Communicating the market:
Understanding finance through robo-advisory

by

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Abstract

This thesis explores the principles and understandings about personal investing that robo-advisors promote and how these are taken up by users. Scholars have previously theorized an ongoing financialization of everyday life, and in recent years this phenomenon has been accompanied by the increasing ubiquity of financial technologies. In this context, the thesis seeks to understand how robo-advisors—cheap and intuitive investment platforms for nonexperts—integrate individuals into financial markets. Using the walkthrough method to study two robo-advisors' online materials and interfaces as well as critical discourse analysis to examine online user discussions, the thesis outlines how robo-advisors support mainstream principles of personal finance and how users mostly, but not always, buy into these conventions. The thesis contributes to the existing literature by complicating concepts of passivity, financial literacy, and subjectivity, and argues for a politicization of stock markets where indices are made responsive to their social and ethical stakes.

Keywords: financialization; robo-advisors; investing; walkthrough method; discourse analysis

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Table of Contents

List of Figures

Chapter 1.

Introduction

Consumer-facing financial technologies have proliferated over the last decade in the wake of the Great Recession and with the sophistication of mobile devices. The digital turn has been accentuated during the Covid-19 pandemic, which shuttered many in-person activities and led consumers to online options for everything from shopping to banking. Simultaneously, scholars have documented the increased power of the financial industry and financial interests since at least the 1970s, if not earlier. In this view, new financial technologies are not utopian, democratizing tools but may instead serve to expand the influence of finance, embedding it in everyday life. In the context of these two concurrent phenomena, robo-advisors—automated investing applications—have emerged as a popular technology for ordinary people to manage investments easily and cheaply, but also may play a role in cementing the grasp of finance on daily life.

Drawing from scholarship on the financialization of everyday life and exploring robo-advisors through the walkthrough method and critical discourse analysis, this thesis investigates how the conventions around investing promoted by robo-advisors are communicated to and taken up by users. The findings from this study suggest that robo-advisors promote mainstream assumptions about finance that users themselves sometimes—but not always—buy into. Overall, robo-advisors are premised on the notion that markets will always grow, thus envisioning a theory of social progress where stock indices describe our societies: in this view, the rise of the market figuratively represents human advancement. Robo-advisory and passive investing more generally allow individuals to invest in the aggregate without considering the political implications of their portfolios. Through the app, an individual can buy exchange-traded funds that each hold several assets, determined by a stock index that the given ETF tracks, and which the app itself then manages. Thus, decisions are outsourced to index providers, who construct stock indices, and the apps that allow individuals to access a diversified portfolio. Users, for their part, are often concerned with more trivial matters, although some contend with mainstream financial assumptions by engaging in riskier, self-directed investing strategies.

This chapter lays the groundwork for the remainder of the thesis. It begins by introducing robo-advisors, outlining how they work, their position in the financial services industry, and some of their theoretical underpinnings. Next, I define finance and financialization and outline a brief history of financialization before moving onto the literature review, which accounts for the bulk of this chapter. The literature review considers the politics of financialization, the scholarship on the construction of financial markets, and corporate-level consequences of financialization. I go into the most depth in addressing the financialization of everyday life, as that is the niche from which this thesis builds most explicitly. Lastly, the literature review touches on terminological concerns regarding financialization. The chapter concludes by outlining the direction this thesis takes, noting how it differs from existing scholarship on robo-advisory, outlining the research questions, and providing a summary of the chapters to come.

1.1. Introducing robo-advisory

Robo-advisors are semi-automated investing platforms designed for nonexperts. Users complete a questionnaire that generates a portfolio based on risk preference, financial understanding, and time horizon, and the robo-advisor then manages this portfolio automatically (Jung et al., 2019, p. 405; Pagnottoni & Polinesi, 2021, p. 358). Robo-advisors usually have lower account minimums and fees than traditional advisors since they onboard and interact with users digitally rather than through face-to-face and individualized meetings. Robo-advisors are based on mainstream economic assumptions, as will be explored shortly, but by instituting these guidelines in an app format they can provide users with an easy-to-use investing tool. In other words, while users might be able to find identical investing advice on YouTube or online blogs, robo-advisors program this advice into an app where users are essentially unable to sabotage their investments. Many scholars attribute the rise of robo-advisors to a lack of trust in financial services, especially among young people (Krueckeberg, 2021, p. 26; Sander, 2021, p. 266; Woodyard & Grable, 2018, p. 65), and increased risk aversion after the 2008 financial crisis (Bhat & Goklany, 2018; Gupta & Tham, 2018, p. 329; Scholz & Tertilt, 2021, p. 7; Schwinn & Teo, 2018, p. 483; Xing et al., 2019, p. 115).

In terms of demographics, robo-advisors target populations with enough assets to invest but who are not classified as High Net Worth Individuals (HNWI) since these wealthier investors are assumed to prefer human contact with a financial advisor (Gupta

& Tham, 2018, p. 329). Importantly, while robo-advisors may market themselves as a personalized solution for investors by offering a range of different portfolios depending on risk level, they are not suitable for individuals with complicated financial circumstances who may need more individualized advice. In general, millennials, or those under 35-40, are primary targets for robo-advisory (Gupta & Tham, 2018, p. 341; Jung et al., 2019, p. 409), although there are associated risks with this demographic: many individuals lack adequate assets to ensure profitability for robo-advisors unless they can retain such customers long-term (Sander, 2021, p. 268; Schwinn & Teo, 2018, p. 489). Despite being celebrated as a way to lower barriers to investing for those with little financial literacy or who are left out by traditional services (Schwinn & Teo, 2018, p. 483), the typical user of robo-advisory tends to have above-average financial knowledge (Woodyard & Grable, 2018, p. 57), and be relatively wealthy (Jung et al., 2018, p. 367).

In the context of the financial services industry (consisting of customer-facing financial institutions and services like retail banking or wealth management firms) robo-advisors are one example of a financial technology, or the leveraging of technology to benefit financial services. Financial markets have always relied on technology to allow for the transmission of information, from carrier pigeons (Freedman, 2006) to telegraphs (Nicoletti, 2017, p. 14; Wilson, 2017, p. 38), and during the 20th century developments were made to innovate on the back end of financial institutions (Rubini, 2019, p. 1; Wilson, 2017, p. 5), with banks becoming early adopters of mainframe computers (Nicoletti, 2017, p. 14). In terms of customer-facing innovations, many scholars point to the emergence of credit cards and automatic teller machines (ATMs) in the 1960s as the first major financial technology breakthroughs (Nicoletti, 2017, pp. 14–15; Rubini, 2019, p. 3; Wilson, 2017, p. 36). According to optimists, financial technology may contribute to extending financial services to more people, including those who are currently un(der)served. While wealth management services have historically been accessed mainly by those with high net worth, financial technology innovations have encouraged the industry to cater to a wider range of individuals with diverse socioeconomic backgrounds (Nicoletti, 2017, p. 27; Wang, 2021, p. 351; Wilson, 2017, p. 105). More generally, financial technologies may offer a better customer experience (Nicoletti, 2017, p. 27; Rubini, 2019, p. 4) at lower cost for both customers and firms (van Papendrecht, 2018).

While robo-advisors are considered a disruptive innovation, they still have relatively few assets under management (AUM) compared to traditional institutions (Scholz & Tertilt, 2021, pp. 7–8; Woodyard & Grable, 2018, p. 56) and although several of the leading robo-advisors are independent start-ups, other robo-advisors operate as a branch of traditional firms (Gupta & Tham, 2018, p. 329; Rubini, 2019, p. 117; Schwinn & Teo, 2018, p. 484; Wilson, 2017, p. 110). Many scholars agree that they are unlikely to completely displace traditional financial advisors and will more likely serve to complement the traditional sector (Gupta & Tham, 2018, p. 341; Woodyard & Grable, 2018, p. 65), for example by using a hybrid model where a robo-advisor is combined with a traditional financial advisor (Jung et al., 2019, pp. 420–421; Sander, 2021, p. 267).

Robo-advisors use exchange-traded funds (ETFs) to make up the bulk of their portfolios (along with other assets like bonds and, sometimes, gold, to manage risk). Like a mutual fund, a single ETF can comprise multiple assets, often up to hundreds. Unlike mutual funds, ETFs are more liquid and have much lower management fees. As well, the assets in most ETFs are not manually chosen but instead are selected based on the stock index that the ETF tracks. Stock indices are meant to illustrate the performance across the market by aggregating data on all the companies included in the index. Some stock indices track particular sectors while others include certain tiers of companies: for example, the S&P 500 tracks the largest 500 American companies by market capitalization (the total value of all stocks for a company traded in the market). Each stock index will have criteria to determine what companies are included (although, as will be discussed later, this does not mean that stock indices are objective). Different stock indices are calculated in different ways depending on that index provider's methodology, but in general stock indices are considered as economic indicators where a fall in the index signifies financial woes and growth represents positive developments. By investing in index-tracking ETFs, investors ostensibly ride the entire market rather than trying to invest in 'winner' companies. Thus, a user can have broad market exposure at low cost.

Robo-advisors are based on a passive investing approach where assets are held for a long period of time and short-term market changes are not considered. Changes to the portfolio will occur for rebalancing (which many robo-advisors do automatically) when one asset increases or decreases in value significantly enough to alter the proportional

makeup of the portfolio. Since the way a portfolio is distributed is determined algorithmically using answers from the questionnaire a user fills out upon registration, rebalancing the portfolio will mean buying or selling some of the mis-aligned asset to ensure that the proportionality of the portfolio is maintained. Portfolios may also change if robo-advisors change methodologies for how they approach risk (for example, Wealthsimple Invest recently started adding gold to its portfolios). In general, however, the overall strategy is to buy and hold. Robo-advisors' approach to investing is backed by research showing that actively managed funds often underperform indices and therefore, passive investing using index-tracking ETFs is likely to be a reliably successful investing strategy (Burton & Shah, 2013, p. 7; Fama & French, 2010; Harper et al., 2006; Hayes, 2019, pp. 9–10, 2020, p. 571; Malkiel, 2005; Pace et al., 2016; Soe & Poirier, 2017; Wimmer et al., 2014).

Two mainstream economic theories are important when discussing robo-advisory, passive investing and ETFs. The first is modern portfolio theory (MPT), proposed by Harry Markowitz in the 1950s. Robo-advisors often base the share of a portfolio invested in equities versus fixed income assets on the risk tolerance of the investor. According to MPT, an investor with more (less) tolerance for risk should invest more (less) in equities, which are riskier assets. The key is not to try and manually select safer equities in order to reduce risk, but simply to invest less of the portfolio in them (Burton & Shah, 2013, p. 17). For example, someone who is expecting to retire in 5 years may choose to hold almost all of their portfolio in bonds to ensure that they will get the value of their investment back, while someone who has another 40 years until retirement may instead decide to invest almost all of their portfolio in stocks, which offer more opportunity for growth along with higher risk, because they have time for their investment to recover if they lose money. In either case, the individual would invest in the same set of equities, but the person with 40 years until retirement would put more money into them.

A second theoretical backdrop for robo-advisory is the efficient market hypothesis (EMH). According to the weakest version of this hypothesis, future returns cannot be predicted using past data (Burton & Shah, 2013, pp. 6–7). This version is widely accepted and means that traders cannot tell whether an asset will continue to increase or decrease in value just by looking at how its price has changed recently: if the line on a graph tracking an asset's value is moving up, this is no guarantee that it will

continue to do so, and the same goes for if the line is moving downward. The semi-strong version of the hypothesis states that current asset prices include all publicly available information (Burton & Shah, 2013, pp. 6–7). This means that there is no shortcut to knowing which assets will be most profitable: a trader could not, for example, find publicly available information on the internet that would give them exclusive insight into the future performance of the asset.[1] While debate persists about the EMH, passive investors accept both the weak and semi-strong versions. By this logic, there is no use in trying to predict market movements or conduct more research to try and find under- or over-valued assets. Robo-advisors exemplify this theory in action because they encourage users to simply invest in a diversified portfolio without trying to guess at performance trends or pick out specific assets.

1.2. Defining finance and financialization

In this thesis, 'finance' refers to the management of money. This can happen on large scales, for example in terms of how states or transnational organizations generate and allocate funds, or on the very small scale of individuals balancing their bank accounts. Similarly, finance takes place on different planes of sophistication. On the one hand, "high finance" often refers to exclusive, profit-driven practices undertaken by professionals like investment bankers, while "low finance" can signify the kinds of finance conducted by ordinary people, like saving for a vacation or deciding which bills to pay first. Meanwhile, in this thesis the 'market' refers to the stock market, where investors and traders buy and sell shares of companies. While financial markets can include many different dimensions, this thesis is focused on the trade in equities rather than other kinds of activities (like consumer debt, real estate investments, or derivatives). A "financial institution" is an organization whose main business focus is the management of money. Financial institutions include central banks, retail and commercial banks, credit unions, savings and loan associations, mortgage companies, insurance companies, investment firms, and brokerage firms.

[1] The 'strong' version of the EMH argues that prices summarize all publicly *and* privately available information; this is largely contested. If prices did already include all *privately* available information, insider trading would not present a benefit to its participants.

While there are a variety of definitions for financialization in the literature, in this thesis I define it broadly as referring to the increasing dominance of finance on economies, firms, and everyday life (Aalbers, 2015, pp. 214–215; Palley, 2014, p. 1). Not only does this include the power of the financial industry, but also the influence that financial motivations in general have in determining economic and policy decisions (Epstein, 2005, p. 3; Haiven, 2014, pp. 17–18; Hudson, 2021, p. 15; Witko, 2016, p. 349). Additionally, financialization is a dynamic process that is ongoing (Chiapello, 2020).

1.2.1. Historical roots of financialization

Scholars differ when it comes to identifying the origins and tracing the development of financialization. While the term has mainly been used to describe economic phenomena in the past 50 years, Ian Baucom (2005) traces aspects of contemporary finance further back, investigating the role of credit and insurance in the Trans-Atlantic slave trade. Baucom explains how slaves were a form of capital predicated on and serving to strengthen finance in Britain. Slaves were both bought and sold on credit and their value was underwritten through insurance contracts. Baucom notes the massacre of 132 slaves aboard the ship *Zong* as an example of one instance in which this financial value of human life can be seen clearly: in throwing slaves overboard, the captain of the ship "was not destroying his employer's commodities but hastening their transformation into money" (Baucom, 2005, p. 62). Not only did financial concepts like credit and insurance sustain the slave trade, but these created forms of money that circulated throughout British society at large, in the form of promissory notes tied to the value of slaves (Baucom, 2005, p. 62).

While fragments of finance can be seen throughout history, as Baucom's work illustrates, financialization is usually invoked to describe the way that finance has taken on a specific status since the 1970s, connected to global economic reordering. In David McNally's view, for example, finance gained its ascendency with the fall of the Bretton Woods economic system in the early 1970s. While currencies had previously been tied to gold and then to the U.S. dollar, which was itself tied to gold, the end of the Bretton Woods regime meant that currencies were floating. In this context, it became necessary to hedge the risk of currency devaluation, prompting widespread use of derivatives (which had previously been used mainly in agriculture). Derivatives, in turn, become their

own means *and* ends because of their profitability (McNally, 2011, pp. 88–95). Simultaneously, a rise in volatility led to a proliferation of mathematical and computational models with dual purpose: make predictions in an effort to mitigate risk, as well as conduct high-volume, high-speed trades to maximize profits. These models ended up perpetuating volatility because they are speculative (McNally, 2011, p. 108).

The 1970s ushered in an era of neoliberalism which, as Thomas Palley argues, supports financialization because of the undergirding assumption that laissez-faire markets will promote well-being (Palley, 2014, p. 1). As Özgür Orhangazi explains, financial innovations also allowed firms to address economic slumps in the late 1960s, and the push for deregulation greased the wheels of financial expansion (Orhangazi, 2008, pp. 31–33). The neoliberal erosion of the welfare state has also served to strengthen financialization (Bryan & Rafferty, 2014, p. 6), especially for the general population, as risk is transferred to individuals and households (Maman & Rosenhek, 2019, p. 1997) and new financial products are created to ostensibly address the gap (Haiven, 2014, p. 350).

1.3. Literature review

Scholars identify financialization in a multiplicity of ways. From a macroeconomic standpoint, many start with a focus on GDP, highlighting that in the current era, profits accrue significantly from the financial sector compared to more traditional forms of production or trade (Bellamy Foster, 2007; Godechot, 2020, p. 413; Krippner, 2005, p. 174; van der Zwan, 2014, pp. 103–104). However, the literature on financialization explores a wide range of topics relating to the power of finance, from its political influence, to the shareholder revolution and the democratization of financial products. This literature review will outline the existing scholarship, beginning with political concerns about financialization, followed by an overview of studies that take the construction of finance as their focus and a section on corporate restructuring. Next, the financialization of everyday life—which is the area of study I draw from and contribute to most considerably—will be addressed in depth. Finally, the review ends with a brief discussion of some critiques of the term.

1.3.1. The politics of financialization

Many scholars approach financialization from an explicitly political perspective, arguing that financialization involves a rise in social and economic inequality: it results in increased in power for elites and decreased power for workers and other non-elite classes (Bellamy Foster, 2007; Fine, 2009; Hudson, 2021; Lapavitsas, 2013, p. 32; Lin & Tomaskovic-Devey, 2013, p. 1285; Mader et al., 2020, p. 5; Palley, 2014, p. 17; Witko, 2016). As Michael Hudson (2021) explores, at least in the US, the economy has shifted from industrial to rentier-based capitalism, where public goods are privatized. For Olivier Godechot (2020, p. 415), economic inequality is fuelled in part by the excessive wages and bonuses available for elites within the financial industry. Meanwhile, according to Christopher Witko (2016, p. 365), political parties in the US may make a difference: until recently, financialization was slower when Democrats were in power, although this constraining effect has weakened in recent years as Democrats have moved further to the right of the political spectrum. Finally, Costas Lapavitsas (2012a) argues that financialization entails a continuous expropriation of workers' income since workers have no alternative to participating in financial systems. This expropriation is mirrored on an international level where overall, wealth is transferred from the Global South to the North (Lapavitsas, 2012a, p. 16; Orhangazi, 2008, p. 58). While there is clearly a diversity of perspectives on how inequality is perpetuated, these scholars collectively agree that inequality is a key feature of financialization.

Much of the literature is also quite clear that, while financialization has occurred in tandem with neoliberalism, and is often conceived as a product of laissez-faire politics, in reality financialization depends on active state support (Fine, 2009; Happer, 2017; Karwowski, 2019; Lai, 2018; van der Zwan, 2014, pp. 116–117). This is especially true in times of crisis, for example during the 2008 crash where the US government's intervention, in the form of bank bailouts and quantitative easing, placed a floor under the economic fallout (Lapavitsas, 2012b, p. 5, 2013; Palley, 2014, p. 7). Moreover, even in cases where political leaders hope to curb the process of financialization, doing so is politically difficult because the state itself is now guided by financial imperatives (Karwowski, 2019, p. 1002) and because the growth of finance creates short-term gains while its negative consequences are farther in the future: as Palley points out, "the political cost of change is immediate and direct, yet the benefit is averting a hypothetical future problem" (2014, p. 61). Overall, these scholars highlight the ways that the state

itself is embedded in and perpetuates financialization and cannot be relied upon for lessening its impact.

1.3.2. Contingency and construction of finance

Although finance has earned its political power in part through the ways it positions certain economic choices as unavoidable, several scholars are concerned with underscoring its contingency and construction. From a historical perspective, Marieke de Goede's (2005) genealogy of finance, which focuses on points of openness and indetermination, pushes against the assumption that financial development is inevitable. In this sense, one of De Goede's arguments is for a repoliticization of finance wherein core financial assumptions and models are brought back up as topics of public debate rather than being relegated to a black box. For example, de Goede argues that the Jubilee 2000 initiative, a campaign to cancel debt, successively re-invigorated conversations about what relationalities credit and debt generate, bringing these issues into a space of deliberation (2005, pp. 160–161). For de Goede, investigating finance's historical contingency prevents it from being an omnipotent force beyond human control.

Indeed, it is this aspect of human-ness that others scholars seek to illuminate, resisting finance's seemingly "unassailable" mathematical authority (Poovey, 2015, p. 223). As Mitchel Abolafia (1998, p. 69) argues, markets are created and sustained by human action: rather than finance and culture being separate, markets actually exemplify cultural norms. For example, James Carrier's (1997) edited volume explores role that 'the market' plays in the Western imagination, from an anthropological perspective. Meanwhile, Donald MacKenzie (2006, 2009) uses ethnographic methods to point out that finance is always embodied and enacted by its practitioners, and that financial facts must always be actively created by the finance community. The culture of high finance has significant impacts on what is prioritized on a broader social level: as Karen Ho's (2009) work illustrates, commonly accepted attitudes among investment bankers serve to perpetuate a worship of shareholder value.

1.3.3. Financialization of the firm

The issue of shareholder value illustrates one of the ways that the influence of financial imperatives extends beyond the formal financial industry. Since the late 1970s,

firms have shifted their priorities towards the pursuit of shareholder value (Aalbers, 2015, p. 217; Ho, 2009; Palley, 2014; van der Zwan, 2014, p. 107), where stock prices define whether a company is performing well or not as opposed to other metrics like employment levels or even profit more generally. This shift has been enforced through hostile takeovers and layoffs, which serve as disciplining mechanisms for firms (Orhangazi, 2008, pp. 36–37). Theoretically, a focus on shareholder value is beneficial for companies as it encourages them to be less wasteful. In reality, however, it contributes to the power of the financial sector and means that companies may ultimately take destructive actions to preserve their stock performance. An emphasis on stock prices often entails cutting expenses for long-term growth and sustainability rather than more discretionary budget lines, meaning that the hypothetical benefits of shareholder value dominance have usually failed to materialize (Ho, 2009).

Not only has corporate restructuring been framed in optimistic terms for companies themselves, but it has also contributed to a popularization of stock ownership that, as Brooke Harrington (2010) outlines, was seen as a potentially democratizing force in the United States, tied to American identity and the ideal of an 'ownership society'. However, despite idealistic claims, the pursuit of shareholder value has generally failed to empower working people: soaring stock prices, while they often allow for bloated executive pay (Ho, 2009, p. 128; Palley, 2014, pp. 29–32; van der Zwan, 2014, p. 109), do not necessarily advantage the majority of employees (Ho, 2009, p. 153).

The rise of passive investing over the last couple decades has led to evolutions when it comes to 'popular' shareholding. While stock ownership previously entailed individuals picking specific companies to invest in, today many investments are done through exchange-traded funds (ETFs) and tied to stock indices. Scholars have noted that this method entails a shift of power from individual shareholders to the asset managers (often large corporations like BlackRock, Vanguard, and State Street) that own the various equities in an ETF. These asset managers hold large portions of companies' stocks and are invested across the market. If such asset managers wish to influence a given corporation, it is assumed that they are limited to direct engagement because the index will determine what shares they buy and sell. Their large holdings and long time horizons may make asset managers of passive investments more motivated and better positioned to negotiate with companies (Appel et al., 2016; Bebchuk & Hirst,

2018; Fichtner et al., 2017; Fichtner & Heemskerk, 2020). Yet, asset managers are often unambitious when it comes to shaping company behaviour (Bebchuk & Hirst, 2018; Fichtner et al., 2017; Fichtner & Heemskerk, 2020; Jahnke, 2021). Benjamin Braun (2016, 2021) uses the term 'asset manager capitalism' to denote this new pattern of shareholding, where large asset managers control huge portions of stocks rather than individuals. In this sense, the popularization of stock ownership in the form of ETFs has led to increased corporate power (an issue that will be discussed at length in chapter 5).

Another way in which firms are becoming more integrated into financial services is through the provision of rewards and credit cards. As Lana Swartz explores, for example, Starbucks now generates a significant amount of its profit through its rewards card program (Swartz, 2020). Members can load money onto their card and use it at Starbucks locations. The membership comes with perks, like a periodic free drink. While the program is profitable for Starbucks because it encourages customer loyalty, it is arguably even more profitable because Starbucks invests the money customers have loaded onto their cards; the rewards program provides the company with a vast pool of liquid assets, to be repaid later in kind. Importantly, customers cannot withdraw the money from their cards as cash; it must be spent at Starbucks. While the Starbucks rewards program is one of the biggest of its kind, it is not unique. More and more corporations now provide customers with some form of loyalty card or even credit cards. This, then, demonstrates the ways that even nonfinancial companies are generating more of their income through financial channels.

1.3.4. Financialization of everyday life

The popularization of stock ownership in the late 20th century is just one example of how, because of macroeconomic changes, finance has become increasingly integrated into the daily lives of non-elite populations. Scholars refer to this phenomenon as the *financialization of everyday life*. Over the past several decades, the retreat of the welfare state has shifted financial risk from the public sector to individuals and households (Haiven, 2014, p. 45; Maman & Rosenhek, 2019, p. 1997; Martin, 2002; Pellandini-Simányi, 2021, p. 281; Zokaityte, 2017). Simultaneously, stagnating wages have left the general population worse off than in the postwar economy (Fligstein & Goldstein, 2015; Palley, 2014, p. 19; Pellandini-Simányi, 2021, p. 281). These two economic trends converge to produce a gap: while individuals are responsible for their

own financial stability, they are often unable to cover expenses based on waged income alone. The result is a proliferation of financial products—within the industry, optimistically termed the 'democratization of finance'—designed to help individuals meet basic needs (Haiven, 2014, p. 19; Lapavitsas, 2013, p. 10; Pellandini-Simányi, 2021, p. 281; van der Zwan, 2014, p. 111). These products include stock investments, credit cards, student loans, mortgages, and many others.

Empirically, just as popular stock ownership did not fulfill its utopian claims, the democratization of finance in general has also been a failure. As Simone Polillo (2020) highlights, the financial system has continued to produce exclusion and inequality even as more people have, theoretically, been included. This failure is, according to him, partly because of the way in which inclusion happened: rather than through public engagement and the provision of safety nets, it occurred through financial innovation and the expansion of financial instruments (Polillo, 2020, p. 70) such as derivatives (see Bryan & Rafferty, 2014). Additionally, while there are quantitatively more products on the market for consumers, the volume of choices can be difficult to navigate (Harrington, 2010) and many of these products are incomprehensible even to people who, theoretically, are highly financially literate (Erturk et al., 2007).

The failure of the democratization of finance is especially notable in the Global South, where the notion of borrowing as an expression of entrepreneurship has fueled supposedly progressive microloan programs that in fact perpetuate harm. These programs often target poor women while generating profit through high interest rates. Despite data pointing to high levels of repayment, Silvia Federici argues that these loans often fail to generate enough income for them to be repaid (Federici, 2014). Instead, because surveillance is taken up by the community and individuals who fail to pay back their loans are harshly policed and ostracized, borrowers are forced to repay the loans without having received a real advantage from taking them in the first place (Federici, 2014). The format of microloans is not only valuable for investors from the Global North due to high interest rates, but also because they allow for direct control over individuals, profit generation from labour that was previously at the margins of the formal economy, and the fulfillment of entrepreneurial ideology (Federici, 2014, p. 239).

Responsibilization and governmentality

In the face of economic inequality that new financial products do not seem to alleviate, policymakers have repeatedly pursued financial literacy education programs as the key to ensuring economic wellbeing, despite their debateable outcomes (Fernandes et al., 2014; Lazarus, 2020; Maman & Rosenhek, 2019). While such programs are often included in supposedly progressive agendas (Polillo, 2020, p. 59; Prabhakar, 2019; Zokaityte, 2017), critical scholars argue that literacy programs promote an individualization of systemic problems and ignore the myriad factors contributing to financial stress (Zokaityte, 2017). Such programs often frame current economic structures as inevitable, driven by and following natural laws (Lazarus, 2020; Maman & Rosenhek, 2020, p. 306; Pettersson & Wettergren, 2020), for example that stock market indices always increase over the long-term (Arthur, 2012), which will be addressed at length in chapters 3 and 5. For scholars, the framing of the economy as rational and predictable serves a rhetorical function: individuals can be made responsible for failures because, based on these assumptions, all it takes to achieve financial security are the right calculative abilities (Arthur, 2012, p. 96; Maman & Rosenhek, 2020, p. 313). However, while individuals are hailed to master their fate, scholars argue that the economy remains a fundamentally unpredictable construction (Arthur, 2012; Maman & Rosenhek, 2020, p. 304; Zokaityte, 2017): they are in fact living in a “snakes and ladders world” (Erturk et al., 2007, p. 562).

Much of the scholarship on the financialization of everyday life argues that financial activities—from participating in financial literacy education to creating a retirement fund—are productive of subjectivity. Scholars often invoke Michel Foucault’s concept of governmentality (see Foucault, 2008) to describe this phenomenon. In this framework, political power is exercised through, in part, incorporating subjects into their own governance. Rather than power being imposed solely through discipline or formal bureaucracy, governmentality illustrates how individuals and social groups play important roles in creating and sustaining norms. In this sense, those living under financialization may adopt specific subjectivities in the context of this form of ‘soft’ power: for example, individuals are encouraged to consider financial involvement as an avenue towards self-realization (Christopherson et al., 2013, p. 354; Langley, 2008, pp. 91–93), and develop specific characteristics, such as an entrepreneurial attitude, appetite for risk, self-reliance and calculative abilities (Aitken, 2007; Lai, 2016, 2018; Martin, 2002;

Pellandini-Simányi, 2021, p. 280; van der Zwan, 2014). Because financial activity is framed as a pleasurable opportunity, individuals may willingly discipline *themselves* rather than being dominated from above (Haiven, 2020, p. 350; Hillig, 2019, p. 1462).

The transformation of personal subjectivity under financialization is linked to broader cultural phenomena where non-financial things, including selfhood, become commodities. Foucault posits that human capital theory reframes workers and labour as pieces of capital. Under this theory, many behaviours can be considered investments in oneself: for example, Foucault mentions that migration could be seen as an investment taken that involves drawbacks but will ultimately generate larger returns (Foucault, 2008, p. 230). Under neoliberalism, where workers are refigured as human capital, Foucault argues that an individual must become “an entrepreneur of [themselves]” (Foucault, 2008, p. 226). Scholars often use Foucault’s framework to explore recent trends of self-branding. In this vein, Alison Hearn explains that in the post-Fordist context where agility and innovation are (at least in theory) valued in the workplace, workers must actively polish and market their self-image (Hearn, 2008). On the organizational side, as Paul du Gay explores, workers are encouraged to envision themselves as in control of their own destinies even as they might play a very small role in a large corporation (du Gay, 1996, p. 60). This kind of practice is both supported by and works to support the financialization of subjectivity as the same qualities which are celebrated in financial participation are also expected in the modern workplace, such as self-reliance and an enterprising attitude (du Gay, 1996, p. 70; Hearn, 2008, p. 199).

Previously non-financial items besides the self are also part of this process of the financialization of everyday life. For example, while property ownership has historically been considered in terms of the value of having a place to live as well as sentimental aspects of home and family, in the contemporary era homes have been transformed into financial assets. Today, property may indeed be of sentimental value, but in addition to this framing, homes are sought after as savvy investment opportunities that will provide returns. Newly financialized cultural understandings of items such as the home are, according to scholars in this vein, integrated into individuals’ subjectivity. (Christopherson et al., 2013, p. 354; G. F. Davis, 2011; Fligstein & Goldstein, 2015, p. 577; Haiven, 2014, 2020).

Contested subjectivities

While financialization may promote certain subjectivities, this is not an automatic process. Rob Aitken's concepts of selection and configuration are useful in this regard. In terms of selection, Aitken (2020, p. 370) notes that individuals are hailed to participate in different ways depending on their position. This is demonstrated, for example, in Neil Fligstein and Adam Goldstein's (2015) study on 'finance culture', where they find that the upper classes are most likely to embrace financialization as an opportunity. Meanwhile, the concept of configuration highlights that "financialization is the *process* through which objects are framed as assets capable of carrying financial value" (Aitken, 2020, p. 370, emphasis added). Configuration takes place in part through specific mechanisms such as borrowing arrangements or savings schemes that serve to cultivate financial behaviours and integrate previously un-financialized populations (Aitken, 2020, pp. 371–372). As well, this process relies on particular technologies like financial worksheets, exercises, calculators and online tools (Aitken, 2007, p. 45). However, throughout this evolution there is room for refusal, resulting in "uneven forms of financial subjectivity" (Aitken, 2020, p. 373).

Empirical studies have highlighted the uneven and contested nature of subject formation. A variety of scholars have found that rather than adopt the neoliberal, rational subjectivity described above, individuals are more likely to reframe financial imperatives on terms they already understand and deem important. As Karen Lai argues, "values and expectations regarding life stages, social roles and responsibilities, and personal life goals can be folded into financial strategies" (2017, p. 918). Similarly, Jack Lipei Tang and Francis Lee (2020) develop the concept of 'lay theories' to describe how individuals may base their decisions as much on common sense and collective knowledge as on pure financial metrics. These phenomena have caused doubt about whether financialization has really been internalized or rather "'domesticated': appropriated to existing relationships, temporal structures and rationalities" (Pellandini-Simányi et al., 2015, p. 753). Furthermore, even when financialized subjectivities form, they often do so in a piecemeal fashion where individuals adopt certain attitudes while discarding others (Pellandini-Simányi & Banai, 2021).

If financialized subjectivity is always contingent, this also raises the possibility of *oppositional* subjectivity formation. This is the case, for example, in Desiree Fields' study

of New York tenants: integrated against their knowledge or will into financialized housing schemes, these individuals often develop a "subjectivity of dissent" (Fields, 2017, p. 590). Their incorporation into financialization, far from necessitating the development of financialized subjectivity, actually serves as a catalyst for refusal and opposition. The study thus demonstrates that not only is subject formation not automatic, but also that the same macro phenomena (in this case, the financialization of housing) could lead to different responses among different populations, illustrating the ways that subjectivities developed under financialization will often be, geographically, context-specific (Coppock, 2013).

Resistance to financialization

The question of resistance to financialization more broadly is a topic of much debate in the literature. Most scholars agree that financialization is harmful for at least some people and to at least some extent, but there are diverse views on what resistance to financialization could look like. While the financialization of everyday life results from macroeconomic shifts, many scholars explain that power should not be seen as flowing unidirectionally from an elite class (Haiven, 2014; Langley, 2020): in Max Haiven's words, "financialization is not some dystopian monoculture imposed on us from above" (2014, p. 4). For Haiven (2014), finance has become an integral part of daily life, even part of practices that seem non-financial on the surface. Therefore, not only is it difficult to eradicate financialization completely for practical reasons (since financial products are necessary for basic necessities), but it is also doubtful whether there exists a space somehow 'outside' financialization.

Instead of a singular, revolutionary moment, Aitken recommends turning to more accessible practices of contestation and critique that could highlight the "political possibilities in quotidian practices within markets" (2020, p. 376). However, this suggestion remains abstract: while Aitken and others identify art as one potential form of resistance that perhaps fits this quotidian framework (Aitken, 2007, p. 210; de Goede, 2005, p. 168; Langley, 2008), Haiven (2018) points out that calls for creative strategies often fail to realize that capitalism, and financialization in particular, depend at least to some extent on imagination and creativity. This is not to dismiss creative resistance altogether but insist that it is always fraught with contradictions and must be considered carefully and critically (Haiven, 2014).

Other scholars interested in addressing the harms caused by financialization approach the issue from a more reformist angle. Fred Block (2014), for example, argues that the financial system need not be abolished in its totality, but significantly reorganized. While he recognizes that reforms cannot be the final solution to such an expansive problem, he notes that effective reforms have something of a ripple effect, paving the way for more significant social change to take place in the future (Block, 2014, p. 22). Similarly, for Michael McCarthy (2019), a true, utopian democratization of finance needs to involve a shift in power—not just economic, but also political—from financial firms to ordinary people in order to prevent retrenchment. Some potential changes, according to these scholars, include expanding support for credit unions (Block, 2014, p. 17) and creating public, non-profit investment banks (Block, 2014, p. 17; McCarthy, 2019, p. 617). At the most interventionist end of the spectrum, according to McCarthy, is bank nationalization: in this case, mainstream financial institutions would be made public (2019, p. 621). These kinds of proposals do not seek to access a (nonexistent) space outside capitalism but instead reshuffle current hierarchies perhaps just enough to ensure that more radical change is possible in the future.

1.3.5. Terminological concerns

Like any scholarly term, there are potential flaws with the concept of financialization. For example, while the term itself is relatively new, many scholars point out that the phenomena it describes are not; they may only appear remarkable when compared with the postwar era (Christophers, 2015; Fine, 2009; Ioannou & Wójcik, 2019; Sawyer, 2013). Another critique is that the term can be used without sufficient empirical evidence: in this sense, scholars may use it to explain other occurrences when it itself is in need of explaining (Christophers, 2012, 2015; Krippner, 2005, p. 181). Lastly, many scholars highlight that like other universal, social scientific terms (such as neoliberalism), financialization can be too broad or vague (Mader et al., 2020, p. 6), and often needs to be mobilized in specific contexts and projects in order to contribute analytic value (Lawrence, 2015).

1.4. Direction of the thesis

This study addresses some of the concerns described above while making a unique and original contribution to the scholarship on financialization by bridging the gap between the financialization of everyday life and financial technology. Although several scholars mention financial technology as an important feature of financialization today (Lai, 2018; Lapavitsas, 2013, p. 8; van der Zwan, 2014, p. 111), few take technology as their focus. By using robo-advisors as a point of entry, the study simultaneously accepts that financialization is not new altogether while illuminating one of the aspects of it that is novel and worthy of investigation.

Critical scholarship on robo-advisors is extremely limited, since much of the literature consists of research geared towards industry (see, for example, Chishti & Puschmann, 2018; Gupta & Tham, 2018; J. Hill, 2018; Jung et al., 2019; Litterscheidt & Streich, 2020; Pagnottoni & Polinesi, 2021; Palmié et al., 2020; Rubini, 2019; Sander, 2021; Wilson, 2017; Woodyard & Grable, 2018; Xing et al., 2019). The few critical studies that exist highlight issues of financial literacy and passivity. According to scholars in this vein, robo-advisors eliminate the need for financial literacy because of their automation (Hayes, 2019, 2020; Tan, 2020). Their automated nature also means that robo-advisors encourage passivity, foreclosing opportunities for active engagement with one's investment (Hayes, 2019, 2020; Tan, 2020). Ultimately, users are distanced from their portfolios and need not understand what robo-advisors do so long as they do not interfere.

This study builds from and moves beyond the current literature. While scholars have noted some of the assumptions robo-advisors are built on, such as that stock markets increase over the long-term and that diversification is a key for investing (Hayes, 2019), there is a lack of research when it comes to interrogating whether and how these assumptions, among others, are communicated to investors through app use. I investigate such principles in more depth and explore how financial beliefs are transmitted through robo-advisors' online content and interface even while passivity remains a key feature. Additionally, in exploring online discussions, the study contributes to scholarship that outlines the uneven and contested nature of financialized subjectivities and adds to debates about financial literacy. Lastly, through its focus on Canadian robo-advisors, this research adds to the currently limited body of literature on

the financialization of everyday life outside a strictly American framework (although the online discourses under examination are not geographically specific).

This thesis is guided by the following research questions:

1. What principles and assumptions about investing and financial markets are promoted by robo-advisors?
2. What conventions surface in online, user-generated discourse about such apps? Are they similar to those supported by the apps themselves?

One important note about the approach this thesis takes is how mundane and mainstream robo-advisors and the principles they promote are. Unlike other studies that focus on the hidden or nefarious aspects of a technology, this thesis engages directly with the ordinariness of personal investing through an app, where many of the directions given to users are consistent with accepted truths about financial markets and professional financial advice. This thesis turns careful attention to how exactly these apps communicate with users and how users discuss them, highlighting instances where the apps reinforce popular principles and illustrating how users often accept these. In the context of this study, the typicalness of these apps does not dilute the findings but rather contributes to them more clearly: such interactions with technology may seem meaningless and empty but in fact contribute to integrating users more thoroughly into financialized life.

1.4.1. Overview of the chapters

The next chapter examines the methodology and procedures used in conducting research for this thesis. There I outline background and examples for both the walkthrough method and critical discourse analysis and explain why these methods were chosen and are the most suitable for answering the given research questions. I also address ethical considerations and limitations for each method.

Chapters 3 and 4 outline the findings from the walkthrough method and critical discourse analysis respectively. In chapter 3, I explore the principles of investing that are promoted by robo-advisors: an emphasis on long-term performance, the use of diversification and asset allocation to manage risk, and the exhortation for investors to fund their accounts as much as possible. The chapter highlights these principles by

using examples from the walkthrough method and notes how they support a conception of rising markets, where stock indices increase over time. In chapter 4, I outline the themes that users discuss in online threads related to each app: risk management, literacy and information, behavioural concerns, and the domestication of finance. I find that while many users accept the passive approach that robo-advisors enforce, there is room for contention around theoretical principles. Additionally, many users turn to online forums for trivial and logistical information.

Chapter 5 concludes the thesis, building from the findings explored in earlier chapters to highlight broader social and political implications. The findings in this study complicate notions of financial literacy and add nuance to conversations about whether and how robo-advisors encourage passivity. Additionally, the logistical nature of many concerns around personal finance suggests the need for improved access to financial information on the part of users. In this chapter, I also spend time considering the financial structures that make robo-advisory possible: large asset managers and index providers that ultimately direct capital flows. I argue for a (re)politicization of stock markets where indices are recognized as formative infrastructures and ethics—especially in the context of climate change—are brought into the frame when considering how investments are made.

Chapter 2.

Methodology

This study examines two robo-advisors and the discourses they generate online. Although there are many robo-advisors that could be examined, Wealthsimple Invest and CI Direct Investing (formerly known as Wealthbar), were selected based on their high ratings by websites geared to lay investors (Borzykowski, 2020; Broverman, 2021; Hannah, 2021; Muller, 2021; Switzer, 2021; Talbot, n.d.; *The Best Robo Advisors in Canada - 2021 Comparison Guide*, n.d.; *The Best Robo-Advisors in Canada 2021*, n.d.). While both apps are affordable and popular, there are contrasts between them that allowed for a useful comparison. For example, whereas Wealthsimple operates with significant independence under a holding company, CI Direct Investing is a branch of the larger CI Financial. Additionally, while both are originally Canadian companies, Wealthsimple has become a more widely known international leader in the robo-advisor market (although it has recently closed operations in other jurisdictions).

Two methods were used to undertake this study, each of which is outlined in this chapter. The walkthrough method was used to investigate each robo-advisor's interface, while a critical discourse analysis was conducted based on content about the apps available on Reddit discussion forums. The chapter begins by focusing on the walkthrough method and then the critical discourse analysis. For each method, I describe its theoretical background and include examples of previous applications of the method. I then explain the procedure used for data collection. The chapter concludes with a discussion of ethical considerations as well as the various limitations of this methodological framework.

2.1. The Walkthrough method

2.1.1. Background and previous applications

One of the advantages for lay investors using a robo-advisor is their availability in an accessible app format. To study an app's interface, the walkthrough method provides the most thorough framework. Interface walkthroughs have previously been used in

software development to improve app design (Lewis et al., 1990; Light et al., 2018, p. 886), and in their seminal 2018 article, Ben Light, Jean Burgess and Stefanie Duguay appropriate this type of procedure to outline a method for critical social scientific research related to apps. The walkthrough method provides an effective technique for the study of apps since it does not rely on backend access, a challenge due to apps' proprietary, closed nature. Additionally, while apps take on a mundane status as they are used ubiquitously in everyday life, the walkthrough method, using ethnographic practices such as field notes, allows for the researcher to slow down and critically interrogate the interface. While there is limited scholarship—both from theoretical as well as practical angles—on the walkthrough method, it draws from affordance theory, social semiotics, and cultural studies. Moreover, in this study specifically, it is grounded in the social construction of technology (SCOT). In this section, each of these features will be highlighted along with some recent and insightful applications of the method.

The term 'affordance' is used to describe the technical characteristics of a certain medium or object while allowing for its flexible use and resisting technological determinism (J. L. Davis, 2020; Nagy & Neff, 2015, pp. 2–3). While the term has been used across disciplines, in the field of communication it allows for nuanced and rigorous study of platforms, web interfaces, software programs, and mobile applications. Some scholars choose to distinguish between two types of affordances, both of which may be of interest in different ways. Low-level affordances refer to material constraints set by an interface, such as the technical features that are available (Bucher & Helmond, 2018, p. 240; Duffy et al., 2017, p. 7), while high-level affordances pertain to the kinds of behaviours that such technical features enable (Bucher & Helmond, 2018, p. 240; J. L. Davis, 2020). By using the walkthrough method, researchers can take advantage of and build from the concept of affordances. For example, in conducting a social media walkthrough, Rena Bivens and Oliver Haimson (2016) show that gender becomes embedded on such platforms not just because of technical features, but more specifically through the placement of these features in the sequential registration process. In this case, the walkthrough helps to expand on the idea of low-level affordances due to its dynamism: affordances may be meaningful in themselves, but their influence is also caused by their specific placement in the routine practices of platform use.

A second area that the walkthrough method builds from is social semiotics. Social semiotics expands traditional semiological concerns with signs and symbols to emphasize how power can be sustained through visual modes more generally (Hodge & Kress, 1988, pp. 1–3). In this view, media are not used arbitrarily but instead favour certain interpretations over others, and these interpretations are often ideological in nature (Hodge & Kress, 1988, p. 3; Kress & van Leeuwen, 2008; Rose, 2016, pp. 69–70). Sarah MacLean and Simon Hatcher's (2019) study illustrates how this can be combined with the walkthrough, as they pay specific attention to symbolic representations within the interface of a healthcare app, showing that these carry certain connotations about the definition of health. While semiotics is sometimes criticized for a lack of holism (Berger, 2005, p. 34), the walkthrough method allows for a more well-rounded analysis that can simultaneously apply semiotic insights while taking other aspects of the app into account.

The field of cultural studies is also a major influence for the walkthrough method (Light et al., 2018, p. 888). One of the most useful concepts in this regard is the circuit of culture, consisting of multiple nodes: production, consumption, representation, identity and regulation (du Gay et al., 1997). While researchers may focus on the actual use of mobile apps at the level of consumption, the method also specifies a stage before the technical walkthrough wherein researchers are directed to consider the environment of expected use, including the app's operating model, the vision of its creators, and its target user (Light et al., 2018). Many insights can be generated by considering the multiple nodes on the circuit of culture that affect apps. For example, while conducting a walkthrough of Tinder focused on questions of authenticity, Stefanie Duguay (2017) finds that aesthetics are carried from promotional material into the interface itself. Taking external factors into account can also highlight contrasts between apps: in this case, D. Bondy Valdovinos Kaye et al's (2021) study of TikTok and Douyin shows that the two apps are positioned very differently in global markets and have different target users despite the visual similarities between their interfaces.

A final theoretical influence to note pertains to this study specifically. While those using the walkthrough method make use of a variety of theoretical traditions, this study is strongly influenced by the social construction of technology (SCOT). At its core, SCOT outlines that the development of a technological artifact should not be taken for granted: as Trevor Pinch and Wiebe Bijker (2012) highlight, artifacts often come into being thanks

to the actions of specific social groups, particular ways of framing and resolving problems with an artifact, and the stabilization of what exactly the artifact means for the general population. In terms of a robo-advisor, the walkthrough method helps to highlight the various ways in which the ultimate configuration of the app is contingent, not only on the power of specific social groups who determine the app's vision and operating model, but also in terms of the technical features and affordances the app includes. This study, then, approaches robo-advisors from the premise that nothing about them is inevitable (see Hacking, 1999), from their very existence to the algorithms that dictate their automated executions and the visual modes they use to communicate with users.

2.1.2. Procedure

The walkthrough procedure consisted of two main stages as outlined by Light et al (2018): examining the environment of expected use and the technical walkthrough. These parts were conducted simultaneously (from October 14th, 2021 to January 14th, 2022). It was advantageous to examine the environment of expected use while doing the technical app walkthroughs as I was able to recognize certain key terms and concepts from the app in the online material, and I was able to access material that may have only been posted during the time I was conducting the walkthroughs.

Examining the environment of expected use consisted of collecting and analyzing sources that manifested the app creators' vision, the app's operating model, and governance structures. Sources such as app store descriptions, website content, blogs, and social media profiles highlighted the app's branding and target users and illustrated some aesthetic and stylistic choices that were carried into the app interface. Information on governance structures, hiring practices, and financial reporting was used to understand the app's operating model, showing how their parent companies are positioned in the labour market and how they generate income. Lastly, during the registration process, each app's privacy policy, FAQs, and pop-ups and disclaimers demonstrated how the app regulates user behaviour.

The second part of the method is the technical walkthrough itself. As an ethnographic method, this procedure consisted of fieldwork sessions spent using the app, as a 'regular' user would. The process began with registration and activation, and

ended by withdrawing all funds from each account,[2] with a significant period spent undertaking regular use. $1000.00 CAD was deposited into each robo-advisor and at the end of the technical walkthrough, all funds were withdrawn ($998.41 from CI Direct Investing and $991.58 from Wealthsimple Invest). I downloaded each app from Apple's App Store and used the app in sessions ranging from 6 minutes to 1 hour and 10 minutes. Sessions took place at a variety of times of day and week. As would be the case when using other ethnographic methods, I took field notes during each session and wrote these up in more detail afterwards. These were supplemented with screenshots from the session. Data from the walkthrough method, including materials that spoke to the environment of expected use and field notes from each session of the technical walkthrough, were stored and coded using NVivo 12, a qualitative data analysis software.

Like many other critical methods, the walkthrough's specific points of focus are malleable in accordance with a study's research questions (Light, 2018, p. 41). Therefore, while many parts of the app were of interest during the walkthrough, the presentation of data was a major concern for this study specifically. In general, data visualizations can play a key role in communicating complex numeric information to ordinary people (Engebretsen & Kennedy, 2020; Gitelman & Jackson, 2013; Kennedy & Hill, 2018). Meanwhile, although data visualizations may be perceived objectively, scholarship has highlighted that this is often not the case (Engebretsen & Kennedy, 2020; Gray et al., 2016, p. 229; R. L. Hill, 2020; Kennedy et al., 2016; Nærland, 2020). In this view, because robo-advisors target those without financial expertise, for whom finance may be a black box (MacKenzie, 2009), the way that data is presented to users may have a significant impact on their understanding of financial markets.

2.2. Critical discourse analysis

2.2.1. Background and previous applications

One of the limitations in using the walkthrough method alone is a lack of attention to actual users, and many scholars point out that supplementing the walkthrough with a

[2] While typical uses of the walkthrough method end with complete account deactivation, this was not feasible due to the nature of personal investing accounts. It was preferable to keep them open so that I would be able to return to them for tax purposes.

user-focused method can be beneficial (Light et al., 2018; Ritter, 2021). Considering this, the study applied critical discourse analysis (CDA) to public forum posts about the robo-advisors under investigation. While 'discourse' is a term defined in a variety of ways, in CDA discourses can generally be defined as "relatively stable uses of language serving the organization and structuring of social life" (Wodak & Meyer, 2008, p. 6). Importantly, in employing CDA, language is accepted as opaque: discourse, in this sense is not a transparent container for opinions, ideas, or facts, but instead a social action worth studying in itself (Gee, 2011; Jones et al., 2015; Le & Le, 2009; Taylor, 2013, p. 13). This opacity is especially of concern when CDA is applied to the online context (as in this study) since user-generated content is reactive to that which surrounds it (Alves & Cavalhieri, 2020, p. 23). This section will provide a theoretical overview of key aspects of critical discourse analysis as well as highlight some examples of CDA's application to online material.

In general, CDA adds an explicitly critical element to traditional discourse analysis. Scholars working with CDA approach texts from the premise that language is always laden with power relations and ideologies (Blommaert & Bulcaen, 2000, p. 449; Bouvier & Way, 2021, p. 345; Breeze, 2011, p. 495; Catalano & Waugh, 2020, p. 2; Fairclough, 2001, p. 124; Le & Le, 2009; Locke, 2004, p. 25; Wodak & Meyer, 2008, p. 19). Drawing from Foucault and Gramsci, CDA scholars recognize that power is diffuse in society and that the interests of the powerful can be maintained not just through coercion, but also through hegemony that is supported by discourses (Flowerdew & Richardson, 2018). Moreover, such power dynamics are often obscured, and it is the role of the critical discourse analyst to bring these hidden ideologies to light (Catalano & Waugh, 2020, p. 2; Locke, 2004, p. 32; Toolan, 1997; Wodak & Meyer, 2008, p. 8). In this vein, many studies have turned their attention to discourses generated by powerful groups: examples include an analysis of Vancouver Police Department reports on mental health (Boyd & Kerr, 2016), a study of childcare policy documents in the UK (Osgood, 2009), sustainability reports created by corporations (Higgins & Coffey, 2016), and corporate communication from consumer labelling organizations in Finland (Pekkanen & Penttilä, 2020).

However, while discourse produced by those in power can indeed perpetuate social hierarchies, scholars have also been fascinated with the ways that power can be challenged or supported by more collective discourses surfacing in the social media

context. For example, Phoebe Jackson and Gale Seiler (2018) find that students who have previously struggled with science were able to develop new narratives about their intellectual abilities in online forums. Other studies, though, illustrate how ideology and hierarchy persist even in supposedly horizontal, peer-to-peer contexts. Patient Rambe (2012, p. 307), for instance, finds that Facebook conversations among university students and educators often sustain existing offline forms of educators' authority. Meanwhile, Mihan Lee's (2017) study of an online forum for those dealing with infertility shows that discourses on the site privilege specific narratives over others with the potential effect of alienating those who may not be able to conform. Additionally, as Catarina Alves and Klaus Cavalhieri (2020) find in their study of sex buyers' forums wherein discourses often perpetuate misogyny, online spaces can be harnessed by those who are already historically privileged. The variety of insights from these studies speak to Gwen Bouvier and Lyndon Way's argument that even the "seemingly banal" of mundane online communication should be of great interest for critical discourse analysts (2021, p. 346).

2.2.2. Procedure

The procedure used for critical discourse analysis in this study involved the identification of a data source (in this case, Reddit), a sampling process that is as systematic as possible, and then qualitative coding supplemented with computational analysis. Reddit is a popular social media platform where users can join a wide variety of communities (called subreddits) dedicated to topics of interest. While some subreddits are closed and need approval to join, others are completely public. Each subreddit has specific guidelines that are enforced by designated Reddit users who serve as moderators. Other than these peer-enforced regulations, there is little oversight on the platform and users are relatively anonymous since they are not required to use their real name or a photo. Users can create multimedia posts on a subreddit (sometimes called a 'submission'); on some subreddits, such posts will need to be looked over and approved by the moderators, while on others there is no such requirement. Users can also comment on posts, reply to comments, and reply to replies. The resulting organization of a discussion thread, then, consists of an original post with an attendant collection of comments and replies in a tree structure.

Reddit forums were selected as a data source for several reasons. In general, forums are an ideal source for discursive data because users may be more forthcoming than in other contexts, since discussion participants share common interests (Jackson & Seiler, 2018, p. 781). More specifically, Reddit is an excellent forum-based site to use for data collection due to its popularity, resulting in a vast quantity of data available, and its public and relatively anonymous nature (Amaya et al., 2019, p. 2; Medvedev et al., 2019, p. 186). In terms of the subject matter of this study in particular, Reddit, with subreddits dedicated to topics such as personal finance, early retirement, and stock trading, is a widely used space for lay discussion of financial activity. As an example, this was demonstrated in early 2021 when members of the WallStreetBets subreddit bought huge numbers of GameStop shares (a brick-and-mortar video game retailer) in an effort to drive stock prices up and sabotage major Wall Street investors who held short positions (Heresco, 2021; Mendoza-Denton, 2021; Van Kerckhoven & O'Dubhghaill, 2021).

While it is not feasible to examine every Reddit post about each robo-advisor, a sampling procedure was used to collect a selection. First, using Google Chrome and without signing into Reddit, keyword-based searches were conducted for each app. For Wealthsimple Invest, the search term was "wealthsimple invest". Meanwhile, for CI Direct, two searches were run because the company recently changed names. First, the search term "CI direct" was used, and second, the search term "wealthbar" was used.[3] Results were narrowed to those from the past year (since apps are constantly changing) and sorted by relevance. Working down this list, threads were opened in a browser. Threads were bypassed if they were clearly irrelevant, not in English, didn't reference the apps, or only consisted of referral links.[4] Posts from subreddits without such guidelines were collected. For each app, up to 50 posts were collected (in the case of the CI Direct searches, only 42 were collected in total because there were fewer results overall). The search and collection of threads took place on January 14th, 2022 and a total of 92 unique posts with attendant discussions were collected.

[3] I began by searching the complete name of "ci direct investing" but the results were too sparse to gather a rich set of data from.

[4] I also ensured that I did not collect threads from Subreddits where research was explicitly disallowed. No Subreddits I came into contact with had this as a rule, so it did not have an effect on the threads collected.

Following this, the posts and their associated discussion threads were extracted and transformed into plain text files with Python using Reddit's freely available API (see Appendix A). Each thread was processed using two Python scripts: one that preserved the tree-like structure of discussions, for qualitative analysis, and another that stripped all formatting, for computational analysis. One important limitation to this technique is due to an affordance of the Reddit platform. On Reddit, a user can read a discussion thread only to a certain point until encountering a "read more" button that must be clicked to continue reading. The script was able to do this automatically, but for especially large posts this can result in unreasonable processing times and create a collection of discussion threads that are much too long to thoroughly analyze. Therefore, the script was set to only open 5 "read more" buttons. This resulted in some discussion content being clipped from especially long posts. While this posed a limitation to the sampling procedure, it still allowed for enough content to be collected to permit the recognition of patterns across the data, an important aspect of discourse analysis (Johnstone, 2018; Taylor, 2013, p. 68).

Coding proceeded in two stages divided by a computational analysis. First, the entire dataset was coded with broad, overlapping themes as a "way in" to the data (Johnstone, 2018; Taylor, 2013, p. 70). During this first round of coding, the most attention was paid to the post itself and the first few comments. While conducting this first round of coding, I recorded each post's unique ID and the apps it referred to (Wealthsimple Invest, CI Direct Investing, or both). After this round of coding, I ensured that there were no duplicate posts based on their unique IDs. Next, Voyant, an online tool, was used to conduct keyword and collocation analyses. These forms of computational analysis are not meant to replace human interpretation, but instead allow for the illumination of statistical trends which can help the researcher see patterns they may have missed (Subtirelu & Baker, 2018, p. 109). Drawing both from the overlapping, researcher-created codes as well as insights gained through the computational analysis, a second, more precise round of coding was conducted. Because critical discourse analysis is an explicitly qualitative method, there was no intention to create exhaustive and objective codes as would be the case in a more quantitative content analysis, and the codes continued to be refined as the second round progressed. The aspects of the text that were most relevant according to the specific research questions in this study were given the most attention (Gee, 2011, p. xi; Wodak & Meyer, 2008, p. 28).

2.3. Ethical considerations

Questions of ethics were taken into consideration at every step during the research process, from conception to conclusion. In terms of the walkthrough method, potential conflicts of interest had to be avoided. Since an app walkthrough involves assuming the place of a regular user, money ($1000CAD) was invested using each robo-advisor. Advice was sought on how best to limit the potential for a conflict of interest in this case. No government-provided funding (SSHRC-CGSM) was used to make the investments, and the research findings and analysis were examined by the author's supervisor to avoid the possibility of these being affected by the performance of investments. A conflict-of-interest procedure was undertaken early in the research process and approved by all necessary parties prior to data collection.

The critical discourse analysis posed more traditional ethical considerations. While there are mixed views about using online content for research purposes, especially concerning informed consent (Association of Internet Researchers et al., 2020; Beninger, 2017; Proferes et al., 2021, pp. 10–11), ethical standards outline that informed consent is not needed in this case since no identifiable information is collected or shared (Canadian Institutes of Health Research et al., 2018, p. 16). Additionally, there is no expectation of privacy on public forum sites and Reddit searches were conducted without logging in, meaning that all results were completely public. As well, data was not collected from Subreddits where this was prohibited by their community guidelines (in actuality, I did not encounter such subreddits so this was not an issue), and the saved text files were stored on an encrypted device. Prior to data collection, an ethics exemption was granted by the SFU Research Ethics Board.

2.4. Limitations

While the methods chosen for this study provide a well-rounded analysis, there are nonetheless several limitations, as with any project, that are considered. Two of the most notable limitations with these methods are their potential lack of objectivity and generalizability. Both methods are malleable in line with the researcher's specific questions, and in the case of CDA, some have expressed concern about the potential for a scholar to project their own values and beliefs onto the data (Blommaert & Bulcaen, 2000, p. 455; Breeze, 2011, p. 494; Widdowson, 1995; Wodak & Meyer, 2008, p. 33).

However, for other scholars, the normative nature of CDA is part of its value, since it is precisely this critical angle that CDA adds to traditional discourse analysis (Graham, 2018). Indeed, this study approaches the issue of financialization critically and complete objectivity is not considered an asset. Nonetheless, two factors limited the potential for the researcher's beliefs to completely determine the analysis. First, in contrast to situations in which a researcher is examining a text produced by a powerful class and hoping to show how it contributes to dominance, this study is focused on the diffusion of ideologies in horizontal discourses. Thus, findings are insightful regardless of whether specific ideologies surface in the data or not. Second, the addition of a computational analysis in the procedure aids in highlighting linguistic trends not picked up on by the researcher and provided a more 'objective' database against which to check qualitative findings.

There are also limitations in terms of generalizability which must be accepted, as in the case of any qualitative, time-limited project. In terms of the walkthrough method, data collection took place over a relatively short period of time and so insights will be specific to the app interfaces for those digital editions (since apps are updated quite often). Meanwhile, the number of Reddit posts collected is inevitably only a fraction of those available. Additionally, the representativeness of the discussion threads is limited considering that those who post on such forums are often individuals with the strongest opinions and most confidence (Alves & Cavalhieri, 2020, p. 23), posts that seek to garner attention and 'upvotes' may intentionally exaggerate (Bouvier & Way, 2021, p. 349), and the limited demographic estimates of Reddit users suggest they are more likely to be young males and therefore not representative of the population as a whole (Proferes et al., 2021, p. 10). However, a lack of generalizability need not devalue the research findings. Instead, it is simply important to acknowledge that all findings will be specific to this study. In the case of discourse, it is also important to note that these are specific to Reddit: no claim can be made about whether the ideologies that surface online are carried from the forum context to the offline world. However, future research could build from these findings to answer this subsequent question.

A final potential limitation, arising from the accessibility of Reddit's API, is the issue of bots.[5] Reddit has freely available API which allows registered users to create bots that can interact on discussion threads just as a human would—however, the content they post is not dictated by a human. Some bots are harmless and recognizable as such due to the type of content they post (for example, a bot that converts measurements), but others may be designed with the goal of blending in as a human and are therefore indistinguishable. While the fact that the data may include discourse generated by bots could be seen as tainting it, bots are an integral feature of Reddit and should be considered key actors in generating discourse. In this sense, the study does not consider bots as a form of discursive contamination but rather their existence is just another factor that contributes to the necessarily opaque nature of language in the online context, as discussed earlier (Gee, 2011; Jones et al., 2015; Le & Le, 2009; Taylor, 2013, p. 13).

2.5. Conclusion

Despite the limitations of these methods, they are nonetheless the most productive to use in this particular study. The walkthrough method allows for a systematic analysis of apps, incorporating and expanding on a range of other frameworks to allow for rich insights. Meanwhile, while a plethora of methods exist for the study of textual content, critical discourse analysis allows researchers to take an explicitly political stance in order to unearth how power operates in the everyday use of language. By using these methods, the study is able to address its research questions and make an innovative contribution to scholarship on the financialization of everyday life as well as robo-advisors. In addition, it adds to the methodological literature since the walkthrough method has not been widely used to study robo-advisors and while critical discourse analysis has been applied to some online forums, Reddit provides a novel context in which to use it.

While this chapter has laid the methodological groundwork for this study and contextualized it within existing literature, the proceeding chapters will examine each section of the study in more depth. The next chapter explores the results from the

[5] Thanks to a family member who pointed out this challenge while I was explaining the project during its early stages.

walkthrough method, outlining the principles that robo-advisors promote around personal investing and financial markets. The following chapter, focused on critical discourse analysis, examines the themes that users discuss in online forums. The broader implications of these results will be elucidated in chapter 5.

Chapter 3.

Principles of investing in robo-advisory

Robo-advisors have become popular tools for those who lack expertise or large sums of capital to invest in the market. With adoption of robo-advisory continuing to grow, it is crucial to understand what robo-advisors communicate about investing and financial markets. In this chapter, I explore how the two robo-advisors under examination—Wealthsimple Invest and CI Direct Investing—promote mainstream principles of investing such as that the long-term is what matters, diversification and allocation can be used to manage risk, and that making deposits is a key behaviour necessary for building wealth. Each of these principles is expressed through online material from the apps, as well as through graphics and affordances in their interfaces. However, there are times when an app's explicit instructions conflict with their interface design, and instances where one app—usually Wealthsimple Invest—demonstrates these principles more noticeably.

In exploring these themes, I incorporate insights from robo-advisors' branding material, online information, and aspects of their user interface in mobile and web format. As well, I pay specific attention to how data visualizations are mobilized. Data visualization is one of the prominent ways that individuals interact with data in our current era (Gitelman, 2013, p. 12), and while charts and graphs are offered and accepted as objective truth (Kennedy et al., 2016) scholars have pointed out that data visualizations "privilege certain views of the world" (Nærland, 2020, p. 66). Choices about which data are visualized at all speak to what is considered important (R. L. Hill, 2020), while graphical techniques and affordances allow a data visualization to foreground certain things over others (Gray et al., 2016, p. 237); as Edward Tufte says plainly, "design is choice" (Tufte, 2001, p. 191). In the context of robo-advisors, visualizations are used to communicate about portfolio performance and time horizons, and to track users' deposits.

The principles of financial management explored here are relatively generic and align with mainstream financial assumptions. As mentioned in chapter 1, robo-advisors are based on the efficient market hypothesis and modern portfolio theory. From the

perspective of EMH, the movements of specific assets are unpredictable because it is accepted that prices already summarize all publicly available information, and therefore it follows that tracking long-term, aggregate performance rather than attempting to pick individual stocks will be beneficial. Modern portfolio theory, meanwhile, suggests that holding a wide range of assets that are distributed between different risk thresholds is the optimal way to balance risk and return for investors. Rather than guess at which equities will perform most reliably, every investor should invest in the same (diversified) set of equities and balance this risk with fixed income assets proportional to their risk tolerance. Limiting user behaviour, except when it comes to depositing more money, helps to discipline users and bake these financial theories into the app.

Considering the relatively dependable performance of passive investing strategies as mentioned earlier, the intention is not to defy the facticity on which the principles explored in this chapter are based, but rather to highlight how they are reflected by robo-advisors both explicitly and implicitly, through their apps. Moreover, these principles are part of the popular paradigm where (Western liberal) markets are assumed to rise over time. This model has profound economic and political significance, especially in the context of robo-advisory where exchange-traded funds are used to transcend the limits of scale and bind financial wellbeing not just to market performance but to the very idea of market growth. This chapter will begin by exploring the environment of expected use for each app, move onto outlining the principles of investing that are prominently featured by robo-advisors, and conclude by introducing some of the implications of such an approach to investing to be explored later on.

3.1. The environment of expected use

The environment of expected use for each app helps to contextualize findings from the technical walkthrough with information on apps' visions, operating models, and modes of user governance (Light et al., 2018). In terms of vision, both apps position themselves as forces for the democratization of finance, approaching this phenomenon optimistically and—in the case of Wealthsimple Invest—promoting financial literacy as part of this agenda. With respect to each app's operating model, while both rely on fees, their contrasting corporate structures may explain why they apply their model somewhat differently. Lastly, when it comes to user governance, the apps regulate behaviour

through the mobilization of formalistic documents and a lack of affordances that would allow for any kind of appropriation.

3.1.1. Vision: The democratization of finance

Both apps share considerable similarities in terms of their vision. Both are advertised to middle-income people who are interested in managing their money responsibly but have little to no knowledge about personal investing. In line with this target market, both apps can be contextualized as part of the democratization of finance, a facet of the financialization of everyday life, as they seek to appeal to those who have been previously excluded from financial services and advertise themselves as a convenient and accessible way to begin planning for the financial future. This is demonstrated, for example, by CI Direct's claim that its app provides "Investing for the 100%: Whether you've got $1,000 or $1 million, we make accessing professionally managed investments and financial advice ridiculously easy." (CI Direct Investing, n.d.-a). Wealthsimple, meanwhile, explicitly frames itself as a democratizing force, arguing that they "want to democratize wealth by giving the financial tools of the rich to everyone" (Wealthsimple, n.d.-a). While this vision positions robo-advisory as inclusive and accessible, it should be noted that users of robo-advisors in fact tend to be wealthy and financially literate (Jung et al., 2018) and confidence using digital tools will be a factor determining whether someone can realistically take advantage of robo-advisory (Tan, 2020). Nonetheless, both Wealthsimple and CI Direct promote a vision of themselves as being accessible to those with little experience or capital.

Wealthsimple also positions itself as a force for the democratization of financial *knowledge.* While both companies produce material designed to help non-experts manage their finances, CI Direct's material consists mainly of factual explanatory pieces or web-based calculator tools. In contrast, Wealthsimple regularly publishes educational articles through its online magazine and has a Youtube playlist with short videos about the stock market, hosted by actor Nicholas Braun, called a "masterclass". The series is described as a "totally jargon-free investing course [that] will turn you into a financial genius in less than 45 minutes" (Wealthsimple, n.d.-b). Articles from Wealthsimple range from instructional pieces on staying calm during market downturns (Wealthsimple, 2021a) to explanatory texts about inflation (Wealthsimple, 2021b).

Wealthsimple's focus on building financial literacy while encouraging passive investing, although a seeming contradiction, is in fact logical. While Adam Hayes (2019, p. 14) notes that robo-advisory users must be outsourced from investing decisions and Gordon Kuo Siong Tan (2020) has argued that robo-advisory use minimizes opportunities to build literacy, Rouven Litterscheidt and David Streich (2020) have found that investors are more likely to adhere to passivity if they understand the principles on which a robo-advisor is based. In this sense, the making-passive of a user can be aided by the incitement to understand the reasoning behind a robo-advisor. This logic is reflected in Wealthsimple's content. For example, the company has produced pieces on avoiding emotional or gut reactions to market behaviour (Wealthsimple, 2018b) and explaining the market's short-term unpredictability (Wealthsimple, 2018a). The conclusion in such content always reinforces passive investing. Thus, the sharing of articles and instructional pieces means that not only can finance itself be democratized, but so can financial *knowledge*—so long as it supports the robo-advisor's investment philosophy.

3.1.2. Operating model: Client attraction and retention

Both apps have relatively simple operating models, generating income based on fees from users' accounts (calculated as a percentage of a user's portfolio value) and they incentivize transferring existing accounts onto their platform and making deposits. Both apps provide reimbursements for fees charged by a user's other financial institution when they move to the robo-advisor. For CI Direct Investing, this is a maximum reimbursement of $150 when at least $25,000 is transferred. Meanwhile, in Wealthsimple Invest, there is no explicit maximum reimbursement if a user is moving at least $5,000 to the platform. Wealthsimple Invest goes a step further than CI Direct Investing by implementing a rewards system that discounts users' management fees for a certain portion of their portfolio. When a user moves at least $5,000 to Wealthsimple Invest or invites others to move to the platform through a custom referral link, they will have $10,000 managed for free for 12 months. Additionally, a user gets $1,000 managed for free when they turn on automatic deposits from their bank account.

While both robo-advisors clearly need the income that account fees provide, and therefore are motivated to attract new accounts as well as additional funding for existing accounts, Wealthsimple's rewards structure may be a response to concerns about

sustainability within the field of robo-advisory. Since robo-advisors often target younger and nonelite users, some argue that they run the risk of being unable to secure sufficient capital to survive, as mentioned in chapter 1. Therefore, robo-advisors must attract a larger number of users and they must emphasize retention of these users as they (hopefully) earn and invest more when advancing in their careers (Sander, 2021, p. 268; Schwinn & Teo, 2018, p. 489). CI Direct Investing could be partially insulated from this vulnerability because it is a branch of a more traditional financial services firm (CI Financial) that may be able to pass on loyal customers. Meanwhile, Wealthsimple is part of Power Corporation, a holding company with a multitude of other financial firms but none that have a direct relationship to Wealthsimple. This potential weakness may be catching up with the company as it has shuttered operations in the US and the UK and is now only available in Canada (where it was originally launched) (Hinchliffe, 2021; O'Hara, 2021). In contrast, CI Financial has recently reported significant growth and profits (CI Financial, 2021). Overall, then, while both companies share similar business models, their positioning in a corporate hierarchy may be part of their different approaches to client attraction and retention.

3.1.3. Governance: Enforcing passivity

Each app governs, to some extent, how users behave on the app and what they can do within it, both through formalities and a lack of affordances. Users are governed primarily through the registration process where certain regulatory measures are enforced. For example, during registration users must provide several pieces of personal data that ensure they are legally allowed to use the app, including indicating the jurisdiction in which they live, their citizenship, providing their social insurance number (SIN), and even providing a form of valid government ID if requested. As well, both apps require users to attest that they are not a politically exposed person susceptible to bribery or an employee of an IIROC (Investment Industry Regulatory Organization of Canada) member firm, and do not own 10% of a traded company. These are much more significant barriers to entry than for many other mobile apps and these measures ensure that only certain individuals can download and use the app—contrary to their claim of being tools 'for the 100%' (CI Direct Investing, n.d.-a). During the registration process, apps tuck formalities such as disclaimers and policies away from direct view by using links that need not be opened to maintain their image as quick and convenient. Yet,

while these are glossed over as much as possible, their very presence hints at the formalistic infrastructure at work.

Within the app, only certain activities (such as checking on portfolio value, transferring funds, and examining holdings) are permitted, and there is no way to appropriate the app for alternative uses. This is especially true on the mobile version where some options—such as closing an account, in the case of CI Direct Investing, or changing one's risk level beyond a certain threshold, in the case of Wealthsimple Invest—are simply unavailable and users are instructed to use the web app for these purposes. Users can look at and sometimes interact with many items through the app interface, but agency is almost completely reduced. These forms of governance serve to reinforce the notion that robo-advisors are built for passivity. At the same time, however, the formalistic governance mechanisms conflict with the apps' branding as convenient, fast, and democratic tools for investing as regulatory requirements inherently prevent them from being as casual and accessible as their vision makes them out to be.

Overall, the environment of expected use provides context for each app, outlining the ways that each app brands itself, generates income, and restricts user activities. In the case of robo-advisors, there are contradictions among these different aspects: for example, their branding as democratic tools and simultaneously, the regulatory standards by which they must abide. Although features of the environment of expected use do not necessarily determine how users take up the apps, it nonetheless highlights certain details that will be helpful in considering the principles about investing that are promoted by each app, to be explored in the next section.

3.2. Principles of investing

Robo-advisors promote three main principles of investing that will be explored in this section: a focus on the long-term, risk management through diversification and asset allocation, and an emphasis on deposits. These principles are illustrated through online materials that sometimes express them explicitly, as well as graphics, affordances (or the lack thereof), and data visualizations in each app. While the principles explored here are present in both CI Direct Investing and Wealthsimple Invest, they are often more pronounced through Wealthsimple Invest, partly because that company has more online content and the app provides more graphs and charts for a user to interact with.

Before addressing each of these individual principles, it is important to note that they are undergirded by a broader philosophy that specifies how markets operate in general, briefly touched on in chapter 1. According to this philosophy, markets (at least in the Western, liberal, democratic context) are assumed to rise over time. This means that stock indices tracking aggregate value in the market will tend to increase, even when adjusting for inflation. This assumption has been true historically, with stock indices growing since inception, and it is critical to passive investing: if the market does not rise over time, then it is not necessarily beneficial to invest in broadly diversified funds over the long-term.

Graphically, rising markets are often expressed through small arrows or simple lines that point upward and to the right, appearing to illustrate a line chart with short-term fluctuations and a clear trend representing growth. The main CI Direct Investing web page has several of these types of illustrations throughout (figures 3.1, 3.2) (CI Direct Investing, n.d.-a). The symbol is also present on the CI Direct Investing support page, where a section dedicated to information on their portfolios is represented with an icon of a computer showing such a line (figure 3.3) (CI Direct Investing, n.d.-b). This type of icon also appears in the Wealthsimple Invest app interface to represent the automatic re-investment of dividends that have been paid out (figure 3.4).

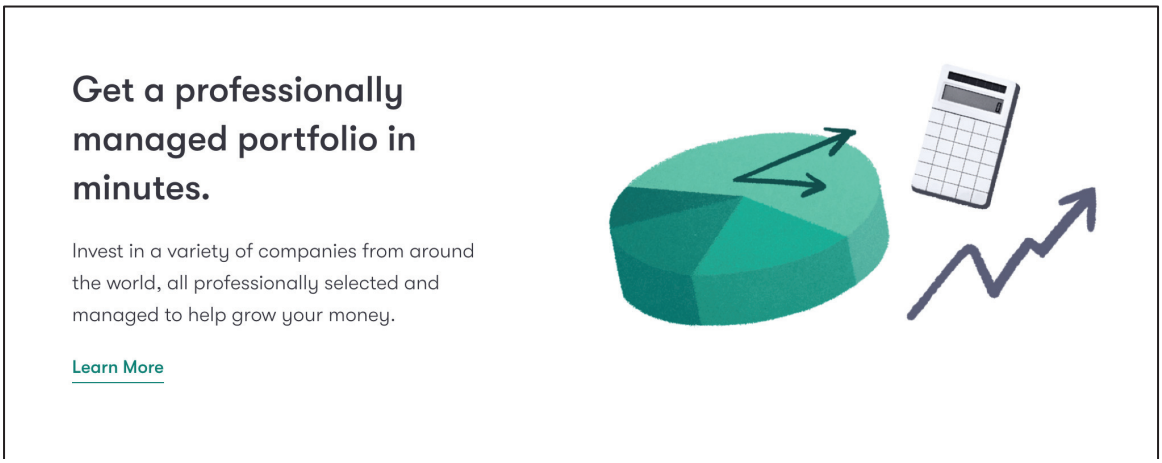

Figure 3.1 Upward-pointing line suggesting growth, from CI Direct website.

Figure 3.2 Upward-trending graph (bottom left corner), from CI Direct website.

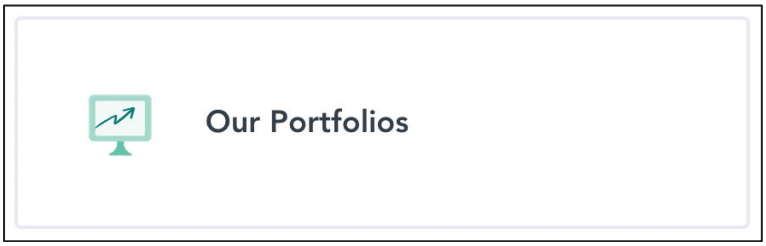

Figure 3.3 Upward-pointing line, from CI Direct help page.

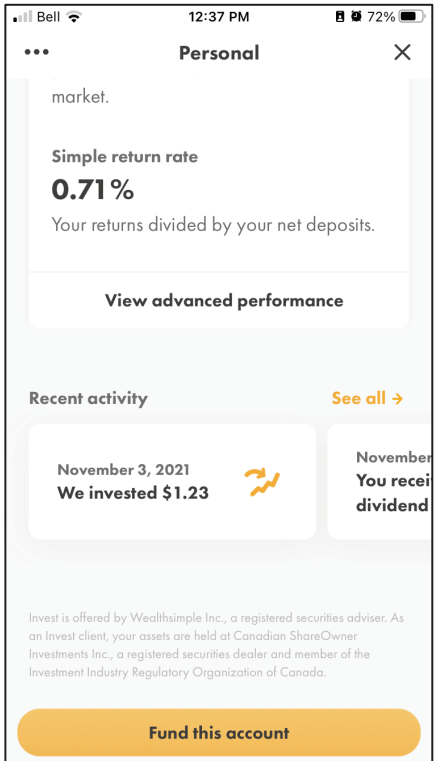

Figure 3.4 Upward-pointing line symbolizing dividend reinvestment, from Wealthsimple Invest mobile app.

Wealthsimple discusses this assumption explicitly in a couple of their magazine articles. For example, they write that "[t]the history of investing looks like a long, smooth, steady ascent" (Wealthsimple, 2018b). Another article explains that "that graph tends to go up and to the right" (Wealthsimple, 2018d), referring to a graph showing the historical performance of equities across the world. Meanwhile, in terms of data visualization, the assumption manifests in graphs that display future-oriented projections where an increase in value is inevitable over the long-term (figure 3.5).

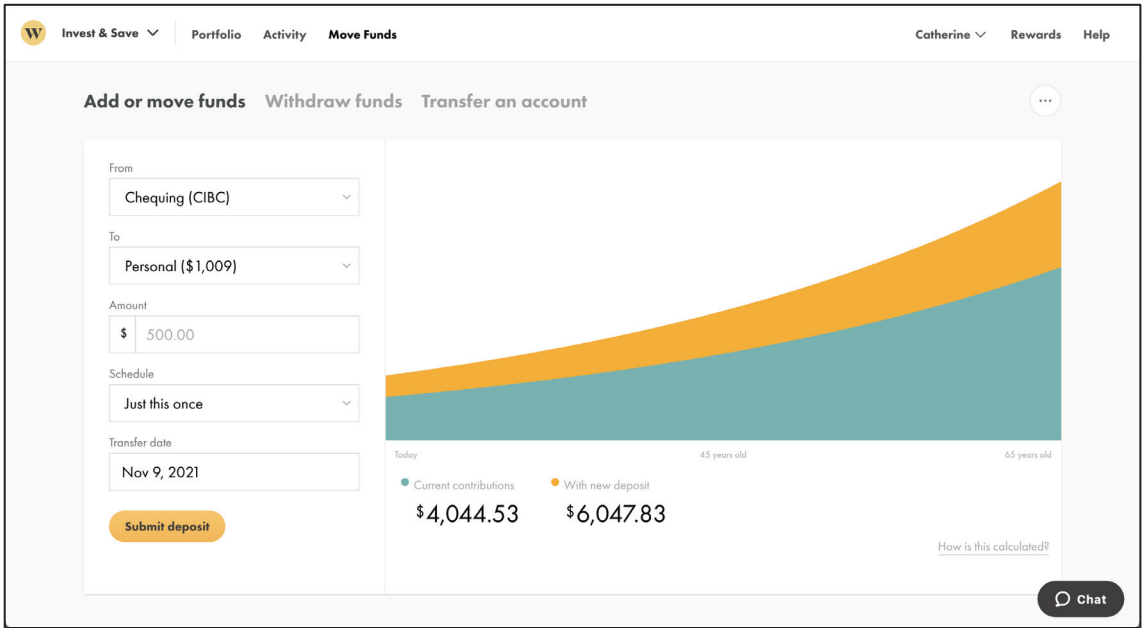

Figure 3.5 Projected future growth, from Wealthsimple Invest web app.

The paradigm of rising markets is not a major focus for either app outside of the few examples shown here, but it is relevant to consider in the context of other principles of investing because it serves as the background material on which such principles are based. Thus, while each principle explored in the remainder of this section may be presented or interpreted as a standalone part of investment philosophy, they can be linked to the underlying premise that the market will rise.

3.2.1. The long-term

Passive investing through robo-advisory is based on a long-term approach. As Wealthsimple notes repeatedly in their online material, investors should stay focused on the long-term and avoid getting distracted by short-term performance (Wealthsimple, 2018b, 2018d). Although the 'long term' is often ill-defined, in this chapter I define it as a period consisting of more than ten years. However, it is important to note that the 'long-term' is not simply a *quantity* of time, but also possesses specific *qualities* that follow from the assumption that markets will rise. From the perspective of rising markets, time is linked to risk: the longer an investor can keep their money in the market, the more risk they can be willing to take on since they will have time to recover from short-term fluctuations. While markets are notoriously volatile in the short-term, the assumption that they will generally follow an upward trend in the long-term supports the idea that markets

are ultimately predictable and rational, which scholars mention is a key part of shifting risk to individuals (Arthur, 2012, p. 96; Maman & Rosenhek, 2020, p. 313). Moreover, the predictability of market trajectories in the long-term helps to reinforce the superiority of passive investing because the amount of time someone can invest is more important than the specific assets in which they are investing.

While short-term market fluctuations can be nerve-wracking, Wealthsimple Invest shares data about such movements that may serve to quell investors' fears. For example, a personalized quarterly report outlining performance for sample portfolios at each risk level contains charts illustrating short-term performance. While engaging in regular use of the app, I received an emailed report detailing a model conservative portfolio's performance. The first chart illustrates the returns per quarter (both positive and negative) since the inception (around 2015) of the portfolio and highlights that 90% of quarters have between approximately -3% and +6% returns (figure 3.6). The second chart is a line graph displaying the performance of a typical conservative portfolio since inception and shows that over that period returns have been 27.8%. The line in the graph, while showing fluctuations, is overall on an upward trend (figure 3.7).

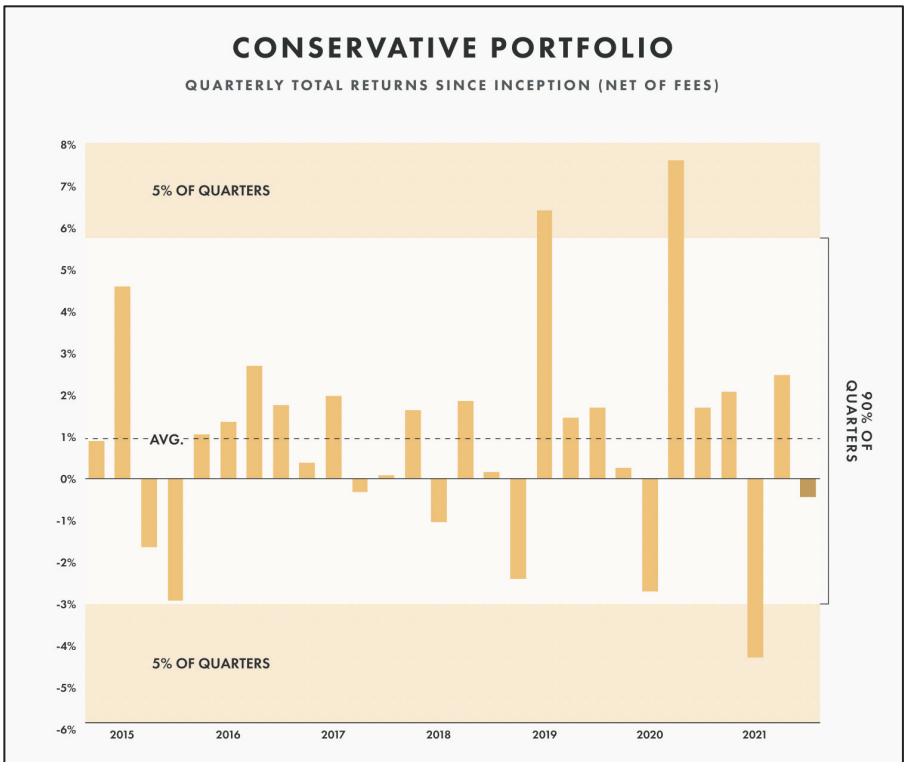

Figure 3.6 Chart from a Wealthsimple Invest quarterly report, emailed to investors.

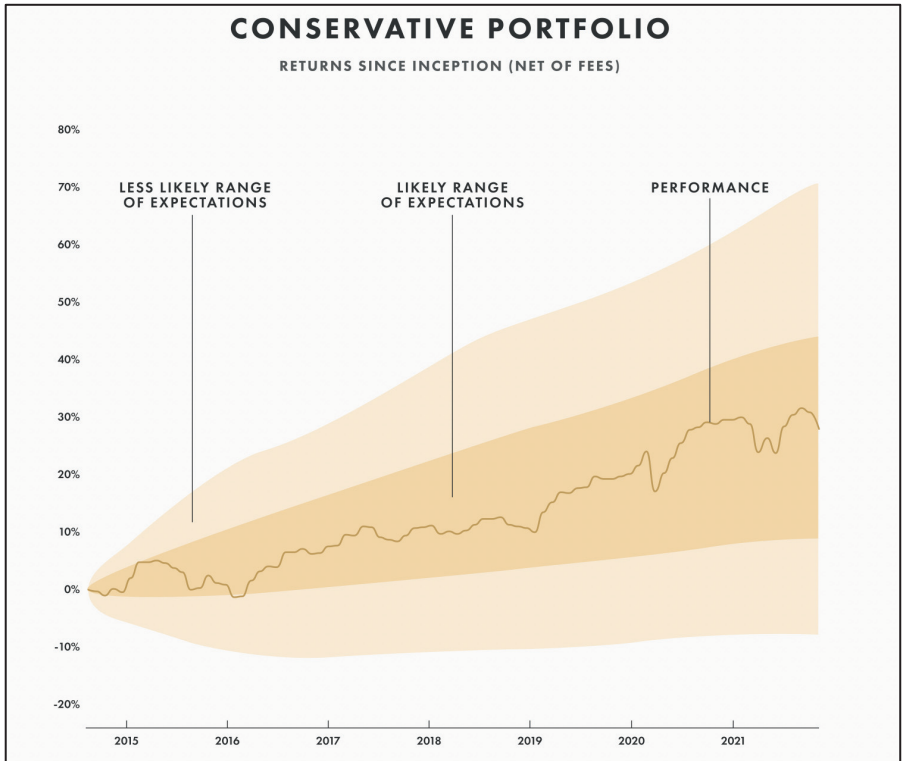

Figure 3.7 Chart from a Wealthsimple Invest quarterly report, emailed to investors.

Contrary to the usual purpose of data visualizations where what is important is visualized (R. L. Hill, 2020), the quarterly report displays visual representations of short-term data specifically to highlight that it is *not* important. In this case, the modelling of short-term data may serve to project a sense of objectivity and expertise, playing to a trust in quantification (Beer, 2016; Porter, 2020) and thereby relieving worries about portfolio performance by reassuring users that current dips are to be expected. Thus, even though returns were negative in the third quarter, as illustrated by the first chart, showing historical data reassures investors that this kind of performance is well within the norm. Moreover, the quarterly report then shifts the focus back to the long-term by reminding investors that the model portfolio has grown consistently.

Time is represented most remarkably in the interfaces of both apps through a chart on the home page that shows the portfolio's performance (figures 3.8, 3.9). The way that this chart is displayed in Wealthsimple Invest, however, conflicts with the principle that the long-term is what matters for passive investors (figure 3.8).

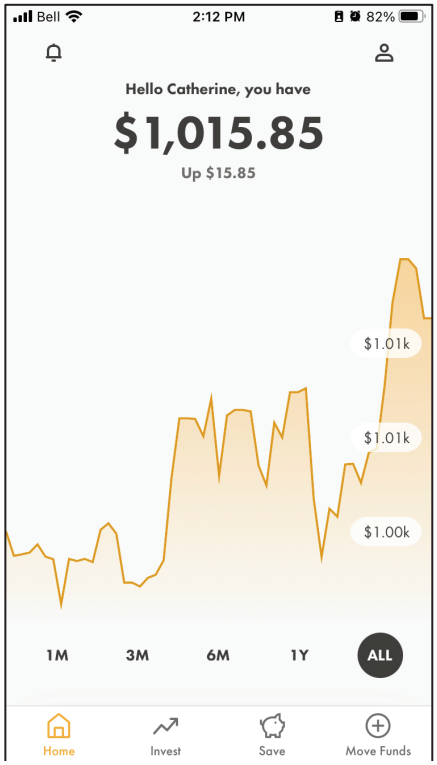

Figure 3.8 Portfolio dashboard on Wealthsimple Invest mobile app.

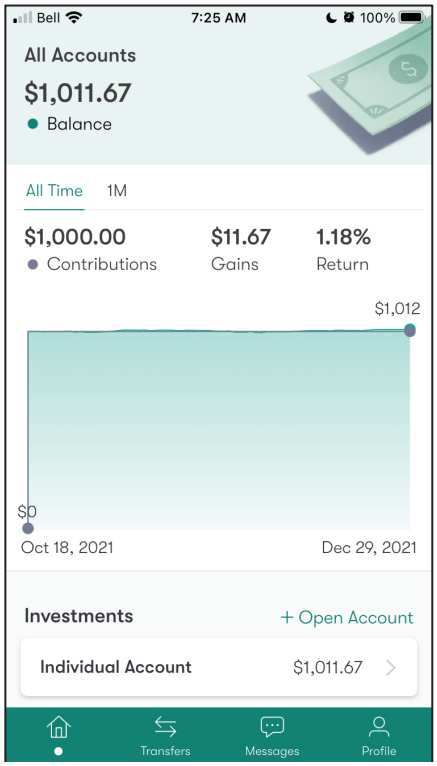

Figure 3.9 Portfolio dashboard on CI Direct Investing mobile app.

In both apps, a user can select what time frame they want to view. The default is the all-time view, where a user will see their portfolio value since it was first invested. When set at this view, the charts in each app contrast significantly. In CI Direct Investing, the Y-axis on the chart spans from $0 to whatever the maximum value of the portfolio has been. In this case, fluctuations appear miniscule if they are visible at all. Paired with the fact that the graph is completely static on mobile devices and its interactivity is limited even in the web app, the chart is boring (unless a user switches to an alternative, shorter time span where fluctuations will appear more noticeably). While potentially a flawed design if viewed from the perspective of aesthetics, this allows the chart to keep users calm as, in the short term, very little will appear to be happening with their portfolio.

In contrast, the chart in Wealthsimple Invest, with a narrower scale, displays any fluctuations as noticeable peaks and valleys even if they only represent a few dollars. There is also more interactivity: if a user moves their finger over the chart, they will be able to see individual portfolio values for each day. Additionally, if a user pulls down on their screen and releases (a familiar affordance used on mobile social media apps), a loading wheel appears, and the current portfolio value will be refreshed. Providing users with this presentation of data as well as the ability to fetch new updates throughout the day contradicts the exhortation to focus only on the long-term.

In both apps, the choice to display portfolio value in the form of a line graph is a potentially problematic one. If fluctuations are clearly visible, as in the case of the Wealthsimple Invest dashboard as well as certain short-term views of the CI Direct Investing dashboard, users may perceive trends and patterns and try to predict future movements, as Rod Duclos (2015) has shown to be a tendency among those examining graphs representing individual stock movements. Although robo-advisors protect portfolios from being micro-managed by users because assets are automatically bought and sold, a user could potentially decide to deposit or withdraw funds based on such forecasts. In the case of the long-term, then, the way that time is presented in the app interface is somewhat contradictory to how robo-advisors—and material that promotes passive investing more generally—present time.

3.2.2. Risk, diversification, and asset allocation

Risk management in passive investing is done through diversification and asset allocation. According to modern portfolio theory (MPT), on which robo-advisors are based, a properly diversified portfolio not only includes a variety of different assets, but more specifically, these assets should be spread across industries and regions, and be responsive to different macroeconomic circumstances (Francis & Kim, 2013). As Jack Clark Francis and Dongcheol Kim (2013, p. 38) explain, assets should be negatively correlated, so that when one asset's value decreases, another increases. Risk is also managed through asset allocation: a certain share of a portfolio will be invested in stocks, which carry more opportunity for growth but also more risk, while another share of a portfolio will be invested in fixed income assets such as government bonds, which provide virtually guaranteed returns but at a fairly modest rate. These two respective shares are often represented as a percentage split: for example, 80% in stocks and 20% in fixed income (which would entail more risk and greater potential returns) or 10% in stocks and 90% in fixed income (which would provide more secure returns for those who are risk-averse). As time passes, this ratio may shift as one type of asset makes gains while others do not. Periodically, then, portfolios must be rebalanced, where various assets are bought or sold to bring the ratio back to its target. Both robo-advisors promote these understandings of risk management through online material and within their apps.

Both apps mention diversification in online material. As CI Direct explains, "the more diversification, the better protected your investments are from dips or swings in a single segment of the market" (Dyck, 2021). Wealthsimple also positions diversification as one of the core pieces of its investment philosophy, explaining that they "don't try to time or predict the market, but instead hold assets that will perform well at different times" (Wealthsimple, n.d.-c). In another piece on diversification from Wealthsimple's magazine, they illustrate the importance of diversification using an analogy of a farmer planting crops. To the reader, it is obvious that a farmer betting only on wheat is taking a risk, while a farmer planting wheat *and* soybeans and ancient millet is probably more protected: "The wheat market stinks? That's OK, maybe the market for soy is fantastic" (Wealthsimple, 2018c).

In the app, diversification is operationalized by investing in exchange-traded funds (ETFs). ETFs are traded individually, but each one can contain many individual

assets. Thus, they allow for broad diversification even if a user holds only a few, and in the case of robo-advisors, investors often hold one ETF per asset class. Graphically, holdings are displayed as percentages or shares of an entire portfolio. The CI Direct Investing web application is especially notable in this respect as it shows a list of holdings next to a pie chart representing them (figure 3.10). Meanwhile, Wealthsimple Invest shows each holding paired with a horizontal bar that represents how much of the portfolio the holding accounts for (figure 3.11).

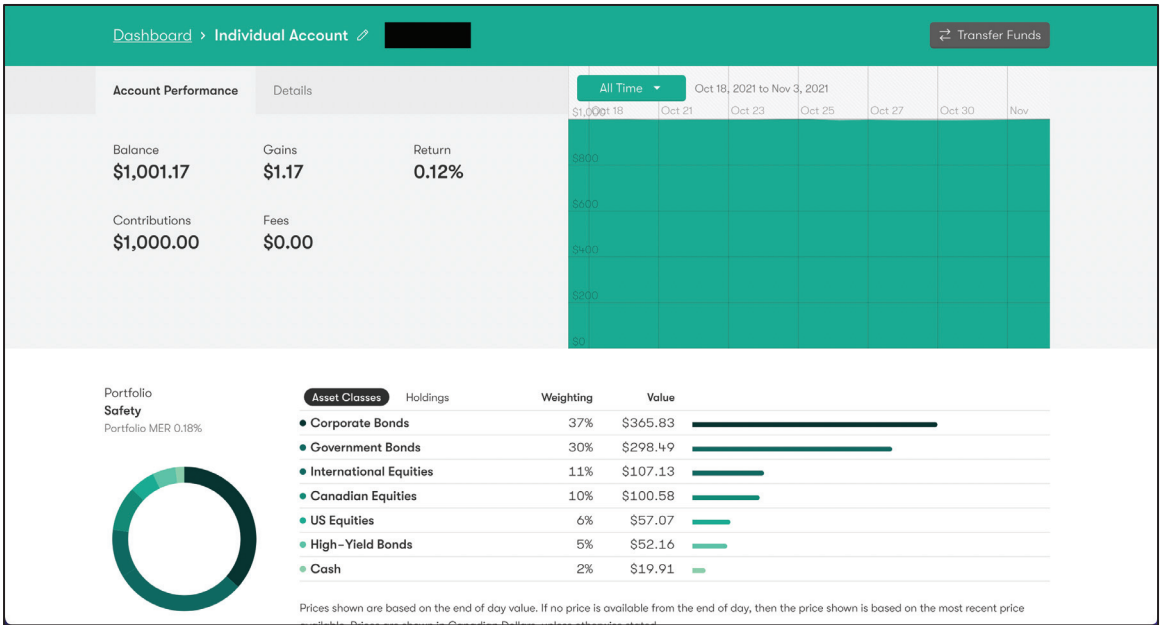

Figure 3.10 Dashboard on CI Direct web app, displaying a pie chart depicting asset class distribution (account number redacted).

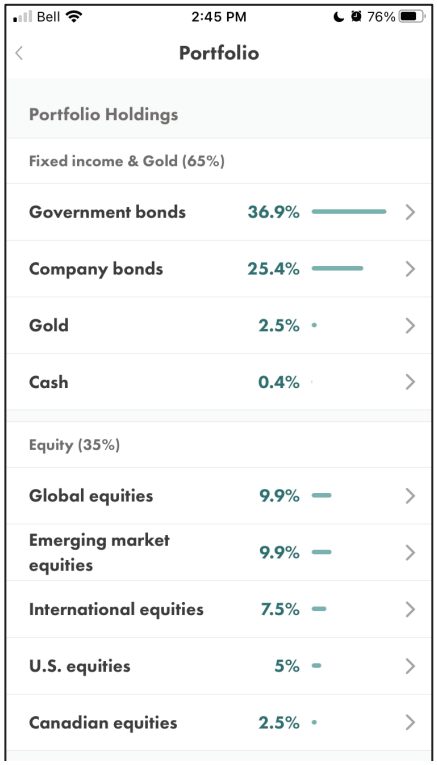

Figure 3.11 Asset class distribution, displayed in Wealthsimple Invest mobile app.

Each app also uses asset allocation to manage risk. When it comes to dividing a portfolio between equities and fixed income assets, risk becomes one side of a trade-off (Maman & Rosenhek, 2020) that must be balanced according to a user's tolerance. Each of these types of assets will provide different levels of risk and reward: equities are riskier, but also provide the potential for higher growth, while fixed income assets are much safer, but will also not generate significant returns. Striking a balance between these is done through the risk assessment that users must complete during the registration process for each app.

In the case of Wealthsimple Invest, users are given two questions as part of this assessment. The first asks for the user's preference in terms of a trade-off between risk and reward. The user is shown a graph which has a positive trend, but the returns in the short and long terms differ depending on the level of risk a user is willing to take on: the more risk, the more potential return (figure 3.12). The second question from Wealthsimple Invest is a hypothetical scenario where a user loses 20% of a $55,000.00 investment. The question asks what the user would do in this situation: add more funds, withdraw some or all of the funds, or do nothing. It is not clear how the answer to this

question factors into the risk assessment, but it is likely that an investor who answered that they would withdraw any of the funds would be put at a lower risk level since robo-advisors discourage withdrawing funds during a downturn. This is premised on the notion that the market will rise over time, as it has historically, and therefore that it is preferable to ride out volatility since withdrawing funds will lock in losses. In the CI Direct Investing app, the risk assessment consists of only one question where risk is a trade-off. The user is asked what they care about most: minimizing risk, maximizing return, or both equally. These three options are presented on one screen and if a user clicks on one, a small pop-up will appear that displays a short blurb describing that level of risk (figure 3.13).

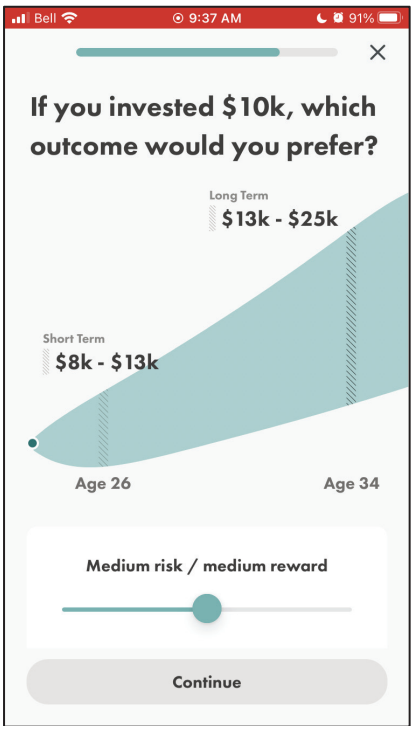

Figure 3.12 Risk and reward presented as a trade-off during the Wealthsimple Invest registration process.

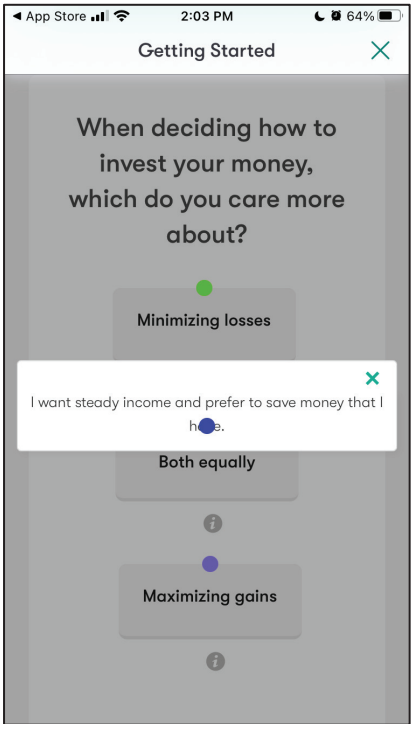

Figure 3.13 Risk and reward presented as a trade-off during the CI Direct Investing registration process.

Each app offers some limited flexibility to change the user's risk level during or after registration. While Wealthsimple Invest gets a user to set up their account with their recommended risk level, users can change this in the mobile app by moving up or down one point (on a 10-point scale). To move their risk level more than this, they must log onto the web app. Meanwhile, CI Direct Investing gives a user complete flexibility during the registration stage to accept or reject their recommendation and move up or down in the risk level. However, after registration, a user must contact a CI Direct Investing advisor to change their risk level. Risk in each app is synonymous with portfolio allocation: the more risk a user takes on, the larger the share of their portfolio dedicated to equities as opposed to fixed income assets. By limiting users' agency in manually selecting or changing their risk level, the apps implement a certain asset allocation and prevent it from being altered on a whim. In this sense, the apps mechanically manifest principles about allocation and risk and the app configuration ensures these are maintained, at least to some extent.

Positioning risk and return as a trade-off, and managing risk through diversification and asset allocation, aligns with mainstream financial assumptions.

Moreover, according to Daviel Maman and Zeev Rosenhek, this allows for risk to become an instrument through which multiple possible futures can simultaneously exist, and yet be managed through considering risk levels (Maman & Rosenhek, 2020). The belief in rising markets further reinforces this since the main unknown factor in any investing scenario—market performance over time—is made known. In this sense, the way that robo-advisors present risk exemplifies scholars' concerns with how markets are presented as predictable: as Maman and Rosenhek put it, "fundamental uncertainty is transformed into knowable risk that can be probabilistically calculated and managed" (2020, p. 306). In contrast, if markets are *not* assumed to rise over time, the promise of a long-term, upward trend disintegrates, and calculable risk devolves into complete uncertainty. Thus, managing risk through diversification and asset allocation not only echoes mainstream financial approaches, but also follows from the larger belief in the inevitable rise of markets.

3.2.3. Deposits and consistency

In the context of robo-advisory where most investing decisions are automated and regulated by an app, deposits are one aspect of investing over which users maintain complete control, and depositing money into their investment account is one of the most important actions a user can take to ensure that their portfolio grows. This principle is reflected by both apps, where accented buttons encourage users to deposit funds (figures 3.14, 3.15) and, in the case of Wealthsimple Invest, data visualizations displaying deposits promote *consistent* deposits. The emphasis on deposits not only follows from the assumption that markets rise over time, where the amount of funding an account receives is one of the only user-controlled variables, but also serves the business models of robo-advisors.

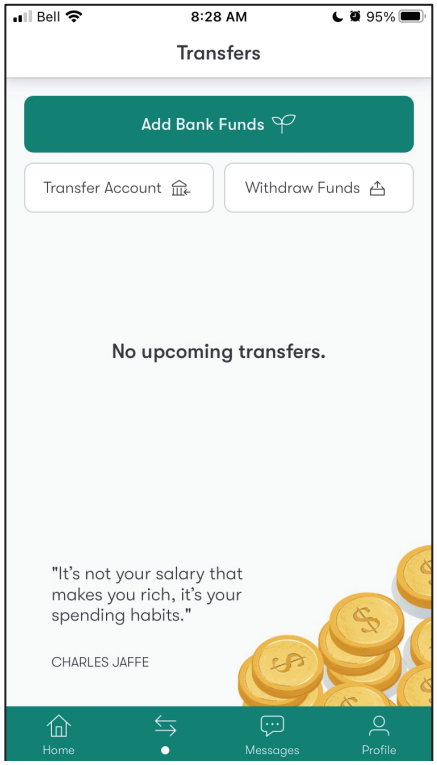

Figure 3.14 A large button to add funds located near the top of the screen in the CI Direct Investing mobile app.

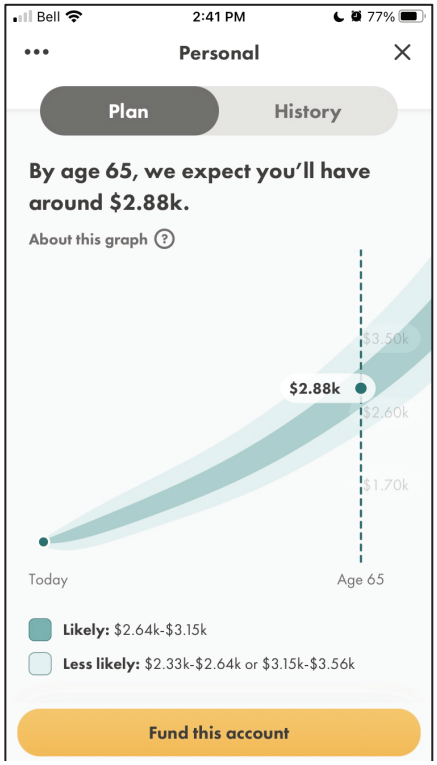

Figure 3.15 A large, floating button to add funds in the Wealthsimple Invest mobile app.

Both apps feature large, accented buttons for deposits. In CI Direct Investing, the button is a large turquoise rectangle labelled with ‘Add Bank Funds’ and accompanied by an icon of a seedling, presumably to represent growth. This button appears at the top of the screen and is twice the size of the two other buttons there for transferring accounts or withdrawing funds (figure 3.14). Meanwhile, in Wealthsimple Invest, the button for deposits is in the section of the app that provides an overview of a user’s account. The button is a bright gold colour and is labelled with ‘Fund this account’. The button floats as the user scrolls up or down the screen and persists regardless of whether they are viewing projected returns or historical performance (figure 3.15). The size and prominent display of both these buttons demonstrates how important deposits are to each app.

Besides buttons that promote deposits in general, Wealthsimple Invest also emphasizes the importance of making consistent deposits using a data visualization. The “Deposit Insights” bar chart shows a user’s deposits over the course of using the app (figures 3.16, 3.17). While total deposits for each month are represented as bars, as months pass the app averages out the deposits per month and the chart displays a

dashed line to mark this average. This averaging is significant because it suggests that the consistency of deposits, and not only their sum, is important. While this may help users who deposit variable amounts each month with the goal of maintaining some average, if a user makes deposits only in large chunks that are frequently spaced out, the graph is not necessarily informative.

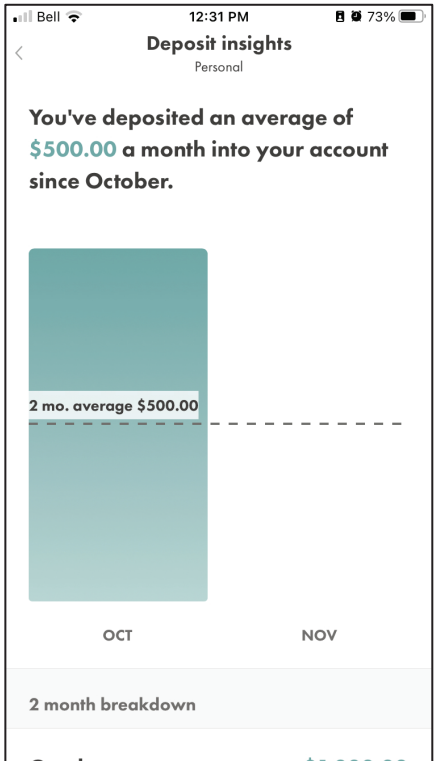

Figure 3.16 Chart from the Wealthsimple Invest mobile app depicting a user's deposits, averaged out.

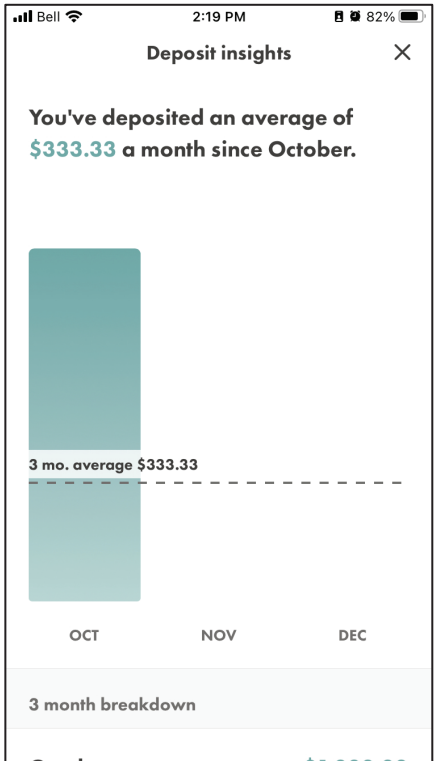

Figure 3.17 Chart from the Wealthsimple Invest mobile app depicting a user's deposits, averaged out.

It is notable that the chart lists deposits in dollars. While this may seem obvious, there are other ways to present this data that could reinforce the importance of making consistent deposits. For example, if Wealthsimple Invest created an option for a user to fill in their biweekly income, it could break down a user's deposits based on a percentage of that. This approach to saving and investing is commonly used outside the app. In its online materials, Wealthsimple (and other online sources addressing saving habits) outline the 50/30/20 rule: spending 50% of one's income on necessities, 30% on discretionary purchases, and 20% on saving or contributing to investments (Hammer, 2020; Whiteside, 2020). Another way to track deposits would be to display them as goals. This method would also reinforce the commonly accepted notion outlined online by Wealthsimple itself that creating a plan and sticking to it over the course of years is crucial to financial planning, even if an investor cannot always deposit huge sums of money (Gustafson, 2022). Tracking a user's deposits—or at least offering a second chart that does so—based on a percentage of their income or pre-determined goals would align with popular financial planning advice.

It is possible that presenting data in this way supports Wealthsimple's operating model. If a user can specify that they are aiming to deposit 20% of their income, or can set a pre-determined goal, then at a certain point each month there may be a time where the user has successfully completed their monthly deposits. Instead, when the chart counts deposits in dollars, users may simply try to deposit as much as possible. This behaviour would manifest the capitalist "desire for more" that Benjamin Grosser highlights: the constant impulse to increase quantified metrics (Grosser, 2014, n.p.). This is highly beneficial for a young company that may face challenges in making ends meet. In this sense, while tracking a user's deposits is sensible in the context of passive investing, the specific way this information is displayed—as dollars rather than percentages or goals—may allow for increased funding to Wealthsimple Invest.

The emphasis on deposits in general highlights how robo-advisors balance passivity with participation. While passive investing relies on the philosophy that most of a portfolio's returns are generated simply through the market's rise over time and therefore, user interference is to be avoided, robo-advisors meanwhile encourage proactivity in the small spaces where user agency is not only allowed, but even required to maximize performance. If the market inevitably rises over time, maximizing deposits is one of the few factors that remains subject to investor participation. Meanwhile, the app's affordances (or lack thereof) prevent users from deciding what assets their deposit will invest in, and they cannot control when exactly the money from the deposit will hit the market. In this context, depositing more money into an account is a specific, narrow action a user can take that will improve their returns in the long run without threatening passivity.

3.3. Conclusion: Investing in the aggregate

This chapter has explored how robo-advisors position themselves within the financial services marketplace and what principles they promote as integral to successful investing. Both apps under examination reinforce the notion that investors should pay attention almost exclusively to the long-term over shorter time horizons, that diversification and asset allocation are key instruments for managing risk, and both encourage consistent deposits into investment accounts. Overall, echoing existing literature, these principles encourage passivity on the part of the user, who is prevented from interfering with their portfolio (Hayes, 2019, 2020; Tan, 2020). Yet, there are some

contradictions to this passive approach when it comes to the app interface, as noted throughout the chapter.

These mainstream principles have broader implications, since they follow from and support a conception of market behaviour wherein markets are assumed to rise over time. Perhaps most obviously, the idea that markets rise over time is a “grand narrative of capitalist progress” (Arthur, 2012, p. 82) that relies on the power of stock indices to model a certain version of the world (Beer, 2016). According to Wealthsimple (2018a), “human progress means markets move up and to the right”. In this view, the stock market is taken as an indicator for all of society rather than considered as a specific financial framework (Haiven, 2014, p. 46), and such faith in the market as a manifestation of wellbeing may serve to support financialization (Palley, 2014, p. 1). This type of argument is unabashedly optimistic and elides the narrowness of stock indices. As Momin Malik notes, quantitative models cannot express meaning in themselves nor give insight about variables—such as an abstract notion of progress—that are not directly measured (Malik, 2020, pp. 7–8). In the field of economics, quantitative models have been contested because they often preclude qualitative economic factors (Keynes, 1939) and mathematical modelling runs the risk of abstracting away relevant complexities (Spiegler, 2015). In other words, while a financial services firm may profit from reading human progress in a positive slope, a stock index is simply a collection of daily or weekly values and cannot imply predictions about the future.

Even if investors do not buy into the narrative that market growth represents an idealistic version of progress, they can still invest financially in it by using exchange-traded funds (ETFs). ETFs, as explained earlier, are traded in the same way and on the same exchanges as individual stocks but can hold hundreds or even thousands of assets. ETFs used in passive investing usually aim to replicate whole markets by tracking popular stock indices such as the Standard & Poor’s 500. In the context of investing using ETFs, the aggregate is more important than individual performance (Tan, 2020, p. 52). This is reflected in robo-advisor apps, where it is somewhat challenging to track down the individual holdings in each ETF through the app, and even the ETF’s prospectus often only includes explicit reference to the top ten assets. Exchange-traded funds (at least those that track whole market indices) allow an individual investor to not only diversify adequately, but further, to invest so broadly that they are able to hold some version of the market in miniature.

ETFs are a valuable innovation in the sense that they enable low-cost, diversified investing, but they also have political stakes. While the breadth of ETFs is one of their key advantages, it also means that personal investing involves buying into a whole host of assets—including ones that many would rather not profit from, such as firms in harmful industries. As robo-advisors have taken advantage of index-tracking ETFs to provide the basis of their portfolios, they contribute to implicating more individuals in such a system. In this sense, individuals using a robo-advisor are not simply investing in the market. They are, more generally, investing in the aggregate, upward trend of the market as express by the stock index, on which the logic of passive investing is based. These political issues and possible ways forward will be explored in more depth in chapter 5.

Chapter 4.

User discourses of robo-advisory

With the proliferation of financial technologies like robo-advisors and self-directed mobile trading platforms, users of such tools have taken to online forums for advice and discussion. In doing so, they participate in debate and dialogue about a variety of topics ranging from speculative stocks to tax filing. This chapter explores results from the critical discourse analysis undertaken on user-generated online discussions. The method involved collecting and coding discussion threads from Reddit, a popular social media site where users can post anonymously and comment on others' posts. In total, 92 discussion threads were analyzed. This chapter focuses on four themes that arise in user discussion about the robo-advisors under examination and personal finance: risk management, financial literacy and information, behavioural concerns, and the domestication of finance.

The principles of investing explored previously sometimes surface in online discussions, but often as part of other, more dominant topics of conversation. The only principle from the previous chapter that is discussed significantly by users is that of risk management, and in this case, participants express agency around assessing risk tolerance and allocating their portfolio. Users repeat the need to focus on the long-term, ignoring or at least paying less attention to short-term performance. Often, this principle is wielded by defenders of robo-advisors as some enthusiastic participants argue in favour of picking stocks based on performance evaluations over the short-term. Meanwhile, the importance of investing consistently is bound up with the automation that robo-advisors offer: the ability to set up automatic deposits ensures that users can invest consistently and protects against behavioural mistakes. Lastly, the assumption that markets rise over time is rarely repeated explicitly; instead, it is folded into users' justifications for taking on maximum risk, where they assume that any losses will be compensated for by long-term growth. Each of these principles will be highlighted as they arise in the discussion of other, more prominent themes.

Overall, users find significant space to question and debate common assumptions. As this chapter will highlight, participants demonstrate divergent views on

personal finance, and appear not as rational or calculative actors but rather as messy humans with conflicting and sometimes dubious perspectives and opinions. Broadly, user perspectives can fall into two general and sometimes overlapping categories: those that promote the conception of a financial market that can be understood and known given enough time and research, and those that conceive of the market as opaque and complex, where it is often accepted that to take advantage of the market, one must surrender their control to automation. This chapter will explore each of the four main themes mentioned above and conclude by drawing together this contested portrait of the market according to participants, which will be investigated further in chapter 5.

4.1. Risk management

Managing risk is one principle that is a significant focus for both apps as well as users. While robo-advisors can algorithmically operationalize risk management tools like assessments, diversification, and portfolio allocation, risk is much more complex when it comes to user discourses. In line with mainstream conceptions of investing, risk and reward are considered as a trade-off, but one that allows for questioning and uncertainty. While robo-advisors provide users with risk assessments to determine a suitable risk level, it is clear in discussions that the results from these are not taken for granted. Moreover, users sometimes explicitly admit that they take their emotions into account when deciding on risk levels.

Within the framework of the risk-reward trade-off, investors are rewarded for the risks that they take. One user summarizes this fact: “You want to maximize gains, then you need to take risk on”. While simple in theory, conceiving of risk as a trade-off creates room to question what the right risk level is: maximizing gains while minimizing risk is a difficult balance to strike. This is especially complex when investment goals—and therefore timelines—change. For example, one user explains that they had been investing to save a down payment, but considering the housing market in Toronto, they were contemplating giving up that goal, in which case they would be left with investments that had no clear objective. They had written a lengthy post questioning whether, in response to this, their risk level should change, and concluded with a sense of exasperation:

> I'm not really sure why I'm sharing this. Maybe I feel like I'm betraying myself by changing my plan? I think I needed to lay it out in front of me. Is the added risk worth the added potential reward in this portfolio? Am I being dramatic and over-stating the added risk? Am I also over-estimating the added potential reward? How do I even make this assessment properly?

This quote demonstrates the confusion and uncertainty that surrounds risk tolerance, as users are unsure about how exactly these should be assessed. The participant's writing is worth quoting at length as it illustrates the plethora of questions that may be raised about personal finance, none of which necessarily have obvious answers for novice investors. Such uncertainty also illustrates that despite robo-advisors' efforts to make the market predictable, users are still left with difficulties arising from the inherent incompleteness of any estimation of risk and reward.

The solution to navigating the risk-reward trade-off would, presumably, be to use a risk assessment created by a financial institution. Indeed, both CI Direct Investing and Wealthsimple Invest incorporate risk assessments during their registration process, as discussed previously. In addition, risk assessments can be found for free online; many comments that discuss risk refer users to a Vanguard questionnaire designed to assess risk tolerance and recommend the weighting of equities and fixed income assets based on this (Vanguard Investments Canada, 2022). At the same time, however, some users push back against the reliability of risk assessments. For example, one user notes that they always end up opting for a higher risk level than recommended. Thus, while users understand the importance of risk assessments such as those conducted by the apps during registration, these are not taken for granted; rather, some users contest their usefulness and openly admit that they manually select risk levels that are not recommended for them.

When users do take on lower risk, they are sometimes frustrated with the results. Many users express irritation with a lack of portfolio value increases even during periods of market growth because of the weighting that bonds (which are less risky and therefore also bring less significant returns) have in their portfolio. Yet, as one user points out, these complaints may stem from a failure to recognize the potential downsides of risk:

> There's a huge number of investors that have never known a true bear market, just a decade of non stop gains with like a 3 month interruption in March 2020 before the gravy train kicked off again. It's been the longest interval in the S&Ps history since a 10% correction, which is inevitably

> coming. We'll see how people feel about bonds when that (or a true, prolonged crash) happens.

Generally, users seem to be interested in reaping the rewards of risk without thinking about the possible consequences. For example, one user explains why their portfolio is set at the highest risk level on Wealthsimple Invest: “I am kind of greedy. I’m guessing more equity means more risk, but I don’t know […] what is my real risk tolerance”. Such a conception of risk is supported by the assumption that markets will rise over time, always bouncing back from any downturns. One user expresses this clearly, saying that they are fine with “a big crash because I would just put more money in rather then [*sic*] take it out because eventually it will recover and I’ll have even more money”. In this sense, in the context of rising markets and financialization more broadly, risk is reframed as an opportunity rather than a threat (Lai, 2016; Langley, 2008; Martin, 2002; Tang & Lee, 2020, p. 538). This opportunistic conception of risk, however, belies the potential losses and the ultimate uncertainty of market performance, as scholars mentioned in chapter 1 point out (Arthur, 2012; Erturk et al., 2007; Maman & Rosenhek, 2020, p. 304; Zokaityte, 2017). Several comments replied to the “greedy” user mentioned above by highlighting that taking on such significant risk could involve a portfolio losing 50% of its value in the short-term and taking years to recover, prompting the poster to reply: “I cannot imagine what it would feel like if one day I opened my account and saw half of my life saving [*sic*] gone […] probably will still give me a heart attack”. In the end, they updated the thread, letting other participants know that they had changed their risk level from a 10 (the maximum) to a 5.

In contrast, some users are *more* cautious than a risk assessment recommends they be. In these cases, users often cite emotions as a reason for taking on less risk. For example, one user expresses doubt about their risk level, noting that while the questionnaire they completed recommended a portfolio made up of 80% equities and 20% fixed income assets, they were considering a lower risk level because they “don’t want any temptation of tinkering with it”. Similarly, while having a longer time horizon should allow for more risk, participants argue that ultimately risk level should hinge on whether someone can handle riding market fluctuations or if it will cause too much stress for them. In these instances, users recognize their limits as humans who cannot be purely logical, unlike an app that is driven by algorithms. Their resignation speaks to the uneven nature of financialized subjectivities, as explored in chapter 1: while the ‘ideal

investor' under financialized capitalism is one who is rational, calculative, and knowledgeable (Hayes, 2020; Langley, 2008; Tang & Lee, 2020), users seem to recognize the impossibility of meeting this standard.

4.2. Literacy, information, and noise

As the case of risk management illustrates, users often have incomplete understandings of finance. Despite this—or perhaps because of it—they often discuss financial literacy and learning. Users have divergent views about this topic. For some, robo-advisory offers an entry point for learning about financial markets, from where they can move towards taking a more self-directed approach. For others, the value in a robo-advisor is its ability to program their investments so that the user need not think about it or make decisions. Conversations about literacy also raise questions about access to financial information and services, especially in the context of a potentially labyrinthine financial industry.

Many users position robo-advisors as convenient tools for learning about finance and a stop on the way to completely self-directing their investments, especially in the case of Wealthsimple Invest. For example, one user writes: "For starting out, I think its [*sic*] great (and keep you safe)". Other users reiterate this, saying that a robo-advisor can be beneficial as "a great starting place" and describe it as a "safety net entry method". While a robo-advisor can be a convenient starting point, users sometimes assume a trajectory where they move onto self-direct trading, as expressed by a post titled: "Eventually one should 'move on' from Wealthsimple Invest… right?". This participant articulates the trajectory from robo-advisory to trading platform that is reiterated by several users, who note, for example, that they now "have a degree of comfort and understanding of investing" and ultimately "out-grew" the robo-advisory platforms. While some users may move from a robo-advisor to more dubious investing practices such as speculative trading, others are simply interested in saving money from the fees robo-advisors charge and they use self-directed platforms to buy all-in-one diversified ETFs.

A small minority of users express their enthusiasm for financial literacy by making normative arguments about society at large, for example contending that financial topics should be taught in schools. One user writes: "The fact that we don't all come out of high

school knowing this stuff is a failure as far as I'm concerned". Other users locate a lack of financial literacy as an individual problem: as one participant states, "We can't even get people to spend less then [*sic*] you earn!". Such arguments about financial literacy reflect concerns articulated by critical scholars: invoking a lack of financial literacy as the barrier to financial wellbeing serves to individualize and de-politicize what is actually a collective problem (Arthur, 2012; Lazarus, 2020; Pettersson & Wettergren, 2020; Zokaityte, 2017). The last quote expresses this especially clearly as they pin blame on individuals for not knowing how to spend less than they earn, which is the first step to being able to save money in the long-term. This user positions the balancing act of saving and spending as a trivial affair that could be accomplished if only people were more educated. Yet, it is also crucial to note that often, such arguments are simply ignored by others or even pushed back against. One participant, in fact, uses sarcasm to deflect individualizing critiques: "Ya**!** We should teach index investing in junior high! Sponsored by ishares".

Financial literacy does not only involve learning about substantive matters. Many posts and comments reflect the need to learn more about aspects of investing such as what type of account to open according to different needs, how to transfer funds without triggering taxable events, or which robo-advisors and brokers will work with Canadians living abroad. In these cases, users are not researching finance itself but rather learning how to navigate the bureaucratic and legal systems that surround the financial services industry. These kinds of logistical complexities may contribute to making personal finance difficult for ordinary individuals and thus contribute to the impossibility of an authentic democratization of finance (Erturk et al., 2007).

Participation in online discussion forums, despite the recognition from some users that such environments may not be suitable for accessing trustworthy advice, suggests that the platform is currently filling the gap when it comes to information and guidance that may be lacking elsewhere. While individuals can hire financial planners to help them (and some participants refer to these services), scholars have documented an erosion of trust in the financial industry at large since 2008 (Bhat & Goklany, 2018; Gupta & Tham, 2018, p. 329; Scholz & Tertilt, 2021, p. 7; Schwinn & Teo, 2018, p. 483; Xing et al., 2019, p. 115). In the case of financial planning specifically, users—especially those with limited financial literacy—may be justified in their reluctance to seek out experts. Financial advisors who are simultaneously salespeople (as many are) tend to

give better advice to those already possessing strong literacy (Calcagno & Monticone, 2015). Instead of seeking out professionals who may not be trusted, knowledgeable Reddit users seem to be taking on roles as 'warm experts' (Lehtonen, 2003) for those who are confused and lost. Previously, Turo-Kimmo Lehtonen (2003) conceived of such contacts as family and friends who were more familiar with new technological devices; in the current context, it seems that robo-advisors are one such device where help is needed to ease adoption and decision-making, and strangers on the internet who are active in shared virtual communities are trusted to provide this guidance.

On the other hand, there is another undercurrent present in user discussions that suggests a *saturation* of information, including on online forums, is the problem. As one user puts it:

> […] in a world where people have bank salespeople pushing crap on them, family at christmas dinner banging on tediously about crypto, every other person you talk to being a stock market expert because they've had a brokerage account for 18 months and you should buy whatever too and so forth ... seems like a robo is not the worst decision in the world.

Reddit can contribute to information overload. Another user in the same thread writes that "if you are not comfortable doing that [deciding what ETF to buy and how to rebalance a portfolio] and ask that question here, you get 200 different scenarios, only to confuse you more". This participant points out that relying on Reddit for advice may increase the confusion around managing personal finance.

In this context, robo-advisors are valuable precisely because they allow users *not* to build literacy, instead helping individuals tune out the noise. This message, in fact, is expressed clearly in a Super Bowl ad by Wealthsimple, where the main character is constantly bombarded with various quips about the stock market and planning for the future (Wealthsimple, 2017). Individuals are often aware that personal investing is necessary to meet major life events, since government-provided benefits are unlikely to cover such expenses (Haiven, 2014; Tang & Lee, 2020)—yet making decisions about how exactly to go about this is difficult, and so robo-advisors offer a way to do *something* beneficial without having to make choices. In other words, as one user says, "All the questions/doubts you have is why you pay the .4% fee".

These conflicting perspectives on literacy and learning in the context of robo-advisory raise tensions with existing literature. On the one hand, the fact that participants often view robo-advisors as a playground for gaining knowledge diverges with Tan's (2020) claim that robo-advisors remove the need to build literacy and scholarship that suggests users are passive (Hayes, 2019). On the other hand, the passivity that apps offer, as a means to side-step information overload, reinforces points from literature on robo-advisory while highlighting once again the contingent way that subjectivity is developed under financialization. Users who take up robo-advisory to avoid learning about finance seem to be embodying a contrary subjectivity to that which scholars associate with financialization involving self-reliance and entrepreneurialism (Aitken, 2007; Lai, 2016, 2018; Martin, 2002; Pellandini-Simányi, 2021, p. 280; van der Zwan, 2014). As with the other themes explored in this chapter, there is a diversity of perspectives among users: for some, robo-advisors are valuable because they allow for a safety net while learning, and for others, the value is in the ability to not learn anything.

4.3. Behavioural concerns

User discussions also demonstrate contention when it comes to behaviour. Robo-advisory is premised on the superiority of passive approaches compared to actively managed investments, as discussed earlier. In this case, passivity is crucial to ensuring satisfactory portfolio performance. Most users in online forums buy into this approach and understand that the convenience robo-advisors offer can help to keep investors on track. However, there is also room for misunderstanding and disagreement when it comes to questionable tactics like timing the market and picking stocks. These cases illustrate that while robo-advisors may help to prevent troubling behaviours, users still express agency and the philosophies on which robo-advisors are premised are not accepted unconditionally.

In debates about whether to use a robo-advisor or invest in broad ETFs on a self-directed platform to save on fees, one of the advantages to robo-advisory often mentioned is the aspect of full automation. In this case, robo-advisors may articulate mainstream assumptions about investing that one could find elsewhere—for example, on blogs or through YouTube videos—but it is the instantiation of these principles in an app that makes using a robo-advisor helpful. This is not just a matter of convenience: the automation available in robo-advisory, along with the straightforward nature of such apps

where no subversive behaviour is possible, safeguard against investors' impulses. For example, if a self-directed investor cannot handle market volatility, they may try to adjust their portfolio based on short-term trends and predictions. One user explains that:

> In the long run, most portfolios that fail to achieve their full potential are due to excessive tinkering and emotional trading. One of the benefits of Wealthsimple Invest is that there is very little that you can do to self-sabotage yourself when things start to go sideways in the market.

If an investor starts making active trades, the "savings [they] might make on lowered fees can be instantly wiped out". In this case, while saving on fees is tempting, it is also a choice that investors must make carefully: unless they are certain they can withstand volatility and continue to hold their positions regardless of short-term performance, they may end up saving money—not to mention stress—in the long run by using a robo-advisor.

As discussed earlier, some users express a sense of information overload when it comes to stock markets, and this can also play a role in allowing investors to fall off track. Questionable financial advice found on social media—including Reddit—or given by friends or family can be risky if acted on. Some users say that they experience fear-of-missing-out ('FOMO') when they tune into popular discourses about the market that encourage them to tinker with their portfolio and often end up regretting it. After expressing such a regret, one user, for example, writes: "[…] this week I'm STICKING TO THE DAMN PLAN (yelling at myself)". Even investors with the best of intentions may end up slipping, as some users point out that there seems to be a pattern among those who spend time reading about and researching markets where investors go from safer to riskier investment strategies:

> […] this trend needs to be discussed more, how you go from investing newb, to "ETF portfolios aren't hard--I can do it myself," to "I'm just going to invest in the big-winning stocks from the ETF," to "100% crypto and meme stocks = diamond hands!

A self-directed investor will need to log into their trading app, see their balance, and go through an order screen to buy more investments, and this process provides plenty of opportunities to change their plan even if the original intention is to invest in passive ETFs. As one user explains, "it's a matter of typing "GME" [the ticker symbol for GameStop Corporation, a speculative stock] instead of "VGRO" [a popular, all-in-one,

diversified ETF]". While some self-directed trading platforms now offer certain automated features so that an investor only needs to log in and click one button to buy more assets, one user maintains that "the buy button […] seems a little daunting to me". In contrast, someone using a robo-advisor can set up automatic deposits from their bank account, which will be invested within a few days, removing the need to check in on their portfolio at all. One user describes this level of automation as "the peace of mind of never having to see your balance". Moreover, automatic deposits are praised by some users as a way to achieve the consistency beneficial for investing without any effort, echoing the emphasis on consistency that is promoted within the app. As one user writes, "[…] that money goes out every fortnight without fail, giving me consistency which is one of the most important things in investing".

Despite the protections that robo-advisors offer, investors continue to engage in risky behaviour, accidentally and on purpose. For instance, some posts and comments express confusion around 'timing the market', a practice where an investor tries to predict when a market dip or rally is going to occur, and then time their buying and selling accordingly. Although this strategy is unreliable, some users do not seem to understand what 'timing the market' is and may end up doing it in practice: one user writes that they are not timing the market but instead are going to try to "withdraw [their] positions in some way when there is a dip starting and then rebuy again later". Several comments correctly point out that this is "the very definition of timing the market".

Stock-picking is another investment strategy that is unavailable through robo-advisory but possible using self-directed platforms. While almost no participants suggest that stock-picking should be the dominant approach to investing, some users claim that certain hand-picked stocks (like cryptocurrencies, blue chip, or tech stocks) can make up part of a broader portfolio. Other users explain that they have compared their stock-picked portfolios to passive investments and decided to move to stock-picking altogether because their performance was better. One user tells their story:

> I've had invest at the highest risk (level 10) set and made 5.5% in 4 months (mar2021-jul2021) but I was also picking stocks in my trade and comparing the two (not trying to compare high growth stocks to etfs I was more seeing if my stock picking is better), eventually I was double up my invest account so I decided to put everything into trade.

Unsurprisingly, narratives such as this get a lot of pushback from others who point out that making comparisons over such short time frames is useless when robo-advisors are designed for long-term investing. As one user writes: “Be patient with long term money”. Additionally, some participants argue that while hand-picked portfolios might see gains in a bull market, they will likely decline in value more severely during a downtown compared to a properly diversified portfolio. Warning other investors about the risks of making decisions based on short-term data during periods of market growth, one user notes that there are “lots of dudes in here getting cocky in a bull run”. Comments such as these emphasize the importance of focusing on the long-term, rather than getting carried away by short-term trends. Thus, these cautious participants echo a key principle of investing according to robo-advisors: long-term data is what matters.

Other users accept that investing in a diversified portfolio is likely the best option for most people, but maintain that some investors are better off picking stocks:

> 98 percent of people should follow extreme diversification and their efforts should be on disciplined and consistent saving in a diversified, balanced portfolio over time. 2 percent should follow extreme concentration and their efforts should be on security analysis, very little trading, and going all in in big winners when they see them. Some people are just good at picking stocks. They have the analytical skills and the vast economic knowledge base to make that work. Basically people who live and breathe market news and like to study individual companies. Their focus should be on trading up their bankroll because 99% of their money after 10 years or so is going to be growth, not contributions. If you go to bed thinking about stocks, you might be in the 2 percent, otherwise you're not.

By arguing that some people have “the analytical skills and the vast economic knowledge base” to successfully pick stocks, especially those who “breathe market news and like to study individual companies”, this comment suggests that stock-picking should be based on fundamental analysis, a specific financial method. Another comment from a user (who says that they are 100% invested in Suncor) references this approach explicitly: “It's not that hard on fundamental analysis to find 3 or 4 stocks that will do 50% on an improved earnings outlook and well within a year, and that's good enough for me”.

According to proponents of fundamental analysis, market prices are determined by various factors affecting a company’s behaviour and accounting (Schinckus, 2018, pp. 10–11). From this perspective, picking stocks may be sensible as—theoretically—investors can study the company to understand whether their stock will be a winner or a

loser. Importantly, however, this approach is contentious. As Christophe Schinckus (2018, p. 11) highlights, there is debate about what specific factors matter in analyzing performance, criticism that this approach predicts future value by relying on past events in the company, and that it does not take account of how emotions and speculation shape market behaviour. Additionally, within a framework based on the efficient market hypothesis, fundamental analysis is unreliable because it is assumed that existing prices already "summarize all publicly known information" (Burton & Shah, 2013, p. 6). In this context, it is worthless to look beyond the price of an equity to determine its underlying value.

Overall, users participate in questionable behaviour despite the premise that passive, diversified investing is the most reliable way to build wealth. Discussions that revolve around debate and disagreement about approaches to investing highlight that, while robo-advisors are able to algorithmically program financial principles and thus allow for investor rationality (Hayes, 2020), users are not purely calculative and still engage in or advocate for dubious strategies, whether out of confusion or because they believe that there are exceptions to the rules. From this perspective, robo-advisors do not necessarily restrict user agency altogether; participants still find room to question personal investing strategies and, when a robo-advisor does not allow them to engage in certain behaviour, they may transition to a more open platform.

4.4. The 'domestication of finance'

A final major theme that arises in user discussions is that of relationships and care for family. Reflecting existing scholarship, user discourses suggest that personal finance is integrated into daily life in line with existing relationships and values (Lai, 2017; Pellandini-Simányi et al., 2015). Users often discuss helping family such as parents or children, and in these contexts personal finance is often used defensively rather than with the goal of getting rich. Such discussions demonstrate that users are not purely rational; rather, they adopt personal investing on their own terms and subject to their own values.

Many posts are written by those seeking to help parents with financial planning. One user, for example, explains that their "father, a hard working blue collar man, asked for advice regarding his investments as he nears retirement". Another user expresses

concern: “I don’t want my parents to worry or stress anymore”. One user also demonstrates mixed emotions of pride and regret as they explain that their parents came to Canada as refugees and have “done well with what they had but I wish I was more financially literate myself so I could’ve helped them earlier”. Sometimes, assisting older family members with personal finances raises questions of futurity and planning. In one thread, two users get into a debate about Canadian life expectancy statistics when someone remarks that since their mother is in her 70s, her investing timeline is short, while another user counters this by pointing out that could live for another 20 years (or more). The original poster comments: “I'm certainly hopeful my mom lives to 90+ but the reality is that things happen” and “I can't plan for her to live into her late 90's, I can only hope that”. Meanwhile, a commenter argues that “the odds of living into her 90s should be part of the plan because for some “the worst” is depleting their savings a decade too early”.

Posts and comments such as those highlighted above not only suggest that users admire and respect their family members, but also that investing in this context is not about getting rich or beating the market. Instead, echoing findings from Lai (2017) and Tang and Lee (2020), investing is taken up in a defensive manner, to provide for basic needs and hopefully create a sense of security, especially as parents move into the next stage of their life. Furthermore, the debate about life expectancy demonstrates how conversations about financial management are fraught with uncomfortable concerns about futurity, health, and age. The case reflects findings from Hungarian mortgage holders where personal financial issues force individuals to reconsider temporality in the context of financial responsibilities (Pellandini-Simányi et al., 2015). In this instance, while having a parent survive into old age is often hoped for, it is also accompanied by serious financial concerns about the potential mismatch of money and time. Conversations such as these also, of course, highlight the injustices of neoliberalism and financialization where individuals are made responsible for their own wellbeing in the wake of the welfare state’s exit.

In response to posts about family members, many users caution against getting involved. Often, users recommend that unless the family members specifically asked for help from the individual posting, they stay out of it. Others suggest that they assist their family in finding an appropriate financial advisor and then step back, because if the poster takes on a more active role in managing the finances while performance

deteriorates, it could “sour your relationship”. Some users have, themselves, resigned to being bystanders in their family’s financial planning, especially when the stakes are lower because their family members have more financial stability. As one user writes, “they could be spending less in management fees but at the end of the day it’s their money and they’ll be fine”. In these cases, participants recognize the power of financial issues to alter, and potential destroy, relationships (Pellandini-Simányi et al., 2015) and their response is to stay clear of such problems.

Overall, conversations about family members show that, as Lai explains, “relationships and social expectations domesticate finance by embedding it into the concerns of everyday life” (Lai, 2017, p. 920). Rather than impose their own logics onto an individual’s life, financial products such as robo-advisors and other means of personal investing are often taken up and configured in line with pre-existing values and relationships (Pellandini-Simányi et al., 2015). Thus, while the financialization of everyday life may indeed integrate ordinary people into financial markets more widely, these types of conversations, along with those of emotional risk management and informational overload as noted earlier, suggest that this is an uneven process and does not necessarily transform subjectivities in line with rationality and calculative qualities (Hayes, 2020; Lai, 2017; Maman & Rosenhek, 2020; Pellandini-Simányi, 2021). Of course, it should be noted that the domestication of finance is ultimately a response to a withdrawn welfare state where risk and responsibility is downloaded unfairly onto individuals, and even if significant transformations in subjectivity do not take place, this is still an unjust situation.

4.5. Conclusion: What is a market?

This chapter has outlined the themes that arise in user discussions of robo-finance. While users repeat principles of investing that are promoted by robo-advisors, their concerns go beyond these, and they approach investing with doubts and debates about what practices are most beneficial. This contrasts with the view of personal investing gleaned from the apps, where certain principles are baked into their infrastructure and there is little room for users to express agency. Moreover, these findings complicate existing literature on passivity in the context of robo-advisors, as the discussions explored here suggest that robo-advisors might also serve as entry points for learning more about finance. Users demonstrate their capacity to question

mainstream principles and, while they are unable to be fully autonomous while using a robo-advisor, they may end up making the decision to move to a self-directed trading platform if they disagree with robo-advisors' approach to personal finance.

Overall, user discourse demonstrates two opposing conceptions of financial markets. On the one hand, some users maintain that markets are knowable and navigable: if an investor is willing to do the research, they will be able to game the system. Such a view is expressed by users who argue in favour of building financial literacy and sometimes stress that hand-picked stocks can play a role in an investment portfolio. While this type of discourse is perhaps common on Reddit and other anonymous forum sites where speculation is popular—as witnessed during the 2021 GameStop affair—it is expressed by a minority of participants in this study. Nonetheless, the presence of speculative discourse that implies that a bit of research is all that's needed is still remarkable. To these users, any investor can make good returns with enough knowledge and tinkering, and they often promote self-directed trading platforms over robo-advisory, although using a robo-advisor may be a suitable introductory step into learning about finance. In some ways, these users' attitudes align with traditional conceptions of financialized subjectivity where individuals must embrace an entrepreneurial spirit (Aitken, 2007; Lai, 2016, 2018; Martin, 2002; Pellandini-Simányi, 2021, p. 280; van der Zwan, 2014), yet, importantly, engaging in self-directed investing as a nonexpert also involves disproportionate risk and potential losses, which conflicts with the image of an ideal investor as rational and disciplined.

Meanwhile, most participants seem to accept that the market is opaque and cannot be beat (or, at least, it is so unlikely to be able to beat it that it is worthless to try). Such users may take emotions into account when gauging risk tolerance, as they understand that they cannot be purely calculative. They also likely favour a passive investing strategy where questionable behaviours are to be avoided. This view is consistent with the approach that robo-advisors take, where the goal is to ride aggregate market growth under the assumption that markets will rise over time. In contrast to users who believe in the market's knowability at the level of specific assets, these users buy into a notion of large-scale and long-term predictability. In this case, robo-advisors can ease the burden of information saturation by allowing an investor to remain passive, and most of the decisions that a user needs to make are logistical in nature. Additionally, investing may be taken up with hesitation and is often used for defensive purposes

rather than with the goal of striking it rich. While the power of the market can be harnessed through ETFs, it is unnecessary—and perhaps not even possible—to fully understand market mechanics.

When it comes to contesting a singular, dominant view of the market, the continued participation of users in online discussions such as those explored in this chapter is a potentially hopeful phenomenon. Although the fact that online forums are now arenas for financial advice is problematic and a sign of a broken financial services industry, it may also indicate that individuals are interested in continuing to question what is accepted as objective truth. Such questioning occurs even in mundane, everyday conversations about topics like opening an investment account for parents or considering one's risk level. In this context, algorithmically programmed finance, in the form of robo-advisory, has not ironed out the world and solidified just one version of what the market is and should be. At the same time, this expression of agency raises ethical quandaries when users refute approaches to investing that research has shown are usually beneficial for lay investors. In these instances, users may be demonstrating autonomy, but they do so at their own peril. The implications of users' energetic engagement—and the possibilities that it may open—will be explored in the following chapter.

Chapter 5.

Discussion and conclusion

This chapter explores the implications of the findings outlined in this thesis. When it comes to robo-advisors themselves, we have seen that they promote mainstream assumptions about how investing should be done, each of which hinge on an imaginary of markets where stock indices represent the world and rise over time. On the user side, chapter 4 explored the contested notions of risk, literacy, and behaviour that arise in online discussions. While passive investing principles were articulated and supported by many participants, others found room for critique and (potentially risky) creativity. This chapter builds from these findings to argue for a politicization of markets where individuals are given access to reliable financial information, the power of stock indices is recognized and debated, and personal investing can be practiced in line with social and environmental priorities.

The chapter begins on the micro scale, outlining the implications of user discussions in chapter 4. User discourse complicates existing literature on passivity and literacy when it comes to automated investing, and I argue that the trivial nature of some discussions highlights the need for a healthier financial information ecosystem. Meanwhile, users' differing conceptions of how markets work could be points of entry for public dialogue. Next, the chapter moves to the macro scale, raising the issue of ethics in the context of extreme diversification and highlighting how passive investing has served to increase the power of asset managers and index providers. In contrast to proposals for greater engagement with corporate practices, this section argues that indices should be denaturalized. Finally, the chapter argues that ESG investing—where environmental, social, and governance factors are considered when building portfolios—may allow for individuals to balance personal finance with ethical concerns and has the potential to catalyze a broader reconfiguration of how stock markets are conceptualized. The chapter concludes with a brief discussion of future avenues for research and a summary of the main ideas explored in this thesis.

5.1. Knowing the market

As chapter 4 explored, users approach personal investing with some amount of uncertainty. Throughout discussions of risk management, literacy, behavioural concerns, and relationships, users often demonstrate debate and contention around the 'correct' way to invest. They sometimes override risk level recommendations given in questionnaires, and users diverge in terms of their reasoning for taking up robo-advisory: some argue it can be a learning tool while for others, it is a way to tune out popular discourse on stock markets. Although robo-advisors can help to maintain a pre-set investment plan, some users instead migrate to other, more open-ended apps to engage in riskier investing strategies. Lastly, users show that they adopt financial strategies in line with existing values and relationships. In this section I argue that these findings (along with some of those from chapter 3) complicate existing critical scholarship on passivity and financial literacy and recommend that increased attention be paid to financial information. I also highlight the latent understandings of what a market is, drawing from the results explored in chapter 4, and raise the subject of public debate and politicization.

5.1.1. Passivity and literacy

Robo-advisors encourage passivity on the part of the user. The basic mechanics of the platform enforce this: as explained earlier, there is no way to manually buy or sell assets and the ability to change one's risk level is constrained. Additionally, in emphasizing the importance of aggregate market performance rather than that of individual assets, robo-advisors promote distance between the user and their actual holdings (Tan, 2020, p. 52). Passivity is legitimized through the assumptions that ground robo-advisors, such as the focus on long-term gain and automated risk management techniques built on modern portfolio theory, and the automation that robo-advisors offer is one of the reasons why individuals turn to them as an investment solution rather than trying to do their own research. Moreover, even outside the app users are continuously instructed to be passive as content produced by robo-advisors and email communications serve to further reassure them of the effectiveness of the robo-advisor's approach in the long-term. Echoing existing literature, these aspects suggest that passivity is one of the most notable products of robo-advisory.

However, it is critical to complicate this understanding of passivity. One of the aspects of robo-advisory that was raised in chapter 3 was the way that Wealthsimple provides financial literacy material while encouraging passivity; in this case, such a seeming contradiction may actually make sense because it could encourage users to adhere to a passive approach, as suggested by findings from Litterscheidt and Streich (2020). Yet other aspects of the apps are not as easily reconciled. One of the most obvious questions is why robo-advisors have built and promote the use of mobile apps at all (rather than simply having a web interface) if the goal is to maintain user passivity. Moreover, when it comes to Wealthsimple Invest, the interactive features highlighted in chapter 3—being able to see precise values in the chart depicting portfolio value and being able to swipe downward to fetch intraday updates—conflict with the exhortation to be passive. There thus seems to be a contradiction between the substance of robo-advisory (philosophies that do indeed promote passivity) and its form (an app format with affordances that allow users to engage). While investigating the motivation behind such a contradiction in depth is beyond the scope of this study, it could be that there is an affective element to allowing users some level of engagement with the app, even if this is ultimately superficial. In other words, robo-advisors may contribute to a feeling of control and agency, despite the fact that such autonomy will ultimately be restricted. This may be especially true given the intended audience for robo-advisors: younger people who are likely more connected and accustomed to having tools available in mobile apps, even if they are of limited actual use.

User discussions also complicate passivity and connect it to issues of financial literacy. The very existence of online discussions suggests that while most users accept the norms guiding robo-advisors, they still actively engage with and interrogate them. Moreover, as chapter 4 highlights, some users find space to critique and challenge mainstream assumptions that underpin a passive approach, occasionally going so far as to migrate to a more open-ended platform and engage in riskier investment strategies. In light of research showing the reliability of passive investing, these cases suggest that passivity and literacy are not at odds, as Tan (2020) claims: instead, it may be a lack of financial understanding that pushes users to move away from passive investing and neglect to consider the risks involved in active approaches. Even for those who remain with a robo-advisor and buy into the benefits of passivity, this need not foreclose the possibility of learning since, as many users explain, the safety net of a robo-advisor can

provide a productive learning environment. While it is possible that in the general population robo-advisors overwhelmingly produce passive subjects and the individuals in this study represent exceptions, these findings suggest that passivity is at least somewhat complicated: the relationship between passivity and literacy is not straightforward and will ultimately depend on the desires of a given user.

The fact that many users raise logistical or trivial questions challenges critiques of financial literacy programs. Critical scholars in this area have repeatedly problematized the individualizing and depoliticizing nature of popular financial literacy discourse, where financial wellbeing is characterized as attainable through the development of personal skills (Arthur, 2012; Soroko, 2020; Zokaityte, 2017). In contrast to how financial literacy education is currently framed, Chris Arthur (2012) argues that it should instead focus on root causes of economic inequality and empower participants to advocate for system-level changes. While these systemic interventions may be desirable in the long-term, the findings in this study suggest that there remains a need for factual information among lay investors, who often demonstrate hesitancy when navigating the logistical and bureaucratic maze of the financial services industry. For example, many users were unsure of the different account types available or how to manage taxes. As discussed in chapter 4, users also demonstrate misguided assumptions about risk in long-term investing, and when comparing passive investing to self-directed trading they sometimes neglect to consider the impact of behavioural errors on hypothetical savings. While information alone is unlikely to solve the problem of lay investors taking on too much risk, it is a necessary first step.

In the Canadian context, it seems that robo-advisors themselves have begun addressing the need for understandable information on topics related to personal finance. Both CI Direct Investing and Wealthsimple Invest have blogs and help pages where users can locate information on a wide range of topics, both logistical and—in the case of Wealthsimple, at least—more philosophical. Yet, relying on financial corporations to provide public information reinforces their power, and instead robust resources should be developed in the public's interest. The Financial Consumer Agency of Canada maintains a Financial Literacy Database (Financial Consumer Agency of Canada, 2022) that could serve as a starting point for developing an open source for information. Currently, the Database has serious limitations: users must complete 8 drop-down menus before searching for resources, and because these criteria narrow the

search so considerably, results are often sparse. Many of the results that do appear are provided by third parties, including financial services firms themselves, and so there is also a question of how reliable and up to date such resources are. With improvements to the interface and functionality, however, such a database could be useful for lay investors.

Considering the limited behavioural effects of financial literacy programs that focus on building skills (Fernandes et al., 2014), information that can be accessed repeatedly and at the appropriate time may be more useful for individuals. Moreover, access to information may also help to generate increased scrutiny of the role traditional financial advisors play in the financial ecosystem. The popularity of passive investing is fuelled at least in part by extensive research indicating the chronic underperformance of actively managed funds, as noted throughout this thesis. In this context, opting for a passive approach may be highly beneficial for many lay investors who do not have significantly complicated financial situations (in which case, active management is sometimes valuable). Being able to access information pertaining to the debate about active versus passive styles of investing could help consumers to save on fees and build wealth more effectively. Increasing access to information may also benefit individuals who choose to hire a traditional advisor, as financial literacy and high quality service are often complements rather than substitutes (Calcagno & Monticone, 2015). To be clear, information cannot replace legal financial consumer protections, but may still be a beneficial initiative.

Paying attention to information must not be conflated with individualizing the problem. Instead, the provision of information about managing one's finances should be considered part of a liberating agenda wherein access to high quality, understandable, and neutral information is a fundamental right for individuals and communities living in a financialized world. In this sense, access to information is part of holding government and corporations accountable by giving the general population a shared resource that might serve as a baseline for financial literacy development. Meanwhile, access to information does not preclude questioning finance more deeply. In the long-term, giving individuals better access to information may also be part of an iterative process where each change leads to the conditions under which more substantial transformations can occur (Block, 2014). In this sense, addressing informational needs is entirely compatible with and could ultimately help to sustain more progressive initiatives.

5.1.2. Market imaginations

Beyond trivial or logistical concerns, user imaginations of how financial markets work on a more abstract level broadly fall into two categories, as pointed out in chapter 4. While some users—the minority in this dataset who argue for intentionally overriding risk recommendations, picking stocks, or transitioning to active management—perceive the market to be understandable and navigable based on research, many users accept it as opaque and confusing (at least on the level of specific assets and portfolios) and hence advocate for the benefits of passive investing for nonexperts. These opposing conceptions of what a market is have financial and political stakes. The view that markets are able to be subjected to analysis by a lay investor is concerning when it leads to risky behaviours, as these findings suggest. For example, users who recommend hand picking stocks based on short-term comparisons with passive, diversified portfolios may believe that a lay investor can beat the market if they put in the time and effort, but—as other users often point out—this reasoning is flawed and may lead to individuals losing significant amounts of money as they try to Google their way through finance. The actions of these users highlight the contradictions in how financial subjectivity is conceived: such participants simultaneously manifest a spirit of entrepreneurialism associated with financialization while demonstrating a lack of regard for rational calculations that would theoretically push them towards passive investing.

Meanwhile, lay investors who accept the logic of passive investing and seek to ride the index, as robo-advisors encourage, will likely fare better when it comes to the value of their investments. These users trust in the long-term predictability of rising markets, as mentioned in chapter 4, and often do not demonstrate an interest in cultivating financialized subjectivity, admitting their fallibility and lack of calculative skills. Yet, as will be explored later, taking a passive approach has political consequences: it perpetuates index providers' grip on financial markets and smooths over questions of ethics that should be raised for debate.

Neither of these conceptions of financial markets is entirely satisfactory as both entail financial and political drawbacks. Contrarian investors may, in some ways, contest the notion that aggregate growth is all that matters, but their expression of this entails financial risk and embracing an individualistic approach to finance. Arguably, such investors are not contributing to political discourse any more than those who passively

accept a robo-advisor's discipline. Rather than take either of these ways of imagining the market at face value, I propose instead that ongoing discussions among users could be harnessed and redirected into political projects. The debates taking place online suggest that users are at least somewhat enthusiastic about understanding how financial markets affect everyday life, and this provides a fertile starting place for building capacity to question and critique markets as they currently operate.

Simultaneously, this must be done without threatening the financial wellbeing of individuals. One of the challenges with financialization is that it is a self-sustaining problem (Haiven, 2014): the needs generated within financialized society are often addressed through further participation in financial markets. In the case of personal investing, individuals who accept the naturalized view of the market as an aggregated, upward trend that should be ridden may benefit financially. In this context, my argument pertains to the collective and political levels. Mobilizing users' energy for normative discussions about how markets (should) operate could open further avenues of investigation. The remainder of this chapter will move to the macro scale to highlight the political implications of passive investing in more depth.

5.2. Riding the market

In mainstream economic thought, "markets are basic to growth, growth means progress, progress means growth through markets" (Gills & Morgan, 2021, p. 1194). As discussed in chapter 3, the principles that robo-advisors promote follow from and contribute to an understanding of markets where stock indices are assumed to rise throughout time. This manifests the 'growth paradigm', as Gareth Dale (2017) calls it, which has a long history going back to (at least) the seventeenth century. According to Dale, knowledge accumulation through colonial expeditions and—false—conceptions of human progress from 'primitive' to 'sophisticated' served as primers for the growth paradigm to emerge. Ultimately, Dale suggests that contradictions in business practices—and the attempted resolution of these—led to the emergence of the growth paradigm as we know it today: greed, while traditionally considered a vice, was normalized in an era of growing trade and commerce. Resolving this contradiction involved positioning private profit as beneficial to the general population, where "the economic acts of individuals promote prosperity and general welfare" (Dale, 2017, p. 46).

The view that economic growth is synonymous with welfare has served to legitimize financialization (Palley, 2014) and consistent economic expansion, often measured as GDP (Gross Domestic Product). While "economic growth has not only been about the mindless craze for more consumer items […] but also about socially and culturally rich lives" (Borowy & Schmelzer, 2017, p. 10), this has only ever been true for certain people. Growth has historically coincided with (and arguably perpetuated) destruction to Indigenous land and life, systemic racism and sexism, and many other forms of oppression. A general acceptance of economic growth and its relation to welfare may be crumbling: in recent years, even from a technical macroeconomic perspective, growth has not necessarily led to increases in quality of life or promoted equality (Borowy & Schmelzer, 2017, pp. 10–11). Although a deeper examination of scholarship on theories of growth is beyond the scope of this thesis (but will be touched on as a potential area for future study), it is worth understanding the genealogy of the growth paradigm and how, in the contemporary context, it may be contested.

While most debates around economic growth center on GDP, the way that robo-advisors frame stock market growth is based on a similar—overly optimistic—linking between the individual and the economy. By simply riding the upward trend of the market, passive investors profit individually from broader and more abstract financial growth. As noted in chapter 3, investors need not mindfully accept the ideology of growth: ETFs manifest it financially, allowing investors to be indifferent to the values of individual assets and ignore the performance of specific companies. According to robo-advisors' branding, investing in the aggregate can be part of a liberating and democratic agenda where individuals can participate in—and profit from—broader stock market growth thanks to passively investing in index-tracking ETFs.

Yet, it is also critical to distinguish stock growth from growth in other indicators. In the case of GDP, scholars argue that the endless pursuit of growth can be harmful because it necessarily involves increased production of material goods and therefore, more intensive resource extraction (Hickel, 2021). Stock prices, on the other hand, which stock indices track, are not so directly material. To be sure, many companies represented on an index produce consumer goods or engage in business activities that require physical materials, but stock prices are determined only in part by the actual activity of a company; they are also speculative, representing current trading prices. In this sense, it may be possible to imagine a world (or even just a particular index) where

growth in a stock price represents something we deem socially important and beneficial: for example, robust performance of sustainable firms or social enterprises that seek to undo much of the harm perpetuated by the unconditional support of resource extraction and economic expansion.

This section, then, builds from the above critiques of the growth paradigm and moves in a slightly different direction. The more specific problem with growth when it comes to robo-advisors is not growth itself but instead, the way that it ties individuals to an aggregate vision of what the market is. This forecloses the possibility of users engaging more deeply with the particular assets they hold. The rise of passive index investing has concerning implications when it comes to ethical and environmental issues: for example, Patrick Jahnke (2019a) describes index funds—including index-tracking mutual funds and ETFs—as 'holders of last resort' for fossil fuel divestment. Today, passive investors effectively delegate decisions to the index providers who decide what companies are on an index and therefore, what companies passive investors will buy shares in (Petry et al., 2021, p. 153; Robertson, 2019). Thus, while investing in the aggregate might allow an individual to tap into the assumption that markets will always grow, it also means that an individual's portfolio almost definitely includes stocks from companies that contribute to social and environmental damage.

Addressing this tension is the focus of the remainder of this section. Because passive investments are tied to indices, there is an assumption that asset managers can engage and influence companies but cannot sell shares: in other words, they have 'voice' but not 'exit' (see Hirschman, 2004). In this context, many argue that index fund managers should engage directly with companies and encourage more ethical practices, yet this is unlikely to be a successful and sustainable way forward. Meanwhile, the stock indices that ultimately direct passive investments have gained considerable power and their authority should be challenged. Throughout this section, I pay specific attention to environmental impacts, as the climate crisis is one of the most pressing issues in our contemporary moment and there is growing concern about the role that the financial industry plays in perpetuating it (see Kirsch et al., 2022) (however, the arguments put forth here can likely apply to other social and political issues as well).

5.2.1. Asset managers

Today, large index fund managers—such as BlackRock, Vanguard, and State Street in the U.S.—control huge portions of stocks across the market. While index funds are not usually able to sell the shares of individual companies because they are tied to the index, their large holdings theoretically make them well-positioned to engage with firms directly and voice their concerns about performance or other issues (including questions of environment, social, and governance factors) (Appel et al., 2016; Bebchuk & Hirst, 2018; Fichtner et al., 2017; Fichtner & Heemskerk, 2020). Because index funds are usually long-term holders who have no 'exit', they are often considered forms of patient capital in that they will hold stocks regardless of short-term considerations (Deeg & Hardie, 2016). As well, the largest asset managers often hold so many shares that they could cast the deciding vote in many cases (Fichtner & Heemskerk, 2020; Jahnke, 2019b, 2021).

Yet, for all their power, index fund managers usually fail to engage ambitiously. The largest index fund managers are often deferential to management (Bebchuk & Hirst, 2018; Fichtner et al., 2017; Fichtner & Heemskerk, 2020; Jahnke, 2021), prefer to engage with companies privately (Bebchuk & Hirst, 2018; Fichtner et al., 2017), and frequently fail to support more progressive proposals, especially those focused on social and governance aspects of firms (Sood et al., 2021). While the largest asset managers have given a general indication that they will be taking more actions to engage with companies that are not meeting ESG standards satisfactorily, it remains to be seen whether they will follow through with these public statements (Fichtner & Heemskerk, 2020, p. 510). Some scholars argue that even in the case of stewardship attempting to directly increase the value of the company under question, there is a lack of incentive for engagement because the costs must be shouldered by the asset manager and any asset value increase will have a miniscule effect on their overall returns and fees (Bebchuk & Hirst, 2018; Braun, 2021). Reluctance to engage may also be caused by conflicts of interest: many asset managers simultaneously coordinate companies' pension plans (Bebchuk & Hirst, 2018), and often the boards of index fund managers also serve on the boards of other listed corporations (Jahnke, 2021, p. 141).

Hypothetically, index funds may be motivated to engage with corporate activities to minimize externalities. In basic economic theory, an externality is a cost that arises

from market activity but is not accounted for by the actor who generates the cost. The classic example is that of a firm which pollutes a river: the firm is unmotivated to change their polluting behaviour because the costs of the pollution have no effect on it, instead being externalized and falling on the public or other firms that must contend with polluted water. In this framework, index funds should care about all externalities because, as 'universal owners' who are invested across different companies and industries, those costs will affect other assets in their portfolio, essentially being internalized (Braun, 2021; Fichtner & Heemskerk, 2020; Jahnke, 2019b; Trucost, 2010). While many discussions of externalities focus on environmental concerns, it is important to note that similar principles could apply to social or governance issues as well.

Not only does the actual inaction of large asset managers challenge the argument about universal ownership and externalities, but even on a theoretical level there are several limitations with this model. The notion that externalities from one company will surface elsewhere in the economy and affect another firm in an index fund is somewhat simplistic. If an externality emerges in the form of water pollution isolated to one river where there are two firms, it may be easy to see who is causing it and what its effects are; the issue gets slippery in our contemporary context where many harms—for example, the effects of climate change—are far-reaching and not caused by any one specific firm. Today, environmental degradation happens at such a staggering scale that any individual company's contribution to it may be seen as an abstraction by fund managers, and the uncertainty about where, when, and in what form exactly the degradation will re-appear in the economy could allow for indifference.

Even attempts to price in externalities, as a report from the United Nations Finance Initiative does (Trucost, 2010), cannot overcome this limitation, since pricing will account for the aggregate costs of externalities but not the specific consequences of such costs for individual asset prices. While the report mentions instances where real value was lost, for example the Norwegian Government Pension Fund Global losing over a billion USD in the aftermath of the BP Oil spill in the Gulf of Mexico (Trucost, 2010, p. 8), such losses are not necessarily calculable before-the-fact and therefore their risks will be discounted. The question of externalities becomes even more difficult considering the missions of many firms contributing to harms such as climate change. While many corporations could change their business practices to promote sustainability, for other companies this may be out of the question: for example, asset

managers who engage with fossil fuel companies to advocate for them ceasing production are unlikely to be met with agreement.

Braun (2021, p. 290) also highlights that "While asset managers are universal shareholders, the distribution of share ownership in society is extremely unequal". From this perspective, index funds may be universal owners, but externalities can emerge that fall on those excluded from the stock market. Braun uses the example of wage stagnation, which will affect lower-income workers more acutely. Many of these people may own few if any assets, and while lower wages could have a ripple effect in terms of stifling demand, it may be offset by increased corporate profits. Braun's analysis points to the fact that 'universal owners' are only universal owners in the stock market, which should never be considered to represent the whole of society.

From an ideological perspective, the theory that asset managers can account for market failures undermines the political nature of externalities. While it is an intriguing argument that capitalism has evolved into such a state of absurdity that those who generate harm might also be motivated to address and eliminate it out of sheer self-interest, at its core this theory does little to disrupt free market ideology—in fact, it may serve to sustain it. To be clear, it may indeed be beneficial for index funds to take account of such externalities and engage with companies accordingly, but ultimately this approach is, at the very least, insufficient. Instead, broader transformations are needed in the way that investing operates to reconfigure the relationship between public interest and finance, as will be explored later.

5.2.2. Index power

Passive investing has not only allowed for a concentration of power in terms of the largest asset managers, but also in terms of index fund providers at a more fundamental level. Today the most well-known index providers (MSCI, FTSE Russell, and S&P DJI)[6] have become market movers. The inclusion or exclusion of a company on an index will direct flows of capital, and stock prices rise and fall accordingly (Authers, 2018; Robertson, 2019, p. 800). In this sense, "indices are the indispensable and invisible infrastructure of modern finance" (Rauterberg & Verstein, 2013, p. 5). Yet index

[6] Morgan Stanley Capital International, Financial Times Stock Exchange Russell, Standard & Poor's Dow Jones Indices

providers have few constraints when it comes to the formative decisions they make. Methodologies are protected as trade secrets and change frequently (Robertson, 2019, p. 806). At times, index providers will decide to include or exclude companies on a discretionary basis, even if the decision does not fit their methodology precisely (Petry et al., 2021, p. 156; Rauterberg & Verstein, 2013, p. 19). Importantly, while indices affect passive portfolios most explicitly, they also have an impact on active funds since these will use an index as a benchmark and generally seek to minimize how much they deviate from it.

The power of index providers today manifests a longer history of the mathematization of finance and economics more broadly. In the late 1800s, Irving Fisher worked to advance economic projections by using mathematical models, thereby inaugurating the discipline's status as one based on scientific laws (Brine & Poovey, 2019). In recent years, scholars have used the term 'virtualism' to describe how policy-makers attempt to shape the world in the image of economic axioms, despite the gaps that exist between theory and reality (Carrier, 1998). Meanwhile, the field of economics has become increasingly devoted to unsupported assumptions and beliefs about human nature, even as such an approach impedes taking action on critical social issues, such as climate change (Gills & Morgan, 2021). The making-scientific of economic principles also connects with cultural trends across society where metrics are increasingly viewed as authoritative and prioritized in decision-making (see Beer, 2016). The dominance of stock indices is part of this tendency: trust is placed in the metric, even if the metric may be recognized as discretionary or constructed.

Like other economic indicators, stock indices should not be accepted unquestioningly. The case of GDP, for example, can provide lessons for considering the ways that indicators are constructed. The original promoters of GDP advocated for taking account of aspects such as pollution and the exhaustion of natural resources in the indicator (Fressoz & Bonneuil, 2017). If these kinds of proposals had been adopted—for example, integrating oil depletion into GDP measurements—economic growth would have been in decline since the 1970s in the United States (Fressoz & Bonneuil, 2017, p. 59). Instead, the growth paradigm remains intact today in part because of the selective inclusion of data. While I am not suggesting that charts of rising stock markets are entirely fabricated, it is critical to understand stock indices as human-

made and discretionary, contingent on specific decisions by index providers (Rauterberg & Verstein, 2013, p. 15).

Despite the importance of stock indices, robo-advisors obscure the role that they play in users' investments. In the app, as explored in chapter 3, users are directed to focus on particular aspects of investing—timelines, risk levels, and depositing more funds—without any attention given to individual assets or the indices that determine them. Users are sold the benefits of passive investing based on the assumption that the market will inevitably rise, and at its core this growth in fact hinges on stock indices to continue representing the market. Within this framework, the market is beyond the reach of an investor and is positioned as something complicated and opaque, as mentioned earlier. Meanwhile, the infrastructures and actors, such as asset managers and index providers, that enable passive investing in the first place are left out of the frame.

5.3. Politicizing the market

So far, this chapter has suggested that users' interest in personal finance could be a starting point for generating public debate on the role that stock markets play in everyday life and outlined the ways that passive investing contributes to the power of large financial corporations in determining how funds are invested. While robo-advisors gloss over the infrastructural elements of personal finance, allowing individuals to invest in aggregate growth without considering the implications of their portfolios, the distribution of funds across corporations and industries is ultimately a political issue, particularly in the context of climate change and other pressing social problems. This section will turn attention to ESG investing (where environmental, social, and governance factors are considered when building a portfolio) and the way its popularization could be used to politicize markets productively. Some robo-advisors already offer such portfolios: CI Direct Investing has 'Impact Portfolios' while Wealthsimple Invest offers a Socially Responsible Investing option. Meanwhile, organizations around the world, such as the UN's Principles for Responsible Investment (*Principles for Responsible Investment*, n.d.), aim to promote financial activities that align with public interest. However, ESG investing as it currently stands is problematic both because of uncertainty in terms of performance and, perhaps more importantly, a lack of regulations on classifying such portfolios (at least in Canada). This section will outline

these challenges while maintaining that, when committed to on a collective scale, ESG investing could provide opportunities for a critical reconfiguration of financial markets.

There are mixed findings when it comes to assessing ESG investment performance. For example, some scholars find that, in the case of corporate bond ESG funds, performance during the period from 2014 to 2019 was superior to benchmarks (Drei et al., 2019), but returns were less satisfactory between 2010-2013 (Ben Slimane et al., 2019). Findings across the literature suggest that investors interested in ESG funds value the ethical aspect of the investment along with performance (Dahlberg & Wiklund, 2018; Drei et al., 2019; Halbritter & Dorfleitner, 2015; Nath, 2021; Tucker III & Jones, 2020), and Christophe Revelli (2016) argues that it is important to ensure that such funds meet ethical standards before factoring in performance. However, assuming that the ethical nature of such funds will make up for any—real or perceived—insufficiencies in performance is misguided, as it means asking investors to sacrifice on personal financial gain. For ESG investing to become widespread enough to threaten the stock prices of extractive companies, more technical research will be needed to ensure that such funds can compete with traditional ETFs when it comes to performance.

Classifying ESG investments is another concern. Although socially responsible forms of investing have become more widespread since their genesis as a protest tactic in the 1960s, what counts as an ESG fund is highly contested (Nath, 2021). This ambiguity has raised concerns that funds may profit from greenwashing: branding themselves as socially conscious or environmentally friendly without being so in practice (Nath, 2021, p. 202). While agencies exist that seek to classify and rate ESG funds, their results often differ because of divergent and opaque proprietary methodologies (Conway, 2019), as well as the fact that measurements around environmental, social, and governance factors are necessarily multi-faceted (Drei et al., 2019). Very recently, guidance has been released in Canada that aims to set standards for how such funds are advertised and outlines the types of disclosures they must make to investors (Bijoux & Jongeward, 2022), which is a promising development but should be followed with legal requirements. Moreover, classificatory schemes must be specific and measurable, in contrast to current initiatives (such as the UN PRI mentioned earlier) that are vague and aspirational.

Even when a robust classification scheme is generated, it must be accompanied by consistent review and revision. When it comes to metrics that have stakes attached, Malik (2020, p. 25) notes that data can often be manipulated in order to 'game' the system. Thus, even if ESG investments can be coherently classified, it is likely that further mechanisms will need to be developed to ensure that loopholes are closed and opportunities for malfeasance are limited. Additionally, it will be necessary to ensure that standardization does not imply depoliticization. Any classification must be revisited repeatedly and adjusted iteratively, especially as socially accepted principles and norms change. As Geoffrey Bowker and Susan Leigh Star remark, "The only good classification is a living classification" (Bowker & Star, 2000, p. 326).

Despite these challenges, ESG presents a promising way forward for reconfiguring financial markets. From a material perspective, the growth of ESG investing would allow individuals and institutions to move funds to sectors of the economy deemed more socially beneficial, and away from corporations that have a destructive impact on communities and the natural environment. This contrasts with corporate engagement, which seeks only to influence various companies' activities: instead, ESG investing involves an actual transfer of wealth. There is already a demonstrated interest in taking ethical factors into consideration when allocating funds, as recent campaigns for fossil fuel divestment have demonstrated (see, for example Choi & Hsu, 2022; DeRochie & Taylor, 2021; Moreno, 2022). Large institutions with investments, such as pension funds and educational institutional endowments, can be leaders in moving capital to such funds.

When conducted on the individual level, one possible critique of ESG investing is that it simply re-packages arguments about behavioural changes targeted at consumers. In this view, ESG investing may be seen as just another exhortation to buy the right kind of laundry detergent, for example. To be clear, ESG investing cannot replace policy change. Simultaneously, however, it goes beyond classic individualist approaches, especially regarding environmental issues. Whereas individualist approaches to the climate crisis suggest that everyone (at least in the industrialized context) must change dozens, if not hundreds, of lifestyle decisions they make each day to lower their environmental impact, ESG investing could harness the power of ETFs to virtually eliminate the need for consumers to make unreliable judgements about the potential harms of their activities. With a robust classification scheme, ESG funds could be

created that are trustworthy, reliable, and easy to invest in. Moreover, ESG investing affects share prices—arguably the most important performance metric in the context of financialization, where even those firms with thin or nonexistent profits can survive based on the growth of the stock prices. Unlike consumer lifestyle changes that enter the frame at the end of the supply chain and only threaten profits, ESG investing could have more influence over firm behaviour, and determine which companies survive in the long-term. In the case of corporations that are fundamentally premised on extraction and harm, ESG investing would directly allow for an outflow of capital. Additionally, while the onus should not be placed entirely on consumers, incentives could be used to encourage a shift to ESG investments, such as taxing capital gains from ESG funds at a slightly lower rate than those from traditional investments (up to a threshold and only for consumers).

Robo-advisors themselves could play a role in popularizing ESG investment. For example, robo-advisors could set their default portfolios to be ESG-compliant (once standards are determined) and subsidize management fees on ESG portfolios, perhaps by raising fees on traditional portfolios. They could also provide lay investors with greater access to the individual assets in their portfolio and highlight the potentially undesirable firms that an investor is contributing to. Robo-advisors promote the idea that an investor is riding the entire market, yet they currently obscure the fact that doing so means binding one's financial fate to companies which are actively destroying prospects for environmental and social justice. Instead, robo-advisors could put this tension on display for users and incentivize them to change to an ESG portfolio.

For ESG investing to have a more structural impact on financial markets, it is necessary to engage with indices, either altering the most widely used ones or creating new ones. Jahnke (2019a) argues that funds could lobby index providers to remove undesirable firms from their indices altogether. While this would involve contesting the seemingly objective nature of stock indices, it should not be impossible considering the fact that providers already make some discretionary decisions and have the power to alter their methodologies, as noted above (Petry et al., 2021; Rauterberg & Verstein, 2013; Robertson, 2019). Alternatively, new indices could be created and adopted on a wider scale, which would threaten the oligopoly that mainstream indices currently hold. Making changes to indices would not only affect passive funds, but also active ones that use such indices as benchmarks, since it would entail actively managed investments

calibrating to the updated or new index. Considering that indices serve as the infrastructure behind passive—and much active—investing, it is essential to configure these for ESG investing to move from a consumer-side intervention to one that has the power to disrupt and recalibrate markets on a fundamental level.

While ESG investing does not directly eliminate the influence that finance has on daily life, it could be considered—like the provision of financial information discussed above—as one intervention that opens space for further transformations. Developing ESG classifications would allow investments to be distributed in line with ethics, rather than have portfolios built from indices that contain destructive assets. If ESG principles were implemented on the level of the index, this would allow for structural changes, considering the influence that indices have in directing capital. From a practical perspective, ESG investing is an accessible initiative since it does not threaten individuals' ability to meet basic needs through engagement with financial markets, which is itself a product of financialization. In terms of public dialogue, popularizing ESG investing could normalize discussions about ethics and personal investing, potentially generating fissures in the conception of the market as an all-powerful entity (MacKenzie, 2009) and creating room for broader debates about stock markets and financial infrastructure. In this sense, conversations about ESG investing would manifest de Goede's (2005) approach to politicization where accepted truths are made debateable. Overall, popularizing and implementing ESG principles on a large scale may help to move power from corporations to regulators (who classify what counts as an ESG fund) and the public (who move money directly to such funds and out of noncompliant ones).

5.4. Future directions for research

The findings of this study provide multiple avenues for future research. Methodologically, both the walkthrough method and critical discourse analysis could benefit from being used in future studies with longer timelines. Conducting the walkthrough method over a longer period, for example over the course of at least one year, would allow for an observation of how the apps change with updates and how the interface responds to more user activity (such as withdrawing or depositing funds periodically over the course of months). A study designed with a longer timeline in mind might also benefit from the collection and analysis of more user threads. Future studies may also seek to gather data from the general population rather than only on Reddit, to

consider the generalizability of the data in this project. As well, researchers could examine a wider variety of apps.

Future critical studies should cautiously approach the financialization of everyday life. While this concept can be helpful in contextualizing research findings and although financialization offers a salient lens for considering economic issues in the contemporary North American setting, scholars have perhaps been too quick to assume that shifts in subjectivity follow from shifts in economic processes. Existing empirical work—as well as these findings—demonstrates that subjectivity is often contested and individuals adapt to financialization by folding it into their current values and relationships (Lai, 2017; Pellandini-Simányi et al., 2015; Pellandini-Simányi & Banai, 2021; Tang & Lee, 2020). Many passive investors demonstrate a lack of interest in developing an entrepreneurial attitude towards finance, and this is precisely the reason they favour passive approaches. Moreover, as noted in this and chapter 4, financialized subjectivity in the context of passive investing is contradictory since entrepreneurial, individualist methods are often irrational considering the potentials for financial loss. Empirical work that pays specific attention to the responses of actual individuals and communities to financialization will be worthwhile in highlighting the diverse possibilities that arise when finance becomes integral to daily life.

Research focused on technical aspects of passive investing may also be a fruitful area for future study. Widespread use of passive, ETF investing has raised concerns about the functioning and efficiency of financial markets. While passive investing relies on market efficiency, market efficiency is maintained thanks to the continued existence of active investors who look for opportunities to arbitrage. Investors who are willing to trade individual stocks—even if they are doing so based on fads or incorrect predictions (Burton & Shah, 2013, pp. 38–41)—enable the existence of aggregate assets (Black, 1986, p. 531), such as ETFs. As Hayes explains, if “nobody is left to actively price the shares of the individual companies that make up [an] index […] they will tend to become mis-priced and thus markets will ultimately turn out to be more *in*efficient.” (Hayes, 2019, p. 23, emphasis in original). In this view, passive investors are the free-riders of the marketplace (Hayes, 2019; Pace et al., 2016, p. 29). In the future, researchers working in finance and economics may investigate how immediate the risk of market inefficiency is as passive investing continues to gain popularity.

More broadly, scholars interested in questions of banking and economic restructuring may be interested in exploring topics such as postal banking, bank nationalization, universal basic income (UBI) and theories of de-growth. Postal banking would involve adding banking services to post offices across Canada, which might benefit individuals who are currently under- or unbanked and rely on fringe financial institutions (such as payday lenders) with high associated fees (Anderson, 2013). Not only would postal banking increase access for individuals and communities, but it would also introduce competition in Canada's oligopolistic banking sector, raising the bar for customer service and reducing fees (Anderson, 2013; McCarthy, 2019). Canada had a postal bank until 1968, and Canada Post still provides some basic services such as international money transfers. Additionally, many other countries such as the UK, France, and Switzerland have successful postal banks, yet the topic has not received significant attention in Canada in recent years. Another fruitful area for future study when it comes to banking systems is the potential for bank nationalization. McCarthy argues that nationalizing banks goes furthest to increase public control over financial services, because it directly transforms the power structures that currently support financial exclusion and injustice (McCarthy, 2019). Both postal banking and bank nationalization offer exciting possibilities for transforming the financial industry and contesting the power of financial institutions in Canada.

In terms of broader economic re-ordering, universal basic income has become a topic of popular conversation in recent years. While UBI involves direct transfers to individuals, allowing everyone to meet a minimum threshold of income regardless of employment, it raises critical questions about distribution. As Jože Mencinger (2017, p. 1) points out, "Even among approximately equally developed countries, the notion of what is a socially equitable distribution of income and wealth varies", making it difficult to determine where the UBI threshold would be set. This question also applies to proposals to transition to de-growth or post-growth economies. While growing GDP is assumed to be a positive feature of contemporary economies, it is no guarantee of increases to quality of life, as mentioned earlier. Many argue that the imperative of continuous growth hinders our ability to respond appropriately to climate change, and de-growth advocates describe it as "a planned reduction of energy and resource throughput designed to bring the economy back into balance with the living world in a way that reduces inequality and improves human well-being" (Hickel, 2021, p. 1106). Yet, this too raises questions about

how to distribute a limited supply of goods, especially in a consumer society such as Canada. Academic scholarship focusing on policy interventions may take up either of these proposals (UBI or de-growth economy) and investigate their feasibility in more depth.

While these various directions are beyond the scope of this project, the findings and analysis outlined here may provide a starting point from which to work. Although my arguments about politicization are focused on personal investing specifically and the infrastructures that sustain it, the need for public dialogue extends to broader issues such as banking and economics more generally. In this sense, contention about one topic may also help to energize debate about other, related subjects.

5.5. Conclusion

This thesis has sought to explore the assumptions and conventions about finance that robo-advisors promote, and how these are taken up by users. Building from scholarship on the financialization of everyday life and contributing to work on robo-advisors, this project used the walkthrough method and critical discourse analysis to examine both the app interfaces as well as discussions among users. Robo-advisors, despite their branding as innovative and disruptive tools, promote mainstream assumptions about investing and how financial markets operate, based on modern portfolio theory and the efficient market hypothesis. Various elements of the interface, including affordances and visualizations, encourage users to focus on long-term performance, position risk as a trade-off that can be managed through diversification and asset allocation, and promote deposits as one of the few user behaviours that is not limited. Not only are these standalone principles significant in showing how robo-advisors communicate conventions to users, but on a more abstract level they also serve to support the presumption that (Western, liberal) markets will rise over time. This emphasis on macro-level growth allows users to invest in the aggregate rather than critically consider the assets they hold and the way that their portfolio is shaped by stock indices.

Meanwhile, users discuss a wide range of topics, from trivial matters to more theoretical concerns about methods for personal investing. Participants were found debating risk management, and their strategies or opinions often conflicted with the

approach support by robo-advisors. There were also contrasting perspectives when it came to understanding why users take advantage of robo-advisory: for some, the safety of passive investing offers space to learn more about finance, while for others it allows them to tune out the noise. Lastly, users differed in their behaviours. While many advocated for passive investing, others argued that with sufficient research, individuals could beat the market.

These findings have significant implications, as explored throughout this chapter. User activity complicates existing theories about passivity, as it demonstrates that lay investors are at least somewhat attuned to questions about personal investing, even if they take a passive approach. Meanwhile, the fact that many participants focused on trivial or logistical needs suggests that developing a more robust information resource for lay investors could be beneficial. This chapter has argued that from a political angle, users' energy around debating personal finance could be harnessed for broader public dialogue about the role that stock markets play in everyday life. As touched on in the introduction to this thesis, the fact that robo-advisors are accepted as everyday artifacts that promote mainstream principles only adds to the significance of these findings. Indeed, it is through the in-depth interrogation of such ordinary objects that research can posit a rigorous assessment of how seemingly mundane interactions between individuals and their technologies contribute to certain social orders. In this case, the examination of robo-advisors' interfaces paired with user discourse illustrates how these relatively new apps integrate individuals into financialized life while appearing innocuous.

On the level of robo-advisors and passive investing more generally, this chapter has argued that despite the utopian framing of passive investing as allowing individuals to ride aggregate market growth, it in fact entails a deepening power in index providers who determine investments. This means that passive investors have little say over what is included in their portfolio, and ethical issues are left unconsidered. While some scholars recommend that asset managers could engage with corporations to influence behaviour, this chapter instead argues that the authority of index providers should be challenged. One concrete proposal moving forward is to popularize and regulate ESG investing so that stock markets are reconfigured to take ethics into account, with special attention paid to the existential threat that climate change poses. If ESG principles were taking into account on the level of the index, this could structurally alter stock markets and shift power from oligopolistic index providers to regulators and the public, as well as

induce popular debate about how stock markets shape the world. While this approach admittedly has challenges, it is one way to reconcile the necessity of personal investing in our financialized era with concern for and action on pressing social issues.

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Appendix.

Script used for collecting Reddit threads

A Python script was developed for the purpose of collecting Reddit discussion threads while preserving their conversational nature where comments from users would reply to others. The script was developed into two separate versions, one for qualitative analysis, which included formatting aspects designed to make reading easier, and the other for producing raw text that could be fed into computational tools (in this case, I used Voyant) . Both are included here as well as the list of dependencies. Data collection on Reddit took place on January 14, 2022 and so all dependencies are current as of that date. Notes were included in the code to help in development. Many thanks to Prem Sylvester who helped in reviewing the script.

Qualitative version

```
# Uses Python Reddit API Wrapper (PRAW)
# For extracting Reddit posts and comments and transforming them into a .txt file that preserves tree structure
# This code should prompt for a Reddit post URL and then prompt for a file name (e.g. testerfile.txt), in the shell
# Result: a .txt file will be saved in the folder where this code is

# Import libraries
import sys
import textwrap
import datetime
import praw

# Authentication – Sensitive info redacted
# Using no username or password ensures that I'm only getting public comments

reddit = praw.Reddit(
   client_id = "REDACTED",
   client_secret = "REDACTED",
   user_agent = "REDACTED",
)

# Main section of the code

# Prompt for submission URL
url = input('Enter URL here: ')
submission = reddit.submission(url=url)

# Prompt for file name, end with .txt manually
```

```
filename = input('What do you want to call this file? ')
sys.stdout = open(filename,'a')

# Expand "see more comments" buttons. Set lower limit to speed up processing time, trade-off
thoroughness
submission.comments.replace_more(limit=5)

# FUNCTIONS
# Spacing function for printing
def twospaces():
   print()
   print()

# Recursive function for comment processing
def handle_comment(comment, depth = 2):
   for child_comment in comment.replies:
      print()
      print(depth * '  ', '__', 'Reply: Level', depth, '__') # This will show the comment level

      # Text-wrapping comment body
      childcommenttext = child_comment.body
      lines = textwrap.wrap(childcommenttext, width = 50)

      for line in lines:
         print(depth * '  ', line)

      # Comment data
      # If commenter is the original poster:
      if child_comment.is_submitter is True:
         print(depth * '  ', '///', 'By submitter.')
      # Author, comment and parent ID to be able to manually check
      print(depth * '  ', '///', 'Author:', child_comment.author)
      print(depth * '  ', '///', 'Comment ID:', child_comment.id)
      print(depth * '  ', '///', 'Parent ID:', child_comment.parent_id)

      # Time, converted from Unix to UTC
      timestamp = child_comment.created_utc
      value = datetime.datetime.fromtimestamp(timestamp)
      print(depth * '  ', '///', 'Time:', f"{value:%Y-%m-%d %H:%M:%S}")

      # Recursive element
      handle_comment(child_comment, depth+1)

# Printing the submission

print('___Submission___')
print()
print('-Submission title-')

# Textwrapping the submission title
submissiontitle = submission.title
lines = textwrap.wrap(submissiontitle, width = 60)
for line in lines:
   print(line)
```

```
print()

# Textwrapping the submission body
print('-Submission body-')
submissionbody = submission.selftext
lines = textwrap.wrap(submissionbody, width = 60)
for line in lines:
   print(line)

# Submission data
# This shows whether submission is text-only. If not, it includes this warning.
if submission.is_self is False:
   print('Note: This submission may include other media')
print()
print('-----')
# Prints submission author
print('Author:', submission.author)

# Time of submission, converted from Unix to UTC
timestamp = submission.created_utc
value = datetime.datetime.fromtimestamp(timestamp)
print('Time:', f"{value:%Y-%m-%d %H:%M:%S}")

# Submission ID, comments, other info
print('ID:', submission.id)
print('# of Comments:', submission.num_comments, '(Comments printed may be less)')
print('Permalink:', submission.permalink)
print('Other links in submission:', submission.url, '(Duplicate permalink if no other links)')
print('-----')
twospaces()

# Printing the comments
print('-----BEGINNING OF COMMENTS-----')

for top_level_comment in submission.comments:
   twospaces()
   print('___Comment___')

   # Textwrapping the comment body
   toplevelcommenttext = top_level_comment.body
   lines = textwrap.wrap(toplevelcommenttext, width = 60)

   for line in lines:
      print(line)

   print('-----')

   # Comment data
   if top_level_comment.is_submitter is True:
      print('///', 'By submitter.')
   print('///', 'Author:', top_level_comment.author)
   print('///', 'Parent ID (should be submission ID):', top_level_comment.parent_id)
   print('///', 'Comment ID:', top_level_comment.id)

   # Time of comment, converted from Unix to UTC
```

```
    timestamp = top_level_comment.created_utc
    value = datetime.datetime.fromtimestamp(timestamp)
    print('///', 'Time:', f"{value:%Y-%m-%d %H:%M:%S}")

    handle_comment(top_level_comment)

# Close the file
sys.stdout.close()
```

Computational version

```
# This is a version of the Reddit Extractor that will print clean text
# Headings and notations about user names, time posted, etc. are left out
# The purpose is that this can be fed directly into NLP

# Import libraries
import sys
import datetime
import praw

# Authentication – Sensitive info redacted
# Using no username or password ensures that I'm only getting public comments

reddit = praw.Reddit(
    client_id = "REDACTED",
    client_secret = "REDACTED",
    user_agent = "REDACTED",
)

# Main section of the code

# Prompt for submission URL
url = input('Enter URL here: ')
submission = reddit.submission(url=url)

# Prompt for file name, end with .txt manually
filename = input('What do you want to call this file? ')
sys.stdout = open(filename,'a')

# Expand "see more comments" buttons. Set lower limit to speed up processing time, trade-off
thoroughness
submission.comments.replace_more(limit=5)

# FUNCTIONS
# Spacing function for printing
def twospaces():
    print()
    print()

# Recursive function for comment processing
def handle_comment(comment, depth = 2):
    for child_comment in comment.replies:
        print()
```

```
        print(depth * '  ')
        childcommenttext = child_comment.body
        print(childcommenttext)

        # Recursive element
        handle_comment(child_comment, depth+1)

# Printing the submission

print()

# Submission title
submissiontitle = submission.title
print(submissiontitle)

print()

# Submission body
submissionbody = submission.selftext
print(submissionbody)

twospaces()

# Printing the comments

for top_level_comment in submission.comments:
    twospaces()
    toplevelcommenttext = top_level_comment.body
    print(toplevelcommenttext)

    handle_comment(top_level_comment)

# Close the file
sys.stdout.close()
```

Dependencies

```
certifi==2021.5.30
charset-normalizer==2.0.3
DateTime==4.3
docopt==0.6.2
idna==3.2
pipreqs==0.4.10
praw==7.5.0
prawcore==2.2.0
pytz==2021.1
requests==2.26.0
update-checker==0.18.0
urllib3==1.26.6
websocket-client==1.1.0
yarg==0.1.9
zope.interface==5.4.0
```