.1100
16	LQD	ISHARES IBOXX INVESTMENT GRA	1.5700	7.7400
17	TIP	ISHARES TIPS BOND ETF	1.1900	6.3400
18	BIV	VANGUARD INTERMEDIATE-TERM B	1.1100	5.5500
19	AGG	ISHARES CORE U.S. AGGREGATE	0.9500	3.7800
20	EFG	ISHARES MSCI EAFE GROWTH ETF	0.7300	18.6200
21	MBB	ISHARES MBS ETF	0.6900	2.9700
22	BSV	VANGUARD SHORT-TERM BOND ETF	0.4600	2.4300
23	SHY	ISHARES 1-3 YEAR TREASURY BO	0.3800	1.2800
24	SHV	ISHARES SHORT TREASURY BOND	0.0600	0.3300
25	VWO	VANGUARD FTSE EMERGING MARKE	-0.2800	23.7500
26	VEU	VANGUARD FTSE ALL-WORLD EX-U	-0.2800	19.9500
27	VEA	VANGUARD FTSE DEVELOPED ETF	-0.6300	19.0900
28	HYG	ISHARES IBOXX USD HIGH YIELD	-1.0400	11.5100
29	EFA	ISHARES MSCI EAFE ETF	-1.1100	19.2800
30	VGK	VANGUARD FTSE EUROPE ETF	-2.1700	20.9500
31	PFF	ISHARES US PREFERRED STOCK E	-2.2500	19.1300
32	RWX	SPDR DJ INTERNATIONAL REAL E	-3.9500	21.1800
33	DBC	POWERSHARES DB COMMODITY IND	-4.3700	20.6900
34	USO	UNITED STATES OIL FUND LP	-15.2000	33.7700

Notes: ETFs funds are ordered from the highest to lowest average monthly returns from August 2007 to December 2017. The monthly return is the percentage change in price of each ETF. Out of approximately 2,200 funds, the 34 ETFs funds are used based on three screening criteria including funds with the largest market capitalization, longest history, and limiting ETFs from each category of asset classes. The ETFs are ranked from the highest to lowest returns. The average monthly return and standard deviation are expressed in percent.

Methodology

To investigate whether optimized ETF portfolios yield superior returns as compared to individual ETFs, we employed classical Markowitz optimization (1952) which identifies the minimum variance portfolio for a given return. First, the return data from the first 60 months was used to identify the optimal ETF allocations for 10 optimized portfolios. These 10 portfolios represent the entire efficient frontier for our 34 ETFs from the minimum risk-return portfolio (Portfolio 1) to the maximum risk-return portfolio (Portfolio 10). Second, month 61 returns are calculated for each of our ten optimized portfolios and the portfolios are ranked based on average annualized return from the maximum. Third, at the

end of each month beginning with month 61, the ETF composition of each optimized portfolio is re-estimated using returns from a 60-month rolling period (the oldest price observation is removed and the most recent (from the prior month) is added). The returns on the ten newly optimized portfolios (based on the re-estimated ETF allocations) are then calculated and ranked for the subsequent month. The re-estimation process for the ETF allocations of each portfolio and the calculation of returns based on those re-estimated ETF allocations are repeated for each month until December 2017, a total of 65 times. Next, a model ETF allocation is determined for each of our ten portfolios by averaging the 65 monthly weights assigned to each ETF in each of the ten portfolios. Finally, the annualized average returns of the ten model portfolios over the 65-month period are compared with the average returns of individual ETFs during the same time period. Note that the replication of the efficient asset allocation for 65 times also allows us to examine if there are any persistent weights assigned to a certain asset class. See the Appendix to understand the methodology in more detail.

Based on the classical Markowitz optimization, the efficient allocation (Markowitz 1952) can be determined as follows:

The objective function is to minimize the risk with certain constraints.

Objective = $\mathrm{Min}(v'\Sigma v)$

Subject to

$$v \geq 0 \quad v'\mathbf{r} = \mu \quad v'\mathbf{1} = 1 \qquad \text{......(1)}$$

where

v = the vector of weights put in each ETFs in the portfolio.

r = the vector of ETF returns

μ= portfolio target return

Σ= covariance matrix of ETF returns

Using the Matlab optimization package, 10 portfolios are constructed on the efficient frontier formed by the 34 ETFs in the study. Because these 10 portfolios represent the whole efficient frontier, investors can choose a particular portfolio along the efficient frontier that suits their personal risk tolerance. The returns of the 10 optimized portfolios are also compared with naïve portfolio allocation strategies as well as the individual ETFs. The naive portfolio can be constructed in such a way that all 34 ETFs are equally weighted.

Empirical Results

Optimized Portfolio based on Historical Variance-Covariance Matrix

Table 3 presents the comparison of the performance of the ten optimized portfolios with the performance of the individual ETFs during the period of August 2012 to December 2017. The optimized portfolios performed quite well producing Sharpe ratios higher than most of the individual ETFs. As shown in Panel A of Table 3, the Sharpe ratios of Portfolio 7 (1.01) and 8 (1.00), which are on the far-right corner of efficient frontier, are larger than most ETFs except 5 top ETFs. Portfolio 10 has higher return than any ETF except QQQ.

[1] Only 5 out of 34 ETFs provide returns that are larger than 12.80%. These ETFs are QQQ, IWF, IWO, IWP, and IJH.

Table 3: Comparison of Performances of Optimized Portfolio and Individual Exchange Traded Funds Based on Actual Return (August 2012 to December 2017)

	Portfolio	Return	Risk	Sharpe Ratio
Panel A: Performance of Optimized Portfolio				
Lowest Risk/Return	Portfolio 1	0.0004	0.0012	-18.3066
	Portfolio 2	0.0177	0.0134	-0.3074
	Portfolio 3	0.0350	0.0268	0.4910
	Portfolio 4	0.0523	0.0404	0.7544
	Portfolio 5	0.0695	0.0540	0.8840
	Portfolio 6	0.0868	0.0677	0.9608
	Portfolio 7	0.1041	0.0818	1.0061
	Portfolio 8	0.1214	0.0994	1.0018
	Portfolio 9	0.1387	0.1246	0.9387
Highest Risk/Return	Portfolio 10	0.1560	0.1804	0.7441
Panel B: Performance of Individual ETFs				
QQQ	POWERSHARES QQQ TRUST SERIES	16.2000	12.1000	1.1600
IWF	ISHARES RUSSELL 1000 GROWTH	13.8000	9.8000	1.1900
IWO	ISHARES RUSSELL 2000 GROWTH	13.5000	14.1000	0.8000
IWP	ISHARES RUSSELL MID-CAP GROW	13.2000	10.6000	1.0400
IJH	ISHARES CORE S&P MIDCAP ETF	13.0000	10.9000	0.9900
VBR	VANGUARD SMALL-CAP VALUE ETF	12.4000	12.0000	0.8500
VTI	VANGUARD TOTAL STOCK MKT ETF	12.3000	9.6000	1.0600
IWM	ISHARES RUSSELL 2000 ETF	12.3000	13.4000	0.7500
SPY	SPDR S&P 500 ETF TRUST	12.2000	9.3000	1.0800
IWS	ISHARES RUSSELL MID-CAP VALU	12.0000	10.0000	0.9900
IWD	ISHARES RUSSELL 1000 VALUE E	10.9000	9.5000	0.9200
EFG	ISHARES MSCI EAFE GROWTH ETF	7.5000	11.1000	0.4800
VEA	VANGUARD FTSE DEVELOPED ETF	6.4000	11.3000	0.3800
EFA	ISHARES MSCI EAFE ETF	6.3000	11.6000	0.3500
VGK	VANGUARD FTSE EUROPE ETF	5.9000	12.8000	0.2900
VEU	VANGUARD FTSE ALL-WORLD EX-U	5.2000	11.4000	0.2700
VNQ	VANGUARD REIT ETF	4.0000	13.2000	0.1400
VWO	VANGUARD FTSE EMERGING MARKE	2.5000	14.5000	0.0200
RWX	SPDR DJ INTERNATIONAL REAL E	1.2000	12.7000	-0.0800
LQD	ISHARES IBOXX INVESTMENT GRA	0.0000	4.9000	-0.4400
SHV	ISHARES SHORT TREASURY BOND	0.0000	0.1000	-21.3300
SHY	ISHARES 1-3 YEAR TREASURY BO	-0.1000	0.7000	-3.2100
TLT	ISHARES 20+ YEAR TREASURY BOND	-0.4000	11.0000	-0.2400
MBB	ISHARES MBS ETF	-0.4000	2.4000	-1.0600
BSV	VANGUARD SHORT-TERM BOND ETF	-0.5000	1.3000	-2.0100
AGG	ISHARES CORE U.S. AGGREGATE	-0.5000	3.0000	-0.9200
PFF	ISHARES US PREFERRED STOCK E	-0.6000	4.5000	-0.6300
HYG	ISHARES IBOXX USD HIGH YIELD	-0.9000	5.1000	-0.6100
TIP	ISHARES TIPS BOND ETF	-1.2000	4.5000	-0.7400
BIV	VANGUARD INTERMEDIATE-TERM B	-1.3000	4.3000	-0.8100
GLD	SPDR GOLD SHARES	-4.3000	15.8000	-0.4100
DBC	POWERSHARES DB COMMODITY IND	-9.1000	14.7000	-0.7700
SLV	ISHARES SILVER TRUST	-9.8000	25.2000	-0.4700
USO	UNITED STATES OIL FUND LP	-18.5000	29.0000	-0.7100

Notes: The optimized portfolio return is calculated based on optimal allocation in each asset class using 1-month rolling period return and historical variance-covariance matrix. These performance was achieved using the last 60 months returns to find the optimal weights and applying these weights to the current month's returns and repeating the process for the following month by adding the latest month and dropping the first month, and keeping the sample at 60 months. This process was repeated 65 times. 65 optimal returns are averaged for each portfolio and standard deviations are calculated and both annualized. Optimized portfolio returns are ordered from the lowest risk/lowest return (Portfolio 1) to the highest risk/highest returns (Portfolio 10). Returns on each individual ETFs are the average monthly returns of the same time period as optimized portfolio Individual ETFs Performance are ordered from the highest to lowest returns. Sharpe ratio is the return on portfolio or ETFs, minus risk-free rate divided by their standard deviation, where 10-year Treasury rate of 2.18 % is used as the risk-free rate. All returns and standard deviations are expressed in percent.

To better understand the ETF allocations of each of these 10 efficient portfolios, we calculate the average ETF weights over the 65-month period. Table 4 presents the average weights of each ETF in the 10 efficient portfolios. These average weights could provide guidance to investors in forming a better performing portfolio which provides superior returns. For example, the minimum risk portfolio (Portfolio 1) is dominated by SHV (Short-Term Treasury Bond) and only four ETFs entered in the highest return portfolio (Portfolio 10). These ETFs are QQQ (Large Cap Growth), SLV (Silver), GLD (Gold), and IWO (Small Cap Growth). During the study period from August 2007 to December 2017, it is interesting to note that SHV accounts for 99.70% of lowest return portfolio (Portfolio 1) as SHV generated an average annual return close to 0%. Similarly, QQQ constitutes 78.50% of Portfolio 10. This is due to the fact that QQQ with an average annual return of 16.2% is the top performer of the 34 study ETFs. As is evident in Table 4, investors who want to achieve higher returns along the efficient frontier should increase their allocation to QQQ while decreasing their allocation to SHV. In moving from portfolio 1 to portfolio 10 the average weights of QQQ increase from 0.0001 to 0.7895 while the weights of SHV decrease from 0.9970 to 0.0020.

Table 4: Optimal Allocation based on Average Weights in each ETFs for Efficient Corner Portfolios (August 2012 to December 2017)

	Ticker	Name	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10
			Low Risk/Return									High Risk/Return
1	TLT	ISHARES 20+ YEAR TREASURY BOND			0.1100	0.1690	0.2290	0.2890	0.3200	0.2630	0.1210	
2	SHV	ISHARES 1-3 YEAR TREASURY BO	0.9970	0.7210	0.5020	0.3590	0.2370	0.1200	0.0290	0.0020		
3	IWS	ISHARES RUSSELL MID-CAP VALU		0.0160	0.0320	0.0480	0.0640	0.0800	0.1000	0.1000	0.0930	
4	SHY	ISHARES 1-3 YEAR TREASURY BO		0.1180	0.1740	0.1520	0.1060	0.0600	0.0210	0.0020		
5	IWD	ISHARES RUSSELL 1000 VALUE E		0.0100	0.0200	0.0300	0.0390	0.0490	0.0460	0.0040		
6	IWP	ISHARES RUSSELL MID-CAP GROW		0.0040	0.0080	0.0120	0.0160	0.0190	0.0100	0.0030	0.0020	
7	IWF	ISHARES RUSSELL 1000 GROWTH			0.0020	0.0030	0.0040	0.0050	0.0050	0.0060	0.0020	
8	MBB	ISHARES MBS ETF		0.0020	0.0030	0.0050	0.0060	0.0030				
9	IJH	ISHARES CORE S&P MIDCAP ETF			0.0010	0.0020	0.0030	0.0030	0.0040	0.0040	0.0050	
10	LQD	ISHARES IBOXX INVESTMENT GRA			0.0010	0.0020	0.0020	0.0030	0.0020			
11	TIP	ISHARES TIPS BOND ETF				0.0010	0.0020	0.0020	0.0010			
12	QQQ	POWERSHARES QQQ TRUST SERIES	0.0010	0.0640	0.1240	0.1840	0.2450	0.3050	0.3830	0.5120	0.6390	0.7850
13	SLV	ISHARES SILVER TRUST										0.1080
14	GLD	SPDR GOLD SHARES		0.0090	0.0210	0.0330	0.0460	0.0590	0.0770	0.1030	0.1370	0.0770
15	IWO	ISHARES RUSSELL 2000 GROWTH					0.0010	0.0010	0.0020			0.0310

Notes: Portfolio optimization conducted for 65 times. Each of these optimization processes computes the optimal weights in each of these 34 ETFs for 10 model portfolios. In other words, each process produces a weight table with 34 rows and 10 columns. In most cases, the weights are zero. To summarize, we averaged weights by columns and rows. For example, the average weight of SHV (I-share's 1–3-year Treasury bonds ETF) in portfolio 1 is 0.997. This is the average weight of SHV in portfolio 1 for 65 estimations. It dominates portfolio 1 since this is a portfolio with minimum risk. It is natural to see that low-risk Treasury bonds makes up the bulk of this minimum risk portfolio. Some ETFs have zero average weight across the spectrum of portfolios. Therefore, we did not include these ETFs in the table since all the values are zero.

Having observed that the optimized ETF portfolios produced better performance compared with individual ETFs on an ex-post basis, we now investigate whether the optimization process can produce better portfolio performance in the future. Using an ex-ante approach, we calculated the ETF allocations for ten efficient portfolios using four different approaches. The first three approaches rebalance ten optimized portfolios monthly to allocations determined by using 1) returns from the prior 60-months, 2) returns from the prior 40-months, and the 3) the monthly cumulative returns. The fourth approach rebalances each of the 10 portfolios annually using the returns from the prior 60 months.

Panel A of Table 5 presents the results of the ex-ante performances from August 2012 to December 2017 of 10 efficient portfolios based on past 60-months return. Portfolio optimization using the historical variance and covariance matrix for out of sample forecasting does not appear to produce useful results. The best Sharpe ratio produced using this strategy is 0.572 from optimized Portfolio 8. This is significantly lower than the Sharpe ratio of 1.01 for Portfolio 7 based on applying optimal allocation on ex post returns and is also lower than the Sharpe ratio of 1.16 for the QQQ ETF. Further, the highest return forecasted from efficient portfolio is only 8.00 %, which is almost the half of the top performing portfolio using the ex post approach or the QQQ ETF alone.

While prior 60-month return data is commonly used in reallocating portfolios and measuring their performance, one particular interest of this study is to see whether the performance of optimized portfolio can be improved by relying only on more recent return data. Thus, we next utilized return data from the prior 40 months to recalculate the weights for our optimized portfolios. The use of 40 month return data is acceptable given that the study is limited to portfolios formed from only 34 ETFs inasmuch as the number of observations that can produce an efficient optimization procedure has to be greater than 34. Panel B of Table 5 reports the performance results for the 10 portfolios optimized using return data from the prior 40 months. Using the 40-month data, the highest Sharpe ratio produced by an optimized portfolio improved to 0.601. The highest return produced by an optimized portfolio using 40-month data is 9.70%, which is significantly lower than 15.6 % return produced by an optimized portfolio using ex post data.

To examine whether historical data from longer periods increase the effectiveness of our optimized portfolio strategy, a cumulative return method is used where each month's return data added without eliminating the earliest observation. For example, while the optimized ETF weights for month 61 were based on 60-month return data, the optimized weights for month 62 portfolios are based on return data from the prior 61 months and so on until month 125 when the optimized ETF weights were based on return data from the prior 124 months. Results reported in Panel C of Table 5 show a surprising finding where longer history does, in fact, decreases the effectiveness of this strategy. When cumulative history of the returns up to the optimization month is used instead of just past 60 months, the Sharpe ratios of each of the 10 optimized portfolios are lower. The best performing portfolio (Portfolio 7) has the Sharpe ratio of only 0.089 with a return of only 2.9%.

Monthly portfolio rebalancing is costly for investors due to the transactions costs incurred and the higher tax rate imposed on short term capital gains as comparted to long term gains. In reallocating portfolio weights monthly, the investor is forced to taxes currently on any gains and thereby loses the ability to defer those potential tax liabilities. To address this issue, we investigate how reallocating portfolios annually rather than monthly might affect the performance of the 10 optimized portfolios. The results of portfolio performance based on annual optimization are reported in Panel D of Table 5. The portfolio performance based on annual reallocation of the optimized portfolios, as reported in Table 5, is worse than when rebalancing occurred monthly. The best performing portfolio in terms of Sharpe performance is Portfolio 8 with a Sharpe ratio of 0.31, declining from 0.57 and 0.60 when monthly optimization based on 60-months and 40-months returns are implemented. When looking at the performance from return perspective, the best performing portfolio generates only 5.40%, which is significantly lower than highest returns from efficient portfolio based on monthly asset allocation obtained from 60-month (7.00%) and 40-months (8.90%) optimization process.

Table 5: Out of Sample Forecast of Optimized Portfolios Performance Using Historical Variance-Covariance Matrix (August 2012 to December 2017)

		Return	Risk	Sharpe Ratio
Panel A: Performance of Optimized Portfolio based on 60-Months Optimization				
Lowest Risk/Return	Portfolio 1	0.0000	0.1000	-20.0670
	Portfolio 2	1.0000	1.3000	-0.9660
	Portfolio 3	1.9000	2.5000	-0.1210
	Portfolio 4	2.7000	3.8000	0.1470
	Portfolio 5	3.6000	5.0000	0.2790
	Portfolio 6	4.4000	6.3000	0.3600
	Portfolio 7	5.5000	7.4000	0.4550
	Portfolio 8	7.0000	8.5000	0.5720
	Portfolio 9	8.0000	10.4000	0.5560
Highest Risk/Return	Portfolio 10	5.5000	16.5000	0.2040
Panel B: Performance of Optimized Portfolio based on 40-Months Optimization				
Lowest Risk/Return	Portfolio 1	0.0000	0.1000	-20.7580
	Portfolio 2	1.0000	1.3000	-0.8730
	Portfolio 3	2.0000	2.6000	-0.0490
	Portfolio 4	3.1000	4.0000	0.2430
	Portfolio 5	4.2000	5.3000	0.3810
	Portfolio 6	5.1000	6.6000	0.4330
	Portfolio 7	6.0000	7.9000	0.4840
	Portfolio 8	7.7000	9.2000	0.6010
	Portfolio 9	8.9000	11.1000	0.6010
Highest Risk/Return	Portfolio 10	9.7000	14.4000	0.5230
Panel C: Performance of Optimized Portfolio based on Cumulative Optimization				
Lowest Risk/Return	Portfolio 1	0.1000	0.1000	-17.3720
	Portfolio 2	0.5000	1.1000	-1.4840
	Portfolio 3	1.0000	2.3000	-0.5110
	Portfolio 4	1.5000	3.7000	-0.1900
	Portfolio 5	2.0000	5.0000	-0.0420
	Portfolio 6	2.5000	6.4000	0.0430
	Portfolio 7	2.9000	7.8000	0.0890
	Portfolio 8	2.4000	9.2000	0.0260
	Portfolio 9	2.3000	11.0000	0.0110
Highest Risk/Return	Portfolio 10	0.3000	15.6000	-0.1220
Panel A: Performance of Optimized Portfolio based on Annual Optimization				
	Portfolio 1	0.0000	0.1000	-19.0260
	Portfolio 2	0.8000	1.4000	-0.9990
	Portfolio 3	1.5000	2.7000	-0.2540
	Portfolio 4	2.1000	4.2000	-0.0260
	Portfolio 5	2.7000	5.6000	0.0950
	Portfolio 6	3.3000	7.0000	0.1660
	Portfolio 7	4.3000	8.5000	0.2470
	Portfolio 8	5.4000	10.4000	0.3110
	Portfolio 9	5.8000	12.3000	0.2970
	Portfolio 10	-1.0000	20.3000	-0.1560

Notes: All the performances are calculated based on out-of-sample forecast and historical variance covariance matrix. Panel A uses historical 60 months observations on a 1-month rolling basis to determine the optimal weight for each month, while Panel B uses past 40-months observations. Panel C uses a cumulative sampling. The initial sample starts with 60-months observations and the current month's observation is added each month without removing the oldest observation. Unlike performances reported in Panels A, B, and C where portfolio composition is changing once a month, the portfolio performance reported in Panel D using a proccess that reshuffles the portfolio annually.

Overall findings suggest that emphasis on more recent return observations and increased frequency in rebalancing portfolio will improve efficiency of portfolio optimization. This is the case for the ex-ante approach. However, the best performing portfolio based on out-of-sample forecast cannot beat the performance based on ex post approach. In addition, portfolio performance using optimization methodology did poorly compared to the top performing ETFs. These disappointing results could be due to a known flaw in Markowitz's portfolio allocation method that relies on the historical variance covariance matrix. To address this concern, we construct optimized portfolios and gauge their performance using a modified sample covariance matrix.

Optimized Portfolio Performance based on Modified Sample Covariance Matrix

The results presented in Table 5 indicate that the ex-ante, out of sample performance of the optimized portfolios not as good as the ex-post performance of an optimal portfolio. One well-known problem with the Markowitz optimization method is its assigning the excessive weights to specific asset classes. In fact, this can be observed from the weights assigned to specific ETFs in several of the optimized portfolios. As shown earlier in Table 4 of average weight of each ETF in each of 10 efficient portfolios, only 15 out of 34 ETFs had a non-zero weight in any of the optimized portfolios. Ledoit and Wolf (2003) suggests the use of a shrinkage technique to modify the covariance matrix. The shrinkage combines sample covariance with a highly structured covariance matrix. Ledoit and Wolf used constant correlation matrix as a proxy for a highly structured covariance matrix. A shrinkage constant is used to combine these two covariance matrixes.

$$\Sigma_{Shrunk} = \lambda(X) + (1 - \lambda)Y \quad \ldots\ldots(2)$$

Where λ is the shrinkage constant, X is the structured covariance matrix, and Y is the sample covariance matrix[2] .

Table 6: The Performance of Optimized Portfolios Using The Modified Variance Covariance Matrix with the Shrinkage Technique (August 2012- Decemer 2017)

	Portfolio	Return	Risk	Sharpe Ratio
Lowest Risk/Return	Portfolio 1	0.0000	0.1000	-20.7570
	Portfolio 2	1.0000	1.2000	-0.9540
	Portfolio 3	2.0000	2.5000	-0.0880
	Portfolio 4	2.9000	3.7000	0.1830
	Portfolio 5	3.7000	5.0000	0.3130
	Portfolio 6	4.6000	6.3000	0.3940
	Portfolio 7	5.5000	7.5000	0.4500
	Portfolio 8	6.9000	8.5000	0.5520
	Portfolio 9	8.2000	10.4000	0.5760
Highest Risk/Return	Portfolio 10	5.5000	16.5000	0.2040

Notes: This table presents the performance of optimized portfolios in the 65-month period starting from August 31, 2012 to December 29, 2017. At the beginning of each month, the optimization process configured the most efficient allocation. The money is invested based on the best allocation and the performance is measured at the end of the month on the ex ante basis. The procedure is repeated for the 65 months. In this optimization, the sample variance and covariance matrix is modified with a shrinkage technique. Risk is measured as standard deviation. Return and risk are expressed in percent.

[2]Please see Ledoit and Wolf for more details on shrinkage covariance matrix.

We estimated shrinkage constant and constant correlation matrix. The shrinkage constant estimate is 0.1514. Using Ledoit and Wolf technique, a shrunken covariance matrix was created and used in repeating the optimization process. The optimization ETF allocations are calculated based on 60-months historical data and out of sample forecast for portfolio returns. New performance metrics for 10 optimized portfolios obtained using the shrunken covariance matrix technique are reported in Table 6. Eight out of ten optimized portfolios show a marginally improved performance in terms of returns and Sharpe ratio when compared with the performance of optimized portfolios determined using the historic variance-covariance matrix and reported in Panel A of Table 5. Only portfolios 7 and 8 show poorer performance when the shrunken covariance matrix is used. The return on the best performing portfolio (portfolio 9) has improved from yielding 8.00 percent to 8.20 percent return and the highest Sharpe ratio increased from 0.572 to 0.576.

Optimized Portfolio based on Average Weight

Based on the findings, rebalancing the optimized portfolio by using the actual optimized weights for each month for each ETFs does not appear to create better portfolio performance. The out of sample forecast performance does not yield a better return than ex post performance even when using a modified covariance matrix. Investigating the asset allocation weight closely, we further examine whether some informed strategies that provide optimized return to investors can be achieved using different weight measure. Alternatively, the average weights for each composition of ETF in each portfolio is utilized instead of the actual weights optimized each month. The portfolio weights will first be created by the optimization process at the beginning of each month using 60-month historical data. Portfolio return for that month is determined based on ex ante approach. Optimized weight for next month is re-estimated on a 1-month rolling basis by the most recent month and the dropping the first month in the data to keep the number of past observations to be constant at sixty observations. Then, the optimized weight for each ETF composition in each portfolio for the second month is the average of the first two months and investment allocation is constructed accordingly. The process is repeated till the end of study period. In particular, the optimized weight for 65-month periods will be the average of 65 optimized weights obtained for each month. The performance of 10 efficient performance is simply the average of monthly optimized portfolio performance.

The average weights over the last 65 months of each ETF in these 10 efficient portfolios was presented in Table 4. As pointed out earlier, fewer than 50% of ETFs under investigation are given consideration based on the optimized weights. QQQ is the dominant ETF as average weight increases with the portfolio return. On the other hand, average allocation in SHV decreases when investors prefer to invest in riskier portfolio with higher returns. This is understandable since QQQ is an ETF investing in large-cap growth stocks in the U.S. and provides the highest return of 16.20%, while SHV focusing on short-term T-Bond returns nothing to investors.

Utilizing the average weights methodology outlined above, the performances of each of these 10 portfolios based on 60-month historical data and ex ante approach reported in Table 7 are lower than ex post optimized portfolio performance. However, the performance is much better than ex ante optimized portfolio results reported in Panel A of Table 5. The Sharpe ratio of top performing portfolio (Portfolio 9) analyzed from applying average weight on one-month ahead return is 1.008 is practically the same from applying actual weight on end of the month return as reported in Table 4. In comparison with ex ante optimized portfolio performance analyzed from actual weight, the top performing portfolio shows Sharpe ratio of only 0.5729, which is less than half of top performing

performance from using average weight. In addition, the performance of best portfolio when optimized weights are averaged remains superior to any of top performing portfolios regardless of the length of historical data used and the frequency of portfolio rebalance conducted. As reported in Table 5, using shorter period of 40-month historical data, the Sharpe ratio is 0.6010 and it is even worse with cumulative data which yields 0.089 Sharpe ratio. Rebalancing portfolio once a year to avoid transaction cost and tax issues does not lead to better Sharpe performance which remains at 0.3110. When comparing with individual ETF performance, the average weight method provides the portfolio return that is higher than the returns of 70% (24/34) of individual ETF and the Sharpe ratio that is higher than 85% (29/34) of ETF under investigation. Overall, the main information to be gleaned from Table 7 is averaging the weights is better than using the actual optimized weights for the month.

Table 7: Out of Sample Forecast Performance of Optimized Portfolios Using The Average Optimal Portfolio Weights (August 2012- December 2017)

	Portfolio	Return	Risk	Sharpe Ratio
Lowest Risk/Return	Portfolio 1	0.0000	0.1000	-20.8870
	Portfolio 2	1.3000	1.2000	-0.7410
	Portfolio 3	2.6000	2.3000	0.1840
	Portfolio 4	3.9000	3.4000	0.4950
	Portfolio 5	5.2000	4.6000	0.6510
	Portfolio 6	6.4000	5.7000	0.7460
	Portfolio 7	7.7000	6.7000	0.8220
	Portfolio 8	9.2000	7.6000	0.9180
	Portfolio 9	10.9000	8.7000	1.0080
Highest Risk/Return	Portfolio 10	11.7000	10.6000	0.8990

Notes: This table presents the performance of optimized portfolios in the 65-month period starting from August 31, 2012 to December 29, 2017. This performance is obtained with average optimal weights. Using the average of the optimal weights, 65 month returns are calculated. The average of these 65 returns and standard deviations are reported in this table.

Conclusions

In this article, efficient asset allocation among ETFs are investigated based on the Markowitz's portfolio optimization approach. Using the data from 2007 to 2017, we empirically examine whether investors can achieve a better portfolio performance with various risk and return levels by simply allocating investment among different ETFs. The optimized portfolios are compared with best performing individual ETFs during the same time period. To determine optimal weight, for each ETF composition in each of 10 efficient portfolios, we utilize 1-month rolling returns of past 60 months, past 40 months, and 60 months cumulative returns.

Markowitz's portfolio optimization approach is known for putting too much weight on a certain asset class. We remedy this issue by implementing the modified variance-covariance matrix in optimization process. The true test of a portfolio allocation strategy is the out of sample ex-ante portfolio selection. We compared the performance of out of sample mean-variance efficient portfolios with the actual ETFs performance.

Overall findings suggest that optimization procedure using historical 60-months data provides an efficient portfolio performance that is comparable with individual top performing ETFs. On the ex-post basis, the top performing portfolio yields the highest average monthly returns of 15.6% with highest Sharpe ratio of 1.01, similar to investing 100% in QQQ ETF that emphasizes on the large-cap high growth stocks in the U.S. However, this efficient allocation using the Markowitz's portfolio optimization approach, does not predict a superior future performance. In 2012-2017 period, this approach underperformed many ETFs. The Sharpe ratio of the top performing optimized portfolio of 0.5720 is less than half of the Sharpe ratio of top performing QQQ. The out of sample forecast of optimized portfolio is a little better when only more recent historical data is used in determining optimal weight because of quicker feedback. The performance is worse when portfolio is rebalanced annually instead of monthly. When a modified shrinkage covariance matrix was employed to reduce the problem of excessive weights assigned to some ETFs, the performance of optimized portfolio improved slightly by 0.2% in terms of returns and 0.004 in Sharpe ratio. Lastly, constructing efficient portfolios based on the average of optimized weights improves the returns of top performing portfolio by 370 basis points and increases Sharpe ratio significantly (+0.5). Efficient portfolios using the average of optimized weight performs better than 85% of the individual ETFs in terms of Sharpe ratio. In conclusion, the average weight approach to portfolio optimization represents the best overall strategy. This is the only out of sample portfolio optimization approach that was comparable to the best ETFs in our list in terms of mean-variance efficiency. Investors should consider using this technique as an investment strategy. While this study is limited to the extent to which Markowitz portfolio theory holds for ETFs, it has clear practical applications for financial professionals as a possible alternative to other portfolio allocation approaches. Additionally, the US-based research provides a useful platform for further research in the Australian market.

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APPENDIX

This appendix explains the methodology in more detail.

1. Using the equation 1, the optimization will be obtained using the returns of ETFs for the last 60 months. 10 optimal portfolios will be constructed to represent the whole spectrum of the efficient frontier.

The output of this process will create a weight matrix with 34 rows and 10 columns.

$$w_t = \begin{bmatrix} v_{1,1} & \cdots & v_{10,1} \\ \vdots & \ddots & \vdots \\ v_{1,34} & \cdots & v_{10,34} \end{bmatrix}$$

Each of 34 ETFs weight will be calculated for each of the 10 corner portfolios.

2. Optimal returns will be calculated using these weights and the returns for that month (Table 3)

$$\mu_t = \acute{w_t} r_t$$

where,

μ_t is a return vector of 10 portfolios for the month t,

$\acute{w_t}$ is the transpose of the weight matrix from step 1, and

r_t is the return vector of 34 ETFs for the month t.

For out of sample portfolio performances, the following month's returns are used rather than the current month's returns (Table 5 and 6).

$$\mu_{t+1} = \acute{w_t} r_{t+1}$$

3. The following month, the same process (step 1 and 2) will be repeated with removing the returns of ETF of the first month and adding the return of the 61st month. Therefore, the sample remains at 60 monthly returns

$$w_{t+1} = \begin{bmatrix} v_{1,1} & \cdots & v_{10,1} \\ \vdots & \ddots & \vdots \\ v_{1,34} & \cdots & v_{10,34} \end{bmatrix}$$

$$\mu_{t+1} = \acute{w_{t+1}} r_{t+1}$$

This process was repeated 65 times.

$$W = \sum_{t=1}^{65} w_t$$

where, W is the item-by-item sum of optimized weights

$$\bar{\mu} = \frac{1}{65} W$$

$\bar{\mu}$ is the 34X10 matrix of average weights of each of 34 ETFs in each of 10 portfolios (Table 4).

4. The performance of each of ten portfolios are calculated

$$\mathrm{M} = \begin{bmatrix} \mu_{1,1} & \cdots & \mu_{65,1} \\ \vdots & \ddots & \vdots \\ \mu_{10,1} & \cdots & \mu_{65,10} \end{bmatrix}$$

$$R = \frac{1}{65} M\mathbf{1} = \begin{bmatrix} r_1 \\ \vdots \\ r_{10} \end{bmatrix}$$

Where $\boldsymbol{M}$ is a 10X65 return matrix of optimal returns calculated for each of 10 portfolios for 65 months (For out of sample, there will be only 64 returns),

$\mathbf{1}$ is a 65X1 vector of 1s,

R is the vector of 65-month average returns for each portfolio.

$$\sigma_i^2 = \frac{1}{64}\sum_{t=1}^{65}(\mu_{i,t} - r_i)^2$$

$$\psi = \begin{bmatrix} \sigma_1 \\ \vdots \\ \sigma_{10} \end{bmatrix}$$

ψ is the vector of standard deviations of each portfolio

$$\phi_i = \frac{r_i - 0.0218}{\sigma_i}$$

ϕ is the Sharpe ratio. Risk free rate is the average 10-year constant maturity Treasury bond yields for the corresponding 65-month period.[3]

[3] Board of Governors of the Federal Reserve System (US), Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity [DGS10], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DGS10, December 3, 2021.

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