

New Sociological Approaches to Economic Rationality and Financial Risk

By

Adam S. Hayes

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The dissertation is approved by the following members of the Final Oral Committee:

Mustafa Emirbayer, Professor, Sociology
Robert Freeland, Professor, Sociology
Max Besbris, Assistant Professor, Sociology
Meg Bea, Assistant Professor, Consumer Science
Rourke O'Brien, Assistant Professor, Sociology (Yale University)

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Abstract Over the last 40 years, behavioral economics has risen to prominence by identifying the myriad ways in which human beings fail to follow the assumptions of the standard model of economics, yet that field remains deeply and stubbornly rooted in principles of cognitive psychology. This dissertation research is motivated by a desire to combine insights from behavioral economics and economic sociology and to put these two fields of study into conversation with one another.

This work focuses on the closely related concepts of economic risk and rationality, and the consequences that social relations, culture, institutions, and technology have for activities like saving and investing, borrowing and lending, and financial risk-taking. Drawing on unique research sites, original data collection and survey-experiments, as well as qualitative analyses of primary and secondary sources, I explore an ensemble of themes that show both the social construction of rational expectations and the way society itself generates “irrational” behaviors in practice that vary depending on social position. This project mobilizes a rich conceptual array of sociological insights to challenge the cognitive-psychological preoccupation of behavioral economics. At the same time, it advances economic sociology by highlighting how social forces directly influence individual decisions, and not necessarily acts involving transactions or other matters concerning two or more economic actors.

The persistent through-line in all this work is to identify those sociological factors, and not only the role of cognition, that are also crucial for individual economic evaluations of matters like risk-taking and one’s degree of economic rationality. Each strand in this dissertation yields important empirical and theoretical insights that describe, for instance, how those in some groups (e.g., among the poor or uneducated) can make systematically imprudent economic choices that perpetuate class distinctions and wealth and income inequality—with already financially disadvantaged demographic groups like women or minorities further penalized. This work also reveals how the objective enactment of economic rationality, which is now an empirical fact brought about via technological systems, can have both desirable and undesirable ramifications for individuals, for the structure of markets and economic institutions, and for society as a whole.

Introduction

People make private economic decisions for themselves all the time—insular decisions that are made entirely for and by one’s own self. This is increasingly relevant in a financialized world where individual judgments related to household and personal finances play an ever-greater role in our present and future welfare. Decisions like whether to finance purchases with debt (e.g. credit cards, mortgages, auto loans, etc.) or how to invest money (in general, or more specifically for e.g. retirement or college savings) are ubiquitous in contemporary Western society. Some choices may seem trivial, such as using a credit card to pay for a meal. Others, like selecting the portfolio for a retirement plan, are more consequential. Nevertheless, either case imposes some reflexive evaluation or deliberative decision in the face of uncertainty: can you afford the interest on the next credit card bill? Are you able to tolerate potential losses in the stock market? For those who answer “no”, that meal out is more likely forgone, or investments in riskier assets or projects are avoided. Certainly, for some people, saying “no” is the appropriate and rational choice; but, for others it can preclude worthwhile opportunities that contribute positively to one’s economic wellbeing. Likewise, spending on credit or engaging in speculative investments may be quite sensible for some but irresponsible for others, resulting in financial hardship.

Conceivably, the life chances and individual outcomes of those people who are more inclined to consistently make “beneficial” or “rational” economic judgments for themselves will begin to differ and diverge from those who regularly make “detrimental” or “irrational” ones—as the consequences from decisions like these, large and small, compound over time. *Just who, or what type of person, and/or under what circumstance are people more or less apt to exhibit patterns of “beneficial” versus “detrimental” economic behavior is thus an important, but largely overlooked, question for sociology.* Note that when I say “beneficial” or “detrimental” I do not

make a moral judgement, but rather speak to decisions that promote or detract from one's objective financial wellness. Indeed, modernity demands logics of calculative reason that lead to rational outcomes in order to achieve upward mobility and maintain socioeconomic status. Free market capitalism demands it, since competition will penalize or drive out those who are less instrumentally rational and reward those who are. In fact, this feature is crucial to Marx's analysis of the capitalist mode of production. Today, financialization demands it, since economic decisions that were once the province of social institutions like governments, employers, or civic groups have been offloaded onto the shoulders of individuals. From matters of healthcare and educational savings to retirement planning and even day-to-day budgeting of credit and spending, individual missteps can be disastrous in the absence of a functioning social safety net.

Economic sociology certainly recognizes behavior that is difficult to explain as rational, but it primarily looks to agents' network ties (e.g., DiMaggio and Louch, 1998; Granovetter, 1985; Uzzi, 1997) or interpersonal relationships and relational roles (e.g. Zelizer 2012). But, while economic sociology has much to say about when, with whom, and to what degree an individual might exchange with a social relation or else with some anonymous arms-length counterparty, it remains largely silent on those economic matters that are confined to a single actor. This is not to suggest an atomistic view of economic action (cf. Granovetter 1985); on the contrary, I recognize that different people living in different social worlds adopt different worldviews that inflect the decisions they make, even in apparent isolation. I also recognize the influence of social ties and the relational work that accompanies those ties in the form of earmarks that change the tenor of an economic choice or transaction, even if that earmark is separated in time or space from the relations it binds. And, I recognize the role that technology plays in the social construction of rational

expectations, by equipping individuals with calculative devices and though automating certain decisions on behalf of economic actors.

In this dissertation, I leverage sociological theory to uncover novel insights about what drives individual economic behavior and decision-making in modern society. In particular, I am interested in how such behaviors and decisions fit in or deviate from the demands of objective rationality to reveal social-structural antecedents of individual economic choice that could subsequently bear on the long-term reproduction of economic inequality as people simply go about living their lives. By looking at how individual economic action is inflected by social forces like culture, institutions, social relations, and technology, this project moves sociology forward and also puts it in conversation with behavioralist strands of economic thought.

Individualized economic decisions have, for decades now, been the domain of behavioral economics, which has identified and catalogued the myriad ways in which human beings systematically deviate from the apocryphal rational actor assumed by the neoclassical model (e.g. Kahneman, 2011; Thaler, 2012). Behavioral economics, rooted firmly in the principles of cognitive psychology, is part of a larger body of social science research that deals with judgment and decision making (JDM). JDM researchers focus on the choices people make, and as Bruch and Feinberg (2017: 207, 211) point out, “sociological research on choice [instead] emphasizes how features of the social environment shape individual *outcomes*, not people’s underlying decision processes” Bruch and Feinberg add that JDM researchers are, at the same time, prone to overlook the social environment within which people are making choices because of JDM’s primary focus on psychological processes occurring within the minds of isolated individuals. Economic actors, however, are never completely isolated, even when making otherwise private financial evaluations. This project is therefore also responding to recent calls to better assimilate the

concepts of judgment and decision-making into sociology (Bruch and Feinberg 2017). Such concepts include individual beliefs and preferences and how these inform the choices people make. Sociologists, as Vaisey and Valentino (2018:133) point out, ought to be concerned with the social processes by which people come to hold these preferences. Research that straddles both sociology and JDM increasingly acknowledges the role that both context and emotion play in informing subjective judgments; while also recognizing that culture, position in the social structure, and interpersonal dynamics are crucial for shaping context and informing personal dispositions (Bandelj 2020; Bourdieu 2000; Bruch and Feinberg 2017; Hayes 2020; Lizardo and Strand 2010; Robinson, Smith-Lovin, and Wisecup 2006). And, while cultural sociologists, in particular, have taken up the mantle in this respect (Lamont et al. 2017; Leschziner 2019; Lizardo, et al. 2019; Vaisey 2009; Vaisey and Valentino 2018), JDM has yet to become prominent within *economic sociology* despite the long-standing position that transactional outcomes and economic dispositions are as much (or even more-so) a product of situational demands as they are of rational calculation (Bourdieu 2000; Cetina and Bruegger 2001; Elster 1988; Granovetter 1985; Lamont, et al. 2017; Smith 1989). This project seeks to address this omission.

Indeed, the main strands of contemporary economic sociology seem to have left the individual actor behind, in a way. Smelser (1963: 27–28) described the nascent sub-field of economic sociology at the time as dealing broadly with interactions among groups and institutions along with social controls like norms and sanctions that operate in modes of exchange. In defining the intellectual contrast between “economics” and “economic sociology”, Smelser and Swedberg (2005: 4) affirm, “To put the matter baldly, the analytic starting point of economics is the individual; the analytic starting points of economic sociology are typically groups, institutions, and society.” Meanwhile, the socially formed “actor-in-society” perspective has largely been

relegated to classical discourses in social theory, in favor of the “actor-in-*interaction*” view which has since dominated. Indeed, Smelser and Swedberg (Ibid.) continue, “Often, moreover, sociologists take the group and the social-structural levels as phenomena *sui generis*, without reference to the individual actor.”

This was not always the case: Weber famously put forth the idea that Calvin’s doctrine of predestination imparted the “spirit of capitalism” that subsequently propelled utilitarian economic conduct as a mandate shared by individuals across Western society, “building the tremendous cosmos of the modern economic order” (Weber, 1949). In his broader work comparing world religions, Weber (1915) was among the first to recognize that the specific character of a social structure had a significant and direct effect on individual human conduct, and especially in the realm of economic behavior. Indeed, “the Puritan *wanted* to work in a calling,” he remarked (Ibid., emphasis in original), with ascetic temperaments in the religious sphere transfigured into economic dispositions that favored hard work and “a bourgeois, economically *rational* way of life” (Whimster, 29; emphasis in original).¹

Following Marx, who furthermore identified a difference in the embodied “class consciousness” that motivated different economic worldviews of those individuals occupying either the laboring or capitalist class, Weber understood that “empirical-historical events occurring in men's minds must be understood as primarily psychologically and not logically conditioned” (Weber, 1949: 96). In a recent re-analysis of Weber’s sociology, Terpe (2020) argues that the various “spheres of life” (*Lebensordnungen*) identified by Weber (e.g. economic, political,

¹ Tocqueville would similarly recognize the *mores* institutionalized into personal preferences and manners among members of different strata of society; and Durkheim in the individually-held morals, norms, and values resulting from various degrees of group solidarity based on the economic division of labor (for more on Durkheim and social cognition, see: Kurakin, 2020).

aesthetic, religious, etc.) can be construed as ideas in the minds of people and operating below the level of consciousness, “these ideas and images, in turn, are important for the courses of action people take and thereby also for the reproduction and change of social entities themselves” (Terpe, 2020: 26-27).²

Such an actor-centric approach to Weber’s spheres of life was later identified by Bourdieu (1992: 17) as a point of convergence with his own work, where the various partitions of modern social life could be re-cast as *fields*: the social terrain on which action takes place, each with its own particular prescriptions, values, and regulatory principles that become elementary to one’s embodied propensities—i.e. their *habitus*. Bourdieu understood the mental templates received by individuals in some facet of social life to be fundamentally relational, based on one’s objective position within the internal structure of a particular field. Here, Bourdieu argues against Weber in that he reformulates the boundaries between social structure and individual action not as permanent or invisible but instead via ongoing processes of competition or struggle among individuals “defined by their rank in the distribution of competing powers or species of capital”.

The theoretical and empirical pursuit of the chapters in this dissertation are thus bound by the following threads that tie each together into a cohesive piece of novel research and a contribution to the field of sociology:

- 1) A focus on the individual economic actor as a social being, even when making apparently private decisions. Re-orienting economic sociology to the individual actor greatly expands this subfield’s existing body of knowledge and expertise that understands group or institutional-level phenomena.

² *Lebensordnungen* has also been translated alternatively as “life-orders” or “value-spheres” (*Wertsphären*). See Swedberg & Agevall (2016: 369); Whimster (2004: 409).

- 2) An engagement with the otherwise cognitive-psychology focused field of behavioral economics, building bridges with that influential and rich body of work. This project does not reject behavioral economics' cognitive claims but recognizes these as incomplete. My work complements existing behavioral economics work to capture a fuller understanding of economic choice and behavior.
- 3) Substantively, and related to the pair of points above, each chapter interrogates the social construction of rational choice, and especially in the context of financial risk-taking or decisions made under conditions of uncertainty.
- 4) Each chapter, including the empirical studies, draws from and contributes to sociological theory. Rather than relying on one theoretical framework to motivate my studies, I instead leverage a rich conceptual basket in the sociological tradition, including more recent thinkers in economic sociology (e.g. Granovetter, Zelizer, Fourcade, Callon, and MacKenzie) as well as drawing from classical thought (Weber, Marx, Simmel, Foucault, and Bourdieu). With the latter, I also contribute to an emerging body of work that applies classic sociological theories to evaluate contemporary perspectives in human behavior.
- 5) The empirical portions in this dissertation utilize multiple methods, drawing on unique research sites and featuring original data collection. Quantitative techniques including ordinary least squares (OLS) and logistic regression, interrupted time series analysis (ITSA), differences-in-differences, and original online survey-experiments reveal the presence of sociologically-relevant phenomena that allow for hypothesis testing, measurement, and, in some cases, causal claims. While I am, of course, interested in the presence of an outcome or its effect size, I am also greatly interested in

understanding mechanisms of action and the data-generating processes at work. As a result, my empirical work also draws a great deal from autoethnography, in-depth interviews, and textual analyses of primary and secondary sources (e.g., free text responses on survey instruments and archival records, respectively). In combination with the statistical techniques, these qualitative analyses deliver far richer insight, contextualization, and theory development. I thus view research methods as a toolkit that should be used in various ways to answer the research question at hand. If, starting out with quantitative methods the presence of a social phenomenon is revealed, qualitative data can provide a better of understanding of *why* the numbers appear as they do. Alternatively, if qualitative methods lead inductively to a set of hypotheses, quantitative approaches such as experimentation can evaluate their validity. Mixed methods are increasingly well-received in sociological research, yet it is still not as prevalent in studies of economic sociology. With my empirical strategy, I advance the methodological range available to this subfield.

Organization of the Dissertation

As I have noted, while the psychological approach adopted by behavioral economics has indeed been generative, its narrow focus on the enclosed individual mind creates important blind spots that preclude scientific inquiry into the following points that are of both practical importance and sociological interest: 1) how social forces that transcend the individual mind mediate or moderate already identified phenomena such as loss aversion; 2) that sociological insights can reveal novel empirical phenomena that have little grounding in cognitive processes, and so have gone unnoticed; and 3) how the use of behavioral economics in practice or as policy has a performative effect that influences economic action in non-trivial ways (e.g. “nudging”), especially when the

principles of behavioral economics become embedded in technological systems that automate finance.

Considering each of these three points in turn, my dissertation work reveals in new ways the role that social relations, culture, institutions, and technology have on economic action such as saving and investing, borrowing and lending, and financial risk-taking and how the resulting economic or financial choices bear on income and wealth disparities.

Part I: Social Factors that Mediate or Moderate Already-Identified Phenomena

Behavioral economics has done an excellent job collecting and categorizing the myriad ways in which human beings deviate from the rational expectations of the standard model of economics in everyday life. The behavioral canon includes now well-known “errors” or “anomalies” in choice such as loss aversion, hyperbolic discounting, bounded rationality, and confirmation bias, among several others. Prominent scholars in the field including Nobel prize winners Daniel Kahneman and Richard Thaler have chalked up these empirical findings entirely to cognitive failings, perhaps driven by the biological evolution of the brain to favor survival over thousands of generations.

Without ignoring the reality of the brain’s role in obtaining and processing information, this part of my dissertation seeks to identify other, non-cognitive, factors that complement the established rationale behind biases like loss aversion, or which can help explain heterogeneity in the strength of biases observed across different individuals.

In “The Behavioral Economics of Pierre Bourdieu” (in *Sociological Theory*), I argue that supra-individual aspects of social life, and in particular culture and one’s objective position in the social structure, can provide new insights into staple behavioral economics concepts. In this paper, I make the case that Bourdieu’s conception of field and habitus provides an alternative framework

where social structure and mental structure constitute one another, and cognitive tendencies toward apparent “irrationality” can be either curtailed or amplified based on one’s position in the economic field and on his or her corresponding set of dispositions. I bracket irrationality in quotes because, following Bourdieu, I argue that economic rationality itself corresponds to a set of particular expectations and measures that are socially and historically constituted and not to some objective reality. Bridging economic sociology and behavioral economics, this theorizing also bears on issues of persistent economic inequality reproduced through self-defeating patterns of economic behavior inculcated into those who occupy dominated positions in the social structure.

New research that builds on this paper is now underway to test my ideas quantitatively, and initial results are encouraging that, empirically, those with greater relative volume of cultural capital are indeed more prone to economic faux pas while those more endowed with economic capital tend to make more “rational” decisions, and with interesting gender differences. I include excerpts from this paper (co-authored with Megan Bea) as an addendum to this first paper chapter.

Part II: Novel Phenomena Revealed through Sociological Inquiry

Even as some economists have recently shown tacit openness in looking to “culture” or “identity” to help explain individual behavior (albeit in quite mechanical and often superficial ways), other facets of the sociological toolkit remain hidden to the behavioral economics project. Drawing from Viviana Zelizer’s relational economic sociology, I have produced a pair of papers that reveal how specific relational roles and the “earmarks” associated with them cause previously unrecognized deviations in individual evaluations of economic risk that cannot be readily explained by cognitive psychology. Indeed, risk-taking is a fundamental part of the behavioral economics enterprise, one which is of increasing practical importance as financialization creeps into the household and the individual self.

In the paper chapter “The Social Meaning of Financial Wealth: Relational Accounting in the Context of 401(k) Retirement Accounts” (in *Finance and Society*) I focus on Fred Wherry’s concept of relational accounting, showing how contemporary culture and shared meaning inflect financial risk-taking in individual retirement accounts following market crashes. This quantitative chapter utilizes interrupted time series analysis (ITSA) and a differences-in-differences approach on administrative 401(k) data to reveal that retirement investments are uniquely valorized in ways consistent with the shared meaning of “retirement” in contemporary society.

As an addendum to this paper chapter, I also include “Earmarking Risk: Relational Investing and Portfolio Choice” (in *Social Forces*, co-authored with Rourke O’Brien). It uses a set of vignette experiments to establish a theory of relational investing. This theory predicts that people choosing investments on behalf of close other as custodian (e.g. a child, spouse, or elderly parent) take on systematically more or less risk depending on the investment’s earmark (see: Zelizer 2012). In particular, we find any earmarked investment is more conservative than investments made for one’s own self; and, a portfolio earmarked for a child is by far the most conservative. Moreover, this research extends the theory of relational accounting to show that intersubjectively-understood labels placed onto investment accounts (e.g. a child’s college savings or a spouse’s retirement account) provide even greater symbolic weight, causing a further reduction in risk taking.

Both of these papers have practical implications in that, paradoxically, following social forces rather than psychological errors reveals a discrepancy between the objective chances of success in achieving personal financial goals like (e.g.) college planning or retirement security and the subjective aspirations of parents or 401(k) savers. This suggests an interesting irony, where cultural meanings may actually undermine their own fulfillment; put differently, because “college”

and “retirement” are so culturally salient, people make “irrational” economic decisions that make them harder to achieve in contemporary society.

Part III: The Socio-Technological Construction of Rational Action

The first two parts of this dissertation investigate social mechanisms that generate various patterns of economic choice that lead to more or less rational outcomes. These chapters describe how non-cognitive and supra-individual mechanisms can lead people to appear as irrational economic actors. Scholars in the fields of STS and the Social Studies of Finance, however, reject using the strawman construct of *Homo economicus* altogether as a foil (still used by some sociologists) to attack or downplay economists’ views of individual action and choice. “Yes, *Homo economicus* does exist,” writes Michel Callon (1998: 22), “but [he] is not an a-historical reality; he does not describe the hidden nature of the human being. He is the result of a process of configuration.” In this third part of my dissertation, I explore this process of configuration of rational outcomes as it emerges from the mobilization of calculative competencies and the technological articulation of economic theory. I accomplish this through two related paper chapters that derive from an in-depth multi-methods case study looking at “roboadvisors.” These are a new and important class of low-cost digital financial advisor that provides automated investment management online with minimal human intervention via algorithms to automatically allocate, manage, and optimize clients' assets – and which now manage portfolios for millions of users worldwide, amounting to trillions of dollars of assets under management. Put differently, these technologies are used by individuals to outsource their financial decisions.

To be sure, even as psychological and social factors act on individuals to produce sub-optimal economic decisions, financial technologies are enrolling increasing numbers of ordinary people into financial cultures that promote new forms of financial inclusion through peer-to-peer

payments, online lending and borrowing, adoption of alternative digital currencies, and automatic investment management platforms, among others. Here, I try to understand how such financial technologies configure lay market participants in accordance with paradigmatic models of financial economics, while using behavioral economics as a *disciplinary* system—ranging from subtle corrective nudges to overt reprimand—that orients economic action toward rational outcomes. In short, this strand of my work explores how, and what happens when, financial technologies can indeed conjure *Homo economicus*.

“The Active Construction of Passive Investors: Roboadvisors and Algorithmic ‘Low-Finance’” (in *Socio-Economic Review*) focuses on the disciplinary aspect of design elements and various nudges embedded in these technological systems, demonstrating how behavioral economics is employed to restrain and objectify lay investors in the spirit of correcting peoples’ detrimental natural propensities. Drawing on Foucault, I show how these nudges along with automating investment decisions and enforcing a principle of being completely hands-off vis-à-vis the market has implications that bear on agency, market structure, and regulatory regimes.

The second paper, “Enacting a rational actor: Roboadvisors and the algorithmic performance of ideal types” (in *Economy and Society*), builds the case that roboadvisors do, in fact, enact lay investors as rational market actors and bring about some version of *Homo economicus* through algorithmic devotion to a renowned model of financial economics called modern portfolio theory (MPT), which the roboadvisors embody, automate, and perform. Through this example, I show how socio-technical systems such as these can perform Weberian ideal types as empirical fact, no longer the hypothetical constructions of the social scientist. At the same time, this presents a clear empirical example of economic performativity by making economic outcomes more aligned with the rational actors described by MPT. I also identify structural and institutional

consequences that can lead subsequently to damaging instances of counter-performativity. Indeed, if we take the limiting case where every single market participant is able to behave rationally, then the market cannot be efficient and the model itself falls apart.

Both papers show that roboadvisors mobilize both neoclassical and behavioral economics, in which their joint use, in effect, actually functions as a counterperformative invalidation of the latter. The irrational aspects of human nature are well-recognized by roboadvisors, but the influence of these is greatly minimized through strict adherence to MPT while strategically deploying behavioral elements as disciplinary checks. Put differently, the corrective usage of behavioral economics makes roboadvisor users appear less like the behavioral model's depiction of investors – leaving users to appear instead as MPT-following ideal types. This provokes questions around whether it is socially desirable for everybody to act rationally, even if it is individually attainable.

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Part I

Chapter 1. The social meaning of financial wealth: Relational accounting in the context of 401(k) retirement accounts³

Behavioral economics is now a dominant academic discipline with a well-known set of theories that have been proposed to explain economic action as it exists in practice. Despite its popularity and growing legitimacy alongside neoclassical economics, it remains under the limited purview of wholly psycho-cognitive explanations – analyzing behavior at the level of individual minds in relative isolation. To be sure, Mullainathan and Thaler (2000) define behavioral economics as “the combination of psychology and economics that investigates what happens in markets in which some of the agents display human limitations and complications”. Richard Thaler went on to win the Nobel Prize in economics in 2017 for his work on “incorporating psychologically realistic assumptions into analyses of economic decision-making”.⁴ It is no surprise, then, that research associated with the field of behavioral economics has followed predominantly cognitive underpinnings as the likely source of ‘irrational’ decision making (see also DellaVigna, 2009; Camerer et al., 2005). This article seeks to confront such a taken-for-granted position by considering the important role of social forces in explaining certain aspects of economic action that cannot be thoroughly explained by psychological factors alone.⁵

³ In *Finance and Society* 5(1), 61-83

⁴ Source: https://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2017/press.html

⁵ To be clear, I am not arguing that cognitive or psycho-emotional factors play no part in ‘irrational’ patterns of economic action; instead, I maintain that top-down influences from culture and society also contribute to the way economic actors actually behave. Nor am I arguing against the definite importance of the embeddedness approach of the new economic sociology (e.g. Granovetter 1985), where one’s social network ties can be crucial in explaining objectively sub-optimal financial decisions (e.g. Uzzi 1999). Rather, I take a new direction altogether building off of a cultural-relational approach rooted in Viviana Zelizer’s (1989) social meaning of money principle as a rival explanation to behavioral economics in cases where the social overrides the psychological.

Recent work by economic sociologist Frederick Wherry (2016, 2017) marks out a distinction between the well-known behavioral economics concept of mental accounting (Thaler, 1985) and what he refers to as ‘relational accounting’. Mental accounting is the practice whereby people apportion certain pots of money to serve different practical purposes rather than treating all money as fungible, where “money in one mental account is not a perfect substitute for money in another” (Thaler, 1999: 185). Following a social approach to money (Zelizer, 1989, 1997), relational accounting focuses on the cultural and symbolic value placed on certain transactions that imbue particular funds with special meaning. As Wherry (2017: 59) puts it, “relational accounting represents the sociological counterpoint to mental accounting in that it uses cultural, moral, and relational processes to develop an interpretive science of choice and decision making ... Unlike mental accounting, however, relational accounting locates individual decision making in the moments of the life cycle that are culturally meaningful and collectively enforced and in overarching moral structures”. Thus far, initial support for relational accounting has been found in the context of charitable donations (Bandelj, et al., 2017) and with informal lending and borrowing (Wherry, 2017). This article extends the scope of relational accounting as justification for the fact that people are also apt to valorize different forms of household wealth (i.e. different types of financial accounts) based on distinguishable social and symbolic importance, especially if such accounts are earmarked for explicit ritual events or life stages.

In this study, I take as an illustrative case a particular pattern of risk behavior that presents itself in 401(k) accounts held by American retirement savers.⁶ The distinction I will make is that the behavioral response to a market shock in a 401(k)-retirement account differs in a novel way

⁶ While the 401(k) account is specific to the American context, defined-contribution individual retirement accounts are becoming increasingly the norm in many parts of the world, and so the symbolic value of these retirement accounts is indeed a global concern.

from that of a general investment account. Leading (behavioral) economic theories do a good enough job explaining the investor response in such a general-purpose brokerage setting, but they cannot explain the case of the 401(k) since these theories overlook the definite social meaning attached to this form of financial wealth. Under normal conditions we observe retirement savers as either active investors who recalibrate their portfolio risk each year to some optimal level, or else passive investors who make fixed pension contributions that are invariant to the regular ups and downs of the market (Benartzi and Thaler, 2007; Chetty et al., 2014). An economic crisis, however, works as a convenient device to reveal its unique pattern of financial risk taking. Due to the significance of retirement as a distinct life stage, it is reasonable to predict that 401(k) savers ought to feel compelled to shift funds out of risky assets (i.e. stocks) and into safer investments (i.e. bonds or cash instruments) and leave this new, more conservative strategy in place even as markets recover, lest they gamble with their future; what I call a pattern of *durable conservatism*. On the surface, this might be mistaken for the behavioral economics notion of loss aversion, which has in fact been identified among individual brokerage accounts. But, the correct way to interpret loss aversion is that in response to economic losses people actually tend to *increase* their risk-taking in hopes of breaking even, since locking in a loss is psychologically uncomfortable - i.e., the pain of a realized loss exceeds the utility from an equivalent gain (Kahneman and Tversky, 1979). Loss aversion thus tends to magnify losses that eventually can lead to financial ruin. What I am describing for retirement accounts is quite the opposite: when stocks fall, retirement savers have the propensity to lock in losses and protect what is left of their savings, reducing the perceived danger of financial ruin in the future. The primary goal is not to maximize expected return or to shy away from losses but to protect and conserve what has been dutifully accumulated. In other words, the social and symbolic trappings that are tied to retirement savings supersede

psychological tendencies observed elsewhere. So, while brokerage accounts that exhibit loss aversion can be explained by psychology, retirement accounts that show durable conservatism can best be explained by sociological theory.

My claim may at first seem straightforward: that when markets crash people recoil and decrease their risk exposure for long periods. Yet, this apparently *prima facie* case, as I will show, challenges several predominant theories of economic action. This article proceeds as follows. In the first section, I describe how expectations of retirement in contemporary society are bound up with individual retirement accounts. In the next section, I briefly sketch out current theories of financial risk taking from the perspective of neoclassical and behavioral economics, highlighting in particular the findings related to loss aversion (Table 1 summarizes how these theories predict the risk response to a market shock). Next, I show empirically that severe bear market years in 2002 and 2008 caused Americans to actively recalibrate their 401(k) investment portfolios, reducing risk exposure where it then remained moderated.⁷ This study utilizes these bear market events as quasi-natural experiments using interrupted time series analysis (ITSA) to help make these claims. Finally, I present a theoretical discussion before concluding. The contributions of this article are relevant for social science research and moreover have practical implications for the financial industry, policymakers, and retirement savers themselves.

⁷ A bear market is typically defined as an annual decline in price of 20% or more.

Table 1: Prevailing Risk Theories: How Exposure to Severe Losses in Stocks Ought to Influence Portfolio Risk-Taking

Theory	Predicted Δ Risk-Taking
Rational Actor: Fixed & Stable	Increase, Re-adjust to baseline risk level
Rational Actor: Risk a Function of Wealth	Decrease, then increase with stock gains
Prospect Theory: Loss Aversion	Increase
Prospect Theory: Status Quo Bias	No change (passive)
Prospect Theory: Availability Bias	Decrease, then increase with stock gains
Relational Accounting	Decrease, then remain subdued despite stock gains

The Locus of Individual Retirement Accounts

Saving for retirement is a financial priority for many Americans, a pursuit that ever more relies on ordinary individuals to make their own investment decisions and bear the brunt of market risk (Hacker, 2006; Ghilarducci, 2010).⁸ As the practice of saving for retirement has moved away from corporate pension guarantees to the sole responsibility of individual workers, the intense emotional and symbolic value that modernity places on the institutions of retirement – understood as an aspirational phase of life in which it is socially acceptable to be without work (Weiss, 2005) – is magnified. Robert Weiss’ (2005) ethnography of the experience of retirement speaks to the romanticism that is placed on this ‘Third Age’ of the life cycle, as well as to the shared anxiety and sense of disappointment when retirement goals fall short. Collective definitions of what retirement means and what financial security in retirement entails serves as a powerful normative pressure not to ‘gamble’ with one’s retirement savings.

As a social institution, retirement involves prevalent beliefs and ideologies that result from an interplay among various interest groups such as management, labor, and the government (Atchley, 1982). Until the Civil War, retirement was infrequent and employer pensions did not yet exist. People worked until they could no longer, and the elderly tended to be valued for their

⁸ ‘Saving’ is a bit of a misnomer since retirement assets are primarily invested in risky assets. For consistency, however, I stick with the commonly used savings terminology.

wisdom, virtue, and experience (Fischer, 1978). The mid-1800's saw the rapid growth of industrialization, which changed the social logics of retirement. The rising need of employers to cut costs led to obligatory retirement of the oldest (and typically most expensive) workers. Private pensions sprung up as an immediate solution; but while an ideology of publicly-supported retirement arose in Europe (notably in Bismarck's Germany), the American government chose to leave retirement security to employers. Structural changes in the early 1900's toward Taylorism rationalized the industrial workforce, where attitudes toward retirement were shaped by the growing belief that older workers were useless (Atchley, 1982). The turn to 'scientific' management led corporations to rebuff their pension obligations, and the poverty rate among the older population in the U.S. rose to over 40% in the 1920's (Fischer, 1978). Only the Great Depression encouraged the creation of social security, which arose out of political pressure to provide economic security to those rendered destitute by forced retirement, age discrimination, and pressure to reduce the size of the labor force (Graebner, 1980); it had little to do with the concept of retirement as a reward for a lifelong career (Atchley, 1982). During World War II, the image of retirement began to shift in a positive direction. Older workers were suddenly recognized as useful with much of the younger labor force sent to war. In 1940, Congress drafted tax advantages for employers who contributed to pension plans, and in 1947 the Taft-Hartley Act established retirement pensions as a legitimate issue for collective bargaining (Graebner, 1980). These policy measures greatly incentivized corporations to offer private pensions and encouraged unions to demand them as a standard benefit. Attitudes among workers were also advancing. In 1951, Ash (1966) surveyed steelworkers and found that most saw retirement only appropriate for the sick or disabled; a decade later the majority believed that it was justified if the worker wanted to retire and could afford it. By the 1970's Americans had learned to want retirement, and the clear

majority of workers could rely on their employer to support their standard of living in old age. Retirement became a rite of passage, ritualized through workplace farewell parties and commemorated with gold watches.⁹

Changes in how Americans save for retirement since the 1980's – in particular, the shift from guaranteed pensions to individual retirement accounts – have fashioned a generation of self-responsible retirement savers. Under rules established by the Employee Retirement Income Security Act of 1974 (ERISA) and the Revenue Act of 1978, the 401(k) plan quickly evolved from its original purpose as a SERP (supplemental executive retirement plan) – intended as an enhancement to traditional pensions for use by upper management – into the primary retirement savings vehicle utilized by all employees in an organization. The arrival of the 401(k) plan marked an institutional shift in the employer-employee relationship where companies transferred the burden of investment management and market risk directly on to the individual worker, while at the same time reinforcing one's moral duty to achieve a comfortable retirement in spite of that. The 401(k) became a staple benefit advertised by employers, and by virtue of these accounts stock ownership in the United States has grown from a contrivance of the affluent to a phenomenon that now involves the attention of more than half of all households who no longer find themselves mere bystanders to market jolts.¹⁰ Those who would otherwise possess little material exposure to stocks find themselves de rigueur market participants, with their retirement security intrinsically linked to the successes and failures of the market – risk that had been shouldered by employers in the past. To be sure, in 1979 nearly two-thirds of newly hired private-sector employees enjoyed a

⁹ The tradition of giving gold watches for retirement supposedly originated in the 1940's with The Pepsi Co.; the concept was “you gave us your time, now we are giving you ours”.

¹⁰ Source: SIPP (2014); Gallup (2015): <http://www.gallup.com/poll/182816/little-change-percentage-americans-invested-market.aspx>

guaranteed defined-benefit pension plan for their retirement security; by 2013 that number had fallen to just 3%.¹¹ Over the same period the number of households with a 401(k) rose to nearly 70%.¹²

Today, retirement is an expected and salient life stage, yet without the assurance of a company pension to fall back on individuals implicitly have nobody to blame but themselves for accumulating too small of a nest egg. A recent financial services industry survey finds that more than 2 out of 3 Americans in a representative sample said that they believed they had “a moral obligation to manage investments responsibly” (Brodeur, 2015: 8). At the same time, the report concludes that such a moral obligation tends to be focused on one undivided goal: “Americans showed considerable ambivalence about the importance of leaving a financial legacy for family and dependents. They were more interested in a comfortable retirement” (Ibid.). The retirement account *itself* comes to signify the aspirations for the future – a dénouement of leisure and freedom after work has ceased – and the 401(k) embodies the potential to validate that accomplishment. Saving for retirement thus turns out to be laden with personal as well as social meaning: a share of stock in your 401(k) plan is valorized with emotional and symbolic importance that differs qualitatively from the same share held in another type of account. Moral beliefs about being a responsible retirement saver are fundamentally external to the individual and so structure reactions to financial risk. Wherry (2017: 67) argues that moral considerations vis-à-vis relational accounts more generally “are not only privately and individually held but are also collective and intersubjectively shared”.

¹¹ US Dept. of Labor 1979-1998, Employee Benefit Research Institute (EBRI) 1999-2013.

¹² Source: <https://www.federalreserve.gov/econresdata/2015-economic-well-being-of-us-households-in-2014-retirement.htm>

It is useful here to contrast the retirement account with the designated brokerage account as a locus for stock ownership: while most Americans own stocks through any means, just 4% of households in 2013 owned a brokerage account (Panis and Brien, 2015). This location typically serves the aim of general wealth accumulation as opposed to the singular goal of retirement security, making these accounts far less likely to carry the same shared symbolic value, and accordingly brokerage accounts may be treated in a more instrumentally rational fashion based or subject to cognitive errors or individual affective dispositions. It is true that owning either type of account is voluntary, yet there is a strong normative pressure in American society to be a diligent retirement saver; this norm does not carry over to investing in general (e.g. Thaler and Benartzi, 2004). Brokerage accounts are also most likely to be owned by financially sophisticated individuals or the wealthy. Indeed, Panis and Brien (2015) show that approximately half of those who do own brokerage accounts occupy the top decile of the income distribution and around three-quarters belong to the top quartile. As I will explain in greater detail in the following section, empirical work on brokerage accounts shows that investors typically fall victim to the biases of behavioral economics, and especially to loss aversion.

Theories of financial risk-taking in mainstream and behavioral economics

Much of the economics literature holds risk-taking as a rational calculation, with informed agents weighing risk decisions against their utility function (Arrow, 1965). Consistent with a rational actor model, risk aversion is endowed as a constant for each individual, stable over time. In support of this claim, several survey studies have shown remarkable constancy of risk tolerance for individuals over time (e.g. Sahm, 2012; Roszkowski et al., 2005). This reasoning predicts that a downturn in stocks should induce *no* change in risk-taking, and that portfolio composition should

be rebalanced regularly to the utility-maximizing level of risk. Allowing for some leniency, some economists have adopted the Arrow-Pratt model that treats risk aversion as a function of wealth (Pratt, 1964; Pratt and Zeckhauser, 1987). Under these assumptions, risk-taking would indeed decrease following a downturn, but would have an equal tendency to increase following market gains.

Observations suggest that far from maximizing rational expectations, individuals are influenced by emotions and cognitive errors, especially when it comes to financial decision making. Foundational work by Kahneman and Tversky (1979) has cataloged dozens of biases to which people are prone, collectively assembled under the umbrella of ‘prospect theory’. Loss aversion reveals that people systematically prefer to avoid losses to a much greater extent than to receive an equivalent gain: losing twenty dollars is more agonizing than the delight of receiving the same amount. The disposition effect predicts that because of loss aversion investors are hesitant to sell losing stocks and realize their losses (Shefrin and Statman, 1985). Rather than lock in a sure loss, investors choose not to sell during a downturn and will, in fact, be tempted to increase their exposure to risk in the hopes of breaking even. Doubling down at the casino after a run of bad luck is one example of the loss aversion in practice. Odean (1998) studied trading records of 10,000 individual brokerage accounts and found evidence that people showed a strong preference for holding on to losers and selling winners. In experimental studies of simulated stock trading, Weber and Camerer (1998) as well as Chui (2001) find further evidence of the disposition effect in the lab. This phenomenon has also been shown to occur in real estate markets (Genesove and Mayer, 2001) and in the context of corporate mergers and acquisitions (Baker et al., 2012), to name just a few. Loss aversion will be expanded upon in the following sub-section, but it is important to

identify other potential outcomes grounded in prospect theory in order to rule them out as explaining investment behavior in retirement accounts.

Behavioral economics also identifies the *status quo bias*, whereby investors are reluctant to make changes to portfolios due to the cognitive and emotional effort involved and so leave things as-is (Samuelson and Zeckhauser, 1988). In other words, the status-quo bias produces passive investors. In a simulated investment setting, Brown and Kagel (2009) find that test subjects commonly ignore both favorable and unfavorable information and continue to hold on to a stock regardless of its performance. Closely related is regret aversion, where investors avoid taking decisive action because they fear that, in hindsight, whatever course they take will prove deficient (Loomes and Sugden, 1982). The fear of regret causes results in a passive investor paralyzed by imaginable regret, with a pattern of behavior that would mimic the status quo bias.

There exists a bias that could produce yet a different result. The availability (recency) heuristic claims that people assign too much weight to recent events causing them to overreact one way or the other (Tversky and Kahneman, 1973). For example, Frieder (2003) and Goetzmann et al. (2016) show that stock traders tend to overreact, both positively and negatively, to new information. Here, we would expect to see conservation strategies following shocks followed by aggressive strategies in the wake of bull markets. Behavioral economics thus predicts any of three outcomes: that a shock will tend to increase risk taking due to loss aversion; induce a passive strategy due to regret aversion or the status quo bias; or fluctuate sharply with the ups and downs of the market due to availability.

Loss aversion: How people behave in their brokerage accounts

Leading theories thus propose several potential outcomes that might describe investor behavior (although none would correspond with durable conservatism). In particular, patterns of loss aversion seem to be most commonplace in the scholarship looking at actual brokerage account

data to understand how individuals actually behave in the market. As mentioned above, loss aversion manifests itself as the disposition effect among investors, which was first introduced into the finance literature by Shefrin and Statman (1985: 777), referring to the tendency that “investors exhibit a reluctance to realize losses ([a] disposition to “ride losers”) even when the precepts of standard theory prescribe realization”. With the availability of account-level transaction data, the disposition effect has become a widely documented empirical regularity (Frazzini, 2006). Notably, Odean (1998) found strong evidence of this behavior in the trading records of ten thousand individual brokerage accounts even after controlling for the effects of transaction costs, taxes, and portfolio rebalancing. Similar patterns of loss aversion were found to occur among Israeli investors (Shapira and Venezia, 2001), and in Finland drawing on a data set of the daily transactions and shareholdings of virtually *all* Finnish investors over a three-year period (Grinblat and Keloharju, 2001). Results from Kaustia (2004) also show that investors of initial public offerings (IPOs) are reluctant to sell their shares if there is an initial drop in price.

Closer analysis suggests that investor sophistication (proxied by socioeconomic factors) can result in somewhat less vulnerability (Dhar and Zhu, 2006); however, professional traders are nevertheless quite susceptible to loss aversion in their own practice. Locke and Mann (2000) analyzed the trading behavior of professional futures traders and found that all members of their sample held on to losers longer than to winners; and Coval and Shumway (2000) reported similar evidence of loss aversion among professional market-makers at the Chicago Board of Trade. And, with regard to mutual funds, Wermers (2003) showed that portfolio managers of underperforming funds, too, appeared reluctant to sell their losing stocks.

It is clear from these studies that investors are likely to exhibit loss aversion in their brokerage accounts as they experience market swings – they hold on to risky assets when they

experience a price decline rather than locking in a sure loss. Yet, a systematic market failure like that which accompanied the 2008-2009 financial crisis could plausibly produce different results. However, this does not seem to have been the case based on several studies looking specifically at that episode. Dorn and Weber (2013), for example, found that the overall allocation to stocks of individual investors in a representative sample of 40,000 self-directed clients at one of Germany's largest retail banks remained stable between 2007 and 2011, suggesting that people did not rotate out of stocks. Likewise, Hoffman, Post, and Pennings (2013) combined monthly survey data with matching trading records of more than 1,500 individual investors to examine what drove trading and risk-taking behavior during the 2008-09 crisis. They concluded that people did *not* de-risk their investment portfolios by shifting out of risky investments; instead, "individual investors use the depressed asset prices as a chance to enter the stock market" (Hoffman et al., 2013: 72). Furthermore, Liu and Wang's (2014: 6-7) study of more than 15,000 individual investors in China during the same period showed that people did not withdraw their capital from the equity market during the crisis; instead, "the net flow patterns were consistent with the disposition effect, *which was even stronger during the crisis ... that behavioral biases such as the disposition effect are amplified during a crisis*" (emphasis my own). These studies indicate that loss aversion actually increased in brokerage accounts during the market crash as investors intensified exposure to risky assets.

If bear markets induce a different aggregate pattern of investor behavior in retirement accounts as opposed to the findings referenced above – indeed, if a crisis provokes exactly the opposite of the disposition effect, where people sell their losses and reorient toward more conservative allocations – it would speak to a qualitatively unique outcome that affirms a symbolic

meaning that can only be explained by social forces that permeate 401(k) money but not brokerage accounts.

Data and methods

401(k) accounts and individual investment selection

401(k) data are especially useful for several reasons. First, companies offer the same list of investment options for all their employees to choose, from entry level to senior managers. This implies that all eligible employees in an organization, regardless of rank or income, are exposed to the same opportunity set of potential investment options in their retirement plans. Second, qualified retirement accounts are structurally illiquid, intended as deferred savings vehicles. Early withdrawals carry a deterrent financial penalty of ten percent and are further subject to immediate payment of any deferred tax liability. All contributions made to a 401(k) plan are thus presumed to be long-term savings where consumption using those funds are explicitly postponed until retirement, making explicit this location is not only designated as a retirement savings vehicle, but also conforms to institutional restrictions that limit alternative uses.

A third feature is that 401(k) allocations are strictly self-selected by employees without any input or nudging from their employer; people choose their own portfolios. This is accomplished by choosing from among a menu of investment options, by choosing a target-date fund, or by filling out a risk profiling questionnaire administered by a financial advisor. Regardless of how the initial asset allocations are made, 401(k) plan participants are free to change their portfolio weights at any time, at little or no cost. It is important to realize that it is the individual saver that changes their asset allocations and not professional portfolio managers. Savers invest in mutual funds with a stated investment mandate that will not deviate from its strategy based on market conditions. For example, investing in a bond fund will yield a portfolio consisting always of 100%

bonds, although the exact composition of bonds may change, the overall asset class allocation does not. Any changes in asset class distribution are left up to the individual saver.

Data and measurement of risk taking

A concern in the financial risk literature is that the bulk of empirical evidence so far comes from experimental or survey sources. It is not convincing that these instruments portray actual risk-taking behavior. Real financial risks are likely to be perceived quite differently from hypothetical choices and in a much more complex way than in an experimental set-up (Slovic, 1969; Kuhberger et al., 2002). Moreover, many experiments rely on undergraduate volunteers who are unlikely to have practical experience with financial decision making. Lönnqvist, et al. (2015: 263) crucially find that oft-used survey and laboratory measures of risk that ask respondents if they would opt for risky bets (lottery-choice) “show no construct validity, almost no predictive power, and most importantly no robust test-re-test stability”. In this study, I make use of data realistically free from these issues.

I draw on aggregate end-of-year 401(k) asset allocations taken from repeated cross-sections published by the Employee Benefit Research Institute (EBRI) in collaboration with the Investment Company Institute (ICI), annually from 1997-2016 (see: Holden and VanDerhei et al., 2000-2018).¹³ These published results summarize data found in the EBRI/ICI 401(k) database, which consists of many millions of individual 401(k) retirement accounts across tens of thousands of participating employer plans in the United States.¹⁴ Although the author did not have direct access to the 401(k) database itself, the aggregated data are nevertheless conducive for my analysis.

¹³ Repeated cross-sections are likely to capture changes to the distribution of wealth in the population over the study period.

¹⁴ For 2016, the EBRI/ICI database included 27.1 million individual 401(k) plan participants at 110,794 employer plans, totaling \$2 trillion in assets.

Market analyses are often undertaken at this level of analysis as economists (see e.g. Shleifer, 2000; Fehr and Tyran, 2005) often maintain that individual idiosyncrasies in market behavior are cancelled out by aggregation (cf. Yan, 2010).

The data presents 401(k) portfolio weights for each year broken down by asset class. To make the analysis more generalizable, I simplify these to three archetypal asset classes: stocks; bonds; and money market.¹⁵ I make use of large, representative mutual funds as standard benchmarks for historical stock and bond asset class performance over the study period: The Vanguard Total Stock Market Index Fund (VTSMX) for stocks;¹⁶ and the Vanguard Total Bond Index Fund (VBMFX) for bonds. I proxy 3-month U.S. Treasury bills for money market funds.¹⁷

Using these asset class weights, I construct a quantified measure of portfolio risk. To naïvely consider weights to stocks, bonds, and cash may be a useful heuristic for gauging portfolio riskiness, however, it is not very precise. Modern portfolio theory (MPT) points out that interaction effects between asset classes matter when evaluating the risk of a diversified portfolio (Markowitz, 1952), and combining risky assets does not necessarily dictate that the overall portfolio risk will increase. In other words, adding risky assets to a portfolio is a process of diversification and not summation. Fortunately, it is possible to use MPT to back out risk more correctly, using portfolio standard deviation (σ_P) as a valid proxy for total financial risk (Fama and MacBeth, 1973). The

¹⁵ From available asset classes in the EBRI/ICI 401(k) data, I exclude those 401(k) plans that include any allocations to company stock and/or guaranteed investment contracts (GICs). Company stock is too idiosyncratic and cannot simply be lumped together with broadly diversified stocks. I add 60% of balanced fund assets to stocks and 40% to bonds. A balanced fund is a mutual fund strategy generally consisting of 60% stocks and 40% bonds. Target-date funds are combined with balanced funds in the data prior to 2007, so I continue to combine target-date funds with balanced funds from 2007-16 to maintain consistency across the study period.

¹⁶ The Vanguard Total Stock Market Index is designed to provide investors with exposure to the entire U.S. equity market, including small-, mid-, and large-cap, growth and value stocks.

¹⁷ The terms ‘cash’ and ‘money market’ are used interchangeably here. Money market funds invest primarily in risk-free short-term government securities, which can be represented generally by 3-month U.S. Treasuries.

procedure for generating the portfolio standard deviation for a three-asset portfolio is defined by

Equation 1:

$$\sigma(p_{a,b,c}) = (w_a^2\sigma_a^2 + w_b^2\sigma_b^2 + w_c^2\sigma_c^2 + 2w_a w_b \sigma_a \sigma_b \rho_{a,b} + 2w_a w_c \sigma_a \sigma_c \rho_{a,c} + 2w_b w_c \sigma_b \sigma_c \rho_{b,c})^{1/2} \quad (1)$$

where σ_p is portfolio standard deviation, σ_i^2 is the historical annualized variance of asset class i over the study period, w_i is the weight of asset class i in the portfolio in year t , and $\rho_{i,j}$ is the observed correlation of annualized returns for asset classes i and j over the study period. Table 2 indicates asset class performance during the study period in addition to the above calculations for overall 401(k) asset weights found in the data.

Table 2: Historical Annual Asset Class Returns (%) | Average 401(k) Asset Weights (%) and Portfolio Risk (1997-2016)

Year	Annual Returns			Avg 401(k) Asset Weights			Risk	
	Stocks	Bonds	T-Bills	Stocks	Bonds	MoneyMkt	σ_p	$\ln(\sigma_p)$
1997	30.99	9.44	5.05	74.10	15.60	9.40	13.58	2.6086
1998	23.26	8.58	4.73	74.20	15.00	8.40	13.60	2.6101
1999	23.81	-0.76	4.51	76.92	12.88	7.70	14.12	2.6476
2000	-10.57	11.39	5.76	76.46	12.84	7.50	14.04	2.6419
2001	-10.97	8.43	3.67	70.50	18.10	9.70	12.88	2.5557
2002	-20.96	8.26	1.66	62.18	24.02	11.10	11.28	2.4230
2003	31.35	3.97	1.03	66.14	22.66	8.30	12.03	2.4874
2004	12.52	4.24	1.23	66.24	22.66	6.60	12.05	2.4891
2005	5.98	2.40	3.01	67.96	23.64	6.00	12.36	2.5145
2006	15.51	4.27	4.68	68.48	21.32	7.40	12.48	2.5241
2007	5.49	6.92	4.64	68.74	21.56	6.90	12.52	2.5273
2008	-37.04	5.05	1.59	56.70	27.80	12.10	10.24	2.3263
2009	28.70	5.93	0.14	60.52	26.68	8.50	10.96	2.3943
2010	15.09	6.42	0.13	60.90	26.00	6.50	11.03	2.4001
2011	0.96	7.56	0.03	60.30	27.60	6.70	10.91	2.3900
2012	16.25	4.05	0.05	59.74	27.16	6.60	10.81	2.3805
2013	33.35	-2.26	0.07	63.84	22.96	6.30	11.60	2.4510
2014	12.43	5.76	0.05	65.16	23.24	5.30	11.85	2.4723
2015	0.29	0.30	0.21	65.68	22.22	5.20	11.96	2.4807
2016	12.53	2.50	0.51	66.22	23.38	4.60	12.04	2.4882

Interrupted time series analysis

Interrupted time series analysis (ITSA) is based on a multiple linear regression model where trends of the dependent outcome variable are observed over time. The objective of ITSA is to introduce

one or more break points as explanatory variables, allowing the trend to break and change both in intercept and slope in a manner that cannot be explained by random variation. In this study, break points occur at the end of years 2002 and 2008.

Following the dotcom bubble of 2000-2001 and a brief slide post-9/11, the stock market experienced modest down years, but began a steep and steady decline beginning in March 2002 reaching lows not seen since 1997. 2002 ended up being the worst year for the stock market in three decades, with the S&P 500 index recording a 22% annual loss and the Nasdaq composite index down 31.5%. From their March 2000 highs to their October 2002 lows, the Nasdaq declined by nearly 80%, and the S&P 500 by 50%, causing investors to lose more than \$9 trillion of market value. In 2008 the market again crashed, with the S&P 500 losing nearly 37% and the Nasdaq 41%, erasing \$11 trillion of investor wealth and ushering in the Great Recession, according to the Financial Crisis Inquiry Commission's 2011 report. Thus 2002 and 2008 represent the two bear market (treatment) years that went into the interrupted time series analysis.

When judging the impact of market shocks on American retirement savers, the treated group is measured at the national level. In such situations, it is common that the only data available are reported as aggregates – such is the case with the EBRI/ICI data. With reference to using aggregate-level data with ITSA, Linden (2015: 389) advises, “if multiple observations on an outcome variable of interest in the pre-intervention and post-intervention periods can be obtained, an interrupted time-series analysis offers a quasi-experimental research design with a potentially high degree of internal validity” (see also: Shadish, Cook, and Campbell, 2002). This analysis follows Linden to detect and measure the causal effect of bear market years on 401(k) portfolio risk, where the dependent variable in this study is the log-transformation of $\sigma(p_{a,b,c})$. The natural logarithm is used to stabilize regression variances and due to the nature of the data as naturally

right-skewed – asset prices are bounded by zero to the downside but have unlimited upside potential and so follow a log-normal distribution.

ITSA produces least-squares estimates along with Newey-West standard errors according to the generalized form in Equation 2, when the error terms follow a first-order autoregressive (AR(1)) process (Equation 3):

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \varepsilon_t \quad (2)$$

$$\varepsilon_t = \rho \varepsilon_{t-1} + u_t \quad (3)$$

where Y_t is the aggregated outcome variable measured at each equally spaced time point t , T_t is the time since the start of the study, X_t is a dummy variable representing pre- or post-intervention, and $X_t T_t$ is an interaction term (Linden and Adams, 2011; Linden, 2015). β_0 is the intercept at time 0 and β_1 represents the baseline linear trend prior to the treatment. β_2 is the level shift immediately following the treatment event and is compared against the counterfactual: had the prior trend $\beta_0 + \beta_1 T_t$ continued uninterrupted. β_3 represents the change in trend slopes before and after treatment. A statistically significant coefficient in β_2 suggests a causal effect in the pre- and post-intervention level.

On top of this single-group analysis, I introduce simulations as controls to determine if a significant change in β_2 is the result of human agency or due to mechanical processes (see the following sub-section). Equation (2) is thus expanded to allow for a multi-group analysis that includes four additional terms (Linden and Adams, 2011; Linden, 2015):

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z X_t + \beta_7 Z X_t T_t + \varepsilon_t \quad (4)$$

where Z is a dummy variable that labels placement in the treatment group or control (simulation) group. Here, β_4 represents the *difference* in initial level from the control to the treatment group, and β_5 the difference in initial trend. β_6 is the main coefficient of interest, representing the difference in level shift pre- and post-treatment between the simulation and observed groups. A

statistically significant β_6 would indicate that the event causes an effect on the observed group that cannot be explained by the counterfactual represented by the simulation. I consider two treatment events over the study period: in 2002 and in 2008, reproducing equations (2) and (4) back-to-back as it were, where the post-treatment trend effectively becomes the succeeding pre-treatment trend line (Linden, 2015).

Simulations to control for mechanical effects

From the initial ITSA results, it is clear that there exist sharp drops in 401(k) portfolio risk at each treatment year; however, it is yet unclear to what extent human agency is responsible. It is conceivable that these observations are due entirely to a purely mechanical mechanism, *i.e.* so-called portfolio effects. A portfolio of stocks and bonds becomes objectively less risky if the value - and corresponding portfolio weight - of stocks declines sharply. If this process alone can explain these results, then the hypothesis that market downturns cause retirement savers to re-orient their risk behavior is far less convincing.

To extricate human agency, I construct two alternative simulations that represent counterfactuals for what we would expect to see if portfolio effects explained everything. The first simulation makes the strong assumption that *all* retirement savers are 100% passive. A passive investor makes no active changes to their portfolio composition at any point in time; they ‘set it and forget it’. To construct this, I model a hypothetical portfolio composed of 74.5% stocks, 16% bonds and 9.5% money market as initial allocations, which corresponds approximately to the initial observed portfolio allocations at the beginning of the study period.¹⁸ The relative weights of each asset class are then left to vary annually in-line with actual historical price returns (see the left-hand column of Table 2). I refer to this as the passive simulation.

¹⁸ The simulation portfolio allocations are slightly different from observed since observed allocations may not add up to 100%. The initial $\ln(\sigma_p)=2.654$ for both the observed and simulation.

The passive simulation is a conservative comparison as it makes the improbable assumption that everybody is completely passive. In fact, we know this is not the case. Some retirement savers are so-called *active* investors who systematically rebalance their portfolio weights on a regular basis to the initial levels, and industry estimates tell us that typically 20-30% of 401(k) savers do actively rebalance at least once a year.¹⁹ There is also a growing normative message to encourage active rebalancing among retirement savers from investment professionals and academics alike (e.g. Benartzi and Thaler, 2007; Calvet et al., 2009). Moreover, 401(k) assets assigned to balanced funds and to target-date funds will automatically rebalance to their intended strategic allocations even if a saver is otherwise passive. The EBRI/ICI data show that such allocations account for some 20-30% of total 401(k) assets. It is more realistic, then, that around half of retirement savers are active while the other half remains passive. I therefore create a second counterfactual that averages the passive simulation with a 100% active simulation (where each year portfolios are re-balanced to the initial baseline allocation weights).²⁰

Control variables

Control variables are introduced to account for macroeconomic events or phenomena that might reasonably confound the analysis. The control variables include annual changes in U.S.: (1) civilian unemployment to account for job losses during economic downturns; (2) nominal GDP to control for economic growth and periods of recession; (3) 10-year treasury yields as a proxy of long-term credit risk, where higher yields signal greater risk; (4) Fed funds target rate which the central bank uses as a tool to spur or reign in economic activity, where lower rates signal greater risk; (5) Case-Shiller National Home Price Index to control for changes in housing wealth; (6)

¹⁹ Source: <https://www.psc.org/401-k-plan-research>

²⁰ The active simulation by itself is thus represented as a horizontal line corresponding to the portfolio risk of the baseline allocation.

CBOE Volatility Index (VIX) as a measure of broad financial risk; and (7) the personal savings rate to control for non-retirement savings. All data for control variables were obtained from the St. Louis Federal Reserve's FRED tool.

Results

The ITSA results are presented visually in Figure 1 and enumerated in Table 3 below.

Table 3: Interrupted Time Series Analysis Estimates of the Effect of Severe Bear Stock Markets on Aggregate 401(k) (log) Portfolio σ as a Proxy for Risk Aversion (1997-2016)

	(1) All 401(k) Assets	(2) Passive Simulation	(3) Differences (1-2)	(4) Active & Passive Simulation	(5) Differences (1-4)
Constant	2.539*** (0.042)	2.556*** (0.060)	-0.017 (0.007)	2.576*** (0.029)	-0.037 (0.032)
Baseline trend	-0.003 (0.009)	-0.002 (0.011)	-0.001 (0.010)	-0.005 (0.015)	-0.002 (0.007)
Level shift after 2002 bear mkt	-0.161*** (0.032)	-0.111*** (0.034)	-0.050* (0.028)	-0.062* (0.029)	-0.099*** (0.053)
Trend shift after 2002 bear mkt	0.032* (0.015)	0.042* (0.018)	-0.010 (0.007)	0.021 (0.008)	0.011 (0.013)
Trend 2002-08	0.0317** (0.009)	0.0374*** (0.013)	-0.006 (0.004)	0.021 (0.007)	0.007 (0.009)
Level shift after 2008 bear mkt	-0.226*** (0.050)	-0.181*** (0.031)	-0.045*** (0.016)	-0.097* (0.053)	-0.129*** (0.042)
Trend shift after 2008 bear mkt	-0.008 (0.063)	-0.004 (0.007)	-0.004 (0.005)	-0.007 (0.016)	-0.001 (0.011)
Trend 2008-16	0.018*** (0.005)	0.028*** (0.003)	-0.010*** (0.002)	0.014* (0.009)	0.004 (0.009)
Controls	Yes	Yes	Yes	Yes	Yes
<i>F</i>	99.75	30.51	179.93	40.22	160.62

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Notes: The constant represents the natural log of the initial portfolio risk for the start of the study period. Column (1) are the observed results visualized in Figure 1. Column (2) are the results of the passive simulation by itself, and column (4) of the average of the passive and active simulations. Column (3) controls for the passive simulation, column (5) for the average of the active and passive simulations using differences-in-differences (See Figure 1).

The passive simulation models a hypothetical portfolio endowed with the same portfolio allocation as observed at the beginning of the study, whose portfolio weights vary each year corresponding to historical asset class returns. The passive simulation assumes that 401(k) participants do not alter their portfolio composition at any point.

The active simulation models a hypothetical portfolio endowed with the same portfolio allocation as observed at the beginning of the study, whose portfolio weights remain fixed at all times. The active simulation assumes that all 401(k) participants each year actively rebalance their portfolio allocations to the initial allocation. Column (4) models the averages of the passive and active simulations and represents a counterfactual where half of 401(k) assets are passive and the other half rebalanced each year.

Controls represents a vector of control variables, annual changes in U.S.:(1) civilian unemployment; (2) nominal GDP; (3) 10-year treasury yields; (4) Fed funds target rate; (5) Case-Shiller U.S. National Home Price Index; (6) CBOE Volatility Index (VIX); and (7) the personal savings rate. All data obtained from the St. Louis Federal Reserve (FRED). Models were estimated both with and without controls, with no substantive difference in results.

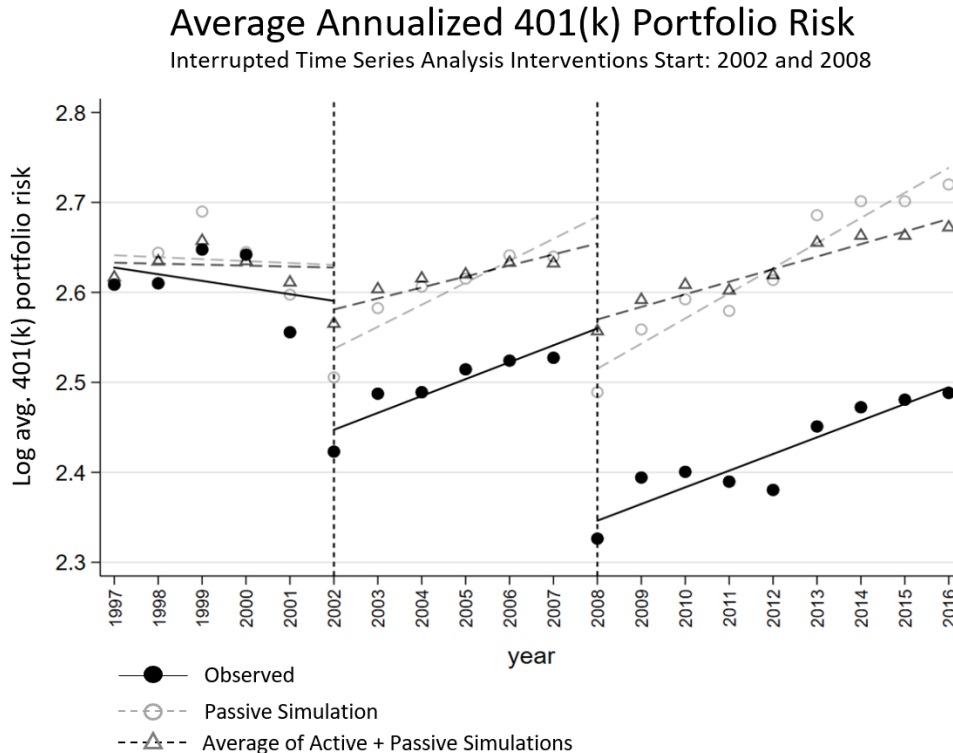
Column (1) in the regression table shows that the 2002 bear market marked a 16.1% decrease in the average level of 401(k) portfolio risk, and that 2008 caused a further 22.6% reduction (relative to the reference trend from 2002-08), both highly statistically significant drops. The slopes of the new trends after 2002 and 2008 are also statistically significant implying that linear interpolation seems an appropriate fit.

Despite statistical significance in coefficients of interest, we are yet to rule out mechanical changes to portfolio composition. I compare these initial results first with the passive simulation: Column (2) shows that starting from effectively the same baseline level and trend, a fully passive investor would have seen her portfolio risk drop by 11.1% and 18.1% in 2002 and 2008, respectively. Column (3) estimates the differences-in-differences between the observed and passive simulation results with corresponding standard errors. The net effect from the 2002 bear market is large (5.0 percentage points), and significant at better than the 10% level. The difference attributed to the 2008 drop is statistically significant at the 1% level: 4.5 percentage points of the 22.6% change – or one-fifth of the total effect – cannot be attributed to passive investing and is therefore the result of investor behavior to create less risky allocations. The gradual rise in risk taking post-2002 is parallel to that of the passive simulation– indicating that these non-crisis years are more or less described by passive investing, without any marked increases in risk behavior. However, the post-2008 trend does mark an increasingly risk-averse trajectory with each year growing 1% more conservative relative to the passive simulation.

Columns (4) and (5) repeat the same exercise but use what I argue is the more realistic counterfactual, that is the average of the passive and active simulations. In this case, the changes in portfolio risk produced by both the 2002 and 2008 market events are highly statistically significant– with human agency explaining roughly two-thirds of each drop. Trend shifts and post-

shock trend slopes are indistinguishable from the counterfactual after both 2002 and 2008, showing that the effects of a severe bear market are plainly unidirectional (there are no sharp increases in risk-taking when the stock market rises comparably) and long-lasting (the new trend lines stay well below the simulation with slopes parallel to it). In fact, what this set of results suggests is that shocks encourage people to re-allocate their 401(k) portfolios to more conservative holdings, and then they return to business as usual. The non-disjoint, gradual upward risk slopes during non-treatment years are not statistically different from the simulation, again suggesting that post-treatment up-trends are merely described by the mechanical response of stocks recovering in value over time.²¹

²¹ A question arises regarding the initial asset allocations for the simulations: What would happen if we began the study a year or two before or after? The passive simulation, since it reflects only changes in asset prices would see no difference, as it is agnostic to starting point so long as the simulation's initial allocation matches the observed. The active simulation, however, would shift up or down depending on the starting observed portfolio risk, where starting with a lower initial risk level would increase the standard errors of the level shifts in column (5). A sensitivity analysis shows that statistical significance for the year 2002 at $p < 0.10$ is lost when the initial risk target for the active simulation is $\ln(\sigma_p) = 2.52$, a risk level that is surpassed in all years prior to 2002. So long as the study begins before that year, all findings are consistent. If the study were to start after 2002, the 2008 results would still be significant compared to the passive simulation, and since that is the more conservative counterfactual those results too, would remain consistent.

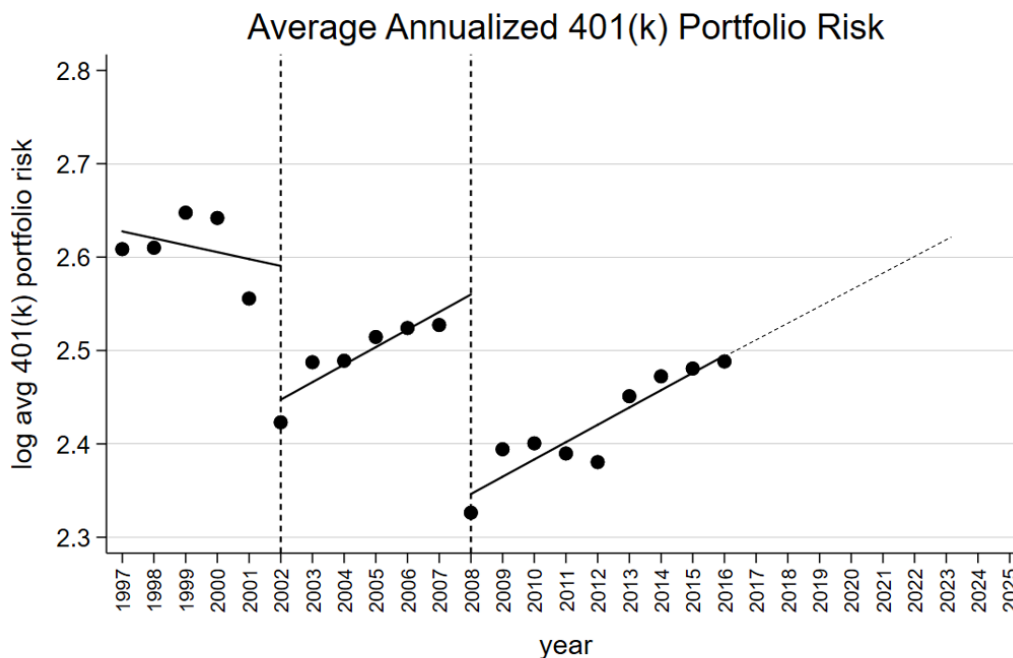
Figure 1: Graphical Output from Interrupted Time Series Analysis of 401(k) Portfolio Risk

Notes: Graphical output from the multi-group ITSA of average annualized 401(k) retirement portfolio risk over time compared to the passive simulation (open circles) and the average of the passive and active simulations (open triangles), with treatment events occurring at years 2002 and 2008. Observed data are plotted in black.

In bear market years (i.e. 2002 and 2008) the decline in portfolio risk exceeds that of the simulations, ruling out mechanical effects. If it is not mechanical effects, then it must be the retirement savers themselves who alter their own mix of stocks, bonds, and cash. It is not plausible that another actor would be making these decisions – it would not be portfolio managers since they are required to follow the stated strategy of the mutual fund they supervise; and it would not be the financial advisors (if there were access to one), who in fact implore investors not to panic sell during a crisis, but to stay the course and take advantage of the opportunity to buy stocks when they're low. Although portfolio risk does recover gradually after a shock, this rise is attributable to mechanical effects corresponding to a rising stock market and not to a change in behavior geared toward more aggressive portfolios - an asymmetry where market downturns produce a striking

effect, but equivalent positive years do not elicit the converse. This is confirmed by the fact that post-shock trends share similar slopes with the simulations.

Shifting out of stocks following a severe bear market reinforces the steadiness of 401(k) plans, but this can also lead to underinvestment in stocks for retirement savers. In finance, the antithesis of risk is return; by shunting portfolio risk, expected return is also diminished. The upshot is that many retirement savers might find that their 401(k) accounts have not generated sufficient returns to maintain their standard of living at retirement and only to face the choice: compromise consumption habits or else work longer into old age. Ultimately, the social meaning of retirement funds could unfortunately serve to exacerbate the retirement readiness crisis and create more danger than it hoped to avoid, with the youngest of savers (who have the longest time horizon) most vulnerable. Extrapolating the 2008 level and trajectory of aggregate portfolio risk past the end of the study period, it would take until approximately the year 2023 to return to pre-2002 levels, barring any intervening contingencies (See Figure 2).

Figure 2: 401(k) Retirement Portfolio Risk Trajectory

Notes: This figure extrapolates the trendline estimates from 2008-2016 onward. Based on the observed 2008 risk level and trajectory, it would take until approximately the year 2022 for 401(k) retirement portfolio risk to return to its pre-2002 levels, barring any intervening contingencies. This figure further illustrates that risk-taking attenuates markedly after the 2002 and 2008 bear markets; however, many positive years do also occur in the non-treatment years (see Table 2). Despite many more positive years than negative years, even when some of these positive years are quite substantial, risk taking remains subdued.

Limitations in the data and its analysis

Some limitations of the empirical study above are worth mentioning. First, the aggregate-level data employed, although appropriate for this analysis, precludes any further investigation using individual-level data. Such granularity could paint a much richer picture and bring out potential differences in behavior based on ascribed characteristics such as race or gender. Because the interrupted time series analysis here evaluates differences between observed and counterfactual controls, the aggregates used would not be subject to an ecological inference problem that could presumably arise in correlational inference. Put differently, any ecological fallacy that would exist in the observed aggregate data would reproduce itself in the simulations, and thus cancel each

other out. The data is segmented broadly by income group and age decile; however, carrying out similar analyses as above on these sub-groups yielded no significant results.

A potential concern could be that many retirement savers simply cashed out their 401(k) plans early in times of great losses, despite penalties due, which may reasonably occur with a greater frequency among those who experience financial pain in other areas of their lives during these periods, such as those experiencing falling home prices or increasing credit card debts. If retirement savers on the lower end of the socio-economic distribution are most affected by multiple financial harms, and if that demographic is also the most naturally risk averse, their absence could bias the results. However, this is unlikely: changes to both mean and median end-of-year 401(k) account balances before and after treatment years correspond to the average losses experienced by stocks at those times (Holden et al., 2013:11). This tells us that there were not widespread withdrawals from 401(k)s in 2002 and 2008, just a reallocation of existing funds. Moreover, controlling for changes in housing wealth, unemployment, and the savings rate did not alter the results in a meaningful way.

Discussion and Conclusions

The utilitarian approach to money – that all dollars are interchangeable with one another – is an idea that had only been challenged in earnest since Viviana Zelizer’s program to uncover the social meaning of money (1989, 1997).²² She puts forth that rather than being fungible, people “assign different meanings and designate separate uses for particular kinds of monies,” following up that, “not all dollars are equal” (1989: 343). The meanings we ascribe to different monies depend on the context from which they are obtained and from whom they are received (how different money

²² Sociologists since Marx and Weber have thought about money as a social construct or involving social relations, (and, also notably Simmel and Knapp), however money had always been framed primarily as an economic object.

is 'earmarked'). At the time, Zelizer commented that, "[M]oney remains confined primarily to the economists' intellectual domain; its noneconomic aspects have not been systematically explored" (Zelizer 1989: 343). Along with colleagues, this agenda has gone on to produce a wealth of empirical and theoretical contributions that have increased our understanding of money as a sociological object. This article extends Zelizer's program to an adjacent object of study whose noneconomic aspects remain yet to be explored: *loci* of financial wealth – and in doing so evaluates the specific relationship with financial risk associated with these locations by moving away from an economic or cognitive viewpoint and toward a sociological one.

By locus, I mean to address the type or context of a financial product as it relates to a household's overall portfolio of wealth. Rather than asking about money, I challenge the dominant assumption that *wealth* is fungible; not all accounts are equal. The semantic contrast between "money" and "wealth" is of increasing importance as financialization encroaches upon households through a plethora of offerings from mortgages and home equity loans (Aalbers, 2008) to mutual funds, trading accounts, student debt, car loans, and various forms of retirement products (Fligstein and Goldstein, 2015). Wealth is not merely money in and of itself but is segregated into these various products and investments. Indeed, Davis (2009: 193) argues that households are adapting to a 'portfolio society'; where "investment becomes the dominant metaphor to understand the individual's place in society". More recently, Aalbers (2017: 2) describes the financialization of the household itself where "financial motives, rationales, and measures become increasingly dominant, both in the way individuals and households are being evaluated and approached, and in how they come to make decisions in life". It is thus appropriate to begin exploring the social meaning of household wealth, invested in financial loci that serve various symbolic goals.

A particular financial locus (account) has meaning related to its specific history, corresponding to the institutions and other social structures that support and interact with it. For instance, an individual retirement account (e.g. an IRA or 401(k) plan) will be bound up with the institution of retirement, which is itself enmeshed with values attached to work, family, and the life course. A child's college savings accounts will similarly be tied to expectations of educational attainment, parental responsibility, and consequent employment. An inter-vivos trust will involve intergenerational transfers of wealth and establishing a legacy. Dependent to all these are the past interactions – political, social, and economic – that have shaped the worldview of what (e.g.) retirement, college, and legacy mean in contemporary society. Each of these accounts, moreover, is referential to some culturally salient and socially recognized milestone in a person's life that engages shared systems of meaning.

Because of this, the meaning of a retirement account will be subject to the social meaning of retirement itself. The brief history presented earlier in the article underscores the fact that expectations of a conspicuous period of retirement in the life cycle is a fairly recent development, and one that is socially constructed and re-constructed. Even more recent is the common expectation that individuals are meant to save for their own future, make their own allocation decisions, and shoulder all the investment risk that their chosen portfolio will bear. The 401(k) renders financial what has become a ritualized transition from work to retirement, a rite of passage that is accompanied by some degree of economic uncertainty. According to Weiss (2005: 2) you are retired only if others see you as such. So, while retirement is decidedly a personal affair, it is also a socially affirmed one – and so too are the funds appropriated for that purpose.

New work exploring the concept of relational accounting (Wherry, 2016, 2017; Bandelj, Wherry, and Zelizer, 2017) has emerged that extends Zelizer's original project beyond money.

Rather than earmarking monies based on from whom it came and for what purpose, financial accounts that are earmarked for collectively endorsed life stages or ceremonial purposes come to embody shared, social, and symbolic importance. The meaning of retirement savings makes it a guarded locus of financial wealth, revealed by the fact that market shocks cause 401(k) plan participants to actively engage in a strategy of conservation – the disposition to realize losses and subsequently reduce risk exposure for a prolonged period of time. This constitutes a unique pattern of behavior that does not conform to prevailing theories from economics or behavioral economics; indeed, the observed pattern of risk behavior is more closely situated within a relational accounting or social meaning of money framework. Relational accounts are not simply designated for certain life-events but moreover come to crystalize those very milestones in definite forms of financial wealth. Such a conclusion not only provides a rival explanation to behavioral economics in terms of what monies are used for which purposes, but additionally *how* different forms of wealth are treated with respect to risk. We should therefore expect people to interact with these accounts in ways that deviate from purely economic predictions – not only with respect to one’s reticence to withdraw monies from them, but in how risk decisions are made within the boundaries of the account itself, even as the money is kept in its place. Put differently, relational accounting may be able to reveal a social-symbolic dimension of certain types of financial behavior that would be invisible to both mainstream and behavioral economics.

We know from prior studies that durable conservatism does not present itself in the case of general investment funds. We also know from an abundance of empirical evidence that investors demonstrate loss aversion (in the form of the disposition effect), which actually increases in intensity during a market crisis. What we see here is quite the opposite – rather than maintaining or increasing exposure to stocks, retirement savers lock in losses and decrease their stock allocation

weights. Retirement wealth is not treated with loss aversion but with loss prevention. Interestingly, Benartzi and Thaler (2007) seem to stumble across this same behavior in their now classic study of various retirement account heuristics, but they do not go on to pursue the finding at any level of depth. They write, “participants were already allocating 58 percent of their [retirement] assets to equities in 1992, and that percentage rose to 74 percent in 2000. In the next two years, however, the allocation to equities fell back to 54 percent. The market timing of ... participants in their exposure to equities was exactly wrong. *They bought high and sold low*” (Benartzi and Thaler, 2007: 92, emphasis my own).²³ Their data describes exactly what I find for the 2002 bear market, and which will repeat for retirement savers in 2008.

Strategies of durable conservatism correspond with contemporary dispositions toward retirement, and so retirement savers may believe they are acting in a morally responsible fashion. However, a looming unintended consequence is the potential for underinvestment in stocks. As long-term portfolios, both one’s ability and willingness to bear risk should reflect a high degree of tolerance in order to generate sufficient returns and to avoid a financial shortfall later in life. Paradoxically, adhering to social forces rather than to psychological errors, here may create an unfortunate discrepancy between the objective chances of retirement security and the subjective aspirations of 401(k) savers. This is suggestive of an interesting irony where cultural meanings may actually undermine their own fulfillment.

The fact that sociological theory can produce a compelling alternative - or at least a persuasive complement - to the dominant force of behavioral economics, which is firmly grounded in cognitive psychology, opens doors to exciting new lines of empirical research and theory

²³ Benartzi and Thaler (2007) had unique access to Vanguard 401(k) plan allocation data covering the period 1992-2002.

development. Most obvious is to continue the emergent work in relational accounting in juxtaposition to mental accounting, as well as further examining the symbolic meanings attached to various other types of earmarked financial accounts. As suggested previously, a child's college savings account, a trust account meant to endow a charity, a permanent life insurance policy with a spousal beneficiary, or an account set aside for the down payment on a first home are all examples of relational accounts yet to be explored. Various types of household debts as well, which are enumerated as negative balances earmarked in specific accounts, are also likely to be subject to relational accounting. While economic logics would predict repayment of different debts by order of highest interest rate to lowest, social logics may prioritize repayment of student loans or home mortgages – both of which correspond to symbolic and culturally important milestones – despite carrying objectively lower rates than, say, general purpose credit cards. Empirical work could reveal such a moral ordering of debts.

Still, several other directions can be followed that draw on the (non-economics) social sciences to explain the way economic actors behave in reality: to illuminate patterns unexplainable by cognitive factors alone; or to provide rival explanations for phenomena already explained psychologically. For instance, Bourdieu's conception of habitus might be operationalized as a way of explaining variations in phenomena such as loss aversion or time inconsistency bias based upon one's composition of capitals relative to their position in a particular field. This may help explain why Bernheim, et al. (2015: 3), among several others, find that the poor are much more likely to be present-biased and seek instant gratification - that "poverty perpetuates itself by undermining the ability to exercise self-control". We can no longer simply take for granted that "[t]he preference for immediate gratification captured in these studies appears to have identifiable neural

underpinnings” (DellaVigna, 2009: 318). At the very least the underpinnings are often socio-cognitive.

Another potential point of interest could be to merge sociological and cultural approaches to the risk literature that elaborates the collective response to manmade and natural disasters and map them onto financial crises and deep economic downturns. For instance, the social amplification of risk framework (SARF) following Kaspersen and Renn, et al. (1988) could provide a useful way for re-interpreting how people experience and respond to market crashes, hyperinflations, or the displacement of populations due to failures in the credit market – by framing these shared economic calamities as disasters in their own right. And of course, a final direction that can be pursued falling back on the new economic sociology, we could link social networks analysis and theories of social capital to the so-called emotional or affective biases (as opposed to what have been identified as cognitive errors) observed in behavioral finance. Each of these potential strands would certainly transcend behavioral economics and make for a more inter- or even post-disciplinary approach to explaining the way people actually behave in financial and economic situations.

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Chapter 1A. Earmarking risk: Relational investing and portfolio choice (w/ Rourke O'Brien)²⁴

More than ever, ordinary individuals find themselves responsible for making financial decisions pertaining to the allocation of investment portfolios (Hacker 2019). As financialization permeates the household (Fligstein and Goldstein 2015), market exposure comes to be a practical consideration for financial decisions made in retirement savings and other self-directed investment accounts (Ghilarducci and James 2018). Moreover, individuals are increasingly tasked not only with investing money for their own benefit, but for the benefit of close others. A child's college savings account (e.g. 529 plans) or a partner's retirement (e.g. 401(k) plans) are familiar examples where the practice of investing becomes unmistakably *relational*. While there is a small sociological literature that examines lay investors as an object of study (e.g. Roscoe 2015; Preda 2017), little is still known about how individuals invest on behalf of their social ties and how those relations subsequently influence financial risk-taking (but see: Bandelj, Wherry, and Zelizer 2017; Zaloom 2019).

This leads us to ask: How do people make investment decisions on behalf of various others? Do people invest their (e.g.) children's or partner's money differently from their own? Does financial risk tolerance differ when investing on behalf of a nephew versus your own child? What does this tell us about the nature of these relationships? And does that risk calculus change when the investment is designated for a culturally meaningful life event like college or retirement?

The answers to these questions don't simply bear on socio-economic theory—a relational approach to investing can have important real-world implications involving non-trivial sums. Take the case of college savings accounts, the most popular of which is the 529 plan in the United States.

²⁴ In *Social Forces* 99(3), 1086-1112

The amount of assets found in 529 plans grew to a record \$352 billion as of mid-2019, with the number of accounts rising to more than 14 million.²⁵ And, relational investing extends beyond just custodial accounts for minors. Studies of household financial management find couples often designate one spouse to make joint financial decisions (see Himmelweit, et al. 2013 for a review), including investing for retirement (Coile 2004). This suggests that some fraction of the nearly \$26.8 *trillion* currently held in 401(k)s and individual retirement accounts (IRAs) is invested relationally.²⁶

Extending Zelizer's (1989, 2012) framework, in this paper we propose a theory of *relational investing* wherein tolerance for economic risk—and consequent portfolio allocation—differs as a function of whether and for whom the invested dollars are 'earmarked'. In particular, we adopt Zelizer's (2012, 146) position that: “[f]or each distinct category of social relations, people erect a boundary, mark the boundary by means of names and practices, establish a set of distinctive understandings that operate within that boundary, designate certain sorts of economic transactions as appropriate for the relation, [and] bar other transactions as inappropriate... I call that process relational work.” Following Zelizer's use of categorical distinctions that fit with labels like 'friend', 'lover', or 'parent' (Ibid., 151), we show how distinct relational roles prime different negotiated meanings for investment monies that, in turn, inform risk behavior.

Earmarking imbues money with relational content that “assign different meanings and designate separate uses for particular kinds of monies... *Not all dollars are equal*” (Zelizer 1989, 343; emphasis added). Zelizer and others have demonstrated myriad ways in which earmarked dollars are treated differently in the context of spending and consumption. For example, Sykes, et al. (2015) show how low-income families earmark earned income tax credits (EITC) for special

²⁵ <https://www.collegesavings.org/529-plan-data/>, Accessed 2/4/2020.

²⁶ https://www.ici.org/research/stats/retirement/ret_19_q3, Accessed 2/4/2020.

purchases such as gifts for family members, and Stellar and Willer (2014) find that ill-gotten money (earmarked as “morally tainted”) is spent more carelessly than dollars earned through legitimate means. Bandelj, Wherry, and Zelizer (2017, 7) observe that people are more reluctant to spend money saved for a child’s education because “these funds represent and reinforce meaningful family ties – the earmarking is relational” (see also Zaloom 2019). Similarly, individuals are less likely to spend from emergency savings when those dollars are earmarked for someone else (Sussman and O’Brien 2016; for several more examples of earmarking, see Zelizer 2012).

Only investment monies—unlike spending, consumption, or production monies—are held in such a way that risk considerations bear directly on how that money is treated *in situ*. Indeed, *investment* monies by definition are uniquely oriented to the future. Goals and expectations that people have that carry shared meaning and moral weight will, too, bear on earmarked investment choices. Wherry (2016, 134-135) advances a theory of *relational accounting* that accommodates both the micro-level relational work involved with specific earmarks as well as with collectively-held codes that correspond to ritually marked moments or rites of passage. Financial goals such as retirement and college savings are thus morally fixed and structured. As a result, we would predict, for instance, that a retirement account or college fund would be allocated to a more conservative portfolio that coincides with the cultural meanings of those life events (see e.g. Hayes 2019). Indeed, the specific investment choices made on behalf of close others would be attuned to both relational roles and meaningful purpose (i.e. a child’s [relation] college fund [purpose]). Accordingly, a theory of relational investing is a sociological intervention into long-standing

debates in economics that deal with financial decisions made under conditions of uncertainty, known as *portfolio choice*.²⁷

Integrating insights from economic sociology, social psychology, and behavioral economics, we use a set of original vignette survey experiments to test how relational earmarking impacts financial risk-taking in two disparate contexts: gambling and investment portfolio choice. By documenting how relational categories and culturally salient life-stage events shape financial risk-taking we reveal yet another instance where culture and economic action are mutually constitutive. That is, when people invest relationally they systematically deviate from what the standard model of economics would predict in ways that are best explained sociologically.

Our findings could have important implications for uncovering unseen drivers of wealth disparities across individuals and between groups. If, for example, parents are systematically more risk-averse when investing on behalf of their children—particularly for a culturally meaningful life moment such as college—then these dollars may be underinvested and therefore less likely to generate sufficient returns to achieve their stated goal. Additionally, if some people treat earmarked dollars with higher levels of risk aversion than others—for example women relative to men (see e.g. Eckel, et al. 2008)—then such differences may result in divergent wealth accumulation over long time horizons (for instance, over one’s working life until retirement). Our findings, and the concept of relational investing more broadly, are therefore of interest to policymakers and household finance professionals alike, as well as to scholars of culture, inequality, and the economy.

In what follows, we first introduce some background on the economic importance of portfolio choice followed by the social-psychological literature that examines generalized self-

²⁷ For the broader importance of portfolio choice, see, Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, 1990. <<https://www.nobelprize.org/prizes/economic-sciences/1990/summary/>>, Accessed 10/21/19.

other risk-taking before linking these two literatures to the process of ‘earmarking’ relational content and symbolic value. Next, we describe our empirical method and elaborate on the results of two survey experiments that test our hypotheses. Finally, we engage in a general discussion of our results and their implications before concluding.

A Theory of Relational Investing

Portfolio Choice

The way that investors allocate funds among risky assets – i.e. portfolio choice – is an important and ongoing empirical question which bears on the economic security of individuals, especially as they take responsibility of their own financial futures. In this vein, scholars have long asked how people choose investments and the associated risk selected for an investment portfolio. This recurring theme in the finance literature begins with the advent of Modern Portfolio Theory (Markowitz 1952) nearly seventy years ago, and which has earned James Tobin, William Sharpe, and Harry Markowitz Nobel Prizes in economics for their contributions to portfolio theory. Choosing a portfolio’s allocation, as Sharpe (1970) explained, is primarily concerned with making decisions involving outcomes that cannot be predicted with complete certainty – in other words, decisions involving risk. While economic sociology has certainly provided important insights regarding economic action under risk and uncertainty broadly (e.g. Beckert 1996), the specific matter of portfolio choice has thus far been left to the economists. As a result, we lack an understanding of how risk decisions are patterned by relational work. What we argue here is that Zelizer’s relational economic sociology can provide a generative framework as it applies to risk-taking for defined financial goals associated with investments made on behalf of others.

Indeed, the question of portfolio choice is ripe for sociological intervention. The standard model of economics presumes that investors are instrumentally rational actors who routinely reach

optimal decisions by considering expected returns and variances of assets, choosing the portfolio that maximizes expected return for a given risk tolerance (Markowitz 1952). As such, earmarks would be irrelevant from the perspective of mainstream economic theory. In recent years, a large body of empirical work from behavioral finance demonstrates that investors in fact exhibit glaring departures from the predictions made by mainstream theory. In particular, this research leverages cognitive psychology to find evidence of systematic biases leading to poorer returns than would otherwise be obtained by a rational actor (e.g. Charness and Gneezy 2010). When it comes to allocating investment portfolios, the behavioral economics concept of ‘mental accounting’ (Thaler 1999) has been put forward to explain the fact that 401(k) plan participants fail to recognize their retirement contributions as a component of their overall portfolio of wealth (Choi, et al. 2009). Instead, individuals compartmentalize money intended for particular practical purposes, rendering those funds non-fungible: “Money in one mental account is not a perfect substitute for money in another” (Thaler 1999, 185). In terms of financial risk-taking and mental accounting, Zhoua and Pham (2004) show that respondents are more willing to invest in a risky business venture with money originating from a stock trading account than with money originating from an IRA, indicating that the mental account for retirement savings is assigned a greater degree of risk aversion than the one for general investing (see also: Prelec and Lowenstein 1998). Given that risk tolerance can vary between one’s *own* mental accounts, it seems reasonable that it should also vary across relational accounts.

Expanding the way that people use mental accounting, Shefrin and Statman (2000) propose behavioral portfolio theory (BPT) as an alternative approach to the standard theory of portfolio choice. Rather than optimizing asset class means and variances, BPT investors choose portfolios by considering subjective evaluations of expected wealth, desire for security, aspiration levels, and

probabilities of achieving those potential levels (Ibid., 128). While BPT better reflects how individuals actually construct portfolios for themselves, the model does not make any predictions about how one would invest money earmarked for another. Polman and Wu (2019, 204), in a review of this literature, agree that contemporary accounts fall short: “put simply, decision making for others is not incorporated in standard economic and psychology models despite the fact that, from a practical perspective these decisions are often made.”

“Self” versus “Other” Risk-taking

Recent scholarship shows that people frequently make transactional decisions on behalf of close others. According to Wu, et al. (2019), over one-quarter of individuals report making 2-3 consumption-related choices for others in a given week, and by another account nearly a quarter of purchase decisions that people make involve friends and family (Garcia-Rada, Anik, and Ariely 2019). Largely concentrated in the fields of social psychology and consumer choice, a literature on ‘self-other risk-taking’ considers whether a surrogate decisionmaker would be more or less risk-seeking when making choices about their own versus another in domains such as romantic relationships, medical outcomes, or games of chance. On the whole, the findings in this literature are mixed (Polman and Wu 2019). When presented with a gamble, Stone, et al. (2002) found no self–other differences in risk-taking behavior across a set of experiments using both hypothetical and real-world outcomes. Further, they found that behavioral errors that occurred in personal financial decisions (e.g. regret or loss aversion) held equivalently when the decisions were made for another person. However, Borresen (1987) came to an opposing conclusion when respondents were asked to imagine they were either the beneficiary of a financial settlement or else an advisor to that beneficiary. He found that “when making a conclusion to support the decision of another,

subjects are more economically conservative than when making a decision for themselves.” (Ibid., 1302).

Two comprehensive literature reviews attempt to integrate this scholarship. Colby (2010, 4-5) summarizes that, “[t]he main thrust of results in research on risky financial decision making for others has been that, as long as the other is a specific, non-abstract individual, people have the same risk preferences when choosing for others as they do when choosing for themselves.” Polman and Wu (2019), in a meta-study of 71 self-other risk-taking papers (across several domains) conclude that risk-taking can favor a risky shift when people choose for others, but the direction and effect size will vary based on the particular context involved. For instance, choices that could influence a child’s health or safety will register more cautious decisions than those that parents make for themselves (Dore, et al. 2014). However, this contextualization also predicts that the level of risk-taking for close others will tend to increase in domains where taking risk is socially or culturally desirable, such as taking greater romantic risks for others than one’s self (Stone and Allgaier, 2008). Polman and Wu (Op cit., 208) conclude, “Thus, when risky behavior corresponds to a valued characteristic (e.g., if taking a risky bet is viewed as desirable), then people are more likely to choose riskier, less cautious options for others than for themselves.”

Earmarking Risk

The self-other risk-taking literature is ambiguous. At first glance it supposes that, from a social-psychological perspective, decisions made by parents on behalf of a child could be more cautious – but since investing for the future and ‘providing’ financially for one’s child is seen as socially desirable there could also be the tendency to make riskier decisions.

A relational approach that recognizes investments made on behalf of close others as ‘earmarked’ will instead take account of the relational work and symbolic content embodied by

those investments, drawing a logical distinction between ‘earmarking’ and ‘mental accounting’ (Zelizer 2012; Wherry 2016, 2017; Bandelj, et al. 2017; cf. Thaler 1999). The crucial difference between the two concepts, Zelizer (2012) argues, is that the focus of mental accounting remains on the individual where relations may appear as context, *but not as explanation*. A relational (earmarked) account, on the other hand, emerges from social interaction, the content of which depends on the relational work behind those interactions. Mental accounting can thus be construed as a special type of earmark where money is set aside for various purposes *for one’s own self*.

An earmark, however, shifts the focus from individuals to relations. Zelizer’s (Ibid., 160) point is that “the relative value assigned in mental accounts...should therefore vary depending on the consequences of that accounting for relations to others. When we earmark money for our child’s college fund, for instance, we are affirming our parental relationship to that child. On the other hand, by gambling the money away we would seriously undermine that connection.” Such an affirmation should therefore manifest empirically in a risk-taking position that opposes gambling (i.e. it should be lower risk), where particular relations come into view as causal explanations for practical differentiations in risk-taking for investment monies.

Scholarship on earmarking to date has emphasized how relational work affects financial *transactions* (e.g. expenditures, payments, loans) and *transfers* of wealth (e.g. monetary gifts, inheritances). In other words, the focus of earmarking has been to understand who or what we *spend* particular money on. We suggest that relational work occurs in *non-transactional* financial evaluations as well. To illustrate this distinction, consider dollars that have been endowed for a child’s higher education. To spend those dollars for anything but tuition would be deemed inappropriate; however, the relational work does not stop there. What we argue is that it would be

equally inappropriate to invest those monies with a risk profile that could put going to college in jeopardy.

In their chapter on mental accounting, marketing scholars Soman and Ahn (2011, 67) tell the following story of “an acquaintance, an economist, who once borrowed a sum of money at very high interest rates to fund a home renovation when in fact he had that sum of money in a money market account earning a fairly small interest rate. The catch was that the money market account had been designated as his son’s (who was 3 years old) education account.” In the end, this father could not come to terms with “breaking into” that account and opted for the high-interest loan – a seemingly irrational decision. Bandelj, et al. (2017, 7) point out that Soman and Ahn misattribute the moral of this story to the emotional content of a mental account rather than the symbolic value of a relational earmark. However, they, too, overlook an equally important (and arguably ‘irrational’) detail of this story: the child’s college fund—with 15 years to go—is allocated to an incredibly low-risk, low-yield money market account.

Based on the framework we have developed here, we motivate a set of hypotheses for how relational earmarking could influence financial risk-taking:

Hypothesis 1: Individual tolerance for financial risk will be generally greater with dollars earmarked for one’s self relative to dollars earmarked for close others.

We expect earmarked dollars to carry less risk than dollars intended for one’s self, but how should they vary among relational earmarks and to what degree? Without a doubt, different social ties will carry unique bundles of relational content and context that should create differences in relative risk-taking. In a series of experiments, Polman, et al. (2018) find that people increasingly discount the value of other’s money as social distance increases. Jones and Rachlin (2006) similarly describe a “social discounting” whereby people were willing to forgo a larger sum of money in

order to give \$75 to another person as a function of perceived social closeness. Ziegler and Tunney (2012), on the other hand, show that people make more impulsive decisions involving money when the beneficiary is a closer tie to the decision-maker. Social distance, it seems, is likely to play some role in risk-taking for others, but is once again ambiguous.

Specific relational roles, on whole, instead correspond to rich relational packages that come to be valorized in commonly-patterned ways. As Wherry (2016, 137) points out, “categorical relations come with corresponding obligations”. For instance, In *Pricing the Priceless Child*, Zelizer (1985) recounts how the relational category of ‘parent-child’ has shifted from a time when it was a child’s obligation to contribute (economically) to the family to modern logics of a binding and important obligation of the parent to the child. Ishizuka (2019, 31) shows that cultural norms of child-centered, time-intensive parenting are now pervasive across a range of social classes, pointing to high contemporary standards for parental investments in children (see also: Wherry 2016; Zaloom 2019). The parent-child relationship has thus become paradigmatic of a fairly universal relational package of considerable gravity. As a result, we believe that investments made by a parent on behalf of a child will be the most guarded compared to other relations.

Other earmarks do not present such clear-cut cases, since the relational work involved in maintaining categories of ‘friend’, ‘lover’, or ‘spouse’ are far more varied and conditional. Because of this, and due to methodological limitations inherent in the experiments used to test our hypotheses, we are only interested in showing central tendencies rather than capturing the more textured, nuanced, and iterated aspects of an individual earmark. Still, even this blunt approach is useful and instructive in demonstrating that relational earmarking does change risk behavior in systematic ways. While we expect risk-taking for non-child others to be lower than for one’s self, we hesitate to speculate on a specific pecking order.

Hypothesis 2: Individual tolerance for financial risk will vary depending on for whom the dollars are earmarked.

Hypothesis 2a: Financial risk tolerance will be lowest for investments earmarked for a child.

The Work of Meaningful Labels on Earmarked Accounts

Hypotheses 2 and 2a suggest that relational earmarks could have a conservative effect on risk-taking for close others. The addition of meaningful labels like ‘retirement’ or ‘college savings’ to investment monies, however, invokes a further set of shared meanings that transcends dyadic relational categories. Therefore, we draw on the concept of relational accounting, which extends the process of earmarking by encompassing “the set of cultural and social processes used by individuals and households to organize, evaluate, justify and keep track of financial activities” (Wherry 2016, 132). In particular, Wherry (2016; 2017, 59) highlights relational accounting’s role in assigning symbolic value to economic activity located in lifecycle transitions that are “culturally meaningful and collectively enforced and in overarching moral structures”. Retirement and college are good examples of such transitions.

As with earmarking, the operative distinction from mental accounting here is both important and subtle. Mental accounting is a *cognitive* process whereby people budget their own money into distinct expense categories (e.g., gas money, bills, vacation jar), presumably as a heuristic strategy for self-control that prevents excess spending (Henderson and Peterson 1992; Thaler 1999). With mental accounting, these arbitrary categories subjectively frame transactions in one’s mind, which subsequently determines the utility they expect to receive from spending certain dollars. As Wherry (Ibid.) puts it, “relational accounting represents the sociological

counterpoint to mental accounting in that it uses cultural, moral, and relational processes to develop an interpretive science of choice and decision making.” Moral considerations are not only private and individually held but are also collective and mutually shared. Accordingly, investments earmarked for rites of passage like college, retirement, a wedding, or buying a first home will fall under the purview of relational accounting. As mental accounts are particular to specific individuals, we would expect a great deal of heterogeneity in the way that cognitively labeled funds are invested. However, the inter-subjectively shared meaning and symbolic value of a relational account like ‘college’ or ‘retirement’ should produce a prevailing tendency.

So far, initial support for relational accounting has been found in the context of charitable donations (Bandelj, et al. 2017) and with informal lending and borrowing (Wherry 2017; 2019). Extending this concept to the domain of investing, Hayes (2019) shows that retirement savers, in aggregate, orient to durably conservative portfolios following market losses, while at the same time ordinary investment accounts that do not contain the shared symbolic meaning of ‘retirement’ remain exposed to far greater market risk. Like retirement, going to college shares a collective meaning among American households, designating it a consequential milestone in one’s personal and professional development. Zaloom (2018), among others, argues that attending college is an *imperative* of the middle-class in the United States today, based on extensive ethnographic study (see also: Grodsky and Jones 2007; Manly, et al. 2017; Zaloom 2019). Highlighting the relational work involved with college planning, Napolitano, Pacholok, and Furstenberg (2014) further explain how the concurrence of rising parental aspirations and rising tuition costs poses an important dilemma as parents work to provide their children with the necessary financial backing to gain educational credentials.

Thus, in addition to a college fund representing markers of the distinct parent-child relationship, we suggest that such an investment portfolio will *also* take account of the collective meaning of college as an important event in the life course. We would therefore expect an account labelled with ‘retirement’ or ‘college savings’ to have relatively lower portfolio risk due to the additional cultural weight and meaning endowed unto those financial accounts. As a result, we propose a third hypothesis:

Hypothesis 3: Individual tolerance for risk will be lower when the dollars are labeled for a culturally meaningful life-stage goal such as retirement or college.

Table 1: Overview of Theories of Portfolio Choice and Investment Risk

	<i>Concept</i>	<i>Cite</i>	<i>Emphasis</i>	<i>Risk Implications for Investing on Behalf of Others</i>
<i>Standard Economic Theory</i>	Modern Portfolio Theory (MPT)	Markowitz (1952)	Individual – Rational choice	None. Investors are self-interested utility maximizers that optimize portfolio risk vs. return; all wealth is fungible.
<i>Behavioral Economics</i>	Mental Accounting	Thaler (1999)	Individual – Cognitive budgeting and categorization of expenditures	Low. Individuals subjectively compartmentalize their own money intended for particular purposes, rendering those funds non-fungible to that person. Predicts nothing about risk-taking for others.
	Behavioral Portfolio Theory	Shefrin & Statman (2000)	Individual – Purposive goals (needs vs. wants); each goal is put into its own <i>mental account</i> .	Low. Layered allocation structure where needs are invested more conservatively than wants. Each mental account is optimized by the mean-variance procedure using MPT. As with mental accounting, predicts nothing about others.
<i>Sociological Approaches (Relational Investing)</i>	Earmarking	Zelizer (1979; 2012)	Relational – Relational categories (e.g. parent-child)	High. Emerges from social interaction, the content and context of which renders funds non-fungible. Risk taking reduced when confronted by relational categories.
	Relational Accounting	Wherry (2012; 2016)	Cultural – Intersubjectively shared meaning	High. Uses cultural, moral, and relational processes, particularly highlighting salient life-stage transitions. Risk for investments earmarked for such transitions are reduced by the additional weight of its collectively-held symbolic value.

Empirical Analyses

Overview of Studies

We test our hypotheses using two original vignette experiments (see e.g.: Schilke and Rossman 2018; Aguinis and Bradley 2014; Finch 1987). Study 1 first explores how respondent's treat earmarked dollars in the context of a gambling scenario. Our aim with Study 1 is to establish that relational earmarks shape risk preferences in a simple context with predictable odds and an immediate time horizon. We then turn to investing behavior in Study 2; here our aims are twofold. First, to test whether relational earmarking of investment accounts impacts portfolio allocation across stocks, bonds, and cash (Hypotheses 1 & 2); and second to test whether labeling the account with the intended purpose of the funds—i.e., retirement or college—further influences portfolio allocations (Hypothesis 3). Both studies utilize a between-subjects design (see Table 2 for a breakdown of respondents per condition).

Respondents for each of our studies were solicited using Amazon's Mechanical Turk (AMT), an online platform where individuals can complete tasks—such as taking a survey—for modest financial compensation.²⁸ AMT respondents do differ from a nationally representative sample in that they tend to be younger, more female, more liberal, and more educated than the general U.S. population (Berinsky, et al. 2012; Paolacci, et al. 2010). Nevertheless, AMT samples have repeatedly been shown to produce highly reliable data for social science research (Shank 2012; Weinberg, et al. 2014). To increase response quality, we restricted our sample to U.S.-based adults with a positive track record of successfully completing tasks on the platform (at least a 98% positive feedback rating with a minimum of 500 tasks already completed). In addition, we included an attention check at the beginning of each study (see: Oppenheimer, et al. 2009), although we

²⁸ Survey experiments built using Qualtrics. AMT respondents were paid \$0.20 upon completing the survey.

note Paolacci, et al. (2010) have shown that respondents on AMT pay greater attention than samples obtained through more traditional methods.

Table 2: Experimental Conditions

Study 1: Gambling	
Self	N = 232
Child	N = 245
Nephew	N = 246
Spouse/partner	N = 225
Study 2: Investing	
Self	N = 304
Self-retirement	N = 348
Child	N = 313
Child's college	N = 303
Nephew	N = 333
Nephew's college	N = 321
Spouse/partner	N = 336
Spouse/partner retirement	N = 330

Study 1: Earmarking Risk in Gambling

Study Participants: Study 1 had a total of 948 participants. Approximately 57% of the sample was female; 61% of the sample reported having at least a four-year college degree; 75% of the sample identify as white and the median age is between 35 and 44. A statistical test for balance confirms participants were randomly sorted across experimental conditions.

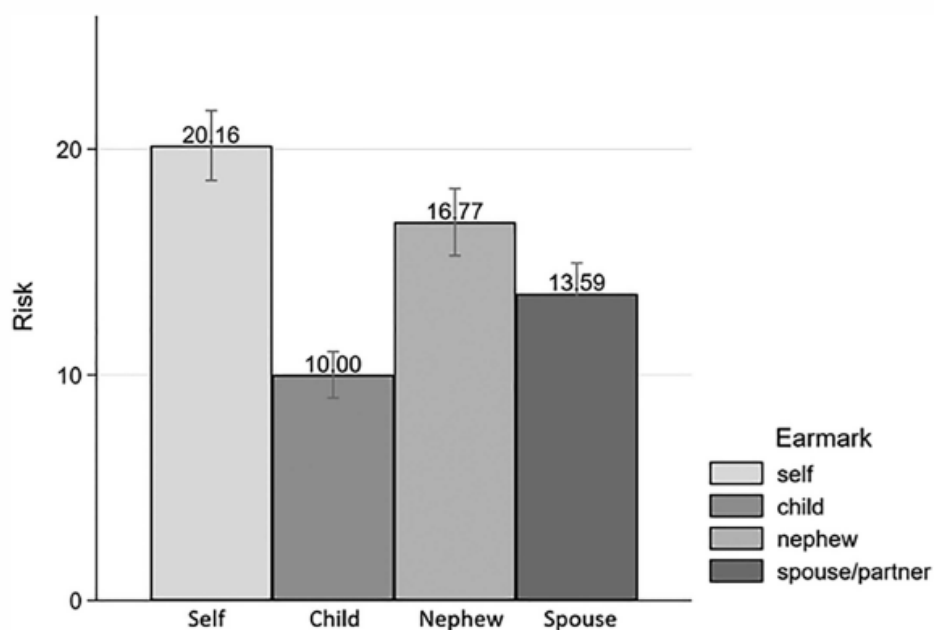
Study 1 Procedures and Materials: In this study, respondents were asked to imagine they had earmarked \$100 for a special gift, which was randomly assigned as intended for either your 'self', 'spouse', 'child', or 'nephew'. Respondents were then told to imagine they were at a casino and had the opportunity to gamble with the earmarked dollars in the hopes of increasing the amount available for the special gift. Respondents were given three options: placing a bet on a single number in roulette, a high risk (and high reward) game; betting on a card game with a 50% chance

of doubling one's bet, a moderate risk (and moderate reward) game; and playing no game at all (no risk, no reward). Respondents were then asked to allocate the \$100 across these three options.

To examine whether relational earmarks influenced risk-taking behavior, we summarized respondent allocations to the high-risk game, moderate-risk game, and cash/no-game options using the following equation to construct a heuristic index of risk: (Percentage Roulette + $\frac{1}{4}$ * Percentage Card Game + 0 * Percentage No Game). This formula is used for analytical purposes only and provides a summary measure of the overall riskiness of the money played at the casino based on the fact that the standard deviation of outcomes for a standard single-number bet placed in a game of roulette is roughly four times larger than the standard deviation of a game with a 50% chance of doubling one's wager.²⁹ Results are substantively similar if we instead look only at the percentage played on roulette, or if we use the difference between roulette and no games as our measure.

²⁹ For an American roulette wheel w/both '0' and '00', sd=5.26. For a game with a 50% chance of doubling the bet or losing it all, sd=1.50.

Figure 1. Study 1 Results—mean gambling risk by earmark.



Note: $N = 948$. This figure depicts the mean gambling risk assigned to dollars earmarked for a gift by each experimental condition, where each column represents a particular relation (from left to right): self; child; nephew; and spouse/partner. Error bars indicate standard errors.

Table 3. Pairwise Comparisons of Average Gambling Risk across Experimental Conditions (Study 1)

	Self	Child	Nephew
Child	-10.16*** (1.86)	—	
Nephew	-3.39 (2.15)	6.77*** (1.81)	—
Spouse/partner	-6.57** (2.07)	3.59* (1.71)	-3.18 (2.02)

Notes: Figures in cells correspond to differences in means for conditions listed in left-hand column relative to conditions across top row (e.g., "child" condition risk score is 10.16 points less than "self" risk score). Standard errors of the differences appear in parentheses using two-tailed t-tests for significance. See figure 1 for individual earmark means.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Study 1 Results: Figure 1 presents the average level of risk-taking in the gambling study (y-axis) for each of our four earmark conditions (x-axis). Consistent with Hypothesis 1, we find that respondents are generally riskier with dollars earmarked for themselves than with those earmarked for others—the difference between ‘self’ and the (pooled) average across the non-self conditions is 6.70 ($p < 0.001$). Table 3 shows the mean difference and associated test statistic for each pairwise comparison. As illustrated in Figure 1, respondents express a greater aversion to risk with dollars earmarked for their spouse (6.57 difference, $p < 0.05$) and even more for a child (10.16 difference, $p < 0.001$) than with money put aside for themselves, supporting Hypothesis 2a.

The distinction between investing on behalf of one’s self versus someone else is not the only contrast of note in Figure 1. Consistent with Hypothesis 2, we also see statistically significant differences in average risk tolerance across the three ‘non-self’ conditions ($F_{2,713} = 6.89$, $p < 0.01$). Specifically, we find respondents are more conservative with dollars earmarked for their child relative to those earmarked for their spouse or nephew (spouse-child difference 3.59, $p < 0.05$; nephew-child difference 6.77, $p < 0.01$). This indicates that individuals are responding not only to whether the dollars *are* earmarked but are considering *who* the dollars are earmarked for in assessing risk tolerance.

Study 1 demonstrates that relational earmarking shapes risk-taking in a setting with predictable odds and an instantaneous time horizon. Respondents in this stylized scenario were more reluctant to gamble with dollars earmarked for a close social relation—and moreover, this impact varied across relational earmarks. Our finding is suggestive that the same social forces may also be at work in the more likely and consequential domain of investing. We examine this below.

Study 2: Earmarking Risk in Investment Portfolios

Having established that earmarks influence risk tolerance in the context of gambling, we now move to examine how relational earmarking and labeling accounts for culturally salient life course events shapes risk tolerance in investment portfolio allocations.

Study 2 Participants: Study 2 had a total of 2,588 participants. Approximately 46% of the sample was female; 60% of the sample reported having at least a four-year college degree; 76% of the sample identified as white and the median age was between 35 and 44. A test for balance confirms participants were randomly sorted across experimental conditions.

Study 2 Procedures and Materials: All respondents were told to imagine they had been tasked with investing \$5,000 for a period of ten years. Respondents were then randomly assigned to one of eight treatment conditions. Four conditions indicated the money was to be invested in either: ‘your personal investment account;’ or on behalf of ‘your spouse’; ‘your child’; or ‘your nephew’. Other than the relational earmark assigned, these four conditions included no other information about the intended use of the funds.

To examine whether additional information as to the intended use of the funds influenced risk-taking, we included four additional conditions that specified the funds would be used for retirement (for self and spouse/partner) and college (for child and nephew).³⁰ This yields a total of eight experimental conditions: self; self-retirement; spouse; spouse-retirement; nephew; nephew-college; child; and child-college (see Table 2).

Respondents were asked to allocate the \$5,000 in the earmarked account across three investment options: stocks (high-risk, high-reward); corporate bonds (moderate-risk, moderate-

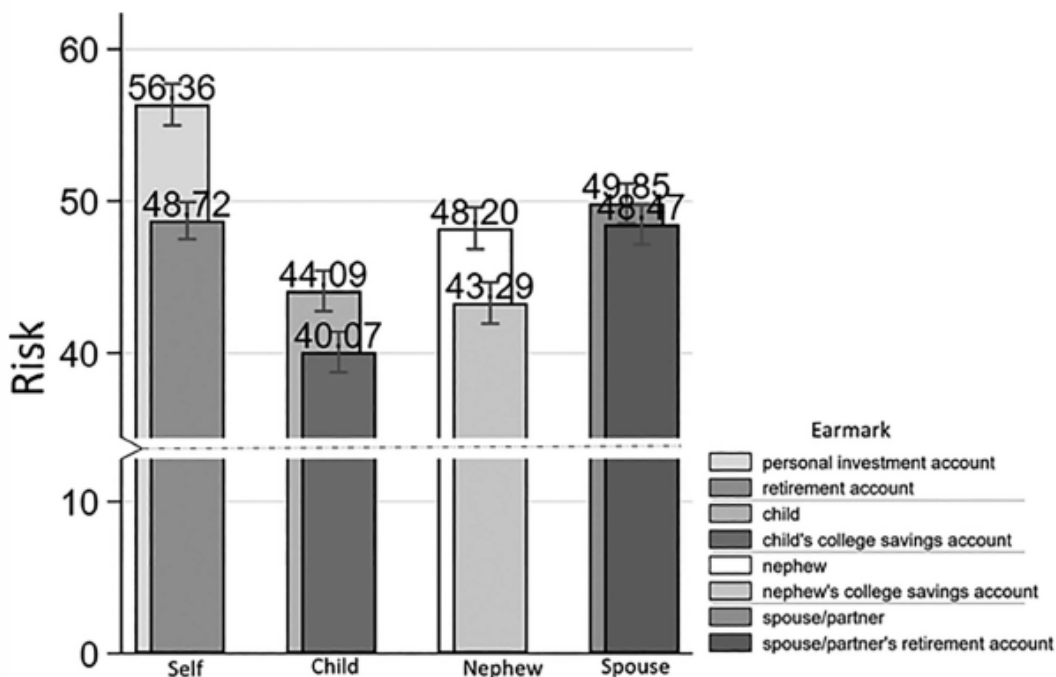
³⁰ For respondents in either ‘nephew’ condition, we additionally indicate in the vignette that the respondent is their godparent to realistically justify why one would be investing money on their behalf.

reward); and cash (no-risk, no-reward). To help make sure the different earmarks did not unwittingly signal different time horizons for investment (and by extension, implied risk tolerance), the vignette explicitly tells respondents the money will not be withdrawn for a period of ten years.

As in Study 1, to examine how relational earmarking influences risk tolerance in investing, we converted respondent's portfolio allocations in stocks, bonds, and cash into a risk index using the following formula: $(\text{Percentage Stocks} + \frac{1}{4} * \text{Percentage Bonds} + 0 * \text{Percentage Cash})$. This formula provides us with a summary measure for analyzing the overall riskiness of each portfolio. The rationale for this heuristic is based on the fact that over the past fifteen years the standard deviation of returns for stocks has been approximately four times greater than that for bonds, where portfolio standard deviation has been demonstrated to be a valid proxy for total financial risk (Fama and MacBeth, 1973).³¹ Our results are substantively similar if we use only percentage of stocks as our general standard of riskiness, or if we use the difference between stocks and cash as our measure.

³¹ Stock market 15-year standard deviation of returns based on the Vanguard total stock market index (ticker: VTSMX) is ~14%. Bond market 15-year standard deviation of returns based on the Vanguard total bond market index (VBMFX) is ~3.2%. Cash is a risk-free asset and has zero risk. Source: Morningstar.com

Figure 2. Study 2 Results—mean portfolio risk by earmark.



Note: $N = 2,588$. This figure depicts the mean portfolio risk assigned to investment dollars earmarked by each experimental condition. Labeled earmarks appear in front of and to the right of unlabeled earmarks, and each pair of columns represents a particular relation (from left to right): self; child; nephew; and spouse/partner. Error bars indicate standard errors.

Study 2 Results: Figure 2 presents the mean portfolio risk for our relational earmarks. Unlabeled earmarks (self, child, nephew, spouse/partner) appear to the left and slightly behind the corresponding labeled account conditions (i.e. retirement or college). Table 4 provides a summary of pairwise contrasts between each condition.

We first consider the unlabeled accounts. Comparing across the earmark conditions we see respondents are more risk tolerant when investing for their own sake than when investing on behalf of others—the difference between self and the (pooled) average across the non-labeled relational conditions is 8.90 ($p < 0.001$).³² This is consistent with our finding in Study 1 that individuals are

³² Unlabeled accounts only $N = 1,286$.

more willing to gamble with dollars earmarked for themselves than with dollars earmarked for others, lending additional support to Hypothesis 1. We also see substantive and statistically significant differences in mean risk tolerance across the three relational conditions ($F_{2,979}=4.80$, $p<0.01$). Turning to the pairwise comparisons, we find respondents make riskier portfolio allocations when investing on behalf of their spouse/partner and nephew compared to their child (nephew-child difference 4.11, $p<0.05$; spouse-child difference 5.76, $p<0.01$). This again is consistent with our findings in Study 1 and provides additional evidence in support of Hypotheses 2 and 2a. Financial risk-taking is shaped by not only whether the invested funds are earmarked but also by who those funds are earmarked for. One point to note in Study 2 is the intermediate position of ‘nephew,’ which may speak to moral obligation or degree of dependence. While a spouse is (often) a closer relation than a nephew, an extended family member who is a minor is implicitly more reliant on a respondent’s investment choices.

Next, we examine whether designating the invested funds for a specific purpose—retirement for the self and spouse/partner conditions and college for the child and nephew conditions—further influences risk tolerance. Pooling across conditions, we find that respondents are more conservative with dollars in labeled accounts relative to those in unlabeled accounts (difference -4.25, $p<0.001$). Turning to the pairwise comparisons in Table 4 we find that within each relational earmark, labeling the account with its intended use further reduces risk-taking. For example, respondents choose less risky portfolio allocations for themselves when told the funds are to be invested for their retirement as opposed to not specifying the intended use (difference -7.64, $p<0.001$). Respondents are also more conservative when told the funds they are investing on behalf of their child or nephew will be used for college (child-generic vs. child-college difference -4.02, $p<0.05$; nephew-generic vs. nephew-college difference -4.91, $p<0.05$). Labeling the account

with a culturally salient and symbolic life course event reduces one's tolerance for risk; this provides initial evidence in support of Hypothesis 3.

It is interesting to note that general risk-taking across all conditions is noticeably lower in the gambling study than with investing. Casino games carry a negative expected return (the house has an advantage), while investing typically carries a positive expected return. That respondents are generally more risk-averse in Study 1 implicitly indicates some understanding of that fact. What is noteworthy is that relative risk differences between earmarks are preserved when the study is carried over to the domain of investing. People who opt out of casino games could be construed as rational in the face of a negative expected return (greater than one-third of respondents wagered nothing at all); however, to forgo an investment with a positive expected return (greater than half of respondents allocated >15% to cash) appears to be a deviation from rational expectations that may in itself be evidence of the value and power of social relations.³³

³³ Many financial advisors recommend 5-10% of portfolio assets in cash for purposes of liquidity. Holding cash can accrue negative real returns due to inflation. In investing, 'cash' is often equivalent to money market funds, which earn the risk-free rate of return. Research suggests ordinary investors look at nominal return rather than accounting for inflation when evaluating investment performance (Campbell and Vuolteenaho 2004). Indeed, if people took inflation into account it would make cash an even *less* attractive option among respondents—that we see people choosing cash in earmarked accounts signals the importance of relationships on risk-taking.

Table 4. Pairwise Comparisons of Average Portfolio Risk across Experimental Conditions (Study 2)

	Self	Self-retirement	Child	Child-college	Nephew	Nephew-college	Spouse/partner
Self-retirement	-7.67*** (1.85)	–					
Child	-12.27*** (1.92)	-4.63* (1.82)	–				
Child's college	-16.29*** (1.92)	-8.65*** (1.82)	-4.02* (1.85)	–			
Nephew	-8.16*** (1.95)	-0.52 (1.85)	4.11* (1.92)	8.13*** (1.92)	–		
Nephew's college	-13.07*** (1.94)	-5.43** (1.84)	-0.80 (1.91)	3.22 (1.92)	-4.91* (1.94)	–	
Spouse/partner	-6.51** (1.90)	1.13 (1.80)	5.76** (1.87)	9.78*** (1.87)	1.65 (1.90)	6.56** (1.89)	–
Spouse/partner retirement	-7.89*** (1.92)	-0.25 (1.82)	4.38* (1.89)	8.40*** (1.89)	0.27 (1.92)	5.18** (1.91)	-1.38 (1.87)

Notes: Figures in cells correspond to differences in means for conditions listed in the left-hand column relative to conditions across top row (e.g., “Self-retirement” risk score is 7.67 points less than “Self” risk score). Standard errors of the differences appear in parentheses using two-tailed t-tests for significance. See figure 2 for individual earmark means.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Extensions: Risk-taking and Respondent Characteristics

Although ours is not a representative sample, we did want to provisionally explore: 1) whether financial risk-taking varies as a function of respondent characteristics such as income, age, and gender; and 2) whether the effect of relational earmarking on risk-taking differs across these sociodemographic groups.

To investigate question 1, we estimated an OLS model predicting portfolio choice, pooling across experimental conditions (results presented in Table 5). Consistent with extant literature in finance and economics, we find that risk tolerance is positively correlated with income and education in our sample (see Riley and Chow 1992). We also find that age is modestly but positively correlated with risk-taking (see e.g. Wang and Sherman 1997), and that male respondents have considerably greater risk tolerance than female respondents, which is also consistent with the literature (Dwyer, et al. 2002; Eckel and Grossman 2008).

To explore question 2, we estimated a series of OLS models wherein we interacted the experimental conditions with respondent characteristics (results available upon request). Notably, we did not find evidence of interactive or multiplicative effects between respondent characteristics and relational earmarks in the present study; although, we think this potential should be investigated directly and more thoroughly in future research using a representative sample or different study design.

It is nevertheless important to appreciate the magnitude of the additive effects of the experimental conditions and respondent demographics, in particular gender which presents the largest main effect. Given that the average female respondent is markedly less risk tolerant than males—and that females and males are both less risk tolerant with earmarked dollars—the combination of these effects may lead women to more significantly 'underinvest' when making allocation decisions on behalf of others. This, over time, may lead to meaningful disparities in wealth accumulation as lower risk portfolios correspond to lower expected returns (Fama and MacBeth 1973). Figure 3 illustrates the mean portfolio risk for labeled account conditions separately for male and female respondents.³⁴

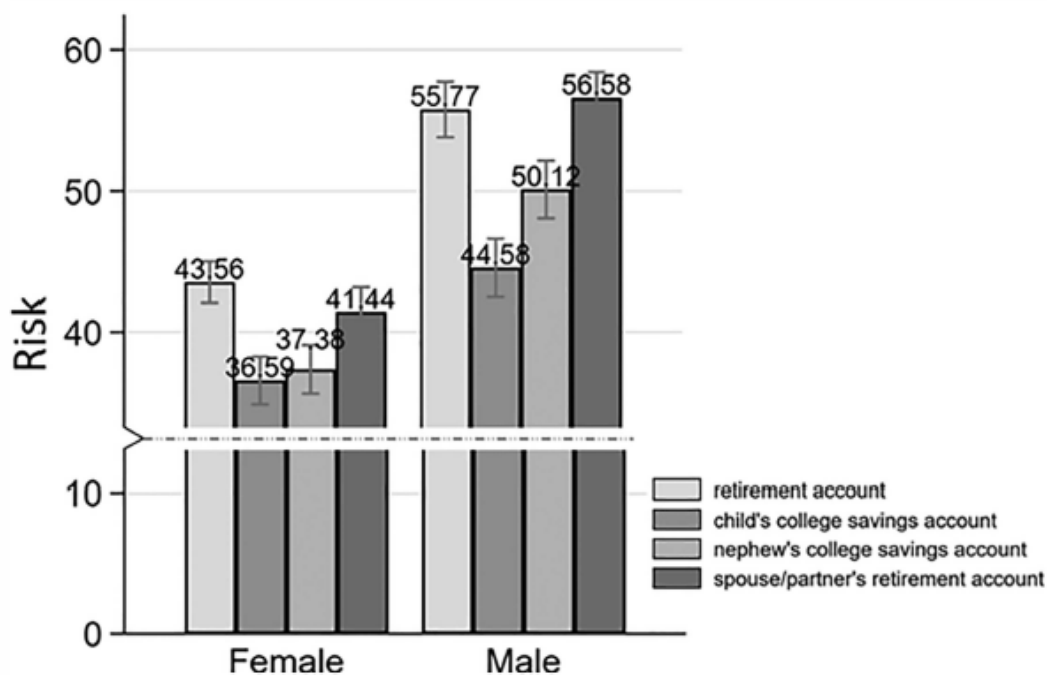
³⁴ We show only labeled accounts here for clarity. Un-labeled earmarks are all similarly lower risk for women than men.

Table 5. Financial Risk-Taking (Pooled) by Respondent Characteristics

Male	10.415*** (0.910)
Married	-0.688 (1.000)
College graduate	5.830*** (0.958)
Age	0.229*** (0.038)
Household income (log)	4.356*** (0.673)
Non-white	-0.413 (1.078)
Constant	-9.248 (7.268)
N	2,550
R ²	0.14

Notes: Robust standard errors in parentheses. OLS model also adjusts for experimental conditions (not shown in the table); eight respondents are missing information for one or more demographic variables, removed by listwise deletion.

*** $p < 0.001$

Figure 3. Study 2—mean portfolio risk by labeled earmark and respondent sex

Note: This figure depicts the mean portfolio risk, broken down by respondent sex, assigned to investment dollars earmarked by each labeled experimental condition. Columns represent a particular labeled earmark (from left to right): self-retirement; child's college savings; nephew's college savings; and spouse/partner's retirement. Error bars indicate standard errors.

Discussion

Retirement security, the ability to afford a college education, and even the funds available to pay for healthcare can all be tied now in some way to the success of the markets. But, it is not only our *own* lives and livelihoods that are at stake; also at stake is the financial wellbeing of our loved ones and family members on behalf of whom we have little choice but to invest in risky assets. Soaring college costs and the disappearance of defined-benefit pensions have made saving for college and retirement not only practical necessities but also culturally salient norms. What we have shown for the first time in this paper is that the influence of relational earmarks complicates investing on behalf of others, and in ways that may be detrimental to those beneficiaries.

Here is how this could work: Over any ten-year period going back to at least 1926, stocks have outperformed bonds on an average annualized basis (see Damodaran 2019), and stocks in general carry higher expected returns to compensate for their greater degree of risk (the so-called equity risk premium [Mehra and Prescott 1985]). Using historical returns for stocks and bonds from 1926-2018,³⁵ we estimate that if a hypothetical \$5,000 investment had been made to a *personal investment account* according to the average portfolio allocation of our study respondents it would have grown to approximately \$10,175 over the following ten years. Had those funds instead been invested according to the portfolio allocation of the *child college savings account* condition the balance would have grown to just \$8,575 over the same period – a disparity of nearly 20%.³⁶ Over a thirty-year period and given the same average historical returns, the personal

³⁵ Between 1926-2018, the historical average annualized return for bonds was 5.29%; stocks 10.09%. <<https://advisors.vanguard.com/VGApp/iip/advisor/csa/analysisTools/portfolioAnalytics/historicalRiskReturn>>, Accessed 2/3/2020.

³⁶ We imagine each portfolio received \$5,000 earning historical average returns for stocks and bonds (see endnote 12). Portfolio A was allocated to 50% stocks, 40% bonds, 10% cash (roughly the mean portfolio risk for the ‘personal investment’ condition in our experiment). Portfolio B was allocated to 30% stocks, 40% bonds, 20% cash (corresponding approximately to a ‘child’s college savings’). We assume cash in a money market earned the average rate of inflation, 2%. Taking the weighted average asset class returns we compute the performance of each: the riskier

investment account would grow to be worth twice as much.³⁷ Our findings thus reveal a potential and previously unnoticed problem in that certain investors may be losing money due to earmarking, a problem which compounds over longer time horizons.

Of course, this monetary disadvantage stems from decisions that deviate from instrumental rationality. Our findings certainly suggest ‘value rational’ tendencies where people do not seek to maximize returns but instead prioritize conservation of funds that have been relationally earmarked. In Weber’s (1978 [1922]) terminology, value-rational action always involves “commands” or “demands” which, in the actor's opinion, are binding on him or her. It seems plain from this study that relational roles and meaningful labels each place binding demands on investors. But as Weber (Ibid., 26) notes, and what is detrimental to relational investors in practice, is that “from the perspective of instrumental rationality, value-rationality is always irrational.”

A key contribution of this study is that it extends Zelizer’s (1989, 2012) relational economic sociology from the domain of transactions and exchange to that of risk-taking. Our gambling study (Study 1) shows that people are far less willing to wager at the casino with dollars that have been earmarked for a close other’s gift. Importantly, it is the *earmark* that re-orientes one towards being more conservative with investment monies – the dollars in question have not been given away or promised to anybody else, nor have they been appropriated for any other purpose. Indeed, the level of gambling risk associated with a spouse/partner’s earmark is found in our first study to be one-third lower, and a child’s earmark more than twice as conservative, than with one’s

portfolio A earned a hypothetical average annualized return of 7.36%; the more conservative portfolio B achieved just 5.54%.

³⁷ Past performance is no guarantee of future returns.

own dollars. Our investing study (Study 2) shows that the same forces are at work in the context of relational investing.

Dollars earmarked generically for a child are invested with far less risk than those earmarked for one's self, speaking to the importance of the parent-child relationship. Through the "concerted cultivation" (Lareau 2003) of their children, Ishizuka (2019) shows that contemporary cultural norms around parenting are demanding in terms of both time and money. Children since the twentieth century have indeed become recognized as "emotionally priceless" dependents (Zelizer 1985, 209). When something is 'priceless' it is treasured, cherished, and safeguarded. And so, the treatment of priceless things tends to be oriented toward preservation and security: i.e. low-risk behaviors.

A child's college savings account is moreover found to be the *most* conservative portfolio, averaging one-third less risk than a personal investment account among our respondents. Indeed, a relation's earmark is inflected merely by labeling it a college fund, which reduces risk-taking by an additional 10% from either a child's or nephew's non-specific investments in our study. Zaloom (2019, 2) explains that for working- and middle-class families, the promise of giving their children a college education carries with it a dependence on both finance and on family, often involving enormous sacrifices—but, "parents believe their children are worth the price." Zaloom makes the argument that 529 plans transcend their utilitarian purpose to "embody ideals of parental responsibility and promote the virtue of being good managers of family finances. These financial mechanisms are tools of moral instruction" (Ibid., 31). Thus, the relational content of a 'child' or 'nephew' earmark is augmented by the symbolic value of the 'college savings' moniker – and in both cases, this 'value' is transformed into an aversion to risk that suits its moral obligation.

Likewise, money invested in one's retirement account is, all else equal, more than 15% less risky than personal investments not earmarked for such a purpose in our experiment. If an individual is unwilling or unable to save enough for retirement it is seen as irresponsible. As with education, 'retirement saving' carries important cultural and moral significance, lest one experience downward mobility in old age. By the same token, retirement funds are inherently relational since a shortfall can lead one to become a burden on one's family or dependent on state assistance (Weiss, 2005). By selecting a more conservative portfolio, retirement savers seem to misconstrue being responsible for being risk-averse. Interestingly, we find only a subtle difference between portfolio risk assigned to one's partner/spouse and to their partner/spouse's retirement money, as well as with one's *own* retirement account. We believe this could be because families tend to commingle retirement money with the expectation of a joint retirement (Ho and Raymo, 2009), where one's own retirement funds would be indistinguishable from their partner's and so the 'retirement' label does the same risk-reduction work for either condition. We instead see the relational influence of the spouse/partner earmark for the investments made generically on their behalf.

In addition to our main findings, we see some differences in overall risk-taking by respondent characteristics in our pooled results, with the starkest difference being that between men and women. This is consistent with previous work in economics that shows women are generally more risk-averse than men across a number of financial and non-financial domains (e.g. Dwyer, et al. 2002; Eckel and Grossman 2008). Here, we show that such differences in portfolio risk are preserved when relational earmarks are present as well. Imagine a single mother putting money away for her child's college education. On average, her child could be subject to a portfolio that is nearly a quarter less risky than if it were a single father making the investment choices.

Even if both the mother and the father in this example contribute exactly the same dollar amount each year to the respective college fund, the mother's child could see a lower account value by age 18 as the more conservative investments would be expected to produce more modest returns over time.

In demonstrating that risk tolerance is influenced not only by whether one is investing on behalf of 'another' but by *who* that person is and *why* the money is being invested, we show that the social meaning of money is far richer and wide-reaching than has been revealed in the literature thus far. Until now, the subject of market risk has been primarily the domain of finance and economics (but cf. Hayes 2019); however, those disciplines tend to downplay the influence of social relations and have completely overlooked the influence of cultural and symbolic value stemming from account labels on financial risk-taking. As a result, we see this study as just the first in a broader research program in the social studies of finance that not only extends theories of economic sociology but those of mainstream and behavioral economics too.

Future work should more closely examine differences by sociodemographic characteristics such as race/ethnicity, immigration status, age, education, and so forth—including characteristics of beneficiaries *as well as* respondents. Moreover, the effect of specific cases of relational *work* should be examined as a logical extension of this study (e.g. Do we become more conservative with funds designated for a relation who has provided reciprocal financial assistance in the past? Or, riskier with funds set aside for a relation who has fallen out of favor due to a long-standing quarrel?). Additionally, the studies in this paper only consider initial portfolio choice. While there is evidence that people typically 'forget' about their investments and do not re-allocate (Benartzi and Thaler 2007), future work should examine how earmarking influences other investment behaviors—for instance, by asking how relational portfolios are re-allocated following a major

loss or gain, in conversation with behavioral economics where losses have been shown to weigh heavier than gains (e.g. Kahneman and Tversky 1979).³⁸

To be sure, the findings we have presented are exploratory and derive from a stylized experiment, and do not necessarily translate neatly to the real world. Yet they do demonstrate the existence of a real and previously unrecognized social phenomenon at play in making investment decisions. Given the prevalence of relational investing, future work should also look for opportunities to examine how earmarks shape risk-taking in real-world settings and propose solutions that minimize potentially detrimental effects.

Conclusion

In this paper we use a set of vignette experiments to extend Zelizer's (1989, 2012) concept of earmarking from the domain of transactions to that of risk-taking in the context of relational investing. In positing such a theory, we try to consider the implications—for individual behavior, for financial cultures, for the economy, and for potential inequality—of a society wherein individuals not only make investment decisions for their own benefit, but for that of close others as well. A partner's retirement account, a child's college savings fund, or an adult child managing the estate of an elderly parent are all real examples of this phenomenon. Due to the relational content of these social ties as well as the shared meaning of labels designating culturally significant life-stage events (e.g. retirement or going to college), our experiments show that risk-taking is attenuated in ways that vary with each earmark. In addition to extending economic sociology to

³⁸ In particular, *prospect theory* states that people evaluate outcomes in comparison with certain benchmarks rather than final wealth; people are more sensitive to losses than gains; and people overweight small probabilities and underweight large probabilities.

the domain of financial risk-taking, our work has important implications for understanding potentially disparate outcomes based on the level of financial risk undertaken to meet subjective future goals.

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Part II

Chapter 2. The Behavioral Economics of Pierre Bourdieu³⁹

The science called “economics” is based on an initial act of abstraction that consists in dissociating a particular category of (economic) practices, or a particular (economic) dimension of all practice, from the social order in which all human practice is immersed. —Pierre Bourdieu (2005:1)

The behavioral turn in economics is considered one of the most important developments in contemporary social science research, challenging the hegemony of mainstream economic theory along several lines. Central to this school is an empirical skepticism of the rational economic agent, as demonstrated by systematic deviations from optimizing behavior when it comes to practical matters of money and financial risk. Such skepticism has no doubt been shared in the sociological tradition as far back as Max Weber, who identified instrumental (means-ends) rationality as an analytic ‘ideal type’ that “certainly does not involve a belief in the actual predominance of rational (*zweckrational*) elements in human life” (Weber [1922] 1978:7). Still, behavioral economics remains under the narrow purview of cognitive science (see e.g. DellaVigna 2009), where it is defined as “the combination of psychology and economics that investigates what happens in markets in which some of the agents display human limitations and complications” (Mullainathan and Thaler 2000). Indeed, nearly all the work of behavioral economics thus far has been to ground ‘irrational’ economic proclivities in universal cognitive processes at work within the minds of individualistic agents. The result is a myopic and incomplete understanding of economic behavior.⁴⁰

³⁹ In *Sociological Theory* 38(1), 16-35

⁴⁰ Piore (2010:385) cautions that tracing deviations from rational action to the biology of the human brain could even have unintended societal consequences that bear a resemblance to eugenics, “in the extreme, this leads to a willingness to improve economic outcomes through biological intervention.”

If the standard model of economics assumes actors that are *a*-social and rational, behavioral economics depicts them as *a*-social and *ir*-rational. To be sure, Streeck (2010:391) underscores that through the process of experimentally falsifying *Homo economicus*, “behavioral economics stripped human beings naked of their social relations and connections”. Meanwhile, sociology as a discipline, and economic sociology in particular, has not seriously engaged with behavioral economics; its main empirical findings remain unfamiliar and largely immaterial to sociological research (but see Bergeron et al. 2018). The ‘new economic sociology’ certainly recognizes behavior that is difficult to explain as rational but primarily based on agents’ network ties (e.g. DiMaggio and Louch 1998; Uzzi 1997), drawing an important distinction between arms-length (market) transactions and socially embedded (non-market) ones (Granovetter 1985; cf. Krippner 2002). Under Granovetter-style embeddedness, social relations constrain self-interested behavior when dealing with network ties, while arms-length transactions are considered free from such restrictions (Uzzi 1997). What behavioral economics shows is that people also fail to comply with economic theory for those ‘purely’ economic matters. It would be a profound mistake, however, to relegate non-embedded economic action as unimportant to sociology; it is simply governed through other means. Moreover, the theoretical boundary demarcating the ‘socially embedded’ from ‘economic’ realms is fading as markets are increasingly understood to be socially constructed (e.g. Bourdieu 2000a; Fourcade 2007) and arms-length transactions are revealed to be relational (e.g. Ingham 1996; Zelizer 2012).

Accordingly, this paper calls for a sociological intervention into the field of behavioral economics and its empirical oeuvre, to understand *economic* agents as both social and fallible. In particular, I seek reconciliation in Pierre Bourdieu’s dispositional theory of practice. This provides a framework that assimilates both mind and social structure through the mediation of the *habitus*

— the ‘generator’ or ‘organizer’ of the practices, representations, and dispositions of individuals. The habitus provides an appropriate analytical lens that functions at the meso-level (Özbilgin and Tatli 2005; see also Lizardo 2004) – at the interface between objective social structure and subjective experience – which can help integrate these literatures.

Recently, there have been some calls to bridge the psychological with the social in matters of economic behavior. Lamont, et al. (2017:866) advocate for a synthesis with cultural sociology, pointing out that cognitive processes are variously shaped by “cultural repertoires” that differ across social groups. Lamont and her collaborators advocate that “incorporating culture can develop a richer model of how the poor or middle class perceive, evaluate and respond to situations of [economic] scarcity” (Ibid.:868). Their argument is oriented toward behavioral economics in asking why the poor so often make (apparently) irresponsible financial decisions. From economics, Hoff and Stiglitz (2016:25) similarly urge their colleagues to “broaden economic discourse by importing insights into human behavior not just from psychology, but also from sociology and anthropology.” They propose a second strand of behavioral economics that recognizes “durable social influences on preferences and cognition,” highlighting that economic decisions can be shaped by culture and environment (Ibid.:26). Akerlof and Kranton (2000) likewise adopt a social-psychological approach to economic decision-making, one that incorporates the notion of (group) identity; that is, the internalization of norms that characterize how those in different social categories ought to behave.⁴¹ Benabou and Tirole (2011) similarly emphasize how, in a wide range of contexts, agents’ preferences are structured by their choices of a social category, recognizing that such choices are endogenous and shaped by social environment. And, acknowledging the

⁴¹ Akerlof and Kranton (2000:717) as well as others in the tradition of identity economics develop their models whereby individuals, more or less consciously, *choose* who they want to be (their identity) in order to maximize a utility function subject to societal constraints.

intergenerational transmission of culture, Bisin and Verdier (2000) model economic choice of agents with respect to the socialization of their children. These corners of the economics literature have made important contributions to socializing *Homo economicus* (see also: Akerlof 2017; Benabou and Tirole 2006; Carvalho 2012; Hoff and Pandy 2006; Sunstein 2002).

Behavioral economics as a distinct sub-discipline, however, has been more stubborn in counseling sociological theory; the calls for bridging the social have been largely peripheral to its efforts. Indeed, a radically different scholarship is carrying forward the central work of the behavioral economists by uncovering clues to suboptimal economic choice, not at the macro-social level, but from deep within the mind itself. The emerging field of neuroeconomics now examines the activity of certain regions of the brain using fMRI machines to reveal how neurons assign values to different options during the economic decision-making process (e.g. Camerer et al. 2005). This research suggests that different parts of the brain may be at work when making optimal versus sub-optimal choices, or for decisions which are self-interested as opposed to those that are socially preferred. While neuroeconomics can provide important insights about the micro-architecture of an economic decision, it risks putting social structure at even greater distance. The goal here is instead to abbreviate that distance.

As a field generally tasked with explaining how economic actors actually behave, behavioral economics lacks the capacity to adequately reconcile the psycho-cognitive with the social-structural. How is it that culture and norms of identity come to be internalized? How can the apparent reductionism of neuroscience predict economic action, which is inherently social? Critics argue that behavioral economics is a normative-descriptive project that lacks altogether a consistent, unified theory; rather, it merely illustrates a collection of (albeit noteworthy) observations (e.g. Berg and Gigerenzer 2010; Gal 2018). “Behavioral economists,” as one

commentator put it, “are too often concerned with describing *how* human behavior deviates from the assumptions of standard economic models, rather than with understanding *why* people behave the way they do” (Gal 2018; emphasis in original). Throughout this paper, I will argue that Bourdieusian theory can help resolve the *why* through a synthesis of both socially-structured and psychologically-motivated practice.

At the same time, this paper seeks to recover a coherent sociological theory that is congruent with, and which in many ways anticipates, behavioral economics (i.e. practical economic action) from among Bourdieu’s own writings, one that is articulated piecemeal across his work. It is a theoretical framework that butts heads with mainstream economic assumptions of rationality (see e.g. Christoforou and Laine 2014; Lebaron 2003), and which *also* radically diverges with the cognitive *idée fixe* underlying contemporary behavioral economics.⁴² It is in this context that Bourdieu (1998:79) asserts his position: “I want to attempt to show how all of my work has consisted in rejecting these two reductions.” Bourdieu’s theory of practice can thus be construed as a dispositional theory of behavioral economics. Given the prominence of behavioral economics and the sustained interest in the sociology of Pierre Bourdieu, the intervention that I present is furthermore an appeal for sociologists to join in dialogue with the behavioral economists and broaden the scope of explanation for ‘irrationality’. To appreciate how the particular economic biases and heuristics that have been identified thus far as cognitive can also be explained, moderated, or mediated by top-down influences is an important addition to our understanding of the economy and society.

In what follows, I first provide a brief overview of three main branches of contemporary behavioral economics: bounded rationality; prospect theory; and intertemporal choice. Next, I

⁴² Swedberg (2011) interprets Bourdieu as having multiple economic sociologies. I advocate that one of these threads can be understood as oriented to behavioral economics.

provide a sketch of Bourdieu's dispositional theory of practice and frame this in the context of economic behavior. Then, with this analytical framework in mind I revisit the three domains of behavioral economics listed above through the lens of the *habitus* in order to provide a richer depiction of how economic actors actually behave in the world.

Behavioral Economics

Since the behavioral economics literature is still not well-known in sociology, I begin by outlining the field's intellectual motivation and key strands of thought (for comprehensive expositions of behavioral economics, see e.g.: DellaVigna 2009; Heukelom 2014; Kahneman 2011; Thaler and Ganser 2015). Behavioral economics deals primarily with 'anomalies in choice'—decisions that do not follow the predictions of rationality or expected utility theory.⁴³ That is to say, behavioral economics is a rebuke against the rational actors ratified by mainstream economics. Of course, the classical political economists like Adam Smith and Karl Marx understood economic action to be situated in social structure and imbued with cultural and political meaning (e.g. Marx's organization of society into the bourgeois and proletariat). Economic *behavior* was assumed to be an inherently contextual characteristic of various individuals. The principles of economics over the past 150 years, however, have evolved from characterizations in favor of logical positivism (Heukelom 2014:26). Since the 1880s, when the *Methodenstreit* rejected the German Historical school in favor of rationalist-idealism, economists have gained stature by hanging their hats on universalizing theorems. Undeniably, the dominant position over the past century has been the neoclassical school, characterized by three core assumptions: individuals are (hyper)rational actors; they maximize utility; and they act independently based on 'perfect' information. For

⁴³ Expected utility theory holds that an agent ('economic man') will make optimal choices that maximize his/her utility, which by implication means avoiding choice patterns that would make him/her worse off economically or vulnerable in competitive markets (Ainslie 2018:261).

neoclassical economics, human beings are assumed to be '*Homo economicus*,' where rational calculation appears in consonant positions: on the one hand, as a tacit assumption built into economic models; and on the other, inculcated into the model builders themselves. To want to explain some deviation observed from a model's predictions would have been dismissed as unscientific and unworthy of serious inquiry. According to Heukelom (2014), it was this rigid adherence to logical positivism that sowed the seeds for the psychological criticism that gave rise to behavioral economics.

Rejecting the assumption of rationality, behavioral economics has since emerged as a dominant research program. Human beings systematically make decisions that vary from neoclassical theory, and behavioral economics has become the repository of heuristics, biases, and errors that permeate economic life. The rise of behavioral economics has mainly followed three key strands (DellaVigna 2009; Thaler and Ganser 2015) that I will briefly describe in turn:⁴⁴ (1) Herbert Simon's (1947, 1955) work on bounded rationality; (2) Daniel Kahneman and Amos Tversky's development of prospect theory (1979, 2011); and (3) issues of intertemporality, often attributed to the work of Richard Thaler and Hersh Shefrin (1978, 1981). Certifying the status of these three strands, Nobel prizes in economics have been awarded to Simon (in 1978), Kahneman (in 2002), and most recently Thaler (in 2017) for his work on "incorporating psychologically realistic assumptions into analyses of economic decision-making."⁴⁵

⁴⁴ Tomer (2007) identifies no less than seven strands of behavioral economics including Akerlof's 'behavioral macroeconomics'. The three I elaborate on are by far the most well-cited, but it stands to reason that Bourdieusian theory would also be compatible with the others.

⁴⁵ https://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2017/press.html

Bounded Rationality

Studying issues of psychology in organizational behavior, Herbert Simon observed that in the real world “human behavior is *intendedly* rational, but only *boundedly* so” (Simon 1947:88; emphasis in original). Rather than possessing “Olympian rationality,” Simon (1955:151) argued that, “[b]ecause of the psychological limits of the organism (particularly with respect to computational and predictive ability), actual human rationality-striving can at best be an extremely crude and simplified approximation to the kind of global rationality that is implied.” Simon did not believe that people are hopelessly illogical. Instead, he supposed that as a rule we follow heuristics or shortcuts (Simon uses the portmanteau *satisfice*) that are “good enough” solutions in place of the best ones that allow people to achieve their goals. Simon’s empirical work on organizational behavior led him to appreciate that corporate administrators did not operate like *Homo economicus*; rather managers satisficed on a regular basis, seeking a simple and intuitive “sensible share of the market,” “reasonable profit,” or “fair price” (Simon 1947:119). Herbert Simon’s contributions to bounded rationality are considered instrumental for the rise of behavioral economics as an identifiable body of economic thought (Hosseini 2003), where ordinary individuals are found to satisfice in all facets of economic life.

Prospect Theory

Kahneman and Tversky (1979), elaborating on bounded rationality, showed that contingent on how an (economic) choice is framed, the same individual will behave differently. For instance, if a risky proposition is set up in terms of a gain versus a loss, people will perceive dissimilar subjective value for each possibility rather than objectively evaluating the final outcome. Perhaps

the most salient product of this analysis is the concept of *loss aversion*, or the phenomenon that losses loom larger than gains.⁴⁶ Consider the following prospect (in Kahneman 2011:283-284):

*You are offered a gamble on the toss of a coin.
If the coin shows tails, you lose \$100.
If the coin shows head, you win \$150.
Is this gamble attractive? Would you accept it?*

The expected value of the gamble is positive and so a rational actor would accept;⁴⁷ but Kahneman and his colleagues have found that a great majority of people dislike this proposition and refuse it. “For most people, the fear of losing \$100 is more intense than the hope of gaining \$150” (Ibid.). Loss aversion is pervasive and leads to myriad ‘irrational’ economic decisions such as holding on to losing investments for too long (to avoid realizing a loss), missed opportunities, and phenomena like the endowment effect (Knetch 1989).⁴⁸ Loss aversion is attributed primarily to psychological reasoning based on evolutionary biology. As Kahneman (2011:282) explains, “organisms that treat threats as more urgent than opportunities have a better chance to survive and reproduce.”

Prospect theory posits a dualistic system of cognition that relies on a set of heuristics: “*System-1* operates automatically and quickly, with little or no effort and no sense of voluntary control; *System-2* allocates attention to the effortful mental activities that demand it, including complex computations. The operations of *System-2* are often associated with the subjective experience of agency, choice, and concentration.” (Kahneman 2011:20-21). It is the interaction of these two systems that explains systematic errancy when individuals are faced with economic

⁴⁶ As opposed to *risk-aversion* that appears in mainstream economics, where a gain and an equivalent loss are treated symmetrically.

⁴⁷ $(0.50)(-100)+(0.50)(150)=25$.

⁴⁸ The *endowment effect* states that people ascribe more value to something merely by owning it than when they do not.

decisions. In the instance of loss aversion, the rejection of the above gamble is due to System-2 but the emotional impulse that leads to that ultimate decision is generated by System-1 (Ibid.).

Intertemporal Choice

If prospect theory instructs that people make suboptimal decisions based on the present context, problems of intertemporal choice arise when people make irrational decisions today that will affect them negatively at a different time. When it comes to orienting economic action toward the future, the neoclassical model assumes that people make decisions consistent with temporal ordering. However, experiments show that people systematically violate this assumption – they are *time inconsistent*. The classic behavioral test that elicits this phenomenon follows some variation of Thaler (1981):

- (a) Which do you prefer: to be given \$100 today or \$105 in a week?
- (b) Which do you prefer: to be given \$100 dollars 52 weeks from now or \$105 in 53 weeks from now?

Both prospects offer a \$5 incentive to wait a single week, and so one should be indifferent between the choices posed in (a) and (b). Yet, people overwhelmingly choose to receive \$100 today and \$105 in 53 weeks. Loewenstein and Prelec (2009) point out that time inconsistent preferences tend to overweight the present at the expense of the future (so-called hyperbolic discounting), causing problems with self-control (Ainslie 1991).⁴⁹ This discount structure sets up a conflict between today's preferences and the preferences that will be held in the future (Laibson, 1997). Real-world implications include the prevalence of shirking on New Year's resolutions, not saving enough for retirement, and over-spending on credit.

Problems of intertemporal choice have been a prominent strand in behavioral economics, where these have traditionally been ascribed to humanity's limited cognitive capacity: "The

⁴⁹ Sometimes referred to as *present bias*.

preference for immediate gratification captured in these studies appears to have identifiable neural underpinnings” (DellaVigna 2009:318).

Bourdieu’s Theory of Practice and Reasonable Behavior

Bourdieu’s theory of practice provides an opportunity to revisit these empirical phenomena from a sociological vantage point without dismissing the influence of cognitive processes. In fact, Bourdieusian theory can help us explain the mental state and shared perceptions of economic agents in the world. The concepts offered by Bourdieu are explained thoroughly elsewhere and are likely familiar; therefore, I will only very briefly sketch the key elements before orienting them toward the topic at hand.

Fields are the social terrain on which action takes place, the structured spaces of relative positions that constitute the social world. Agents occupy various positions in a field in relation to the volume and configuration of *capital* available to and held by them. It is the structure of objective relations between the agents on a field that defines dominant and dominated positions (Bourdieu 1998) and thus determines for whom which practices are imaginable, and which are not (the space of “possibles and impossibles”) (Walther 2014:9). A field sets out the taken-for-granted truths in some microcosm of society (the *doxa*), which will vary based on an agent’s composition of capital. This leads individuals to behave (consciously or unconsciously) in a way more or less in correspondence with their position in the field. But, a field is not static: its configuration will depend not only on the positions of the agents, but also on the everchanging balance of power among the agents and the resulting struggle between them for the acquisition of different forms of capital (Bourdieu 1984).⁵⁰ Field thus provides a template with which to bring in social structure, one which can account for the richness and dynamism of aspects like culture and its influence on

⁵⁰ Capital exists as several interconvertible types, including economic but also cultural, social, and symbolic, as well as field-specific forms.

behavior, including behavior oriented to the field of economics. The crucial move that Bourdieu makes is to relate the effect of social structure with the mind via the *habitus*.

Each objective position in a field imparts a particular habitus to its occupants, habitus being “a system of lasting, transposable dispositions – which, integrating past experiences, functions at every moment as a matrix of perceptions, appreciations, and actions and makes possible the achievement of infinitely diversified tasks, thanks to analogical transfers of schemes permitting the solution of similarly shaped problems” (Bourdieu 1969:100). Habitus is intimately linked to the structure of the field and intervenes repeatedly in the (often unconscious) practices of the agents which it shapes. It is social structure turned mental structure (Wacquant, 2005). Involvement in a field shapes the habitus, shaping agents’ perceptions and actions, which in turn leads to a propagation of the rules of the field (Crossley 2001:101). Mental structures, thus, in the same way emanate outward to confirm and reproduce the objective social structure (Bourdieu 1977). Habitus appears in the mind but also transcends it: “Social reality exists, so to speak, twice, in things and in minds, in fields and in habitus, outside and inside social agents” (Bourdieu and Wacquant 1992:127). The habitus, comments DiMaggio (1979:1464), is “central to all Bourdieu's work as the link that mediates structure and individual practice.”

Practice, including economic behavior, is the resulting dialectic between field and (economic) habitus, the reciprocal relationship between objective structure and subjective dispositions that are simultaneously structured structures (*opus operatum*) and structuring structures (*modus operandi*); Bourdieu’s (1984:101) own conception following the formula: [(habitus) (capital)] + field = practice.

To understand Bourdieu’s ‘behavioral economics’ – i.e., socially-inscribed practice that may deviate from rational expectations – it is necessary at the outset to situate *rationality* in terms

of a particular habitus oriented to the rules of the economic field. “The so-called ‘rational’ economic agent,” Bourdieu (2000a:18) explains, “is the product of quite particular historical conditions.” Far from being automatic or pre-determined, rational expectations are artefacts of socialization within a field where markets and capitalist production are (and have been) pervasive. To this effect, Bourdieu (2005:1) quotes the philosopher Henri Bergson: “It takes centuries of culture to produce a utilitarian such as John Stuart Mill.” Economic agents thus uphold the field’s shared illusion that self-interested maximizing is the self-evident *modus vivendi* and that success (in terms of the struggle for dominant positions in the field) results inevitably from rational calculation. This is the economic field’s *doxa*, the set of fundamental beliefs and pre-reflexive expectations, “an uncontested acceptance of the daily lifeworld” (Bourdieu and Wacquant 1992:73). To possess a habitus compatible with the modern economy does not then suggest an intrinsic, asocial rationality – although successful economic agents may appear superficially to be partaking in self-interested calculation. In truth, they simply exist as a “fish in water”; they share a set of dispositions that tends to naturally yield and sustain a wealth of capital. They are attuned to the economic *doxa*.

The cultivated *doxa* that elevates the taste of dominant social groups in Bourdieu’s (1984) *Distinction* is matched by the middle-brow penchants of the working class (Deer 2014:122). So too, the apparently rational *doxa* of the dominant economic groups is matched by a proletarian ‘*alldoxia*’ in dominated positions that appears firmly irrational (e.g. among the poor or uneducated). Indeed, Bourdieu insists that the struggle over position in a field is not only about accumulation of capital but the right to define the *doxa* itself (e.g. Bourdieu 1984:471-481, 1991:131-132). As Deer (2014:122) explains, those occupying dominated positions share “a learned form of ignorance, that is to say an *alldoxa*, a type of mis-recognition...stemming from

maladjusted expectations.”⁵¹ Evelev (2006:115) further conveys that for Bourdieu, “middlebrows, lost in their *alldoxia*, do not know how to play [the game], a game in which the terms are established through subtle distinctions by those who set cultural standards.” Accordingly, those who *seem* to act rationally may be said to have a habitus that is *doxic* to the economic field, and those that deviate from rationality *alldoxic* (see Table 1 below).

Frank, Gilovich, and Regan (1993) provide some provocative evidence for the edification of *doxic* economic dispositions. They find that trained economists behave less cooperatively than non-economists along a variety of dimensions. Economists receive mental templates for rational self-interestedness through their preparation and practice, which itself is made possible in good measure by the composition of capital that establishes the position they occupy in the social structure: economic capital in the ability to pay tuition and related costs; cultural capital encoded as the skills, values, and knowledge which instill a norm of higher education and professional aspirations; social capital through the personal network of relations that share adjacent positions in the fields they inhabit; and symbolic capital in the appreciation of the prestige afforded to financial success, as well as the role of the economics discipline in developing the means to achieve desired wealth. On these grounds, economic self-interestedness is unlikely to be essential to the human condition. In fact, quite the opposite appears to be the case – studies in social neuroscience

⁵¹ Unlike *heterodoxy*, which knowingly seeks to subvert the established *doxa*, *alldoxia* is the coincidental result of an incongruous habitus – “consisting in mistakenly recognizing oneself in a particular form of representation and public enunciation of the *doxa*” (Bourdieu 2000b:185). In Bourdieu’s early work *alldoxia* is sometimes construed as a state of confusion, but later it is recast as a practical misapprehension occurring in dominated positions in social fields. For instance, in *Distinction*, Bourdieu illustrates how *alldoxic* practice leads the petit bourgeois to take light opera for ‘serious music’ (Bourdieu 1984:323). In politics, he describes how *alldoxia* in the political field leads individuals in dominated positions to endorse opinions that are not their own (Ibid.:459-460). Elsewhere, Bourdieu (1988) argues that for the same reason young people from working-class backgrounds opt themselves out of higher education, seeing college as “not for the likes of me,” whereas middle-class youth assume college education to be a natural progression in the life course. Moreover, those who do matriculate from working-class backgrounds are more likely to feel out of their element while middle-class students will comfortably navigate university life and find success.

show that important regions of the brain linked with reward processing are stimulated in games like a prisoner's dilemma, involving both monetary and non-monetary payoffs, when individuals *cooperate* with one another, but not when defecting (Decety et al., 2004; Rilling et al. 2002). Of course, even the most appropriately socialized agents who populate the upper echelons of the economic field are still prone to stray from the standard model from time to time, suggesting that default cognitive predilections may tend toward the 'irrational'. However, the degree of irrationality is greatly moderated by a *doxic* habitus, which is socially constructed and inscribed unto those occupying the proper field positions, overriding cognitive errors and biases.

Turning to 'irrational' economic behavior, practices that deviate from utility maximization can be understood to result from an *alldoxic* habitus. A key insight that Bourdieu brings to economic thought is that "economic...dispositions can only be understood by reference to the economic and social situation which structures the agents' whole experience" (Bourdieu, 2000a:64). Rather than moderating irrational tendencies, *alldoxia* magnifies them. Those deficient in capital are less likely to have the same (objective) opportunities, and moreover may not value such (subjective) opportunities even if presented with them. A working-class habitus may deem the very same venture an undesirable risk that a bourgeoisie disposition will automatically recognize as an attractive investment. Likewise, a working-class mother may think it natural to play the lottery to get ahead (Beckert and Lutter 2013) while a businesswoman would never waste her money on such a bad bet.

Other cases of economic *alldoxia* appear in Bourdieu's ethnographic work among the *Kabyle* people in the 1960s, an agrarian culture situated in the mountainous regions surrounding Algiers. There, he was able to document contradictory logics between the *Kabyle's* pre-capitalist society and the sudden integration of market institutions that colonialism brought with it prior to

the Algerian War (Bourdieu 1979). The introduction of the free market, the pursuit of monetary profits, and the new-found need for applied calculation created practical mismatches between the existing set of dispositions socialized into the *Kabyle* and those demanded by the free market. When *Kabyle* peasants found themselves thrust into a market logic, they appeared to outside observers as ‘irrational’ economic actors. For instance, Bourdieu (1979:40-43; 2000a) witnessed *Kabyle* “street hawkers” trying to sell odd items or pieces of fruit, and who, despite often earning far less than the cost of goods sold, returned each day to hawk their wares. Why would somebody choose to operate at a net loss day in and day out? For Bourdieu, the answer lies in the pre-capitalist habitus: “To work, even for a minute income, means, both to oneself and to the group, that one is doing everything in one's power to earn a living by working, in order to escape the state of unemployment” (Ibid.:42).⁵² The *Kabyle*, brought up to believe that toil is a social virtue and idleness a moral misconduct, lacked the pragmatic distinction between ‘productive’ versus ‘unproductive’ work – and, equating unemployment with idleness chose the perfectly *reasonable* but nonetheless self-defeating decision to return to the streets each day to lose money.

From this perspective, (ir)rationality is a situated construct that varies among and between individuals that occupy different field positions, across space and over time. This is an important break with how rationality is traditionally understood, where “economic science treats the prospective and calculating disposition towards the world and time as a natural datum, a universal gift of nature” (Bourdieu 2000b:70). The respective habitus and (*allo*)*doxa* corresponding to a particular field position tend to produce practical beliefs and behaviors that appear sensible to those who share similar positions, yet potentially non-sensical to those who occupy others. In reframing economic action, Bourdieu (2005:2) revises rationality “by the substitution of the lexicon of

⁵² The habitus is durable, yet it adapts to changing conditions, although its adjustment often introduces a lag, or *hysteresis*, whereby its initial state finds itself provisionally incompatible with a rapidly changing external reality.

dispositions for the language of decision-making, or the term ‘reasonable’ for ‘rational,’ which is essential to express a view of action radically different from that which – most often implicitly – underlies neoclassical theory.”

Table 1: Theories of Economic Behavior

	Asocial	Social
Rational	Neoclassical Economics	Field+Habitus (<i>Doxic</i>)
Irrational	Behavioral Economics	Field+Habitus (<i>Allodoxic</i>)

In the following sections, I return to each of the three strands of behavioral economics previously outlined through the lens of Bourdieu’s dispositional theory of practice. The contemporary glorification of individual responsibility in everything from employment choices to retirement savings tempts us to search *within* our brains for faulty wiring – it seems obvious that it should be our own misdeed when we fail to live up to rational action. But this is deceptive. “[E]verything conspires to make us forget the socially constructed, and hence arbitrary and artificial, character of investment in the economic game and its stakes: the ultimate reasons for commitment to work, a career or the pursuit of profit in fact lie beyond or outside calculation and calculating reason in the obscure depths of a historically constituted habitus, which means that, in normal circumstances, one gets up every day to go to work without deliberating on the issue, as indeed one did yesterday and will do tomorrow” (Bourdieu, 2005:10). We take economic reality for granted and many of us reprise practical mistakes because they seem (and have always seemed) quite reasonable. As Swedberg (2009:241) quips, “*Homo economicus*, in contrast, has no past or a habitus; everything he does is eternally new.”

Socially Bounded Rationality

Reconsider Simon's concept of bounded rationality, where individuals intend to act rationally but, despite good intentions, are limited in their capacity to identify and achieve optimal outcomes.⁵³ Bourdieu (2000b:19) observes, “[h]ow can it be denied that agents are practically never in a position to gather all the information about the situation that a rational decision would require and that they are in any case very unequally endowed in this respect?” This sentiment indeed rings of bounded rationality; yet, Bourdieu challenges Simon's account – it is not simply that we satisfice, “redefining the aim of maximizing profit as a quest for 'acceptable minima” (Ibid.). Rather, the limitations placed upon us are, at least in part, socially inscribed in the space of possibles and impossibles, pre-determined by one's position in the field. Simon, unlike Bourdieu, overlooks the way that social structure influences the manner with which people carry out their calculations and the information that is available to them in the first place (Swedberg 2011:75).

Socially constructed frames can focus our attention on specific aspects of a decision for consideration, while leaving us to discount or completely fail to see other avenues of inquiry. Choices are framed by one's position in a field, and through the subsequent peer networks, cultural norms, institutions, and mass media preferences that accompany such a position (Dietz and Stern 1995). “Rationality is bounded not only because the available information is curtailed, and because the human mind is generically limited and does not have the means of fully figuring out all situations, especially in the urgency of action, but also because the human mind is *socially* bounded, socially structured and determined, and, as a consequence, limited” (Bourdieu and Wacquant 1992:126; emphasis in original).

⁵³ For an extended sociological discussion on behavioral economics featuring Simon's bounded rationality, but which arises from an alternative perspective, see Etzioni, Piori, and Streeck (2010).

The CEO of a corporation, for instance, trying to accumulate as much information possible on a potential merger would hardly be inclined to seek advice from the building's janitor – even though the janitor may know something about the acquiring company having worked in their headquarters as well. Alternatively, the janitor would never approach the CEO for advice on a cleaning product, even if that executive runs a household products manufacturer. Within the scope of Simonian bounded rationality, each seeking information from the other would be perfectly acceptable (if not unlikely) in the process of satisficing; however, it stands outside the socially bounded realm of possibilities for one to beseech the other.

Another example of socially bounded rationality comes from Bourdieu's early work in Algeria, with *Kabyle* farmers who commonly engaged in a type of loan called a *charka*, where an ox is lent to a peasant too poor to buy one in exchange for a certain amount of grain (Bourdieu 1979:21). Rather than maximizing *or* satisficing, the *Kabyle* show social restrictions against rational intention altogether: “when self-interested calculation is openly revealed, it is sharply reproved” (Ibid.). And so, there is *no* calculation and no expectation of profit from such exchanges. To act in even a modestly self-interested way would be seen as unreasonable.

Every person is socially bounded by a personal sense of self – his identity. Akerlof and Kranton's (2000) identity economics figures different social categories (e.g. gender or race) and how people in these categories should behave. Identity, they argue, can explain behavior that appears maladaptive or even self-destructive by those with other identities (Ibid.:717; see also Benabou and Tirole 2011). However, according to Collet (2009:431), Simon's concept of identification, which is similar to how economists conceive of identity, “only referred to the inherent properties of the categories to which we belong and not how they relate to each other.” Indeed, identities like ‘female’, ‘black’, and ‘poverty-stricken’ appear in these models as simple

dummy variables (Akerlof and Kranton 2000:738). Yet, by allowing for identity to be malleable and relational, their argument that social difference leads one group to perceive of another as “making bad economic decisions” could be expressed in terms of habitus+field. Identity economics presumes that (e.g.) poor black men are excluded from the dominant groups, which limits their access to information and resources needed for economic opportunity. This incentivizes them to adopt an “oppositional identity” replete with pathological behavior (Ibid.:739-740). We can now appreciate that such individuals don’t so much elect a maladaptive identity but instead occupy dominated (*allogenic*) positions in the structured microcosm of the economic field. As a consequence, their realm of ‘possibles and impossibles’ is circumscribed by a habitus that essentially provides a reasonable set of norms and practices (such as drug dealing or crime) to make ends meet.

Thinking Fast and Slow, and Social

Turning to prospect theory, Lizardo (2004:395) argues from constructivist psychology that Bourdieu’s theory of practical action is “perfectly compatible” with Kahneman and Tversky’s behavioral model. Prospect theory recognizes that people maintain sub-optimal preferences that differ depending on the frame of context. Frame-dependent preferences can now be understood as socially-conditioned and incorporated into cognitive structures, where the habitus works particularly at the *unconscious* level. Automatic socio-cognitive feats of economic life include: “[a]ll the capacities and dispositions...the art of estimating and taking chances, the ability to anticipate through a kind of practical induction, the capacity to bet on the possible against the probable for a measured risk, the propensity to invest, access to economic information, etc.” (Bourdieu and Wacquant 1992:124).

System1—System2

As a central tenet of prospect theory, Kahneman's (2011) "System-1—System-2" dialectic may thus reveal itself under the guise of the habitus. According to prospect theory, System-1 "is the brain's fast, automatic, intuitive approach;" System-2 "the mind's slower, analytical mode, where reason operates." Yet, "System-1 is...more influential...steering System-2 to a very large extent."⁵⁴ Kahneman describes System-1 as "effortlessly originating impressions and feelings that are the main sources of the explicit beliefs and deliberate choices of System-2," that System-1 can "generate surprisingly complex patterns of ideas" (Kahneman 2011:21). Moreover, "[t]he main function of System-1 is to maintain and update a model of your personal world, which represents what is normal in it,...it determines your interpretation of the present as well as your expectations of the future" (Ibid.:71). Taken together, economic action under prospect theory is the dual product of automatic impulses regulated by conscious effort.

Bourdieu's (1990:53) treatment of the habitus is strikingly similar to this duality (the bracketed text my insertions): "the responses of the habitus [System-1] may be accompanied by a strategic calculation tending to perform in a conscious mode [System-2] the operation that the habitus [System-1] performs quite differently, namely an estimation of chances presupposing transformation of the past effect into an expected objective [System-2]. But these responses are first defined, without any calculation [System-1], in relation to objective potentialities, immediately inscribed in the present." Like System-1, which "generates impressions, feelings, and inclinations" and that "operates automatically and quickly, with little or no effort, and no sense of voluntary control" (Kahneman 2011:105), the habitus, too, is an involuntary, generative formula,

⁵⁴ Interview with Daniel Kahneman at Harvard University: <https://news.harvard.edu/gazette/story/2014/02/layers-of-choice/>

“[t]he schemes of the habitus...owe their specific efficacy to the fact that they function below the level of consciousness and language” (Bourdieu 1984:266).

It would be wrong to interpret the habitus (or System-1 for that matter) as a simple deterministic reflex. Instead, the habitus provides a blueprint for how to feel and act when confronted with novel situations. While operating below the level of consciousness, habitus does not dictate that individuals simply repeat past behavior; they must consider changes in the fields and environments in which they are situated, as well as adapt to the particular situation that presents itself. Duncan’s (2011:6) analysis of habitus resolves this point succinctly: “Hence agents both follow rules and exercise agency; they combine discursive, practical and unconscious agency”. In prospect theory, economic behavior follows from an interaction between some dispositional impulse and a conscious appraisal of that stimulus. From a Bourdieusian perspective, the homology between System-1 and habitus is clear. It does not follow, however, that System-2 be rendered asocial. Attention given to peer-effects and localized norms of conduct, for example, can mediate and moderate economic behavior (Manski 1993), and sometimes override the habitus’ impulse entirely – but, while the habitus is durable and a product of accumulated history, System-2 is contingent and transitory.⁵⁵

What of System-1’s ability to orient action based on expectations of the future, with respect to habitus? Bourdieu (1998:80) would reply, “pre-perceptive anticipations, a sort of practical induction based on previous experience are not given to a pure subject, a universal transcendental consciousness. They are the fact of the habitus as a feel for the game”. Depending on one’s feel for the game – the compatibility of their habitus in relation to the field – they will vary in their

⁵⁵ Scholarship on education in particular emphasizes the centrality of peer groups in ensuring the reproduction of dominated social groups (see also: Bourdieu 1988).

ability to anticipate the future, to calculate risks and probabilities – to once again appear *doxic* or *alldoxic*.

Loss aversion

One of the most widely studied topics in prospect theory is *loss aversion* – the recognition that people systematically prefer to avoid losses than receive an equivalent gain. Across the literature, loss aversion is chalked up to psychological causes; but perhaps it is because people are endowed with systems of transposable dispositions that favor *winning* and condemn losing. People are socially predetermined to fear loss – whether it is injury, death, rejection, or humiliation. Winning and losing come to represent a symbolic opposition — where winners gain not only economic profit but also symbolic capital (i.e. recognition) at the expense of losers. Depending on a particular situation, losing may be more or less acceptable in the eyes of others. For example, to lose to an underdog can be shameful for the favorite; “it is this sense of acceptability, and not some form of rational calculation oriented towards the maximization of...profits” that can lead us to avoid losses (Bourdieu 1991:77). Cast in this light, certain people come to view certain risks (e.g. a gamble to either win \$150 or lose \$100) as unacceptable. In Kahneman and Tversky’s experiments certain people *do*, of course, choose the gambles, acknowledging that some individuals are more loss averse than others (Kahneman 2011:284).⁵⁶ It is not (only) that human beings are bad at computing expected payoffs; it is that our actual perception of the payoffs is dependent on our habitus. “To view action as the outcome of conscious calculation...is to neglect the fact that, by virtue of the habitus, individuals are already predisposed to act in certain ways, pursue certain goals, avow certain tastes, and so on” (Bourdieu 1991:16-17).

⁵⁶ Kahneman, Tversky, and most others who have studied loss aversion experimentally do not, however, tell us *which* types of subjects choose the gamble versus those who do not.

It will often go against one's direct economic interests to exhibit loss aversion, as it induces people to *increase* risk-taking in hopes of breaking even when presented with a (paper) loss. Doubling down at a blackjack table in hopes of recouping deficits is a prime example of this deleterious effect. It also encourages investors to hold on too long to losing investments for fear of locking in a loss, and at the same time compels people to sell their winners too early for fear of losing paper gains (in the context of trading, loss averse behavior is known as the *disposition effect*). Bourdieu (1984, 2005) frequently operationalized distinctions among habitus as corresponding with one's occupation. Those that work in finance should accordingly have a more rational (*doxic*) outlook when it comes to risk-taking as opposed to, say, undergraduate students or manual laborers. Similar to Frank, et al.'s (1993) study of self-interestedness among trained economists, professional traders, whose livelihoods rely on judging the market, are found to be far more tolerant to financial losses than lay investors or lab subjects (Kahneman 2011; Locke and Mann 2005). Locke and Mann (2005:1) comment that "in fact, the successful...traders in our sample exhibit trading behavior well characterized as rational and disciplined" (cf. Haigh and List 2005).

Economic dispositions that approve of winning and scorn losing are apt to be indoctrinated by virtue of neoliberal ideology and policy that exists in much of the developed world today. These cultural risk attitudes should furthermore vary between-subjects by the composition and distribution of capitals ascribed to particular individuals. In an empirical study, Gächter and his colleagues (2007) find that loss aversion increases with age and decreases with education, and Von Gaudecker, et al. (2011) report a high degree of heterogeneity in individual loss aversion with a significant correspondence between a decline in loss aversion and rising income (see also Hjorth, et al. 2011). For a poor person, losing \$100 *is* very often more severe than a \$150 gain. The same

holds true for a retiree. Such a logic is consistent with Hoff and Stiglitz's (2016) "enculturated actor" and with other economists seeking to inject culture into their models (e.g. Benabou and Tirole 2006; Bisin and Verdier 2000; Carvalho 2012). For instance, a male situated in a society maintaining traditional gender roles may internalize a greater concern with financial loss as the expected breadwinner. We would also suspect that loss aversion would be generally greater in societies that value individual autonomy or self-responsibility. Little research has compared loss aversion across cultures, but one recent study of 53 countries finds that those ranking higher on both individualism and masculinity do show increased loss aversion (Wang et al. 2017).

Neuroeconomics associates loss aversion with a fear response in the brain — since fear reactions are similar across species, the 'animal model' has been seen as a useful way to understand loss as a biological response (Camerer et al. 2005; Rick 2011). While it is true that prey animals will react with fear to a sudden movement, it is less obvious that the human brain will trigger the same instinct when confronted with a monetary loss. A plausible alternative is that people are conditioned with a habitus that on the first order generates a shared understanding of what circumstances constitute a 'loss;' and second, that we should collectively seek to avoid such losses (i.e. 'fear' them). Depending on one's position in the economic field, losing a job may be more consequential than losing face. For others, losing to a competitor is worse than failing on one's own. DeMartino, et al. (2010) studied loss aversion in the brains of people with damaged amygdalas, the part of the brain attributed with the experience of emotions. They find that those with a damaged amygdala do *not* exhibit loss aversion and go on to suggest that loss aversion may reflect a simple Pavlovian approach–avoidance response. Pavlov had to train his dogs to salivate at the sound of a bell, just as quotidian experience within the social structure implants the cognitive pathways for recoiling from a financial loss. A key point with Bourdieu's theory is that as people

are variously loss-averse in practice, that gradient of aversion is at the same time generative – it subsequently reinforces the rules of the game of the economic field and conditions particular sensitivities to economic loss to each position. It would be as if dogs' salivation in turn resulted in Dr. Pavlov ringing his bell more often.

Time Inconsistency

Finally, to come back to issues of intertemporal choice, Bourdieu argues that it is also the habitus which informs our dispositions toward time, and especially toward in the future. “In fact, a given agent's practical relation to the future, which governs his present practice, is defined in the relationship between, on the one hand, his habitus with its temporal structures and dispositions towards the future...and on the other hand a certain state of the chances objectively offered to him by the social world” (Bourdieu 1990:64). Problems of time inconsistency (Thaler 1981) and the desire for immediate gratification (Thaler and Shefrin 1981) may therefore be socially mediated. “It is the discrepancy between...a 'subjective' disposition (which does not mean an internal or mental one) and an objective tendency, which gives rise to relations to time such as waiting or impatience” (Bourdieu 2000b:209). For the habitus, the past, present and future all intersect and inform one another. Because of this, the temporal decisions we make will vary depending on our specific dispositions.

During his time in Algeria, Bourdieu noticed that those who had not (yet) adapted to the capitalist system had radically different perspectives toward time. “[N]othing is more foreign to the pre-capitalist economy than representation of the future as a field of possibles to be explored and mastered by calculation” (Bourdieu 1979:8). The *Kabyle* did not *lack* dispositions toward the future, instead they embodied alternative arrangements informed by past experience and a culture of prudence (e.g. storing up a surplus of food) over risk-taking oriented toward the future: “Far

from being dictated by a prospective aiming at a projected future, the [*Kabyle*] practices of foresight stem from the desire to conform to inherited models” (Ibid.: 9). For neoclassical economics, the future is postulated as a field of infinite possibilities, each of which can be calculated probabilistically and ranked in order of preferred outcome (see Beckert 2016). But, traditional Algerian society “has no ambition to lay hold of the future and of chance” (Bourdieu 1964:70). In a modern economy that increasingly rewards short-term profits and consumption on credit, as opposed to “patient capital” and precautionary saving, the Western economic habitus may indeed be predisposed to prefer \$100 today and \$105 in a year and a week, against rational expectations.

Even among us who live in contemporary Western society, our economic dispositions toward time can only be properly understood with reference to our past and present social situation, informed by the field positions we occupy. “In fact, to each socio-economic position corresponds a system of practices and dispositions organized around the relationship to the future that is implied in that position” (Bourdieu 1964.:64). Variations in socio-economic status will thus inform the perception of unequally probable trajectories in the set of outcome-possibilities and, thus, should predict a diversity in anomalies like the self-control bias (see Bourdieu 1996:351).

Indeed, Bernheim, et al. (2015:3) find that the poor are much more likely to seek instant gratification, where “poverty perpetuates itself by undermining the ability to exercise self-control”. Fligstein and Goldstein (2015) present further evidence that those lower on the socio-economic status distribution adopt defensive financial strategies while those at the top embrace finance as an opportunity to extend their lifestyles through long-term investment. For Bourdieu this, too, would seem unsurprising. From among his earliest writings, Bourdieu (1964:70-71) writes, “[t]he peasant knows that, whatever he may do, he will not succeed in making ends meet, and he resigns himself to living day by day.” In other words, the peasant – just like the contemporary poor – have

dispositions oriented toward the present and not toward the future; they are present-biased. Bourdieu also suggests that for a person to take control over their destiny and begin to think about the future, they first must be able to gain some minimum control over their present situation. We would expect present bias to diminish as more dominant positions in the social structure are achieved and financial concerns over the quotidian become less salient.

Conclusion

Behavioral economists have succeeded in disrupting the traditional order of economics by challenging the field's assumptions of rational actors. However, like the neoclassicals, the behavioralists have largely reduced action to individual cognition. Economic sociology has also kept its distance from behavioral economics' phenomena such as loss aversion and time inconsistency – these curious but still 'arms-length' occurrences have typically fallen outside the scope of socially embedded transactions. In this article, I have argued that Bourdieu's dispositional theory of practice is a useful sociological framework with which to analyze and explain the types of 'irrational' economic behavior observed by behavioral economists, incorporating both the individual mind and supra-individual social forces. Our mental templates *are*, in part, embodied social structure, notwithstanding the mind's biological materiality. Lizardo (2004:394; emphasis in original) sums up this point succinctly: "the habitus is itself an *objective* structure albeit one located at a different ontological level and subject to different laws of functioning than the more traditional 'structure' represented by the field;" adding that "the interplay between individual bodily and mental structures and macrolevel social structures has so far been under-exploited" (Ibid.). Using Bourdieu's insight, I have argued throughout this paper that field and habitus provide an analytical framework that can account for a range of seemingly irrational empirical behavior identified in the economic sphere.

Bourdieu already understood this perfectly well. “Economic agents,” he remarked, “make choices systematically different from those predicted in the economic model: either they do not play the game in accordance with the predictions of theory, or they resort to ‘practical’ strategies, or they evince a concern to act in conformity with their sense of fairness or justice and to be treated in the same way themselves. This empirically observed discordance is merely the reflection of the structural discrepancy I have analysed from my earliest work...[T]he field imposes on everyone, though to varying degrees depending on their economic position and capacities, not just the ‘reasonable’ means, but also the ends, of economic action” (Bourdieu 2005:8).

Importantly, I do not seek to reject out of hand the role that psychological processes play on economic behavior; instead I favor an integrative or complementary approach. Thus, when behavioral economics instructs that losses loom larger than gains for individuals, I accept that human beings may have evolved deeply-seated instincts as protection from harm, and as Piore (2010:386) notes, “there is no question that, in some way and at some level, human behavior is rooted in our biological construction.” But, Piore is also quick to follow that the human organism, unlike the other animals, is uniquely equipped with linguistic capacity that institutionalizes norms, both formal and informal (Ibid.). For this reason, discourses around losing and winning in this way become socially-inscribed, which can either minimize or magnify the extent of our loss-averse instincts – within a social order and across cultures. Once we understand deviations from the standard economic model as not only cognitive, but also socially structured, individual rationality can then be recognized to vary naturally between and among individuals, over time, and across contexts.

As an empirical project, the thesis put forth in this paper can be evaluated to measure how phenomena like loss aversion vary by social position and habitus. An ‘analytic Bourdieusian’

approach could greatly extend the project of behavioral economics, which already hints that the poor are *alldoxic* – i.e. they are found to be more loss averse and have greater issues with intertemporal choice (e.g. Bernheim et al. 2015; Von Gaudecker et al. 2011). Following Bourdieu’s framework, we would also expect (e.g.) loss aversion to vary along dimensions besides volume of economic capital. Cultural and symbolic capital accumulated through education and financial training (e.g. financial literacy) should provide for a more *doxic* orientation and reduce susceptibility to behavioral errors (see Frank, Gilovich, and Regan 1993). At the same time, dispositions toward winning that are socialized through immersion in athletics or other competitive activities could transpose otherwise *doxic* notions in the field of sport as *alldoxia* with economic decision making – perhaps high-performing athletes will also be more loss averse.

Many of the most influential findings in behavioral economics to date have been elicited primarily from small samples of college undergraduates at prestigious research universities. This inadvertently homogeneous sample has produced fairly consistent findings in terms of non-standard preferences and decisions. But this is also unsurprising since these subjects are likely to share similar field positions. There is a growing critique against behavioral psychology’s singular use of Western, Educated, Industrialized, Rich and Democratic (‘WEIRD’) samples (e.g. Henrich et al. 2010; Jones 2010). Using a range of social positions as explanatory variables, both within societies and across cultures, future research can explore a sociological behavioral economics and motivate new strands of inquiry.

Finally, while the emphasis of this paper has been to unite sociological thought and behavioral economics by way of field and habitus, Bourdieu’s theory is also not intended to be the panacea that uncomplicates *all* deviations from the standard economic model. Indeed, other theoretical frameworks from sociology can shed light on certain findings from behavioral

economics. For instance, Zelizer's (2012) approach evinces a sociological counterpoint to 'mental accounting' that is better explained through relational work and earmarking (Hayes 2019; Wherry 2016; cf. Thaler 1985). Still, Bourdieu serves as a cogent starting point to bridge the gap between these literatures and a worthy place to begin a productive dialogue.

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**Chapter 2A. Excerpts from “A Feel for the Game:
Economic Dispositions as Micro-Foundations of Economic Inequality” (w/Meg Bea)**

Bourdieu understood this interface between social structure and individual action to be regulated based on the volume and composition of material and social resources they possess. This could be revealed empirically, where “the task of [social] science is to uncover the structure of the distribution of species of capital which tends to determine the structure of individual or collective stances taken, through the interests and dispositions it conditions” (Bourdieu, 1992: 113-114). What is more, Bourdieu recognized a fundamental opposition between holding economic and cultural capital, an extension of the contradictory logics that regulate cultural and economic life more generally.⁵⁷ In his most famous book *Distinction*, Bourdieu (1984) arrives at a theory of taste and shows how social reproduction occurs due to different dispositions and behaviors that stratify class in the cultural field. Those with an abundance of cultural capital can play the “culture game” well and get ahead. Those with a preponderance of economic capital instead see the world more practically “for what it is” and therefore cannot appreciate the legitimacy or nuance of the aesthetic sphere, finding it difficult to navigate the cultural sphere. Our point is similar: Possessing dispositions derived from a dominant position in the *economic* field (that is, holding a wealth of economic capital) should render apparently rational choices since those dispositions are more attuned to the “economic game” and steer individuals unconsciously toward relatively “better”

⁵⁷ Bourdieu (1984, 1990) referred to the essential logics of a field as its *nomos*, or the organizing laws of experience that govern practices and decisions made within a field. The *nomos* underlying one social microcosm is often irreducible to those underlying another, as in the noted disparity between the *nomos* of the aesthetic field that values cultural capital and, in some sense, discourages economic capital, and that of the economic field which values economic capital. This invokes a principle of division between that which is economic and that which is cultural or aesthetic. Agents subscribe to a particular field not by way of explicit contract, but by their practical acknowledgement of the stakes, implicit in the very “playing of the game.”

decisions. At the same time, those with dispositions better oriented toward the field of cultural production conduct their lives somewhat out of sync with the calculative, detached logic that the economic sphere demands.

One way to measure the influence of social position on individual economic decision-making is to see if phenomena already identified by behavioral economics can be influenced through isolating sociological, rather than cognitive, explanantia. For this paper, we focus in particular on the “cognitive error” known as *loss aversion*, a well-known empirical finding describing an essential asymmetry where “losses loom larger than gains” for individuals when making decisions. Loss aversion is an important concept in behavioral economics, although sociological theory seems to play no role in the existing literature. In the context of mainstream models of economics, loss aversion is firmly irrational as losses and gains should be perceived quite equally. Loss-averse people instead hang on to losing undertakings much longer than standard rationality would lead one to expect (Jervis 1992). As losses mount, these people tend to take on excessive risk in the hope of breaking even, which could ultimately result in ruin. Loss aversion can also stymie individuals from engaging in sensible or profitable endeavors. The behavioral science think tank *The Decision Lab* offers, “as individuals, it’s evident that we don’t want to incur losses. But the fear of incurring losses prevents individuals from taking even well-calculated risks, with potential for worthwhile returns...and if an individual cannot make sound, calculated decisions with their finances, their choices can be detrimental”.⁵⁸ Being loss-averse can therefore lead to poor decisions, and also prevent people from making good decisions for

⁵⁸ “Loss Aversion-Biases & Heuristics”, <https://thedecisionlab.com/biases/loss-aversion/>, Retrieved 30 Oct. 2020.

themselves (or even lead them to behave dishonestly; e.g. Schindler & Pfattheicher, 2016), in an attempt to avert disappointment.

We engage in this study by taking Bourdieu to task: to empirically test if one’s own “distribution of species of capital” does, in fact, influence individual economic evaluations by measuring relative differences in loss aversion. To be sure, if heterogeneity in the degree of loss aversion can be attributed to one’s composition of capital, particularly in terms of economic and cultural capitals, this finding would be an important theoretical and practical contribution to both sociology and economics.⁵⁹ It could also reveal certain micro-causes of economic inequalities that stem from more or less advantageous financial decisions and practical behaviors that result from socially structured dispositions held by different individuals. In this paper, we thus explore the curious possibility that composition of capital can predicate systematic variations in economic choice. Following Bourdieu in this vein, we ask in particular: Do those with relatively more economic capital appear to behave more “rationally” and *less* loss-averse? Are individuals with a composition weighted more heavily to cultural capital instead *more* loss-averse?

We test these propositions and find striking evidence that variations in capitals do correspond with noticeable differences in loss aversion among our respondents (N=1,387). Findings from preliminary models indicate that, at first glance, relative endowments of cultural versus economic capital work in opposing directions; however, upon closer inspection we discover that these elements operate in fundamentally different ways for women and for men. Gender is important on its own—women are, on average, more loss-averse than men overall (which is unsurprising in light of existing research on gender differences in generalized risk-taking). Women

⁵⁹ Cultural capital can be described as the accumulation of objects, knowledge, behaviors, tastes, and skills that a person can tap into to demonstrate one’s cultural competence and social status. We elaborate more on cultural capital below.

have also been found to engage in a greater degree of cultural consumption than men (e.g. Bihagen and Katz-Gerro, 2000; Collet and Lizardo, 2009; Lizardo, 2006). Upon investigation, we identify strong gender-linked interactions in our analyses and sub-set our sample by respondent sex, accordingly. Doing so reveals that relative endowments of cultural capital seem to have a large effect among women but make little difference in men's degree of loss aversion. At the same time, men appear to be quite sensitive to relative holdings of economic capital, but which seems to have little influence on loss aversion among women. This suggests, all else equal, that men's and women's feel for the economic game may be regulated predominantly by different capitals.

Individual-Level Loss Aversion

Loss aversion is one of the most widely referenced ideas in behavioral economics. First identified by Kahneman and Tversky (1979) in their development of *prospect theory*, loss aversion describes the fact that people are systematically more sensitive to losses than to equivalent gains. This characterization of individual risk preferences can be set in contrast with the rational economic actor who would view gains and losses of equal magnitude symmetrically (i.e. they would instead be *risk-averse*). From the perspective of the standard model of economics, it is irrational and often quite costly in practical terms to be loss-averse. Indeed, mainstream economics assumes that when confronted with options that could result in either a loss or a gain, individuals make objective evaluations and experience commensurate subtractions or additions to their utility, respectively: losses *should* loom evenly with gains.

Behavioral economics identifies that people, in fact, give far more weight to potential losses than to comparable gains. The result is that loss-averse individuals will tend to become more risk-seeking when confronted by a loss due to the psychological injury of enduring said loss, as prevailing theory goes; it will be avoided at all costs. Loss aversion, for instance, can lead to

unreasonable risk-taking when doubling down at a casino in hopes of breaking even. It also leads investors to hold on to poor investments for too long and to sell winners too quickly, resulting in subpar market returns (Shefrin and Statman, 1985; Weber and Camerer, 1998).⁶⁰ It is responsible for the so-called “endowment effect”, whereby individuals place greater value on an object they already own than the same object not in their possession (Beggan, 1992; Kahneman, Knetsch, and Thaler, 1985). In its clearest theoretical form, loss aversion induces people to prefer one mathematically identical choice over another simply by framing it as a gain rather than a loss.

Such an asymmetry, Kahneman (2011, 282) and his colleagues contend, is a “cognitive error” that can be traced to our biological evolution, where “organisms that treat threats as more urgent than opportunities have a better chance of survival.” As a result, by framing two otherwise equivalent situations in terms of either a loss or else a gain, people will respond in a different way. In the so-called “Asian disease” scenario, for instance, Tversky and Kahneman (1981: 453) asked respondents if they would be more willing to try an experimental drug on a sick population given some likelihood that a certain proportion would either live versus die. Note that the choices offered by Tversky and Kahneman were mathematically equivalent in either case—the only difference was that one version was framed as a gain (x% of people will be saved) and another as a loss (y% of people will die). Nevertheless, 72% of respondents chose not to attempt the drug in the gain frame, yet 78% chose to go ahead and try the experimental treatment given the loss frame. Put differently, people tended to shy away from the *risky* choice and choose the sure thing when faced with a positive frame but would avoid a sure *loss* when the identical scenario was framed negatively. When losses and gains are not evaluated on equal terms the resulting actions can appear quite illogical and, in fact, be harmful.

⁶⁰ loss aversion in the context of investing is known as the *disposition effect*.

This phenomenon has been demonstrated time and again in the literature and is now well-established as one of the canonical concepts of behavioral economics.⁶¹ The most basic empirical approach to evince loss aversion appears in Kahneman (2011: 283):

You are offered a gamble on the toss of a coin:

- *If the coin shows tails, you lose \$100.*
- *If the coin shows heads, you win \$150.*

Is this gamble attractive? Would you accept it?

The expected value of the gamble is a positive \$25 $[(150-100)/2]$, and so the rational actor of mainstream economics would always take this bet. Kahneman (2011: 284), however, finds that a majority of respondents reject the proposition: “for most people, the fear of losing \$100 is more intense than the hope of gaining \$150”.

To measure the *extent*, or degree of loss aversion, Kahneman (et al.) further ask those who reject the gamble: What is the smallest gain needed to balance an equal chance to lose \$100. This produces a “loss aversion ratio”, denoted by lambda (λ), which has been experimentally verified to fall, at the median, somewhere around 2.5 to 3.5 – indicating that people generally need a 50% chance to win around \$250-\$350 in order to risk losing \$100. Thus, the widely accepted method of measuring loss aversion in the behavioral economics literature is to present a “mixed gamble” like this and ask respondents at what point they would be indifferent to the prospect offered to them. Higher values of λ indicate a greater degree of loss aversion, and by proxy a greater degree of objective “irrationality”.

⁶¹ Although the usefulness of loss aversion has come under recent criticism (e.g. Gal and Rucker 2018), it is consistently observed among respondents in hypothetical survey choices as well as in real-world experimental or observational studies.

Not everyone, it turns out, is loss averse. Bruhin, et al. (2010) show through a set of experiments that around 20% of a representative sample did behave essentially as rational maximizers, while 30% displayed substantial departures from the standard model. The other half in their sample showed moderate degrees of loss aversion. Hey and Orme (1994) similarly find that some people seem to follow the predictions of expected utility theory whereas others deviate, often markedly so. Kahneman (2011: 284), too, acknowledges that “of course, some people are much more loss-averse than others.” Yet he, nor any of the authors of the studies above, do not, mention *which* respondents deviate, and any such differences, besides, are ascribed to one’s internal emotional or psychological state alone.

We look to Bourdieu’s theory of field+habitus as a practical way to explore the social structuration of not only outcomes, but also the pre-conscious individual dispositions that inform and lead to such outcomes. We, of course, are interested in what takes place in the *economic field*, the social terrain governed by the accumulation and conservation of wealth under logics of instrumental calculation, profit, and utility maximization (Vigerland and Borg, 2018). To be sure, these “rules” of economic life are themselves historically situated within a political economy where markets and capitalist production are (and have been) pervasive (Bourdieu, 2005; Hayes, 2020:20). Nonetheless, those who are able to act in ways that appear instrumentally rational tend to succeed in amassing economic capital; they may be said to have a habitus that is well-attuned (i.e. *doxic*) to the economic field. These dispositions confer a natural “feel for the economic game” and are most likely to be associated with dominant positions in the field—i.e. among those possessing a wealth of economic capital. Meanwhile, individuals who occupy dominated positions share “a learned form of ignorance, that is to say an *alldoxa*, a type of *mis*-recognition...stemming from maladjusted expectations” (Deer, 2014: 122). Put differently, those with allodoxic

dispositions take for granted that they are playing the game correctly, but demonstrably they are not.

What is important here is that, for both those occupying dominant and dominated positions in the economic field, individuals make quotidian economic decisions that seem perfectly *reasonable* for them—but which may also seem entirely *unreasonable* to those in opposite social positions. The poor, for instance, tend to play the lottery far more than wealthier individuals (Beckert and Lutter, 2013). While this may seem like a reasonable choice for someone with low income as a practical way to achieve upward mobility (albeit an aspirational and affective ambition), those with economic resources are much more likely to see the same opportunity to buy a lottery ticket as a bad choice – focusing instead on more practical aspects such as its unfavorable probabilities. Similarly, the opportunity to participate in a hot IPO in the stock market could appear as a reasonable and worthwhile investment for somebody of means, but an unreasonable and perhaps frightening risk to somebody with little to spare. So, it is not only that certain people don't know how to play the game, but also that they mistakenly think they're playing correctly when objectively they are committing errors.

To recall, Bourdieu identified an underlying disagreement in the logics of the cultural and economic fields, with corresponding mental templates conveyed through cultural and economic capitals. Possessing cultural capital is associated with a good “feel for the culture game”, providing the appropriate aesthetic gaze and affect to appreciate conspicuous, highbrow consumption. The logics of the cultural field and the dispositions required to succeed at the culture game are, however, often at odds with the utilitarian and calculative logics of the economic game. Success in the economic game precludes the aesthetic gaze altogether; there simply is no room for gaudy overwrought spending or frivolity, and excess without apparent financial gain is deemed wasteful

and indeed irrational. Likewise, the culture game has no use for the vulgarities of economic rationality and more frugal inclinations to (e.g.) save money in lieu of consumption. Indeed, worldviews that value cultural capital tend to discourage accumulating economic capital, and those which value economic capital hinder the collection of cultural capital.

Bourdieu makes the empirical case that composition of capital plays out in different mental templates that confer particular outlooks toward the world, for instance in evaluating the aesthetic merit of different genres of photograph: “Factorial analysis of judgements on 'photogenic' objects reveals an opposition within each class between the fractions richest in cultural capital and poorest in economic capital and the fractions richest in economic capital and poorest in cultural capital” (Bourdieu 1984: 39). While it seems clear that there ought to be some direct link between cultural capital and the appreciation of artistic works, in *Social Structures of the Economy*, Bourdieu (2005; see also Swedberg, 2011) later produces empirical evidence that cultural vis-à-vis economic capital can generate different *economic* decisions in individuals, here in the context of buying or else renting a home: “Everything inclines us, then, to conclude that the structure of capital plays a determining role in the choice between purchasing and renting: it is among the categories appreciably richer in economic than cultural capital, and which depend mainly on economic capital for their reproduction, that the proportion of homeowners is highest... By contrast, the proportion of homeowners is distinctly lower in the categories with high cultural capital...” (Bourdieu 2005: 26-28).

The same rationale should hold true, by extension, for one's degree of loss aversion; i.e., the relative volume of economic vs. cultural capital that one possesses could help explain individual heterogeneity toward more or less rational choices made in the economic field. In fact, evidence in the behavioral finance literature does show that the poor are significantly more loss-

averse than those with a higher net worth (e.g. Gächter, et al., 2007; von Gaudecker, et al., 2011; Hjorth and Fosgerau, 2011). Yet, these studies fall back on wholly cognitive justifications for observed variations and only report sample means without conducting any sub-group analyses (see e.g. DellaVigna 2009). As an alternative, we suggest that differences in *dispositions* based on composition of capital are at play in modulating one's propensity to weigh losses heavier than gains, and so individual levels of loss aversion should vary accordingly (see also: Hayes, 2020: 27-28).

From the above, we extract a theoretical framework that can be tested empirically to test whether individual economic dispositions are shaped by their position in the social structure.⁶² Given the inference that those with relatively greater economic capital should possess more *doxic* economic dispositions and those with a greater abundance of cultural capital should more *allogodoxic* dispositions to the economic field, it seems that there is good theoretical footing to correspondingly suspect that these should translate into individual differences in loss aversion. We formalize this into a set of deductive hypotheses:

H1: Higher relative composition of economic capital is negatively associated with an individual's degree of loss aversion.

H2: Higher relative composition of cultural capital is positively associated with an individual's degree of loss aversion.

⁶² Critiques do exist, of course, for instance some have argued that Bourdieu's analysis lacks certain methodological rigor, or that his landmark work in *Distinction* is too particular to the 1960s and ethnocentric to France. There has also been more recent contention over the usefulness of Bourdieu's theory of class (Riley, 2017; cf. Burawoy 2018; Heilbron and Steinmetz, 2018). We do not wish to take sides in these debates and instead prefer to recognize that the ideas put forth above should be evaluated objectively on their own terms. That is, cultural capital vs. economic capital, regardless of how we got here, provides a theoretical framework that can be tested empirically to see whether individual economic dispositions are shaped by social structure.

Analytic Strategy

To assess the interplay between cultural capital, economic capital, and loss aversion, we field an original survey instrument developed in Qualtrics and administered on Amazon’s Mechanical Turk platform (AMT). AMT is an online service where individuals can complete tasks—such as taking a survey—for modest financial compensation.⁶³ We field a comprehensive survey instrument that asks a series of questions about respondents’ individual-level loss aversion, economic and cultural capitals, and sociodemographic background.⁶⁴ The full survey included 1,432 participants, with our final analytic sample including 1,387 respondents; excluding 45 respondents, either who only partially completed the survey (38 people; 2.6% of sample) or had missing information on key measures (7 people; < 1% of sample).⁶⁵ The survey data was then used to estimate a series of nested OLS models that assess the relationships between respondent loss aversion and cultural and economic capitals. This is a relatively simple and straightforward methodology, but it is at the same time the most appropriate statistical tool for what we are trying to accomplish here: to build an evidentiary case that starts to reveal a consistent pattern, where together in combination the models estimated below do tell a compelling and cohesive story.

Measuring Cultural Capital

Cultural capital is posited to exist in three distinct but interrelated forms (Bourdieu, 1986: 243-244). In the *embodied* state, i.e., in the form of durable tastes or preferences of the mind and body, where one engages in a prolonged and ongoing “process inculcation and assimilation”, through

⁶³ We paid respondents who completed the survey the equivalent of a pro-rata \$15/hr wage.

⁶⁴ While some large representative surveys contain a module for either cultural capital or loss aversion, no such data set previously existed in the U.S. or abroad that contained both sets of questions in tandem.

⁶⁵ To increase response quality, we restricted our sample to U.S.-based adults with a positive track record of successfully completing tasks on the AMT platform (at least a 98% positive feedback rating with a minimum of 500 tasks already completed). In addition, we included an attention check at the beginning of each study (see: Oppenheimer, et al. 2009), although we note Paolacci, et al. (2010) have shown that respondents on AMT pay greater attention than samples obtained through more traditional methods.

personal experience and investment of time in cultural activities (attending the theater, reading poetry, enjoying haute cuisine, partaking in cultural activities, etc.). 2) In the *objectified* state, i.e., in the form of cultural goods (artworks, books, media, instruments, artifacts, etc.), objects that contain cultural capital are acquired and can be conveyed through their materiality. Bourdieu notes that while objectified cultural capital can be exchanged for economic capital, merely owning a cultural good is not sufficient for it to transmit cultural capital. One must additionally possess the proper gaze to appreciate and use the good as intended, which is related to the embodied form of the owner. 3) In the *institutionalized* state, as in the case of educational qualifications, cultural capital is inculcated through formal academic training and is well-recognized by others based on the status or prestige of one's scholarly pedigree. The social role of institutionalized cultural capital often manifests in the labor market, wherein certain occupations demand more extensive academic training or qualifications, which may or may not also translate into higher income.

Because cultural capital is ternary, we attempt to isolate and measure the effect of each of its states, in turn. Additionally, having several measures of cultural capital in our survey instrument increases its construct validity (Carmines and Zeller, 1979), suggesting that our findings are not simply driven by how we choose to operationalize cultural capital.

Measuring Embodied Cultural Capital

We employ two empirical approaches to obtain a pair of measures of embodied cultural capital. The first involves a simple count variable of elite or highbrow activities, following Lizardo and Skiles (2009: 8) and Matthes and Trahms (2010) where respondents are asked whether they had in the past year (1) attended a dance or ballet performance, (2) attended a classical music or opera performance, (3) attended a live theatre or drama performance, (4) visited a domestic or foreign gallery or museum, or (5) read a book for pleasure (see also DiMaggio and Useem, 1978; Katz-

Gerro, 2002; van Rees, et al., 1999). A similar set of items appears in the German National Educational Panel Study (NEPS) (see Goßmann, 2018), and aims to measure socially distinctive highbrow activities.

We also utilize a more rigorous strategy for measuring embodied cultural capital, following Bourdieu (1984, 1998) by asking survey respondents to identify the particular activities, pastimes, events, or interests they engage in or enjoy a great deal in order to discern personal taste. We recognize that a frequent critique of Bourdieu's work in *Distinction* is that the empirics reflect only a snapshot-in-time of decades-ago France, which is not necessarily generalizable to any other time or place. Bourdieu (1998: 2-6), however, directly addresses this concern in the first pages of *Practical Reason*:⁶⁶

Concretely, this means that an analysis of French social space in the 1970s...focuses on a particular cultural area... I am convinced that, although it has all the appearance of ethnocentrism, an approach consisting of applying a model constructed according to this logic to another social world is without doubt more respectful of historical realities (and of people) and above all more truthful in scientific terms... Some would thus consider the fact that, for example, tennis or even golf is not nowadays as exclusively associated with dominant positions as in the past, or that the noble sports, such as riding or fencing, are no longer specific to nobility as they originally were, as a refutation of the proposed model [i.e. *Distinction*]... Thus, at every moment of each society, one has to deal with a [particular] set of social positions which is bound by a relation of homology to a set of activities (the practice of golf or piano) or of goods (a second home or an old master painting) that are themselves characterized relationally... That is, the "choices" made by the social agents in the most diverse domains of practice, in food or sport, music or politics, and so forth. It is a reminder that comparison is possible only from system to system.

Following Bourdieu's response to his critics, we re-construct this type of analysis in the contemporary United States by crowdsourcing the identification of cultural status of a variety of

⁶⁶ see also Lizardo, 2014

foods, events, venues, and activities. Our set of pre-tests asks respondents to identify and rank both high and lowbrow activities, reconstructing an up-to-date cultural space of objectively disparate social positions corresponding with these items, while also avoiding any implicit researcher bias in coming up with particular cultural items. To address the potential issue of conflating economic value and cultural status, we also asked respondents to rate each item's perceived cost. We then draw from these crowdsourced rankings, selecting the top 32 activities that ranked either very lowbrow or very highbrow on cultural status to include in the full survey instrument, making small adjustments to balance for category (e.g. caviar and hot dogs) and cost. These items (presented in random order to respondents on the main survey) serve as the basis for a key question in our main survey: "Which of the following activities do you enjoy or partake in a great deal?"

We use the ratio of highbrow/(highbrow+lowbrow) culture items selected by survey respondents to address the discourses that have emerged from the literature on cultural *omnivorousness*. Several studies reveal that contemporary cultural elites tend to engage in both highbrow and lowbrow cultural consumption (Lizardo, 2016, Lizardo and Skiles, 2009; Ollivier, 2012; Peterson and Kern, 1996), different from lower-status individuals who share more narrow tastes concentrated in lowbrow consumption (Lizardo and Skiles, 2012; Peterson, 1992). We identify higher cultural capital among those with relatively more highbrow consumption relative to total cultural consumption (a maximum ratio of 1.0, where *only* highbrow items have been identified by a respondent); and those with lower cultural capital with more lowbrow consumption relative to total consumption (a minimum of 0.0, where *only* lowbrow items have been identified).

Measuring Objectified Cultural Capital

Objectified cultural capital is measured by an adapted item battery from the questionnaire of the Programme for International Student Attainment (PISA) 2003 survey (Ramm, et al., 2006), which

also appears in the German National Educational Panel Study (NEPS) (see: Goßmann, 2018). It consists of questions on cultural possessions (e.g. at home, do you have classic literature, books with poems, works of art?).

We also use the number of books owned at home as a measure of objectified cultural capital. The items on the number of books, both at present and at age 12, are adapted from Paulus (2009) and Sieben & Lechner (2019), which show that book count can serve as a valid benchmark for one's level of objectified cultural capital.

Measuring Institutionalized Cultural Capital

Institutionalized cultural capital is measured in two ways: first, by surveying the educational attainment of respondents, using a three-category measure: high school degree or less (our reference category), some college or associates/technical degree, and a four-year college degree or more.

Second, we utilize respondent occupation, selected from a list of occupational categories that best defined their current job (or previous job if retired or no longer working). In this measure, we follow Lizardo (2006: 13-14) and make use of Hauser and Warren's (1997) disaggregated measure of occupational educational requirements, allowing us to use occupation to measure one's relative composition of capital that considers the economic and cultural capital investments of one's occupational role. This measure involves using a set of socioeconomic indices for occupations developed by Hauser and Warren (Ibid.) that disaggregates occupational earnings and educational requirements and generates scores for each. As Lizardo (2006: 14) does, we generate a relative measure by dividing the economic capital score (i.e. occupational earnings) by its total score for economic and cultural capitals (i.e., occupational earnings plus occupational education requirements). This produces a ratio "with lower values indicating an imbalance of cultural over

economic capital and higher value a preponderance of economic over cultural capital” (Ibid.) To account for occupational prestige, or the symbolic capital attached to a job, we continue to follow Lizardo (Ibid.) and control for an occupation’s overall volume of capital using Hauser and Warren’s (1997) measure of total socioeconomic index (TSEI).

Measuring Economic Capital

Our measure of economic capital is respondent wealth, measured in terms of value of personal assets. Relative to income, net assets provide a more comprehensive understanding of respondents’ economic capital position because income is a flow while assets are a stock. Income may be high, but so too may be expenses leaving little in the way of new wealth accumulation. Likewise, a wealthy person may live well without needing labor income, relying only on what is generated by their existing assets. Closer in definition to assets than income, Bourdieu (1986) explains that “economic capital is that stock which is directly convertible into money and may be institutionalized in the form of property rights”.⁶⁷

In the survey, respondents selected among twelve net assets categories, ranging from negative net worth (i.e., in debt) to more than \$5 million. We take the midpoint of these ranges, coding individuals reporting negative net worth as having zero assets.⁶⁸ We take the log-transformation of the linearized assets variable due to the fact that wealth is right-skewed, i.e. a far greater proportion of individuals have relatively low or modest net wealth compared to those with millions of dollars of net wealth.⁶⁹

⁶⁷ Note, however, that our results are still substantively similar if we replace assets with income; available upon request.

⁶⁸ Our results are substantively similar when using the categorical variable recorded for assets as well.

⁶⁹ Because there are zeroes in the data (i.e. zero or negative assets), we take $\ln(\text{assets}+1)$.

Measuring Loss Aversion

We use the mixed-gamble approach mentioned in the section above on loss aversion in generating our dependent variable of interest to measure individual-level λ . Following Wang, et al. (2017), we acknowledge that the original lottery-choice task where \$100 is at risk may produce different results than if a smaller amount is posed as the potential loss. Accordingly, we ask respondents to independently indicate their indifference levels for *both* a possible \$100 and \$25 loss, where λ is the arithmetic mean of $(X/25$ and $Y/100)$:⁷⁰

In the following lottery you have a 50% chance of winning or losing money:

A) The potential loss is given. Please state the minimum amount \$X for which you would be willing to accept the lottery:

- *50% chance loss of \$25*
- *50% chance win of \$X*

X should be at least \$_____ to make the lottery acceptable.

And separately:

B) The potential loss is given. Please state the minimum amount \$Y for which you would be willing to accept the lottery:

- *50% chance loss of \$100*
- *50% chance win of \$Y*

Y should be at least \$_____ to make the lottery acceptable.

A rational (i.e. risk-averse) individual would choose \$25 and \$100 as the respective points of indifference and produce $\lambda=(25/25 + 100/100)/2=1.0$. A loss-averse individual would instead require higher dollar amounts to make the same lottery acceptable and would produce something like $\lambda=(75/25 + 250/100)/2=2.75$.⁷¹

⁷⁰ we randomize which prospect respondents see first.

⁷¹ Note that a small subset of respondents in the behavioral economics literature, as well as in our own study, report $\lambda < 1.0$, indicating these respondents are in fact *risk-seeking*.

Results

Is there variation in loss aversion based on personal differences in composition of capital? According to our hypotheses, a greater weight to economic capital should result in less loss aversion, as those individuals would have more well-matched dispositions to the economic field and make more “rational” choices. Meanwhile, those with a relatively greater weight to cultural capital should be more loss-averse, with more discordant dispositions corresponding with less objectively rational economic choice. We look at the three forms of cultural capital in turn. In all analyses we use assets as our measure of economic capital.⁷²

We report three nested OLS models in all cases. Model 1 shows how loss aversion varies when looking only at cultural versus economic capital; thus, we can identify the naïve effect of cultural capital net of economic capital and vice-versa. Model 2 introduces sociodemographic controls for age, marital status, and sex.⁷³ We include age because different cohorts of respondents may have different overall volume of capital due to their position in the life course as well as to control for extant dispositions that may change with age, such as generic risk-taking.⁷⁴ We control for marital status because in some married households the husband and wife may adopt traditionally gendered scripts where the man is responsible for maintaining the family’s economic capital and the woman for its cultural capital (e.g. DiMaggio and Mohr, 1985).⁷⁵ We also control for sex as there have been found to be generic differences in risk-taking among men and women in the economics literature (e.g. Charness and Gneezy, 2012; Dwyer, et al., 2002; Eckel and

⁷² With the exception of the occupational model where we employ our measures of an occupation’s relative economic capital and TSEI, see below.

⁷³ In a series of supplemental analyses, we test models’ sensitivity to respondents’ race/ethnicity, geographic region, whether they have children, and self-reported assessments of competitiveness, financial literacy, and math abilities, and find no substantive deviations from our main findings (results available upon request).

⁷⁴ Age and age-squared are statistically significant in all models.

⁷⁵ Thanks to an early reader for suggesting to include this control.

Grossman, 2008; Maxfield, et al. 2010), as well as gendered differences in cultural capital accumulation (e.g. DiMaggio and Mohr, 1985; Lizardo, 2006; Tepper, 2000). Lizardo (2006: 1) indeed points out “the fact that women are more likely than men to participate in traditional high-status leisure activities constitutes one of the most consistent findings in the empirical study of cultural choice” (see also: Bihagen and Katz-Gerro, 2000). When controlling for respondent sex, this particular variable is not only statistically significant in all model specifications, it also displays a strong effect size. Because of this and the suggested interactions mentioned above, we sub-set our samples by sex in addition to reporting on the full sample. When doing so, we discover stark differences by gender in how composition of capital affects individual loss aversion. Models 1-3 remain the same in these stratified models (except for sex, of course, which drops out of M2 & M3) for our split samples of women (N=652) and men (N=735).

Model 3 improves the robustness of our analyses by controlling for two personal traits that may confound loss aversion. The first is an individual’s *risk aversion*, which is measured by asking respondents to describe the amount of financial risk that they are willing to take generically on a 4-point scale, from “I am not willing to take any risks even though that greatly reduces my expected returns” to “I am willing to take a substantial amount of risk, in the hopes of earning substantial returns,” which is a conventional approach for evaluating risk aversion (see: Hasson and Arnetz, 2005; Pan and Statman, 2012). As mentioned above, risk aversion has been identified by economists as conceptually distinct from loss aversion (Kahneman and Tversky, 1979; Rabin, 2000), and many behavioral economics studies of loss aversion also control for risk aversion in this way (see: Rabin, 2000; Rieger, et al., 2015; Wang, et al., 2017). Due to these differences and the empirical implications of loss aversion vis-à-vis risk aversion, we, too, control for respondent’s risk aversion in these analyses. Model 3 additionally controls for one’s stated propensity to gamble,

which we ask from our respondents since our dependent variable might be construed by some as a bet.

In all of our models we report standardized beta (β) coefficients in order to better commensurate the effect sizes of our various measures. Doing so removes the units from the variables and allows for easier evaluation of any effects in terms of standard deviations (Mayer and Younger, 1974).⁷⁶ This way, we can better make comparisons between variables that use different scales like (e.g.) our cultural ratio, number of books owned, cultural items owned, education, and economic assets, etc. We also indicate the corresponding standardized robust standard errors and standardized F-statistics for each.

Figure 1 visually summarizes results for Model 3 for each of our measures of embodied, objectified, and institutionalized cultural capital. We discuss each in turn below.

Descriptive Statistics

Table 1 reports descriptive statistics for our full analytic sample and segregated by respondent sex. Just over half of our sample is male, 42% are married, and the average age of respondents is about 40 years old. 53% of respondents hold a 4-year college degree or higher. At the median, respondents hold roughly \$30,000 in net assets. On average, respondents have a high culture ratio of 0.45 indicative of omnivorousness, but some have a ratio of 0.0 (selecting no highbrow activities) and others have a ratio of 1.0 (only selected highbrow activities). We report the median value for our outcome of interest, λ , following standard practice in behavioral economics. The reported median, 3.5, is within the normal range observed in other studies in behavioral economics.

⁷⁶ We use the `stdBeta` Stata package developed by Hemken (2016) to report standardized betas, standard errors, and F-statistics in all figures and tables.

Table 1: Descriptive Statistics of Respondent Sample

	Mean (SD) or Proportion	Min	Max
Loss Aversion (λ)	3.5* [♀ 3.73, ♂ 3.00]	0	69.97
<i>Cultural Capital</i>			
High Culture Ratio	0.45 (0.27) [♀ 0.45, ♂ 0.44]	0.0	1.0
Elite Activity Count	1.81 (1.17) [♀ 1.93, ♂ 1.71]	0	5
# Cultural Objects Owned	3.68 (1.97) [♀ 3.97, ♂ 3.42]	0	7
# Books Currently Owned	3.22 (1.47) [♀ 3.45, ♂ 3.22]	1	6
# Books Owned at Age 12	3.03 (1.31) [♀ 3.15, ♂ 2.93]	1	6
<i>Education</i>			
High School or Less	0.13 [♀ 0.13, ♂ 0.12]		
Some College	0.34 [♀ 0.35, ♂ 0.34]		
4-yr Degree or Higher	0.53 [♀ 0.52, ♂ 0.53]		
<i>Economic Capital</i>			
Assets (nearest \$1,000's)	30,000* [♀ 28,000, ♂ 32,000]	0	5,000,000
Total Socioeconomic Index	37.42 (13.80) [♀ 37.75, ♂ 37.14]	19.38	72.89
Relative Vol. Econ Capital	0.16 (0.09) [♀ 0.14, ♂ 0.17]	0.03	0.40
<i>Demographics</i>			
Sex (% Male)	0.53		
Age	39.52 (12.24)	18	88
Non-White	0.24		
Married	0.42		
Divorced/Widowed	0.11		
Single	0.47		

Notes: N = 1,387; sub-set by gender [♀ N=652, ♂ N=735]. For both number of books variables (current and at age 12), respondents selected among six categories, ranging from fewer than ten books to over 500 (see: Sieben & Lechner, 2019). A value of 3 indicates 26-100 books. Age was provided as an integer rather than as a category.

* We report the median value for λ , as is conventional in the behavioral finance literature. Mean loss aversion was 6.48. Due to being right-skewed, we also report median assets.

*Embodied Cultural Capital***Table 3:** OLS Regression Modeling the Effect of Embodied Cultural and Economic Capital on Loss Aversion

	<u>Full Sample</u>			<u>Women</u>			<u>Men</u>		
	1	2	3	1	2	3	1	2	3
Culture Ratio	0.088** [0.028]	0.077** [0.028]	0.077** [0.028]	0.142*** [0.043]	0.131** [0.043]	0.132** [0.045]	0.019 [0.035]	0.011 [0.034]	0.011 [0.034]
Assets (log)	-0.073* [0.029]	-0.086** [0.030]	-0.070* [0.032]	-0.024 [0.040]	-0.057 [0.042]	-0.042 [0.046]	-0.130** [0.043]	-0.144*** [0.043]	-0.124** [0.046]
Male		-0.173** [0.055]	-0.145** [0.056]		-	-		-	-
Age		Y	Y		Y	Y		Y	Y
Age ²		Y	Y		Y	Y		Y	Y
Marital Status		Y	Y		Y	Y		Y	Y
Risk Aversion Gambles			Y			Y			Y
			Y			Y			Y
<i>F</i>	6.60***	5.40***	7.26***	5.45**	4.22***	3.98***	4.71**	2.60*	4.99***
<i>N</i>		1,387			652			735	

† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Standardized β coefficients; standardized robust standard errors in brackets. F-statistics are also standardized. This table displays the change in the loss-aversion coefficient (λ) given differences in cultural capital and economic capital. Cultural capital in this table is measured by respondents' ratio of highbrow cultural items to the sum of high- and lowbrow cultural items selected. Economic capital is measured by the log-transformation of respondent assets. Coefficients with a positive sign indicate a greater degree of loss aversion, while a negative sign indicates less loss aversion. Model 2 controls for the demographic characteristics: sex; age; and marital status. Model 3 additionally controls for possible confounding pre-dispositions, in particular propensity to gamble and *risk* aversion.

Table 2 reports our high culture ratio as the measure of cultural capital. In the full sample, an increase in embodied cultural capital is associated with an increase in loss aversion, net of controls, with a moderate effect ($\beta=0.08$, $p<0.01$), consistent with Hypothesis 2. When we stratify the models by sex, however, we see the effect size increase for women ($\beta=0.13$, $p<0.01$), with greater cultural capital associated strongly with an increase in loss aversion. This coefficient for men, however, is not statistically significant—and importantly, the point estimate is in fact quite close to zero—suggesting that the positive association between culture and loss aversion observed in the

full sample is largely driven by women. A similar, but opposing, phenomenon occurs when we look at the effect of economic capital and men. With the full sample, a one standard deviation increase in economic capital is modestly associated with a decrease in loss aversion ($\beta = -0.07$, $p < 0.05$), consistent with Hypothesis 1, but separate models for men show that economic capital has a much stronger influence ($\beta = -0.12$, $p < 0.01$). Moreover, in the models subset by women, the point estimate related to economic capital is effectively zero, and moreover holds no statistical significance.

Interestingly, the effect sizes for cultural capital for women and economic capital for men are roughly equivalent, but with opposite sign. For women, for every one standard deviation increase in cultural capital, λ increases by 0.13 standard deviations (i.e., loss aversion increases), while for men, a one standard deviation increase in economic capital decreases λ by 0.12 standard deviations (i.e., loss aversion decreases), *ceteris paribus*. When we use the elite count variable to measure embodied cultural capital we also find similar opposing, but here weaker, associations between cultural and economic capital on loss aversion that are, too, segmented by gender.

This novel phenomenon, where loss aversion among women is strongly and positively associated with increases in cultural capital measures yet differences in economic capital have little to no effect; and among men where loss aversion is strongly and negatively associated with increases in economic capital yet differences in cultural capital have trivial effect, is a story that remains consistent across all of the additional models examined below. All following findings are represented in the graphical depiction in Figure 1 below.

Objectified Cultural Capital

We next consider our measures of objectified cultural capital. Similarly-sized but opposite relationships between cultural and economic capitals and loss aversion appear in the full sample, and are once again starkly differentiated by gender. These results show that consistent with Hypothesis 2, an increase in the number of cultural objects owned the number of books owned currently and the number of books owned at age twelve are each associated with an increase in loss aversion, but only among the women in our sample. Differences in cultural capital appear to elicit no meaningful effect among men.

At the same time, consistent with Hypothesis 1, economic capital continues to be strongly and negatively associated with loss aversion, but only for men while there is no substantive association among women and differences in economic capital, all else equal. Of the three measures of objectified cultural capital, number of books currently owned has the strongest effect size in relation to increased loss aversion among women in the full model ($\beta=0.17$, $p<0.001$; compared to $\beta=0.11$, $p<0.01$ for cultural objects owned, and $\beta=0.08$, $p<0.10$ for number of books at age twelve). Among male respondents, the associations between economic capital and loss aversion for men is similar in each case ($\beta=0.12$, $p<0.01$ for all). Again, the net effect sizes are similar for cultural and economic capital but operating in opposite directions, respectively among women and among men.

Institutionalized Cultural Capital

When we look to our measures of institutionalized cultural capital, our results reinforce the same stylized facts. Educational attainment is positively associated with loss aversion, consistent with Hypothesis 2, but again this relationship is only substantively and statistically significant for

women: relative to those with only a high-school diploma or lower, women with a college degree show more than a one-quarter standard deviation increase in loss aversion ($\beta=0.27$, $p<0.001$), all else equal (note that the men and women in our sample have comparable education distributions, see Table 2). In contrast to our earlier measures of cultural capital, the sign of this coefficient is negative for men, but suggests only a very weak association between increased education and decreased loss aversion for men.⁷⁷ This may help explain why the full-sample models here do not indicate statistical significance on the education measure.⁷⁸ Consistent with Hypothesis 1, economic capital remains negatively associated with loss aversion, but once again, is only meaningful for men.

Finally, we turn to our measure of institutionalized cultural capital that draws on respondent occupation. These analyses are somewhat different from the other models presented thus far, nevertheless they do tell the same story once more. Recall that for this particular measure we consider the relative economic and cultural capital investments of one's occupational role. First, because they measure employment-contingent composition of capital these models are restricted to individuals who report being currently or formerly active in the labor force ($N=1,294$), with 67 cases excluded due to being a full-time student or never employed (e.g. a housewife) and 26 due to missing information on occupation. Second, our main explanatory variable is a combined index of composition of capital (described above), which essentially measures the relative volume of economic capital associated with an occupation in a single metric. Thus, larger values in this measure indicate a comparatively greater weight to economic vs. cultural capital. Third, we are able to include here an omnibus measure of *overall volume of capital* in addition to composition

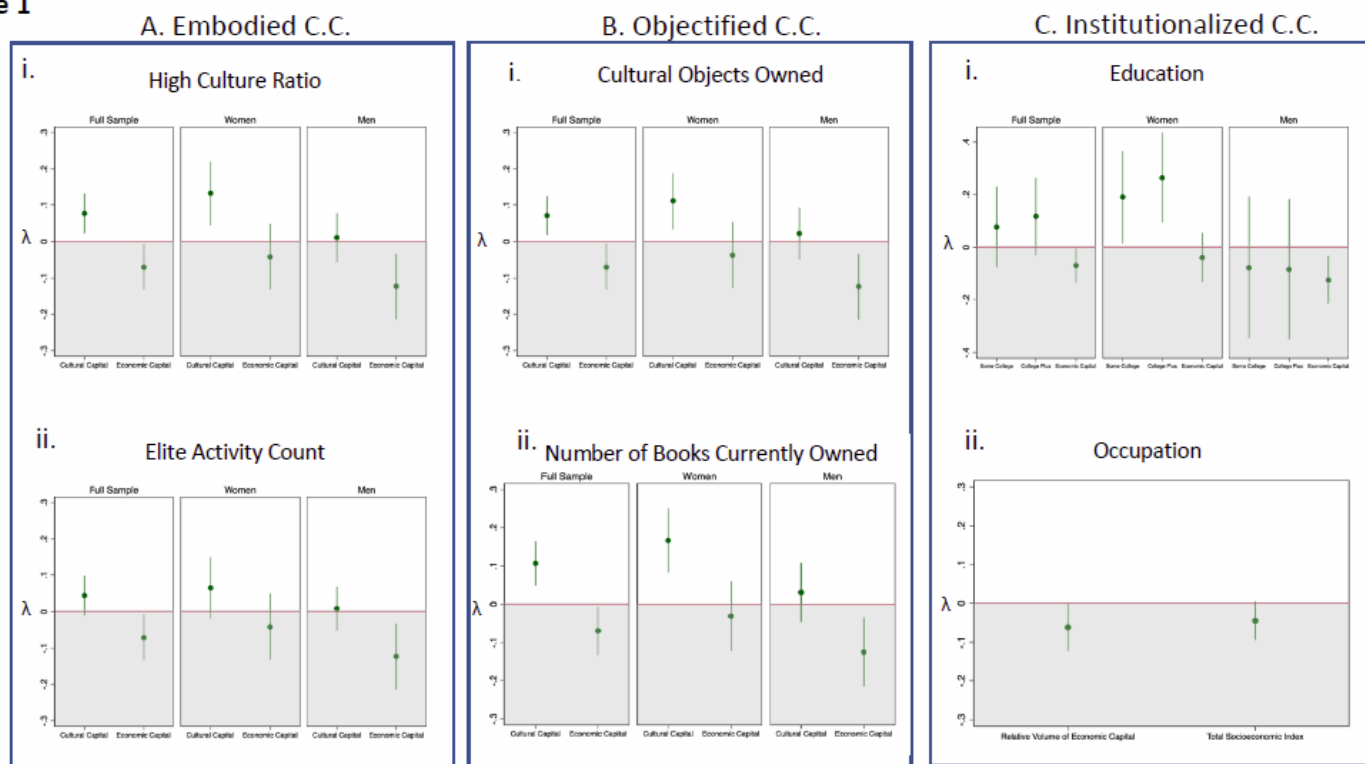
⁷⁷ We speculate this could be because educational attainment may also be picking up associated increases in income.

⁷⁸ Note that including education in prior models does not substantively change any top-line findings, and for theoretical consistency we exclude education from other models that include different measures of cultural capital as to not confound one with the other.

of capital. Note that while we do control for respondent sex, we do not sub-set our sample here since many occupations are already complicated by gender.

In support of Hypotheses 1 and 2, we find that as the relative composition of economic capital increases (holding total volume of capital constant), loss aversion decreases (see Table 5B; $\beta = -0.062$, $p < 0.05$). Additionally, total volume of capital is negatively associated with loss aversion, net of composition of capital, but with weaker significance in the fully-specified model. This could be due to the fact that both propensity to gamble and generic risk aversion are likely also correlated with overall volume of capital.

Figure 1



Notes: This figure visually displays the net impact of economic and cultural capital (c.c.) on loss aversion (λ) using our full model (Model 3), utilizing the full sample ($N=1,387$) and then sub-set by respondent sex ($\sigma^2 N=735$; $\sigma^2 N=652$). Standardized β point estimates are shown along with 95% CIs using standardized robust standard errors. Values that fall above the zero-line indicate a greater degree of loss aversion, while values below indicate lesser loss aversion, where the y-axis displays STDs of λ . Panel A displays two measures of embodied c.c., Panel B objectified c.c., and Panel C institutionalized c.c. Note that cultural capital measures are strongly associated with greater loss aversion among women, and economic capital with lesser loss aversion among men. Meanwhile, economic capital is not statistically significant among women, while cultural capital is not statistically significant among men. See the note to Table 5B for details related to our measure using occupation for institutionalized c.c.

Robustness Checks

We are primarily concerned with the relative effect size and direction in interpreting the pattern that emerges from our results. Still, we are interested in the robustness of our hypothesis tests when our models are considered simultaneously. When considered together, the significance of coefficients observed in individual tests no longer represents the error rate of the combined set of tests, increasing the risk of committing a Type I error (i.e. reporting a false positive) (see, e.g. Blakesley, et al., 2009). The probability of making at least one Type I error in a group of related tests is known as the family-wise error rate (FWER) (Dudoit et al., 2003). Following the resampling method proposed by Westfall and Young (1993), we are able to control the FWER regardless of which hypotheses in the group of models happen to be true (Jones, et al. 2019). In addition, we perform Bonferroni and Šidák corrections (Dunn, 1961; Šidák, 1967) to counteract the problem of correlated p-values among multiple comparisons. Each of these three adjustments increases the p-values for our variables of interest, but still largely preserves their statistical significance. This suggests that we are unlikely to report a false positive in our tests of loss aversion as it varies by cultural capital among women and economic capital among men.

We are also concerned about the possibility that even after accounting for multiple hypothesis testing, the combined study has zero effects everywhere—i.e., we want to test for complete irrelevance, that no explanatory variable had any effect on any outcome. Following Young (2019), we bootstrap randomization inference-based p-values and conduct a joint test of the hypothesis that no explanatory variable has any effect. We are able to *reject* the null that across all models differences in cultural capital are irrelevant for women’s loss aversion (max. $p=0.018$); and that differences in economic capital are irrelevant among men (max. $p=0.001$).⁷⁹ At the same

⁷⁹ Using 10,000 randomization iterations. As a conservative measure, we report maximum p-values for tests that reject the null hypothesis and minimum p-values for tests that cannot reject the null.

time, we are unable to reject the joint null that across all models differences in cultural capital are associated with differences in loss aversion among men (min. $p=0.698$) and economic capital has an effect on women's loss aversion (min. $p=0.364$). These randomized inference tests support our claim that loss aversion in men and women is quite sensitive to economic and cultural capital, respectively, while not sensitive to the other.

Finally, we want to be confident that the relative effect of cultural capital operates more or less the same way for any level of respondent assets; and that economic capital works similarly for various levels of cultural capital held. Since we are interested in the relative sensitivity of loss aversion to changes in composition of capital, we estimate conditional elasticities after interacting (cultural capital measures \times economic capital \times sex), while including the other controls in M3. These tests once again indicate that when interacted, changes in economic capital have a strong marginal effects on loss aversion for men, just as cultural capital does for women—and, that variations in cultural capital have no marginal effect for men, nor economic capital for women.

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Part III

Chapter 3. The Active Construction of Passive Investors: roboadvisors and algorithmic “low-finance”⁸⁰

Electronic markets and algorithmic trading programs have exerted ever-increasing influence on financial markets over the past decades. Social scientists have aptly attended to these trends along the way, from Knorr-Cetina and Bruegger’s (2002) study of the transition to screen-based currency trading to the rise of fully-automated high-frequency trading (HFT) algorithms, which now dominate securities markets.⁸¹ High-frequency trading has proven to be a fruitful object of study, generating important insights into how human-machine relations are forged between traders and their “algos” (e.g. Borch, et. al 2016; MacKenzie, 2016), the socio-material infrastructures that it has enrolled (e.g. MacKenzie, 2018; Arnoldi, 2016) and how financial algorithms become construed as market subjects in their own right (e.g. Coombs, 2016; Lange, et al. 2016).

But how does algorithmic finance operate in society as it crosses the threshold of ‘low-finance’; that is, into the hands of lay investors?⁸² This question is imperative as consumer-ready financial platforms become increasingly popular, consummated wholly via mobile app or web interface. In this study, I analyze a recent and notable innovation in retail financial services known colloquially as the ‘roboadvisors’. These are a new class of digital financial advisor that provides advice and automated investment management online with minimal human intervention, at little to no cost. Roboadvisors provide these services via algorithms to automatically allocate, manage,

⁸⁰ In *Socio-Economic Review* (forthcoming, DOI:[10.1093/ser/mwz046](https://doi.org/10.1093/ser/mwz046))

⁸¹ According to NASDAQ, “it is estimated that 50% of stock trading volume in the U.S. is currently being driven by computer-backed high-frequency trading.” (<https://www.nasdaq.com/investing/glossary/h/high-frequency-trading>, retrieved 11/05/2018).

⁸² I use the term ‘low-finance’ (as opposed to ‘high-finance’) to refer to financial services aimed at individual (lay) investors, many of whom tend to have average to below-average levels of financial literacy and moderate to low levels of income and assets; for more, see: Hutton (2009) and Lazarus (2016). ‘Lay’ investors are differentiated from professional traders or practitioners and correspond to what Preda (2017:3-4) calls “retail” investors.

and optimize clients' assets based on personalized information that each client enters through a website or application.

Rather than transpose the active, complex, and often inscrutable strategies used by HFTs, the roboadvisors' algorithms embody a well-known model of passive indexed investing known as Modern Portfolio Theory (MPT), operating under the premise that it is impossible to systematically 'beat the market' (Markowitz, 1952). These algorithms are thus modified from an ethos of high- to low-frequency trading, and from operating as proprietary black boxes (Pasquale, 2015; Lewis, 2014) to enacting familiar financial models. From the viewpoint of studying algorithms, roboadvisors are not unfathomable "objects of ignorance" like the HFTs (Lange, 2016; Lange, et. al 2018) but are instead objects of cognizance — in the sense that they are knowable to an observer through direct interaction and via analysis of publicly available regulatory filings, and also alluding to the fact that they perform a well-understood model of financial economics.

This paper seeks to uncover how the socio-technological assemblages constituted by algorithmic 'high-finance' have been re-cast to fit a market paradigm compatible with non-practitioners – and moreover how the end-users of these systems similarly undergo a process of reconfiguration. While HFT traders employ self-disciplinary techniques to restrain emotional interference with their algorithms (Borch and Lange, 2016:3), roboadvisors actively pursue a program of corrective nudges to keep their users in line with the MPT strategy. Following Foucault's (1988:18) framework, Borch and Lange (2016) argue that HFT traders engage in technologies of the self (see also: Borch, 2017), which permit individuals to effect *by their own means* a way of self-control; whereas roboadvisors project technologies of power, which determine the conduct of individuals and submit them to certain ends – "an objectivizing of the subject"

(Foucault, 1988:18).⁸³ Yet, by actively constructing passive investors, the designers of roboadvisors seem to utilize this power in an arguably productive modality (Foucault, 1977), where they seek to promote financial wellness by approximating rational outcomes through algorithmic devotion to MPT, objectivizing the subject as the lauded *Homo economicus* (cf. Weiss, 2018).

This path to financial well-being (i.e. via MPT) is, nevertheless, an ideological choice discharged by the roboadvisors. While there is ample evidence that active strategies systematically fail to surpass their benchmark indices,⁸⁴ passive investing is coming under increasing criticism. As the practice has grown from a relatively unimportant niche strategy to the dominant way individuals now invest, “passive investors have become the giants [and] they have morphed from the good guys to the bad guys” (Authers, 2017). The moral infractions that are most cited for following a strategy like MPT label index investors ‘free-riders’ who benefit from the work of active traders involved in price discovery of the component stocks. Or, that through owning a broad index, shareholders have less of an incentive to take an active voice against a company’s management, opening the door to corporate impropriety and a failure in the market for corporate control. On an individual level, a passive investor tacitly accepts that there is no hope to do better than the market, and so the desire to be exceptional (i.e. to earn excess returns) falls out. To structure this sort of economic action therefore is to import a moral character that may oppose

⁸³ Foucault speaks of objectivizing the subject throughout his work, and especially in his *Lectures at the Collège de France, 1978-1979* (Foucault, 2008). He construes the *subject* as an entity with agency (but which is often framed by the control of and/or dependence upon another) – and that agency is curtailed through objectification. This curtailment can be achieved through distancing – for instance, by classifying and individual as ‘criminal’ or ‘insane’ they are excised from society and objectified through a loss of autonomy.

⁸⁴ Active investing is where traders or portfolio managers attempt to pick winning stocks or time trades in hope of beating the market.

contemporary ideals of competition and exceptionalism – the very things that HFT algorithms (which try to beat the market on a daily basis) tend to exemplify.

Contrasting the study of algorithms of high-finance with those of low-finance, the contribution of this paper is to explore for the first time the relations formed by the human-roboadvisor assemblage (cf. Lange, et. al 2018) and in particular, the disciplinary mechanisms adopted by these firms to construct and maintain passivity – that is, to keep users behaving ‘rationally’. While HFT algos are certainly important, they will probably remain an apparatus of the Wall Street elite. Roboadvisors, on the other hand, are a rapidly growing segment of the retail financial sector, courting ordinary individuals for their very first investable dollar. This study helps us understand how individual investors will increasingly interact with markets in a new way, making roboadvisors a particularly interesting and important empirical object that has not yet been explored in the literature.

For this research, I undertook an ethnography of sixteen roboadvisors and their algorithms,⁸⁵ which consisted of three overlapping aspects. First, I became a participant user of their platforms, where I opened and funded an account at each roboadvisor. As a user I had direct access to the algorithms that were managing my finances, and I was able to interact closely and on a regular basis with the roboadvisors’ websites, mobile apps, blog posts, and email correspondences. Second, I carried out a detailed archival analysis of each of their regulatory filings with the U.S. Securities and Exchange Commission (SEC). Finally, I conducted in-depth interviews with highly-placed individuals spread across these roboadvisor firms in order to gain a

⁸⁵ see: Lange, Lenglet and Seyfert (2018), *On studying algorithms ethnographically*.

deeper understanding of what I was experiencing and to gather insights beyond what a roboadvised individual would glean from the user experience alone.

The paper proceeds with an overview of what roboadvisors are, including a short history of their emergence over the past few years, situating ‘algorithms of low-finance’ as objects of sociological interest situated within the broader literature on technology and markets. In Section 3, I describe the methodology and data used in this study. Section 4 introduces the model of Modern Portfolio Theory, showing that roboadvisors use this strategy as their guiding principle and briefly discussing the arguments that have been made in support of passive investing. Section 5 demonstrates how roboadvisors format their users through disciplinary techniques meant to keep them from straying from the model. In Section 6, I discuss some of the practical implications of roboadvisors and the ubiquitous use of passive investing on markets and robo-advised individuals. In the conclusion, I summarize my findings and propose directions for future research, including the broader potential for algorithms in structuring human behavior in other realms of economic decision-making and beyond.

What Is a Roboadvisor

What becomes of the economy — and indeed of society — when markets and most participants in them are computer algorithms? asks MacKenzie (2014:2). Wall Street has already been dominated by algorithmic trading for nearly a decade: by 2012, almost 84 percent of all trades executed on U.S. stock markets were placed algorithmically on behalf of human traders⁸⁶ – a trend toward what Lin (2012) calls “cyborg finance.” As of mid-2018, roughly 90 percent of volume in the *global* equities markets are traded by algorithms.⁸⁷ Until recently, these algorithms mainly served Wall

⁸⁶ <https://www.ft.com/content/da5d033c-8e1c-11e1-bf8f-00144feab49a#axzz1t4qPww6r>; not limited to HFT.

⁸⁷ <https://www.technavio.com/report/global-miscellaneous-algorithmic-trading-market>; not limited to HFT.

Street professionals or for the benefit of those situated within high-finance; however, with the introduction of the roboadvisors over the past few years, ordinary individuals are starting to plug in to the financial technoculture.⁸⁸ Indeed, the role of technology in financial markets has generated a great deal of scholarship in recent years; however, there remains an important gap in this literature that overlooks how lay financial technologies (“fintech”) implicates non-professional market participants. To date, scholarly work on the technology and technicity of financial markets has emerged from the social studies of finance tradition, where it has focused mainly on traders located in Wall Street banks, trading rooms, hedge funds, or high-frequency trading shops (e.g. Knorr-Cetina and Bruegger 2000, 2002; Beunza and Stark, 2004; MacKenzie and Millo 2003; Svetlova 2012; Borch, et. al 2016; MacKenzie 2006, 2018; cf. Preda 2017). As stated in the introduction, lay financial technologies do not simply duplicate algorithms of high-finance; they operate with distinct logics and act on large populations of otherwise ordinary individuals. Situating roboadvisors within the broader literature on markets and market actors vis-à-vis financial technology is thus an important empirical task.

In June of 2010, a technology start-up called *Betterment* launched as the world’s first roboadvisor with the aim of disrupting the traditional mode of financial planning. By embodying emblematic models of financial economics into their platforms, roboadvisors like *Betterment* hope to achieve optimal outcomes for their clients and at the same time make those outcomes accessible for nearly all.⁸⁹ Since 2010, the number of roboadvisors has grown to more than three hundred worldwide, including numerous start-ups as well as large incumbents like *Vanguard*, *Schwab*, and *TIAA* building out their own offerings. Far more than some niche phenomenon, in the U.S., ‘robos’

⁸⁸ Algorithmic trading entails computer-automated trading strategies and/or execution. Online self-directed trading would therefore *not* be considered algorithmic.

⁸⁹ All that is required is a bank account and an internet connection.

now collectively manage three-quarters of a trillion dollars of client money for 8.3 million users.⁹⁰ According to industry forecasts, by the year 2020 this amount will grow to more than \$2 trillion, and by 2025 it is estimated that in excess of \$7 trillion globally will be managed by roboadvisors, making up an impressive 15% of all retail investment in just a few short years (Kocianski, 2016; Srinivas and Goradia, 2015).

Somebody looking to become an investor has typically had two main options: do it yourself using an online brokerage platform like E-Trade or TD Ameritrade; or hire a professional financial advisor to manage your assets. The problem is that do-it-yourselfers often employ sub-optimal investment strategies where they fall victim to cognitive and emotional errors such as those identified by behavioral economics (e.g. Barber and Odean, 2000; Benartzi and Thaler, 2007). In addition, self-directed investors tend to trade too much (Barber, et. al 2008), fail to diversify (Goetzmann and Kumar, 2008), and chase trendy stocks (Froot, et. al 1992) without undertaking proper due diligence. Hiring a financial advisor, on the other hand, may (or may not) produce better results, but this comes at a price – typically one percent or more in fees per year based on the amount of assets managed. Financial advisors, moreover, typically require opening balances of at least five- or six-figures, effectively barring a large percentage of potential investors who lack the minimum amount of assets, and so have little choice but to become a do-it-yourselfer if they want market exposure. These end up being the credulous investors who, in turn, generate the market “noise” (Preda, 2017) that feeds profits to professional trading desks and HFT firms.

The roboadvisors were created to solve both of these problems simultaneously, by offering state-of-the-art asset management but with very low starting balances and inexpensive fee structures. In fact, several roboadvisors today charge *zero* in annual fees (the modal fee structure

⁹⁰ As of Q1 2019: <https://www.statista.com/outlook/337/109/robo-advisors/united-states>

is just 0.25% annually) and have *no* minimums, so that you can literally start investing with \$1 where every cent is allocated to an optimally diversified portfolio.⁹¹ This low-cost is achieved through the prodigious use of algorithms that make portfolio allocation decisions and execute them in the market. To be profitable, roboadvisors must attract a large number of small accounts, which necessitates a novel tactic of aggressively courting people in the realm of ‘low-finance’ for the first time. Through my interviews with roboadvisor executives (see the following section for a detailed description of my methods and data), I identified an intentional reorientation of advising toward low-net-worth investors; as the founder and CEO of one roboadvisor explained to me:

The traditional advisors and to some extent the hedge funds have had decades of time spent to figure out how to get a \$1 million or a \$100 million client. And now for the first time, everybody is focused on how to get the \$10,000 client, the \$1,000 client. And if you're that \$1,000 client, there's a whole new litany of companies trying to earn your business.

The head of operations at another large roboadvisor highlighted this new focus on ‘low affluence’ clientele:

The truth is that for the affluent customer [there] is already an extremely competitive market for them. And roboadvisors are typically charging much lower fees, so the economics just don't work when you're going up against like a Morgan Stanley who can spend thousands of dollars acquiring a customer. So, it's not that we couldn't acquire that kind of higher affluence customer, but it's just much more difficult and so I think, in general, our model—the marketing—was for lower affluence customers. And I think that's true in general for the roboadvisor market.

Per industry reports, as of the second quarter of 2018 the average account balance for a client of a traditional (human) financial advisor was roughly \$1 million.⁹² Using public regulatory filings, I was also able to determine that the average account size for roboadvised accounts in the U.S.

⁹¹ Roboadvisors also earn money through cash management, lending shares to short-sellers, selling order flow to institutional traders, and targeted marketing of other financial services.

⁹² https://aboutschwab.com/images/uploads/inline/2017-RIA-Benchmarking-Study_Results-0717-7ZSV.pdf;
<https://clearingcustody.fidelity.com/app/literature/item/9882273.html>

during the same period was approximately \$20,600 (48x smaller than accounts with traditional advisors). Some of these roboadvisors required an account minimum of \$5,000 or larger, and so may be targeting a slightly more well-off demographic. Excluding these, the mean account size falls to \$9,500 – (105x smaller than human advised accounts). The average account size at *Acorns*, the roboadvisor with the largest number of users (~2 million accounts), is just \$424.⁹³

According to data provided by FINRA, roboadvisors also tend to attract clients that are lower-income, younger, and more ethnically diverse than the typical investor.⁹⁴ The median age at the roboadvisors I followed was reported to be between 25-30 years old whereas the FINRA data indicates the median American investor is 55-60 years of age. It is telling that “Millennials” are specifically targeted in roboadvisors’ advertising and marketing campaigns, which are carried out mainly via social media channels. The vice-president of growth and strategy at one medium-sized roboadvisor related, “We have for example, a lot of Uber and Lyft drivers as customers so they can start saving, and they feel comfortable already with digital platforms. With just \$5 you can become an investor. It's very low barriers to entry.”

Methods and Data

To understand roboadvisors and their algorithms as objects of sociological inquiry, my methodology employs a three-pronged approach: (1) participant observation by becoming a roboadvisor user; (2) an archival review of regulatory documents filed with the SEC; and (3) in-depth interviews with well-placed individuals at roboadvisor firms. These approaches overlapped and supported one another throughout the study; for instance, in triangulating findings gathered from the user experience with interviews, and to confirm statements made by my informants with

⁹³ As of Q1 2019.

⁹⁴ <http://www.usfinancialcapability.org/investor-survey.php>

data found in regulatory documents. At the same time, my interviews pointed me to certain aspects of the user experience that were not initially salient, and SEC filings prompted particular lines of questioning related to my interviews. I will briefly discuss each of these approaches in turn.

Algorithms of high-finance tend to be inscrutable black boxes in order to preserve proprietary trading techniques as corporate secrets (Lenglet, 2011; Lewis, 2014; Pasquale, 2015; Lange, 2016). This makes direct interactions as a participant observer between the analyst and the algorithm untenable due to a clear lack of access. Such concerns do not apply to the algorithms at work within the roboadvisors, where I was afforded direct and unencumbered access simply by funding and opening an account. Recent scholarship has argued “that a multi-sited ethnographic approach would be most suitable to study algorithms as ethnographic objects in order to grasp the changing human–machine/trader-algorithm relation” (Lange, Lenglet and Seyfert, 2018:14; see also: Lange, 2016; Seyfert, 2016). Accordingly, I opened and funded individual taxable accounts at sixteen North American roboadvisors, which were chosen to reflect a popular cross-section of the most widely-used platforms in order to generalize as much as possible from my encounters. I opened these accounts using the minimum allowable balances [in brackets] at the following roboadvisors in August, 2017 where they remained open until July, 2018: *Acorns*[\$1]; *Betterment*[\$1]; *E-Trade Adaptive Portfolios*[\$5,000]; *Ellevest*[\$1]; *Fidelity Go*[\$1]; *Hedgable*[\$1]; *Future Advisor*[\$10,000]; *MI Finance*[\$100]; *SigFig*[\$2,000]; *SoFi*[\$100]; *Schwab Intelligent Portfolios*[\$5,000]; *TD Essential Portfolios*[\$5,000]; *Stash*[\$5]; *Wealthfront*[\$500]; *Wealthsimple*[\$1]; and *Wisebanyan*[\$1].⁹⁵ After opening each account, I went through an onboarding process that scored my risk preference and I agreed to a portfolio allocation

⁹⁵The \$27,712 which I invested was transferred from an existing investment account that I had already established several years ago, and the funds were returned to that account at the conclusion of the study. On average, I earned an approximately 10% annualized return over the study period. As my goal was to be a participant observer, I see no conflicts of interest using personal funds.

recommended by the algorithms. In practice, I logged on to each platform's mobile app or website at least once per week and interacted with as many parts of the site as possible including their portfolio analytics, financial tools, blog posts, company information pages, and help sections. My approach to participant observation of roboadvisors is closely aligned with analytic autoethnography (Anderson, 2006) in that I became an active participant in this research. What is novel, however, and which I will elaborate on in the sections that follow, is that my own participation had little influence on the roboadvisors that I studied. Indeed, each did evaluate my individual risk tolerance, investment time horizon, and subjective goals (e.g. am I saving to buy a house? To send a child to college?); yet, once my portfolios were constructed the remainder of my interactions turned out to be quite neutral in that my role was purposefully configured by these systems to that of a passive client (see Section 5 below). My observations and insights as a user were recorded both as field notes and through screen captures, which were subsequently entered into a qualitative data analysis (QDA) software package.⁹⁶

Since all of the roboadvisors in my sample fall under SEC regulatory purview as registered investment advisors they are required to file *Form ADV*, which is publicly available on the Investment Adviser Public Disclosure (IAPD) website.⁹⁷ The Form consists of two parts: Part 1 requires information about the advisor's business practices, affiliations, number of clients, amount of money managed, and any disciplinary events of the advisor or its employees; Part 2 requires advisors to prepare narrative "brochures" written in plain English that contain information such as the types of advisory services offered, the adviser's fee schedule, the investment strategies and methodologies employed (such as the use of MPT), and the background of management and key advisory personnel. In the case of roboadvisors, this disclosure also clearly explains to what extent

⁹⁶ NVivo 12

⁹⁷ <https://adviserinfo.sec.gov/>

algorithms are used in day-to-day practice. Each Form ADV was imported into the QDA software where they were coded thematically, revealing patterns across the documents and other insights.

Beginning in September 2017, interviews were conducted by phone or Skype with twenty-eight well-informed roboadvisor executives, employees, or former employees, each lasting approximately sixty to ninety minutes. Interviews were open-ended and followed a semi-structured format, which became increasingly focused on particular topics as my interviews progressed. My sample frame included executives or other employees in management positions who could speak authoritatively about their platforms, their algorithms, and their investment strategies. Moreover, I was interested in speaking to individuals who had first-hand experience in designing and implementing both the user experience as well as the back-end trading and portfolio management systems. I made initial contact with my informants either through personal introductions, or else through unsolicited requests via LinkedIn (the response rate was surprisingly high – approximately 60%), with prospect names and affiliations garnered from the roboadvisors' websites or Form ADV. Further informants were then obtained through snowball sampling following these initial contacts. Interviews also included informants at four additional roboadvisors where I did not open accounts: *bloom* (which optimizes 401(k) accounts), *Personal Capital* (which has a \$100,000 minimum), *Honest Dollar* (which only offers retirement accounts), and *Clarity Money* (which automates non-investment financial tasks). Three informants were interviewed on more than one occasion. Following Rubin and Rubin (2011), interviews were recorded, transcribed, and coded inductively in the QDA software, allowing me to identify themes and patterns across the transcripts.

Direct quotations excerpted from my interviews that appear in the following analysis refer only to the informant's job title, with names of informants and their employers withheld. In late-

2017, I began pilot interviews with twelve roboadvisor users after primary data collection for this study was concluded, mainly drawing from personal acquaintances. The data collection among users is ongoing and intended for future study; nevertheless, it provided me with some subjective insight into the user experience outside of my own.

In line with the conceptual focus of this paper, the consolidated coding and mapping procedure utilized strategies inspired by abductive inference (Timmermans and Tavory, 2012) and a process of triangulation (Olsen, 2004), which encourages theoretical discovery and refinement as an ongoing process.⁹⁸ This combined approach moreover allowed for themes and trends that overlapped between different data sources to become apparent in order to verify that findings derived from one source were compatible with that from another. Therefore, in the analysis below, I do not distinguish between data sources but present thematic findings side-by-side.

Modern Portfolio Theory, Passive Investing, and Low-Frequency Trading

By and large, roboadvisors follow passive investment strategies and construct portfolios exclusively from various exchange traded funds (ETFs), securities that mimic market indexes and offer passive exposure to roboadvisor users across several distinct asset classes.⁹⁹ The distinguishing feature of ETFs is that unlike index mutual funds, these securities trade on stock exchanges as if they were ordinary shares, making them highly liquid, low-cost instruments. Buying and selling ETFs often incurs no trading commissions and the management costs for these funds can be as little as 0.02% per year. Braun (2016:7) argues that the introduction of ETFs

⁹⁸ Similar approaches have been used elsewhere to recover Foucauldian theory from ethnographic data, e.g. Zaloom (2006), Hill (2009), and Borch and Lange (2016).

⁹⁹ Roboadvisors build optimized portfolios across multiple asset classes including various subsets (e.g. by market capitalization) of foreign and domestic stocks and bonds, commodities, real estate, alternative investments, etc. The number of distinct asset classes varies by roboadvisor from as few as four (e.g. *Vanguard*) to more than a dozen (e.g. *Schwab*). Some roboadvisors offer optional active or 'tactical' portfolios, but passive indexing remains by far the largest strategy and in the majority of cases is also the default option.

“completed the socio-technical *agencement* of the ‘passive investor’ [and] the transformation of the investment industry into a low-cost, ‘universal owner’ system.”

Passive investing, broadly, is a strategy of buying and holding a diversified portfolio across a variety of asset classes over a long time horizon. Passive investors do not seek to ‘beat’ the market by picking individual stocks or timing the market. Rather, passive investors seek to replicate the performance of the entire market, where asset classes are represented by broad benchmark indexes (e.g., the S&P 500 is often the benchmark used for large-capitalization U.S. stocks). Active investment, on the other hand, operates under the premise that investors make specific trades with the goal of outperforming a benchmark index. For example, they may seek to buy supposedly undervalued shares or try to time near-term market lows and highs as points of entry and exit. At the extreme end of active management is high-frequency trading. While an HFT trader may make tens of thousands of trades in a day, passive investors may only make *tens* of trades over the course of a year.

There are several reasons to consider passive strategies as the optimal choice for most lay investors. Practically, as they are long-term buy-and-hold portfolios, transaction costs are greatly reduced and research into individual securities is minimized. In terms of theory, the efficient market hypothesis (EMH) states that markets are for the most part efficient – that current prices reflect all available information, and thus are fairly-valued. If the EMH is correct then there is no way to systematically exploit mispricings in the market since they rarely exist (or if they do, they are very quickly arbitrated away by professional traders) (Ellis, 2016). While the theoretical soundness of the EMH is still an unsettled matter, abundant empirical evidence collected over several time spans shows consistent support that passive (indexed) investing is indeed favorable to active strategies.

Malkiel (2005:1) shows that active mutual fund managers, both in the U.S. and abroad, consistently underperform their benchmark index, and “provides evidence that by and large market prices do seem to reflect all available information.” Swenson (2005) showed that between 86 and 95 percent of actively managed mutual funds did not fulfil their goal of beating the market on an after-tax basis in the early 2000s. More recently, Soe and Poirier (2017) find that over the fifteen-year period from 2002 to 2017, only about 8% of active funds were able to outdo passive indexes. After accounting for taxes and the trading costs generated by active management, the number of successful funds drops to just 2%. In another study of 70,000 self-directed individual brokerage accounts, the average investor’s return for the year 2016 lagged the S&P 500 index by more than seven percentage points.¹⁰⁰ Several other studies report similar findings (e.g. Fama and French 2010; Cremers, et. al 2006). The evidence is extensive and compelling that for most long-term investors a passive strategy will end up being best.

Given a passive strategy, an algorithm requires a set of rules with which to implement it. Harry Markowitz, in 1952, introduced his Nobel prize-winning framework known as Modern Portfolio Theory, outlining the concepts of the risk return trade-off, correlations of returns between different assets, and diversified portfolio selection for investment optimization. In an overview of Markowitz’s work on MPT, Kaplan (1998:267) explains, “A basic premise of economics is that... all economic decisions are made in the face of trade-offs. Markowitz identified the trade-off facing the investor: risk versus expected return. The investment decision is not merely which securities to own, but how to divide the investor's wealth amongst securities.” Following Markowitz, MPT is a theory which provides a solution for investors by showing what is the best combination of available assets to build a portfolio with in order to maximize the total expected return for a given

¹⁰⁰ <https://www.cnbc.com/2017/01/04/most-investors-didnt-come-close-to-beating-the-sp-500.html>

risk preference. This process of *mean-variance optimization* thus delivers the ideal asset class weights for a passive portfolio.

From my analysis, it is clear that roboadvisors code MPT into their core algorithm. The head of investments and strategy at one prominent roboadvisor explained to me the influence of Markowitz's equations:

I think you can say robos' use of Modern Portfolio Theory, mean-variance optimization,...that we're making the argument that that's how you should be investing. That that is the model you should be using and it's the rational way to go about it.

Reviewing the web sites and regulatory filings of the roboadvisors in my sample, *each one* of them directly or indirectly mentions that MPT is employed in their practice.¹⁰¹ For instance, one prominent roboadvisor's investment methodology states: "Optimal portfolios are identified using Modern Portfolio Theory (MPT) and combine a broad set of asset classes, each usually represented by a low-cost, passive ETF."¹⁰² Another's website declares: "We determine optimal asset class combinations based on a common-sense application of Modern Portfolio Theory (MPT)."¹⁰³ The following text is found in another's Form ADV: "Our strategy focuses on Modern Portfolio Theory ('MPT'), which provides the framework for combining securities in a portfolio to generate the highest returns possible at a given level of risk."¹⁰⁴ Yet another's explains: "We manage client portfolios...with strategies based on Modern Portfolio Theory...Then, initial allocations are determined by the software-based algorithm, which selects among the target asset allocations based on information from clients about their financial situation and risk profile."¹⁰⁵ The

¹⁰¹ Some roboadvisors enhance MPT using e.g. the Black-Litterman model or a factor-model, which allows for views on the market's direction to be incorporated into expected return assumptions.

¹⁰² <https://research.wealthfront.com/whitepapers/investment-methodology/>

¹⁰³ <https://www.personalcapital.com/wealth-management/investment-strategy/>

¹⁰⁴ https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=493823

¹⁰⁵ https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=530981

investment strategies carried out by roboadvisors' allocation and execution algorithms could not be more plain.

Interestingly, roboadvisors that demand larger or smaller minimum balances displayed no fundamental difference in terms of portfolio selection – the end result was effectively an algorithmic implementation of MPT in all cases. In the early days, roboadvisors that catered to higher-net-worth individuals offered additional features such as automated tax minimization, favorable yields on cash balances, and the ability to speak to a human financial advisor on demand. Due to the high level of growth and competition in the space, however, many of these perks are now included standard across the board.

A roboadvisor is, in fact, an assemblage of interrelated algorithms. To determine proper MPT allocations, each roboadvisor conducts a risk assessment of their users. At account opening, clients provide age, financial condition, employment status, investment objectives or goals (e.g. saving for retirement or a down-payment on a home), time horizon, and they typically will complete an online risk tolerance questionnaire – all of which an algorithm considers for selecting and then executing target allocations (see Figures 1).¹⁰⁶ Algorithms also generate advice regarding other investment decisions, including (but not limited to) transactions related to deposits and withdrawals, automatic rebalancing, account type selection, and tax-loss harvesting. For instance, algorithms continuously monitor and review clients' accounts to ensure their portfolios are within a set range of their target allocation. If a portfolio deviates from this range, the algorithm will automatically place orders to restore its target allocation. Or, when clients receive dividends or make deposits or withdrawals from their accounts, an algorithm will determine the specific securities to trade based on the client's asset allocation and current tax lots.


¹⁰⁶ When circumstances change, users can re-do the risk-assessment process and receive a new portfolio allocation.

Figure 1: Sample Roboadvisor Account Opening

A


What is your goal for this account?

Grow Investments



Build wealth

Withdraw Income from Investments



For retirement or other expenses

Discharge Products: Not FDIC Insured - No Bank Guarantee - May Lose Value

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B

Please tell us more about your goal for this account.

I am looking to:

- Prepare for retirement
- Save for major upcoming expenses (education, health bills, etc.)
- Save for something special (vacation, new car, etc.)
- Build a rainy day fund for emergencies
- Build long term wealth

Discharge Products: Not FDIC Insured - No Bank Guarantee - May Lose Value

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C

Please answer a few questions to design your personal portfolio.

What is your understanding of stocks, bonds, and k-1's?

- None
- Some
- Good
- EXTENSIVE

Discharge Products: Not FDIC Insured - No Bank Guarantee - May Lose Value

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D

Please answer a few questions to design your personal portfolio.

If you were even to experience a 20% decline or more in the value of your investments in one year, what would you do?

- Sell everything
- Sell some
- Do nothing
- Reallocate my investments
- Buy more

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E

Please answer a few questions to design your personal portfolio.

How would you describe your approach to making important financial decisions?

- I try to avoid making decisions
- I instinctively make decisions
- I comfortably make decisions and don't look back

Discharge Products: Not FDIC Insured - No Bank Guarantee - May Lose Value

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F

Now let's see how we can help you achieve your Build Wealth Goal.

How much do you want to invest to get started? \$5,000

How much investment value fluctuation would you be comfortable with 1 year from now?

40% 48% 32% 20% 12% 5% 15% 20% 30% 40% 50% 60% 62%

Target Goal Amount

Invested Balance **\$91,817**

Today 2044

How much do you want to contribute each month? \$100

How many years will you need to start withdrawing funds from this account? 25

There is no guarantee that the intended goal will be reached and changes in inputs and other assumptions may affect your potential to reach the intended goal. In addition, the projections and other information you will see here about the likelihood of various outcomes are hypothetical in nature, do not reflect actual investment results, and are not a guarantee of future results. The projections are based on parameters intended to be representative of the selected portfolio. The output of this tool may vary with each use and over time. The tool does not consider the specific tax rules or other aspects that may apply. This tool provides general information and is not intended to constitute an offer of investment or any other financial product.

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Note: These six panels represent, in general, what the risk assessment process entails for opening a roboadvised account. These screen shots were taken from *Schwab Intelligent Portfolios*, and displays six out of thirteen question items. What is interesting about this particular risk profiling questionnaire is that it updates the recommended general asset class allocation (on the left of each panel) as users respond to each prompt. Ultimately, the portfolio recommended based on my risk responses had a moderate level of risk exposure (see Figure 1B for the portfolio recommended based on my risk assessment). Some questions in the risk assessment require objective input (e.g. panels A, B, and C) while others elicit subjective responses (panels D and E). Panel F illustrates how investment goals (objectives) also play into the overall measurement of risk.

Prior to the launch of software-based financial advisory services, it was not practical to offer rigorous and complete MPT to everyone because delivering a complete solution was too costly and complex. Historically, the sort of comprehensive MPT-based financial advice that roboadvisors provide has been available exclusively through certain high-end financial advisors, whose cognitive bandwidth would be limited to servicing perhaps a few dozen well-paying clients apiece. The number of calculations required to identify an optimized asset allocation, pinpoint the ideal securities used to represent each asset class, and assess an individual's true risk tolerance are beyond the ability of most individuals as well as the scope of free, web-based investment tools. The job becomes even more difficult when continuously monitoring and periodically rebalancing a portfolio to maintain a desired level of risk. Taken together, an algorithmically-guided investment strategy that conforms to MPT can construct, on a large scale, objectively rational portfolio choices. But, in order to maintain such model-driven rationality, lay investors must be objectified in ways that conform to the algorithms' direction.

The Active Construction of Passive Investors

One of the most striking findings from this study is that roboadvisors construct passive investors in two ways: first by building passive, indexed portfolios that follow MPT; and *second* by automating processes that keep users at a distance from their investments. A former head of analytics described this doubly-passive orientation to me:

It's kind of more passive than self-directed passive investing, that, you know, you're not managing your own taxes and the tax implications of buying and selling...you don't have to reinvest your dividends, you don't have to— really if you don't want to you don't have to know *anything* about investing...I really see it as an extension of passive investing and kind of a *more passive version of passive...*

Financial algorithms can produce extraordinary results, but only if their users are prepared to participate in the working of the model – and in this case participation suggests, to use Woolgar’s (1990) terminology, *configuring* users to explicit *non-participation*. Satisfying this double-passivity upholds compliance with the prescripts of portfolio theory; consequently, roboadvisors utilize technology to discipline their users.

Most of the informants I spoke with acknowledged the wayward role emotions play in thwarting investor success and saw it as part of their duty to remove the influence of that affect from their users. Research that has looked at the trading behavior of ordinary investors finds that there is a countervailing tendency among individuals to trade too often and display pernicious overconfidence in their trading decisions (Barber and Odean, 2000; Grinblatt and Keloharju, 2001) – a problem that is particularly pronounced among those using self-directed online brokerages (Odean, 1999).¹⁰⁷ Indeed, the contemporary incarnation of self-directed brokers are new fintech apps like *Robinhood* that tempt lay investors with free stock trading. Such a business model relies on a user interface that encourages trading rather than discipline. It purposefully exploits human propensities to over-trade, playing upon emotions like fear and greed and the thrill of gambling (Albarrán-Torres, 2018:222). In fact, active customers check the *Robinhood* app ten times per day, on average, often in response to push notifications (Harris, 2017).

For lay investors, Weiss (2018) recounts how financial literacy seminars endorse emotion-curbing practices and the necessity for self-discipline under the rubric “you are your own worst enemy.” This appears to align with discourses aimed at professional traders; however, market professionals regularly employ self-restraint in conjunction with algorithms of high-finance that

¹⁰⁷ Emotional factors are stubbornly present even among market professionals (Pixley, 2004), who routinely tinker with and override financial models (Svetlova, 2012) – where HFT traders may even become emotionally attached to the algorithms that they design and code (Borch and Lang, 2016).

figure into a calculative assemblage (Borch and Lange, 2016). “Rather than equipping investors with calculating skills and an enterprising élan,” ordinary investors are instead taught to discard any hope of achieving the ideal of rational calculation in the market (Weiss, 2018). The roboadvisors are fundamentally unique in that they equip calculative capacity while also doing away with self-discipline. Through this study, it became clear that roboadvisors believe the best way of ensuring emotional and cognitive detachment is to automate or systematize investment behavior – for the user to keep their hands off *rather than to instruct in self-restraint*; to set-it-and-forget-it. In contrast to market professionals who are taught to follow a self-disciplinary doctrine of “don’t think” (Zaloom, 2006), algorithmic low-finance requires that individuals “don’t *do*.” Thus, in a departure from discourses of trader subjectivity (the ways that participants think about the market), roboadvisors describe a regime of investor objectification (that investors are removed from market decisions). Through distancing the individual, investors are ultimately portrayed as mindless things instead of a thinking and doing subjects.

Among my interviewees, there was a strongly held view that roboadvisors must *impose* restraint since ordinary investors lack the necessary self-discipline and market savvy. “I don't think people can stay the course, they don't have the time or the discipline – and you need a certain level of mathematical competence too. A lot of people just don't have those skills,” remarked one executive. Said another, “the data show time and time again that left to our own devices people make bad decisions – I mean, not everyone obviously, but most people are not going to have the necessary discipline.” Here, the roboadvisor becomes a technology of power (Foucault, 1988), shaping the conduct of individuals and submitting them to certain ends of objective rationality. This power is deployed with arguably good intentions (Foucault, 1977) – to help investors do

better in the market and to mechanize tasks whereupon computers can do things that a human being simply cannot.

The first layer of discipline is enacted at account opening and involves constraining the amount of risk that a user can take on. Clients are able to choose their time horizon or financial goals, but once the algorithm has selected an allocation several roboadvisors do not allow users to increase their risk even if they want to.¹⁰⁸ Others only allow the assigned risk score to be modified by plus or minus one tick, or they limit users from re-taking the risk assessment to once every thirty days. I encountered this impediment when, based on my level of income and savings, the algorithms at some of the roboadvisors I studied assigned me to a moderate portfolio when I thought myself more willing to take risk. This restriction is often unidirectional — when I expressed my frustration about being limited to the head of business development at one of these roboadvisors, he explained:¹⁰⁹

You know, we won't let them if they say, 'you put me in moderate, but I want to be in aggressive.' We allow them to be more *conservative* than our suggestion, so if they're aggressive we allow them to invest in moderate or conservative portfolios. But if you're conservative that is *all* you can invest in – we don't want to encourage our users to take more risk than what we think is optimal for them.

Once a portfolio has been built, the core financial algorithms that will drive performance embody a model built on mainstream financial theory. Algorithms that discipline otherwise exemplify the lessons learned by behavioral economics. Rather than operating under the belief that the standard models of economics are flawed, the corrective use of behavioral economics by roboadvisors insinuates that the models are fine, and it is the human users who are in need of

¹⁰⁸ It should be pointed out that roboadvisors often encourage users to contribute more money to their portfolios in order to achieve their goals. But users do not have a say in how that money is allocated among investments.

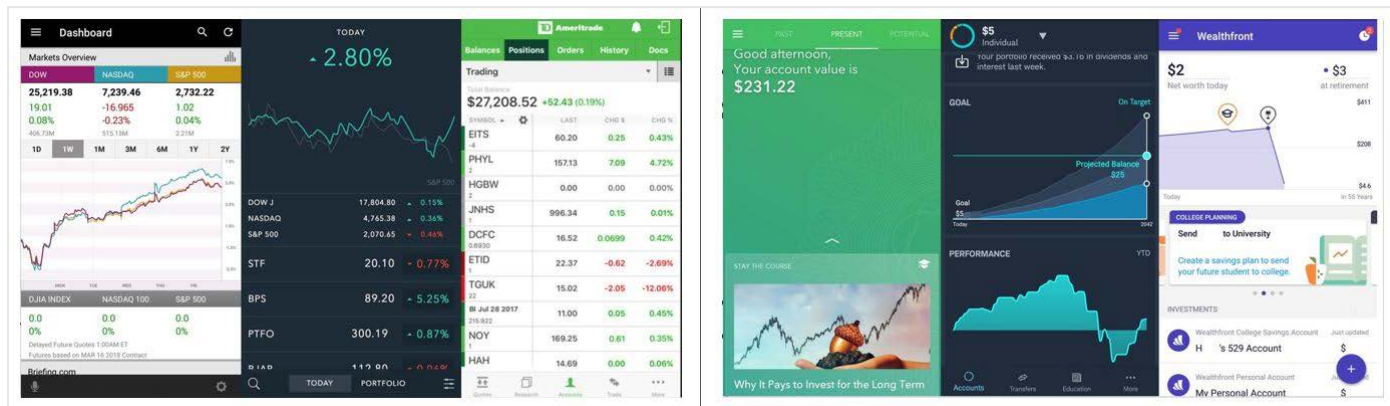
¹⁰⁹ Five of the roboadvisors in my sample would not allow me, or made it difficult, to override the algorithm for a more aggressive portfolio.

reform. To this end, efforts to dissuade emotion and regulate behavior are built directly into the user experience with a sort of Foucauldian governmentality. The head of behavioral finance and investing at a large roboadvisor commented, “it’s our job to sort of help manage the psychological side of things so that you can do the rational thing.” A big part of the design elements that lead to “better behavior” are involved around either diverting or re-targeting a person’s motivation. This often involves initiating targeted paternalistic nudges aimed at adjusting specific responses (see: Thaler and Sunstein, 2009).

Take the case of how roboadvisor platforms attempt to correct for loss-aversion and availability bias, psychological errors that undermine self-control (see: DellaVigna, 2009). Behavioral economics teaches that people tend to overweight the present and are prone to make snap decisions based on the recent past – all at the expense of future well-being (e.g. Loewenstein and Prelec, 2009). Unlike the focus of self-directed brokerage platforms (such as *E-Trade* or *Robinhood*) that offer clients reams of backward-looking information to induce buying and selling – what the change in price has been since yesterday in both graphic and numeric form, with flashing colors around that historical information to get visceral reactions in terms of profit or loss – roboadvisors attempt to keep clients focused on the *future*. The design thus frames the client’s present to her future self to the exclusion of the past or contemporary alternatives, crafting what Beckert (2016:131,217) refers to as imaginaries of profit opportunities – “fictional expectations” that help regulate the present state of being. That means not putting up historical returns and not focusing on short-term gains, and instead concentrating on staying the course and realizing future accomplishments. Figure 2 illustrates some of these stark design differences between three popular self-directed apps and three popular roboadvisors. The design elements utilized by the latter are

specifically employed to keep users from tinkering with their portfolios and to stave off behavioral errors before they can transpire in the first place.

Figure 2: Roboadvisors' Interface vs. Self-Directed

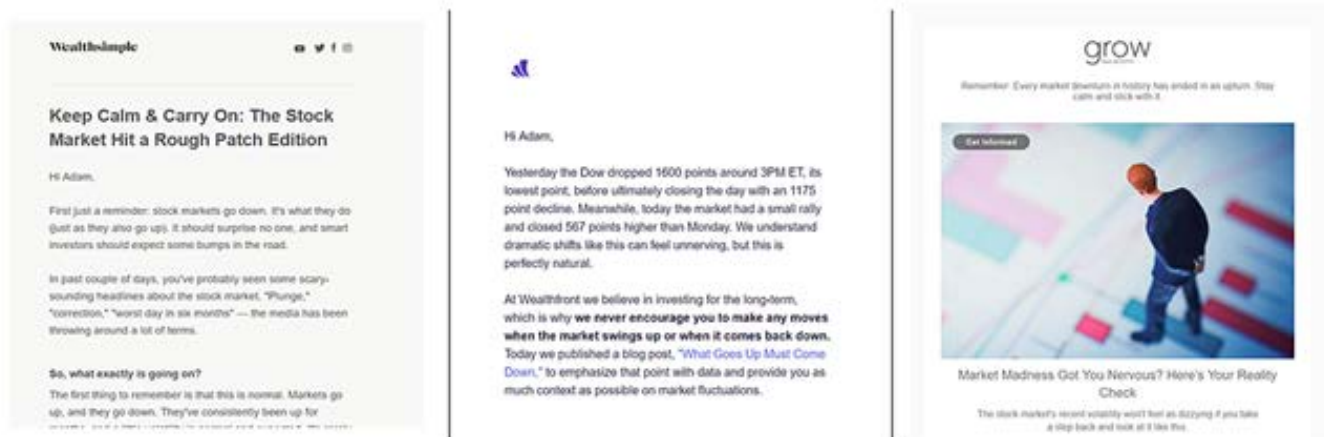


Another element shared by some roboadvisors is the availability of basic financial tools or calculators for users to interact with. These tools again tend to serve a disciplinary purpose to keep investors docile and divert them from the algorithmic processes that are actually governing their portfolios day-to-day. For instance, several roboadvisors offer a retirement calculator that, given some inputs from the user such as time to expected retirement and earnings assumptions through that date, will generate a probability of being able to achieve that retirement goal. This calculation, however, has no practical bearing on the portfolio allocation assigned to that user (although it may encourage them to increase the amount of money under management). The informants I spoke with recognized that while technology is increasingly ubiquitous and dependable, many people still feel uneasy about completely handing over the financial reins to software. One interviewee directly cited the work of Dietvorst, Simmons, and Massey (2015) on *algorithm aversion*, whereby people believe that algorithms are too unyielding and thus seek some degree of control over the process. “So, if you give them some agency over the platform, they're much more likely to go ahead with it,” that informant remarked. This is reminiscent of so-called ‘placebo-buttons’ found

in places like pedestrian crosswalks or elevator cars. These are buttons that we commonly encounter that we think do things but actually do nothing (McRaney, 2013); the changing of traffic lights or closing of elevator doors are in fact coupled to timers. According to Moore (2016), placebo-buttons confer a sense of agency in a technologically-mediated world: “we feel in control of these interactions.” Roboadvisors design their platforms with this sort of research in mind to ‘empower’ people, letting them toggle meaningless levers and dials of inert financial tools so that they trust the platform and are more likely to work well with the algorithms rather than view them as a limitation.

One of the interesting things that a roboadvisor can do is leverage the technology platform to identify which clients are most at risk to behave ‘badly’ and respond accordingly. For instance, by proactively messaging *only* those users who are detected to have logged on frequently to the platform during a market downturn ‘to stay the course’ while refraining from messaging ‘calmer’ users, avoids creating unnecessary anxiety. In February 2018, when The Dow Jones index fell more than 3,200 points, or 12%, in just two weeks, I was able to confirm this targeted response where I received several “remain calm” emails from the roboadvisors I was most engaged with (some examples appear in Figure 3), while those I had not interacted with sent far fewer unsolicited messages.

Figure 3: Communications



Overall, the majority of disciplinary features are introduced to keep users from the temptation of straying from the model. As an example, when one roboadvisor began to progressively introduce a new feature showing users how much of a tax impact they would generate from modifying their portfolios away from the algorithmically recommended one, they were able to conduct a quasi-randomized experiment comparing the behavior of those who had and had not yet received the roll-out. The developer who designed that functionality spoke to its effectiveness:

I think it's something around 70% of users that get shown [the tool] as opposed to those who don't – they do not go through with the allocation change...If we show people that the tax impact of a change will cost them \$50 or more, the rate of those who don't go through with it goes up to around 90%. So, it's very effective in terms of counterbalancing their emotional decisions with more rational ones.

Surprisingly, an additional corrective element that I found common in approximately half of the roboadvisors I surveyed is the re-introduction of human financial advisors. However, the

role and duties assigned to these actants would be unfamiliar to what is commonly thought of as a ‘financial advisor’. In most cases these human advisors cannot actually turn any dials: they cannot change portfolio allocations; adjust risk tolerances; or make specific investment recommendations. Instead, their role is reformatted to act as a ‘counselor’ or a ‘coach’ in order to suppress users’ propensity to tinker or to keep their emotions (in particular, fear and greed) in check. According to one executive:

Our advisors are not there to decide what strategy somebody should be in or to build a portfolio *or anything like that*, they are there to help make sure the client feels comfortable and sticks with it.

As a roboadvisor user, I reached out to several on-staff advisors and reached a similar conclusion.¹¹⁰ The most candid response was the following email sent to me by one of my advisors when I asked if he could make my portfolio somewhat more aggressive:

Our role as advisors is to answer questions around our investment strategies/methodologies, portfolios, our services etc... We as advisors *are not able change portfolio allocations*. This is done through our questionnaire and the corresponding recommendation made by our algorithm.

The human advisor is there to help keep users adhering to MPT. But, more than an agent of discipline, the human advisors also create a familiar social relation between the end-user and the unfamiliar calculative equipment at their disposal. Even if the advisor is just a ‘face’ that users can associate with the rest of the assemblage, the presence of a responsive human (i.e. a “translator” or “spokesman” of the entities he represents [Callon, 1986:25]) keeps the assemblage stable. A manager in charge of the advisory piece at one robo explained that people sometimes call in just to have “a sort of a cathartic experience:”

We [advisors] don't say anything that we couldn't send out via email or that we couldn't put at the end of a recording so that they can get the same answer. But

¹¹⁰ At two roboadvisors the advisors did have some discretion in making portfolio changes or recommendations, but the large majority did not.

they [users] just want to know that there's a human being, kind of as a therapist, on the other side of it. So, the facts and the concepts of what you would think of as the rational component of investing don't change but talking to a person is far more cathartic and interactive.

For the most part, these measures collectively do result in discipline. According to several informants, about 80-90% of users comply with the algorithms' direction at any point in time: "by far, the vast majority take our advice, on allocations and transactions and things of that nature."

The choices recommended by theory-laden algorithms, too, need to be situated in a relational context in which certain goals are highlighted – for instance, the technocratic operation of maximizing an investment's risk-adjusted return must be constrained by the context of the social and subjective goal of (e.g.) retirement saving, where the prescripts of financial models are made compatible with human behavior at the same time that human behavior is made compatible with the model. Mean-variance optimization requires risk and return assumptions and sometimes when these are plugged into the model, the results makes little practical sense. When using historical returns as inputs, the MPT approach favors allocating greater weights to negatively correlated asset classes or those that experienced superior performance over some period. For example, an MPT strategy based on historical data spanning only the years 2000-2008 would have resulted in an unreasonably heavy weighting to real estate, commodities, and emerging markets stocks. A portfolio concentrated in Latin American shares and real estate investments would not be considered good judgement, where a competent financial advisor would immediately recognize such imprudence. "In real life the [algorithm's] output is not very satisfying much of the time, so you have to limit it in some way that you and your client can live with," explained one vice-president of portfolio management. Thus, at every roboadvisor sits an investment committee, made up of three to five market experts, who oversee the algorithmic processes. This group is tasked

with updating model inputs and assumptions and has the final say on whether the algorithm's output is satisfactory or needs to be overruled.

Algorithms are also constrained by the circumstances of their human end-users, each of whom has a unique combination of risk tolerance, time horizon, financial goals, and so on. To become optimized through a roboadvisor does not mean to be made homogenous – each user-algorithm combination must be configured in different ways to optimize portfolio selection against individual preferences and goals. This is an important distinction that sets the likes of roboadvisors apart from other passive indexed strategies such as target-date mutual funds, which take a far more static and one-size fits all approach. The roboadvisor and its relation to the human user may be encapsulated by the following quotation from a senior robo executive: “[A] good way of thinking about it is that it's working with their existing eyesight and we're like a pair of glasses. But their eyes are still their eyes, we're just going to change the way they see the world so that it's a little bit clearer.”

Algorithmic low-finance and society

The Governed Investor

Roboadvisors are not just user-algorithm assemblages, they are also for-profit firms that seek to enlarge their market share. Unlike the loosely regulated domain of HFT (Coombs, 2016; Lenglet and Mol, 2016), in order to grow, this new category of financial firm must convince both users and regulators that they are legitimate, trustworthy, and competent fiduciaries of client assets; but how is one to enlist trust in the absence of a track record? Rather than wait patiently to develop and test proprietary investment models (which may or may not succeed), they draw on an existing framework that they can tout to give some confidence to their allocations. In order to operate in the domain of low-finance, roboadvisors must further satisfy the incumbent responsibilities outlined by strict legal and regulatory frames intended to protect small investors, and the safest

way to achieve that is by pre-establishing a basis in “Nobel-prize winning research.” The economic model is used as a tool to convince others (e.g. regulators) that their interests align, where the persuasive power of MPT helps bring roboadvisors into existence. Therefore, the want to create optimal client portfolios is in fact borne out of the requirement to fulfill a fiduciary duty – as the former CEO of one roboadvisor explained, “I’d say we used MPT probably 80% from a regulatory standpoint, and then 20% because we felt it’s the best kind of investment strategy.” Another CEO similarly admitted, “I’m no mean-variance optimization devotee; frankly, a lot of what we put out there in terms of portfolio management is because it’s defensible against popular literature.” The organizational politics of roboadvisors are thus intrinsically bound up with the social forces and larger political structures that allow them to operate and manage (lay) client money, as well as from a practical aversion to potential lawsuits claiming irresponsible portfolio management.

The passive actors shaped by roboadvisors thus align with state regulators’ ideal for lay investing that equates rational with responsible, as a form of governmentality. In particular, actively constructing passive investors in this way is consistent with a neoliberal manner of rationality that is not only instrumental with calculation but also “intensely constructed and governed,” tasked with enhancing portfolio value across all endeavors and venues (Brown, 2015:10). Contrary to Adam Smith’s *Homo economicus* as self-interested commodity producer guided by an invisible hand and a propensity to “truck and barter,” Foucault (2008:226) recognized that neoliberalism has brought to bear a version of *Homo economicus* defined by competition rather than exchange, an entrepreneur in search of profit. For Brown (2015:32), contemporary logics of financialization have further reshaped *Homo economicus* as “human-turned-capital”. Just as capitalism for Marx alienated humans from their productive capacity in the transformation into labor, roboadvisors seem to accommodate the alienation of our financial selves in the conversion

of humans to capital. While it is unlikely that automated investment algorithms alone will have a significant impact, this conversion, Brown cautions, can remake a society of political citizens into one of economized automatons, with the ultimate consequence being the potential undoing of democracy itself.

For individual users, roboadvisors furthermore invoke the possibility of imputing interests to people (Callon and Law, 1982; Latour, 1999). I conducted some preliminary interviews with users of roboadvisors, finding that none of them cared very much about emulating a rational economic actor or following a passive strategy. Users are far more responsive to the fact that these platforms are inexpensive, require very low account balances, and manage investments automatically with minimal user input. Using these factors as lures and with the tacit encouragement of regulatory bodies, roboadvisors subtly persuade individuals that they ought to be following MPT. By becoming a passive indexed investor, one must accept that there is no expectation to come out ahead of the broader market, which means there is no opportunity for market excellence in the form of excess returns (what practitioners call ‘alpha’). Enrollment in a roboadvisor does not come with the promise of being a Warren Buffett or George Soros. Rather, it comes with the modest goal of replicating market indexes. To construct this sort of economic action guided by MPT therefore is to import a moral character that may oppose contemporary dictates of individual exceptionalism – one has to accept that being ‘rational’ is indeed to be ‘average’. Put differently, the objective choices determined by can, in some cases, conflict with individual interests inculcated through cultural norms and societal values that incentivize being above average. That *Homo economicus* can exist does not imply in all cases he wants to.

The Perils of Passive

By the year 2023, it is projected that more than 147 million people worldwide will use a roboadvisor (dominated by American and Chinese investors).¹¹¹ What happens if algorithms of low-finance succeed in enrolling a mass of followers into passive investing? A preponderance of actors following the rules of MPT could actually produce systematic market failures, one of which derives from a corporate governance concern: that index funds and ETFs become large shareholder blocs of firms, and they cannot, however, sell their shares, since they must replicate the index at its given component weights. This is a relatively new concern since over the past decade the growth of passive has far outpaced any other strategy (in part due to roboadvisors, but also target-date funds in retirement accounts, standalone index mutual funds, etc.). The result is that passive funds now collectively own an average of 17% of each component of the S&P 500, per Goldman Sachs data (the range is as little as 10%, and as much as 35%), whereas passive ownership was merely “a rounding error” a decade ago.¹¹² Vanguard alone, the largest index fund provider, has at least a 5% stake in 468 components of the S&P 500, according to a 2017 report in *The Wall Street Journal*, up from just three components in 2005.¹¹³ Fichtner and Heemskerk (2018) refer to the incredible growth of passive shareholding as a fundamental shift in contemporary capitalism toward “new permanent universal owners”. Several structural problems have been identified that could arise from this paradigm, what Elhauge (2016:1267) calls horizontal shareholding: “when a common set of investors own significant shares in corporations that are horizontal competitors in a product market.” An index fund may own a sizeable stake in both Delta and United Airlines, in both Coca Cola and PepsiCo. What Elhauge (2016) and others like Schmalz (2018) argue is that horizontal

¹¹¹ <https://www.statista.com/outlook/337/100/robo-advisors/worldwide#market-users>

¹¹² <https://www.goldmansachs.com/insights/public-policy/directors-dilemma-f/report.pdf>

¹¹³ <https://www.marketwatch.com/story/passive-investing-is-changing-the-stock-market-in-ways-investors-dont-realize-2017-09-25>

ownership incentivizes anti-competitive practices. What is good for Pepsi (say, a new product line) could be bad for Coke; a 5% owner in both companies would prefer to see the industry overall succeed rather than gains in Pepsi offset by losses in its main competitor.

The long-run implications of this new buy-and-hold-everything structure on corporate governance are yet unclear – on the one hand it may favor managerial strategies of ‘patient capital’ focused on long-run stability and growth (Braun, 2016), as opposed to the short-term share price focus that has defined the ‘managerial revolution/shareholder maximalist’ dogma. On the other hand, it suggests that managers might not have to be accountable to shareholders who cannot threaten to sell their ownership stake, breaking the market for corporate control and leaving a vacuum in terms of principal-agent responsibility (see e.g. Fligstein, 1996; Dobbin and Zorn, 2005). In a recent paper, Fichtner and Heemskerk (2018) study how the “Big Three” index fund managers (*Vanguard*, *Blackrock*, and *State Street*) vote on shareholder issues, finding that these concentrated centers of shareholding are not flexing their voting power toward a long-term (patient) management orientation. At the same time, there does not seem to be moral hazard arising from corporate managers exploiting the fact that index funds cannot ‘exit’ their positions. Fichtner, et al. (2017:318) reveal that the Big Three seem to exert “hidden power” via informal private engagements with corporate managers of invested companies, highlighting a relational strategy that keeps the interests of managers and index funds aligned.

The roboadvisors could actually serve as a modest check against the concentration of shareholding in the Big Three since they employ algorithms that constantly scan the market for the lowest-cost ETF for a given asset class and choose accordingly.¹¹⁴ Fund characteristics such as expense ratio, liquidity, dividend yield, and tracking error are all involved in the calculus for

¹¹⁴ The only exception would be roboadvisors that also market their own index ETFs, such as Vanguard and Schwab who will prioritize their own by default.

choosing ETFs – and it turns out that for certain asset classes *Schwab*, *Wisdom Tree*, or *Invesco* prove to be the most suitable index fund. Even if the ETFs provided by one of the Big Three end up being the most cost-effective, most roboadvisors now engage in tax-loss harvesting as a standard service, an automated tax-minimization strategy that offsets capital gains in one security with capital losses in another, very similar but not identical, security. Therefore, roboadvisors maintain a stable of two or three ETFs for each asset class: if, for instance, small-cap stocks flounder, the algorithm will sell the (e.g.) *Vanguard* ETF and replace it with the *Invesco* equivalent.

A final issue that has been highlighted casts indexed investors as ‘free-riders’. The logic goes that if everybody passively owns an index of stocks, then nobody is left to actively price the shares of the individual companies that make up that index. With nobody looking out for the share values of the index’s components they will tend to become mis-priced and thus markets will ultimately turn out to be more *inefficient*. If the efficient markets hypothesis breaks down, then MPT will also fail to describe optimal portfolio weights, an example of what MacKenzie (2006) calls *counterperformativity*.¹¹⁵ The Nobel-prize winning economist Robert Shiller responded to the rise of passive investing in a 2017 interview:

It’s kind of pseudoscience to think these indexes are perfect, and all I need is some kind of computer model instead of thinking about businesses...[P]assive indexing...is something that is really free-riding on other people’s work...So people say, ‘I’m not going to try to beat the market. The market is all-knowing.’ But how in the world can the market be all-knowing, if nobody is trying— well, not as many people— are trying to beat it?¹¹⁶

The head of investment research for one of the roboadvisors I interviewed similarly agreed:

If you take the limiting case where every single market participant uses a mean-variance model and that's it, then the market *cannot* be efficient, because somebody still needs to do the fundamental research to work out what the fair value of each stock is.

¹¹⁵ i.e. the practical use of a theory or model alters economic processes so that they conform *less well* to the theory or model.

¹¹⁶ <https://www.cnbc.com/2017/11/14/robert-shiller-passive-investing-is-a-dangerous-chaotic-system.html>

Along these lines, when Vanguard launched the first index fund in the 1970s it was branded as “un-American” (Fichtner, et al. 2017), and more recently Fraser-Jenkins, et al. (2016) assert that indexed investing is “worse than Marxism” in the sense that passive markets cannot possibly allocate capital efficiently, arguing that an abundance of active strategies are a social necessity for the stability of financial markets. If this reasoning is correct, there must be some inflection point where it becomes no longer socially responsible to invest in an index, and that means at some point roboadvisors may actually promote financial *weakness* through performing MPT *en masse*.

Conclusion

In his book on algorithmic high-finance, *Flash Boys*, Michael Lewis (2014:3) depicts how “the stock market now trades inside black boxes.”¹¹⁷ But, as roboadvisors bring algorithmic trading to the realm of ‘low-finance’, that market paradigm is upended. In this article, I have shown that the type of algorithmic finance used by roboadvisors instead embodies market logics suited for ordinary investors; in particular, popular strategies of *low*-frequency trading, i.e. passive indexed investing derived from Modern Portfolio Theory. Thus, while HFT algorithms are highly-secretive objects of ignorance, roboadvisors are highly-regulated entities couched in well-understood models of mainstream finance, making them objects of cognizance. From a methodological perspective, this makes roboadvisors particularly well-suited for studying algorithms ethnographically.

If any piece of the roboadvisor is subject to ignorance (not-knowing), it is the end-user, who fully delegates investment choices to the algorithms – individuals who are actively constructed as ‘doubly-passive’ investors. From this, other important contrasts arise: HFT traders

¹¹⁷ quoted in Lange (2016:3)

who tend to be subjectivized as they adapt to evolving market-forms, and roboadvised clients who are instead objectified and detached from the market. To become competent market subjects, HFT traders engage in curative techniques of the self (“don’t think”), while roboadvisors impose technologies of power to discipline their users (“don’t *do*”). Techniques of discipline used by roboadvisors include behavioral nudges and design elements that draw from the findings of behavioral economics – to keep emotions in check and hands off, with human financial advisors who are brought back in to the assemblage, not to advise on financial matters but to remind users to trust in algorithmically-made decisions.

There is also an implicit understanding of the change of agency that is undertaken – a condition where actors are calculative *yet never themselves calculating*. Roboadvised clients are not individually performing agency but are to some extent being performed by the roboadvisors' calculative intervention. However closely the client of a roboadvisor may approximate rational economic man ‘on paper’, he need not have *any* inkling of financial literacy, never has to make a single investment decision, and can remain perfectly alienated from the market. Thus, individuals themselves become detached from the behavioral ideal of *Homo economicus* and only achieve rational outcomes through outsourcing agency to machines.

The rise of algorithmic low-finance, and the roboadvisors in particular, has important implications on the socio-technological structuration of securities markets and on investor behavior. As more lay investors become roboadvised, and thus passive (who are moreover chastened if they want to pick stocks or time the market), there is less “noise” in the market (Preda, 2017) for the algorithms of high-finance to respond to. And while this may seem like a step toward increased market efficiency, too much passive investing can itself lead to market failure and raise problems of corporate governance and concentrated shareholding.

This work is among the very first to study roboadvisors from the lens of social science, and so several new directions for future work present themselves. While this study focused on the organizational side of roboadvisors, much can still be learned from research oriented to their users – who they are, how they form relations with their digital ‘advisor’, how they respond to being disciplined, and how they feel about being objectified. Or, to explore the extent to which roboadvisors promote financial inclusion and help democratize markets. Another strand could pick up on the performativity of economics thesis proposed by Callon (1998) and extended by MacKenzie (2006), where an economic theory comes to *make* the economy rather than simply describe it. Algorithms that perform MPT on a large scale could bring markets in line with the model’s prescriptions and reproduce lay investors in ways consistent with financial theory.

Consumer-facing financial technology is already branching out beyond the sphere of investments and is a worthy extension of these lines of research. Algorithms now exist that automate quotidian household finance activities like optimizing which credit cards, bank accounts, and loan products and individual gets. Others are in the business of robotically cancelling old or unused subscriptions, or automatically saving loose change into high-yield bank accounts. Still more monitor budgets and spending behavior, alerting consumers to potential credit score impacts based on purchasing patterns. Beyond finance and economics, studying these technologies from different perspectives could also inform the broader study of algorithms in society – describing a constructive class of algorithms, in opposition to those that victimize or exploit individuals like O’Neil’s (2016) “Weapons of Math Destruction”. Roboadvisors appear to benefit and enhance their human user who is “formatted, framed and equipped with prostheses which help him in his calculations” (Callon, 1998:51), albeit through coercive techniques of discipline and a loss of autonomy.

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Chapter 4. Enacting a Rational Actor: Roboadvisors and the Algorithmic Performance of Ideal Types¹¹⁸

In *Economy and Society*, Max Weber (1978[1922]: 6) establishes that, “for the purposes of scientific analysis it is convenient to treat all irrational, affectually determined elements of behavior as factors of deviation from a conceptually pure type of rational action...it is then possible to introduce the irrational components as accounting for the observed deviations from this hypothetical course.” For Weber, and much of the sociological tradition that has followed, the concept of an *ideal type* has been a fictive construction of the analyst, useful for comparative purposes to study (for Weber: *verhesten*) how the social world and the actors within it actually function. Portes (2010: 4) describes this as “rubbing the ideal type against reality” in order to advance social science. Or, as Swedberg (2018: 188) endorses, “you need to confront the ideal type with reality.” Invariably, there is a clear separation between that which is ‘ideal’ and that which is observed in the world. To be sure, Weber (Op. Cit.: 7) counsels that ideal types are not meant to define some normative, optimal reality, “but [used] only as a methodological device.”¹¹⁹

Weber (1978[1922]) particularly singles out the concepts and ‘laws’ of standard economic theory as the paradigmatic example of an ideal type.¹²⁰ These formulations, he states, “are what course a given type of human action would take if it were strictly rational, unaffected by errors or emotional factors and if, furthermore, it were completely and unequivocally directed to a single end, the maximization of economic advantage” (Ibid.: 9). The ideal type economic actor would

¹¹⁸ In *Economy & Society* 49(4), 554-560.

¹¹⁹ Weber initially conceived of ‘ideal types’ in his 1904 essay on Objectivity which has been identified by scholars to refer specifically to his theory of history (e.g. Kalberg, 1994). The *Economy and Society* version of ideal types, on the other hand, was fashioned exclusively with sociology in mind (see: Swedberg, 2018: 182; Schutz, 1967; Heckman, 1983). In this paper, I consider exclusively the ‘sociological’ rendition of ideal types.

¹²⁰ Weber indeed identifies several dozen ideal types in his writings, including the ideal type bureaucracy and ideal type capitalist entrepreneur, but devotes most space to economic action.

have to be instrumental, calculative, and conscious of his actions.¹²¹ Indeed, for Weber the rational economic actor, which he describes not as human but a “*homo oeconomicus*” (Ibid.: 599), does not exist as an empirical subject and would only be glimpsed under “unusual cases, as sometimes on the stock exchange; and even then there is usually only an approximation to the ideal type” (Ibid.: 9). Lopreato and Alston (1970: 89; emphasis added) similarly reason, “by virtue of the very meaning of the ideal type, we are left with deliberate distortions of reality. The outstanding feature of ideal types is that *they literally describe nothing beyond mere logical possibilities.*”

With the advent of new algorithmic processes, however, Weberian ideal types may indeed come into being – manifest in cooperation with technology, no longer fashioned for analytical purposes but for practical effect. Even as human beings remain fallible and systematically irrational in the realm of economic action (made plain in the abundant literature in behavioral economics), the notion of an assembled ideal type has cropped up from time to time—though it has never before been an empirical reality. Marcel Mauss in 1960 commented that “*Homo oeconomicus* is not behind us, he is ahead of us: like the moral and dutiful person; like the person of science and of reason. The person has long been something else, and only recently has the person been a machine, complicated by a calculator.” Similarly, Michel Callon (1998: 22) made the notable assertion: “yes, *Homo oeconomicus* does exist, but [he] is not an a-historical reality; he does not describe the hidden nature of the human being. He is the result of a process of configuration ... He is formatted, framed and equipped with prostheses which help him in his calculations, and which are, for the most part, produced by economics.”

¹²¹ Weber (1978[1922]: 26) instructs that, “action is instrumentally rational (*zweckrational*) when the end, the means, and the secondary results are all rationally taken into account and weighed. This involves rational consideration of alternative means to the end, of the relations of the end to the secondary consequences, and finally of the relative importance of different possible ends.” Swedberg (2018) adds that an ideal type actor has full knowledge of the situation and is fully aware of what he/she is doing.

These pronouncements by Mauss and Callon have yet avoided detection. The role of technology in financial markets has certainly garnered a great deal of scholarly attention in recent years, with empirical work on the materiality and technicity of financial markets emerging from the social studies of finance tradition, where it has focused largely on traders located in Wall Street banks, trading rooms, or hedge funds (e.g. Knorr-Cetina and Bruegger, 2000, 2002; Buena and Stark, 2004; MacKenzie and Millo, 2003; MacKenzie, 2018). These studies have highlighted both the influence and equivocality of calculative finance cultures, formal and informal financial models, regulatory regimes, electronic markets, and various trading algorithms (especially those used high-frequency trading [HFT]) in concert with professional market practitioners. A major conclusion in this literature is that the human beings working in finance are decidedly *not Homo economicus* – as MacKenzie and Spears (2014) make clear, traders and ‘quants’ are not “model dopes”. Svetlova (2018; 2012: 420), too, shows that despite their technological systems, market practitioners significantly undermine the performative power of economic models through tinkering and second-guessing: “[models] are manipulated, regularly overruled by humans and used...simply [as] channels to transmit financial actors’ judgements into numbers.” Even in the highly quantitative and arcane world of high-frequency trading, traders become emotionally attached to the algorithms that they design and code (Borch and Lange, 2016).

Homo economicus may still be upon us, emerging not out of Wall Street trading rooms but from the portfolios of ordinary investors. In this paper, I examine a new class of financial technologies known colloquially as the ‘roboadvisors’, which are already enrolling ordinary individuals as investors. These are a new class of digital financial advisor that provides advice and automated investment management online with minimal human intervention, at little cost. Roboadvisors provide these services via algorithms that automatically allocate, manage, and

optimize clients' assets based on personalized information entered through a website or mobile app, after which time users are obliged to set-it-and-forget-it (Hayes, 2019). Through their efforts, roboadvisors figure outcomes that a rational actor (i.e. the ideal type investor) would achieve.

The type of ideal type that is conjured by the roboadvisors is novel. Like Weber's definition, they constitute a type of meaningful action (i.e. investment choices and trading decisions) where the meaning is explicitly and singularly oriented to maximizing investment returns.¹²² But, unlike Weber's understanding of *Homo economicus*, this action is not sentient in the minds of investors – nor is it otherwise governed by impulse, habit, or half-consciousness. It is instead automated at a distance by the roboadvisors' algorithms, which embody and perform a family of economic models under the heading, Modern Portfolio Theory (MPT).

Based on autoethnographic study of actual roboadvised accounts, I analyze the investment decisions made on my behalf to describe how such a Weberian ideal type emerges through the specific articulation of human beings, algorithmic processes, and template models (e.g. MPT). The methodological premise of this paper is therefore to confront the ideal type investor as empirical fact. This is not to imply that I (or any other user of roboadvisors) was personally transformed into a rational actor through my engagement with these platforms. On the contrary, if asked to pick my own investments or run the necessary calculations alone I would surely fail. The ideal type that emerges is *synthetic*. Without the proper model to follow and algorithms to automate and execute those tasks the ideal type cannot be formed. At the same time, I (the user) became a necessary component, providing the inputs required by the model's equations and the money for the algorithms to invest. One way to think about this association is that the user provides the

¹²² This point is elaborated in greater detail in the discussion that follows the empirical section.

scaffolding upon which the ideal type is assembled, the model contains the blueprints, and the algorithms afford the machinery that carries out the work.

Broadly, the substantive insights from the case of roboadvisors can map on to other instances of algorithmic optimization in modern-day practice; for instance (to name just two): self-driving vehicles that enact ideal type (i.e. shortest time or shortest distance) driver-navigators. Or, in medical settings where physicians and nursing staff are increasingly reliant on precise diagnostic and treatment decisions rendered by algorithmic systems – these invoke ideal type clinicians that rival ‘Dr. House’. With an autonomous car, the ‘driving’ depends on map route optimization models which, in turn, rely on the starting point and destination desired by the specific user of the vehicle. For a physician, the ‘diagnosing’ falls on machine learning techniques that detect and identify patterns or aberrations, but only based off the medical records and tests of a particular patient. With a roboadvisor, an investor brings his or her particular risk tolerance, financial goals, and time horizon. Thus, there is no *single* ideal type investor, driver, or physician, but a plurality—they are not enacted in a wholly uniform way.

More specific to economic sociology, the ideal type investor brought about through roboadvisors contributes an empirical case of strong, or ‘Barnesian’ performativity (MacKenzie, 2006: 18), where “the practical use of an aspect of economics makes economic processes more like their depiction by economics.” Because models of financial economics require the theoretical assumption of rational actors, when such models are embodied and performed by the roboadvisors’ algorithms this assumption is fulfilled in practice. This is a particular case where the model performs the actor (or some version thereof), rather than actors performing market prices through the widespread use of a model (cf. MacKenzie and Millo, 2003); that is, the roboadvisors select

the investments that theory postulates as optimum.¹²³ However, the ‘actor’ in this case is not (just) the human end-user, whose role is simply to set the stage—the model here is performative through the instantiation of the ideal type based on that actor (i.e. it is the *assemblage in toto* that is the rational actor). Everything outside of the raw materials needed for the ‘scaffold’ (i.e. risk tolerance, time-horizon, money to fund the account), including financial acumen but also emotions, social relations, and personal history is excluded and is indeed irrelevant to investors’ outcomes. In fact, ignorance could presumably thrive because one can always rely on their algorithms for optimal results rather than obtaining financial literacy (or e.g. learning how to read a map, or diagnose patients). It describes a logic where individuals appear to be always calculative yet never themselves calculating.

In what follows, I first recover the ideal type investor and establish how that idealization is defined by the specifications of Modern Portfolio Theory. This ideal type is then confronted with the empirical reality of ordinary investors’ behavior. Next, I introduce the roboadvisors as an empirical object, illustrating how they operate, and importantly that as a group they perform MPT. This is an important descriptive step that reinforces the particular ideal type investor the roboadvisors specify. I then set out my methodological approach used to analyze the portfolio recommendations of twenty North American roboadvisors framed in reference to the optimal choice dictated by MPT. I conclude with a general discussion that explores this type of ideal type performed by algorithmic systems, and allude to some broader implications for the economy and society.

¹²³ In fact, in the case of MPT asset price does not even come into play, only portfolio weights.

Investors vs. *Homo economicus*: An Exercise in Comparing with an Ideal Type

Constructing Ideal Types

Despite being a foundational concept in classical sociology, Weber's (sociological) ideal type-as-analytic device has been dismissed by some contemporary social scientists (Hekman, 1983; Biernacki, 2012), and as Swedberg (2018: 181) reflects, seldom been used in empirical research (but cf. Portes, 2010).¹²⁴ In a recent article, Swedberg (Op. Cit.) advances a renewed interest in Weberian ideal types as a valuable tool for sociological use, stating: "It is now more than a century since Weber created the ideal type; and hopefully, the time has come when we will start using it" (Ibid.: 192). He proceeds to offer a practical guide for how to construct and use an ideal type in contemporary analysis, which is what I undertake at the outset in this section—identifying and contrasting the ideal type investor with real investors.

According to Weber (Op. Cit.), and following Swedberg (2018: 188-189), the first step in constructing an ideal type is to pinpoint the element of social action in the object of study, "that is, on the behavior as well as the meaning with which this is invested." For my purposes, such action is oriented to the capital markets, and the invested meaning is indeed with selecting *investments*: acquiring and maintaining an optimal portfolio of securities. The meaning of this action is decidedly *instrumentally rational*.¹²⁵ Second, and relatedly, Weber tells us that there needs to be some identifiable course of action that fits, or possesses "adequacy", with that meaning. For investing, that course of action is defined by a process of 'mean-variance optimization', first

¹²⁴ While this is true of the sociological version of Weber's ideal type, the historical version has been more frequently employed, especially in comparative-historical work (e.g. Kalberg, 1994; Biernacki, 2012; see also endnote 1).

¹²⁵ Weber acknowledges that ideal types can alternatively be oriented to other modes of action (specifically: value-rational; affectual; and traditional), but that to be an ideal type only one mode of meaningful action is chosen. It is by identifying other modes of meaning in contrast to the ideal type that sociological inquiry can proceed.

formalized through Modern Portfolio Theory (Markowitz 1952). This process and theory of investment selection are discussed in the following subsection.

Once we have defined the way of going about the meaningful action, four assumptions must be made about the ideal type actor as he or she engages in that action: 1) they are calculative; 2) they have full information; 3) they are fully aware of what they are doing; and 4) they make no mistakes (Op. Cit.). Next, “causal adequacy” should be ensured. That is, following the prescribed course of action “should lead to the sought effect in a probable and decisive way... The action, in brief, should be of such strength that it leads to the intended result.” (Swedberg, 2018: 188). For an ideal type investor, following MPT should consequently result in choosing the *one* best portfolio that will optimize risk versus return.

Once the ideal type has been constructed, it is to be compared with the phenomenon of interest. Differences and conflicts between the ideal type and the empirical subject – e.g. between the mean-variance optimizer and the lay investor – are then identified and measured. In what follows, I corroborate the way that Modern Portfolio Theory provides a normative framework for developing the ideal type investor, and then proceed to set that in contrast with real-world investors. Afterward, I will compare this ideal type with the investments managed by roboadvisors to argue that these do approach rational outcomes.

The Ideal Type Investor: Modern Portfolio Theory

Modern Portfolio Theory is a calculative approach to investing first introduced in 1952 by Harry Markowitz in a paper modestly titled, *Portfolio Selection*, for which he would later earn the Nobel Prize in economics. His work took the concept that diversification could enhance portfolio return while reducing overall risk (i.e. ‘don’t put all of your eggs in one basket’) and formalized it into a *theory* of investment that “covered the effects of diversification when risks are correlated;

distinguished between efficient and inefficient portfolios; and analyzed risk–return trade-offs on the portfolio as a whole” (Markowitz, 1999: 5). In an overview of the principles of MPT, Kaplan (1998: 267) explains that Markowitz, “identified the trade-off facing the investor: risk versus expected return. The investment decision is not merely *which* securities to own, *but how to divide the investor's wealth amongst securities*” (emphasis added). Simply put, MPT instructs how investment dollars should be allotted to the purchase of various stocks, bonds, and other assets.¹²⁶

Markowitz (1952) discriminated between so-called “efficient” and “inefficient” portfolios based on whether or not some alternative asset allocation theoretically exists that would provide a greater expected return (the portfolio’s mean) given the same level of risk (the portfolio’s variance). An *efficient* portfolio is one that has undergone a process of mean-variance optimization, so that no other such allocation exists. For a particular level of risk (i.e. portfolio variance), MPT provides the solution for the allocation weights that would construct an efficient portfolio – and so an “efficient frontier” can be designated that classifies the entire “set of efficient mean–variance combinations” across all risk preferences (Markowitz, 1952).

Figure 1 illustrates the historical efficient frontier from the period January 1, 2015 through December 31, 2017.¹²⁷ Note the parabolic shape representing the set of theoretically optimal portfolios that offer the highest expected return for a defined level of risk (or, alternatively the lowest risk for a given level of expected return), as determined by MPT. Portfolios that lie below the efficient frontier are sub-optimal because there exists a different portfolio allocation that will

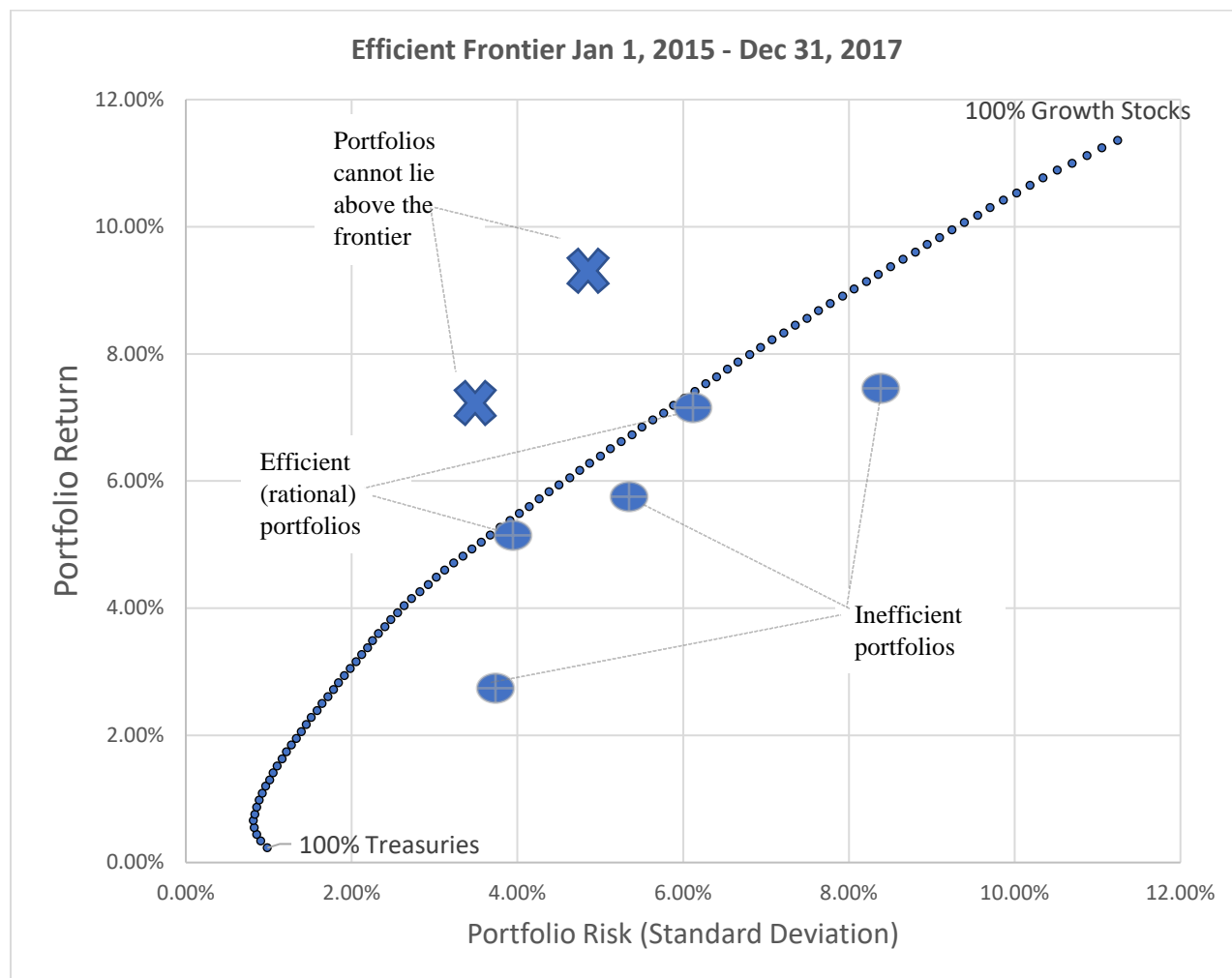
¹²⁶ In practice, MPT would allocate dollars to representative indices (i.e. ETFs or mutual funds) corresponding to a specific asset class, including (e.g.): domestic/foreign/emerging markets large-/mid-/small-/micro-cap stocks; domestic/foreign corporate bonds (of various credit rating); domestic/foreign government debt; commodities (e.g. gold, silver, oil, etc.); domestic/foreign real estate (e.g REITs); and so on.

For a detailed account of the development of Markowitz’s work on MPT, see chapter 2 of Bernstein, 1992.

¹²⁷ Efficient frontier data points obtained from portfoliovizualiser.com

provide more expected return for the same risk. No possible allocation exists that will plot above the frontier.

Figure 1: The efficient frontier and efficient vs. inefficient portfolio allocations



Note: The curve formed by the solid dots represent the historical efficient frontier over the 3-year period Jan 1, 2015 through Dec 31, 2017, which represents the set of optimal portfolio possibilities that offer the greatest expected return for a defined level of risk (or, alternatively the lowest risk for a given expected return), defined by Modern Portfolio Theory (MPT). Portfolios that lie below the efficient frontier are sub-optimal because there exists an alternative portfolio configuration that provides a greater expected return for the same level of risk. No portfolios exist that can fall above the efficient frontier. Efficient frontier data points source: www.portfoliovisualiser.com.

Thus, an investment strategy that allocates portfolios according to MPT's direction is a maxim for *the choice that a rational actor would employ*. Although he makes no mention of sociological theory, Markowitz had, in fact, specified the Weberian ideal type investor. To be sure,

Markowitz (1959; 1999:9; emphasis added) underscored that MPT “applies to an *idealized rational decision maker* with limited information but unlimited computing powers and is *not necessarily a hypothesis about actual human behavior*,” and moreover that, “its objective was to provide a theoretical foundation for portfolio analysis as a practical way to approximately maximize the derived utility function of a rational investor”. James Tobin (1958), a contemporary of Markowitz also working on portfolio choice at the time disparaged that MPT’s “main interest is prescription of rules of rational behavior for investors.” Beyhagi and Hawley (2013: 21) in a more recent reflection on Modern Portfolio Theory similarly point out that “the rational investor assumption (*‘homo economicus’*, that is utility-maximizing and calculating) is the basis for ... MPT.”

Accordingly, MPT is a framework that defines and enumerates a meaningful course of action: how to go about optimizing portfolio choice. It furthermore makes the required assumptions that the MPT investor is rational, informed, and calculating. The MPT investor is fully aware not only of the calculations but of the investable universe of securities from which he can choose, and following the process of mean-variance optimization arrives at the precise mix of securities to produce an efficient portfolio.

Real-World Investors

Before proceeding, it is beneficial to clear up one focal point of terminology: As Preda (2017: 57) rightly calls attention to, being an *investor* is not the same as being a *trader*. Indeed, MPT is the axiomatic strategy for a long-term (buy-and-hold) investor and *not* that of an active trader—and so, it would be a false equivalence to construe the likes of Wall Street trading desks, HFT shops, or retail ‘noise traders’ with investors, lay or otherwise (however, the ideal type trader might indeed be brought about through different financial models and e.g. HFT algorithms). To clarify

the syntactic distinction, a trader is one who actively buys and sells securities in order to generate short-term profits, while an investor intends to hold securities over extended time horizons in order to enjoy long-term capital gains.

As with any ideal type, the MPT investor described by Markowitz and his colleagues was never intended to exist. Undeniably, behavioral economics has revealed time and again that people *do not* maximize, rather they follow a set of heuristics or mental shortcuts in an attempt to satisfice (Simon, 1978). Moreover, people are subject to cognitive errors and the vexing sway of emotions (DellaVigna, 2009), herding behavior (MacKenzie, 2006), and inconsistent preferences (Kahneman and Tversky, 1979) when it comes to economic decision making.

Even without such limitations, the number of complex calculations required to identify an optimized asset allocation (the complexity of which compounds as more asset classes are considered), pinpoint the ideal securities used to represent each asset class, and assess an individual's true risk tolerance are beyond the ability of most individuals as well as the scope of free, web-based investment tools. The process becomes even more intractable in view of the fact that maintaining an efficient portfolio demands continuous monitoring and periodically rebalancing a portfolio to sustain the optimal allocation as markets move. It is unlikely that *any* investor, no matter how knowledgeable or disciplined, can compute and re-compute such calculations on their own. To be sure, in a detailed evaluation of how investments are selected in real-world retirement plans in the U.K. and the U.S., Benartzi and Thaler (2007: 81) demonstrate that households do not have the cognitive ability to solve the necessary optimization problem; and that even if they did, households lack sufficient willpower to execute an optimal plan.

Preda (2017: 241) portrays lay market participants in comparison to experts as “less-informed, less-skilled, and less-knowledgeable”. Similarly, Chen and Roscoe (2017: 577) describe

the lay investor as the “counterfactual to the expert practitioner” (also see: Roscoe and Howorth, 2009; Weiss, 2018), casting non-professional market participants as caught in an unfortunate double-bind of ‘irrationality.’ On the one hand they are at the mercy of detrimental emotional and cognitive errors such as those identified by behavioral economics (e.g. Barber and Odean, 2000; DellaVigna, 2009; Barberis and Huang, 2001; Benartzi and Thaler, 2007), which leads to overconfidence, reluctance to sell losing positions, and an inability to learn from past mistakes. On the other hand, recent work has argued that ordinary individuals are furthermore caught up in a web of institutional relations and cultural expectations that encourage market participation through discursive techniques that promote both self-reliance and success through competition—e.g. marketing campaigns directed at maintaining individual retirement accounts or personal finance ‘classes’ for lay investors (Weiss 2018). Roscoe (2015: 20) suggests that lay market participation is produced by investment services firms that construct docile and productive consumers, where “the investor becomes self-entrepreneur, ...manager of his/her own capital, and foundational member of the social contract under neo-liberalism.” Likewise, Preda (2017) argues that the institutional logics of securities markets *require* the reproduction of uninformed market participants to sustain the system as an ongoing profit-center for professional participants, where the non-professional has little hope of making any money.

It seems that ordinary investors are woefully ill-equipped to enjoy financial success, and yet they are constantly lured to the market. Empirical evidence is abundant for the actual underperformance of lay actors: Several studies in the behavioral economics literature show that ordinary individuals consistently make ‘irrational’ decisions that lose them money, either in experimental set-ups (e.g. Thaler, 1981; Kahneman and Tversky, 1979; Fehr and Gächter, 2000) or from observational data obtained from brokerage records (e.g. Odean, 1998; Grinblat and

Keloharju, 2001; Hoffman et al., 2013; Benartzi and Thaler, 2007). In one study of 70,000 self-directed individual brokerage accounts, the average investor's return for the year 2016 lagged the S&P 500 index by more than seven percentage points.¹²⁸ Another, which considered the twenty-year period ending December 31, 2015, reported that the average investor earned 4.66% less each year (on an annualized basis) than the market index.¹²⁹ The report concludes that, "behavioral biases that lead to poor investment decision-making are the single largest contributor to underperformance over time." The lay investor thus appears to be the antithesis of rational economic man.

Yet, professional investors, too, fail to live up to the ideal type. Malkiel (2005:1), for instance, shows that mutual fund managers, both in the U.S. and abroad, consistently underperform their benchmark index, with Swenson (2005) showing that between 86 and 95 percent of actively managed mutual funds did not fulfil their goal of beating the market on an after-tax basis throughout the 2000s. More recently, Soe and Poirier (2017) find that over the fifteen-year period ended 2017, only about 8% of professionally managed portfolios were able to outdo their benchmarks. After accounting for taxes and trading costs, the number of successful funds drops to just 2%. Several other analyses report similar findings (e.g. Fama and French, 2010; Cremers, et al., 2006). "[Professionals] in financial markets might seem to fit the economist's ideal type of decision-maker, using an extraordinarily rich flow of information in the unbridled pursuit of gains," writes Abolafia (1998); "nevertheless they are cognitive and social beings, and as a result, imperfect information processors who are susceptible to habit, custom, and the institutionalized

¹²⁸ <https://www.cnn.com/2017/01/04/most-investors-didnt-come-close-to-beating-the-sp-500.html>

¹²⁹ <https://www.dalbar.com/Portals/dalbar/Cache/News/PressReleases/2017QAIBPressRelease.pdf>

myths of trading” (see also: Svetlova, 2012; MacKenzie and Spears, 2014). The evidence is extensive and compelling that ideal type investors do not naturally reside in financial markets.

The Roboadvisors

In 2010 a technology start-up called Betterment launched as the world’s first roboadvisor, a new class of digital financial advisor that provides advice and automated investment management online with minimal human intervention, at little to no cost. Roboadvisors provide these services via algorithms to automatically allocate, manage, and optimize clients' assets based on personalized information that each client enters through a website or application (Hayes, 2019). This is achieved through the prolific use of algorithmic processes that serve the end goal of performing Modern Portfolio Theory, an emblematic model of financial economics that describes how an investment portfolio should be allocated to optimize expected return for a given level of risk. Through automating investment decisions and algorithmic devotion to MPT, roboadvisors remove the cognitive and emotional biases identified by behavioral economics.

Broadly, roboadvisors also represent an improvement in client financial advice over human advisors. Mullainathan and his colleagues (2012) find in an audit study that financial advisors fail to de-bias their clients and often reinforce certain biases that serve their own interests. They find that advisors furthermore encourage returns-chasing behavior and push for actively managed funds that carry higher fees, regardless if a client starts with a well-diversified, low-fee portfolio. Even when unbiased financial advice is made available, lay investors are reluctant to listen. In a field experiment, Bhattacharya et al. (2012) show that investors who most need the financial advice are least likely to obtain it; and, among the small number of investors who do obtain the advice (about 5% in their study) hardly any follow it and they do not improve the efficiency of their portfolios.

Calcagno and Monticone (2015) add to these findings, showing that more knowledgeable investors are more likely to consult advisors, while less informed ones invest by themselves.

Roboadvisors are particularly attuned to lay investors, explicitly courting “low-affluence” clientele to acquire an individual’s first investible dollar (Hayes, 2019). Indeed, several roboadvisors require as little as \$1 to open an account and charge a modal fee of just 0.25% per year of assets under management (AUM). Compare this with the 1% or more of AUM charged by human advisors, who typically require opening account balances of five, six, or even seven figures, effectively excluding large numbers of potential investors in need of advice or professional portfolio management.

Over the past several years the number of roboadvisors has increased to several hundred worldwide (Kocianski, 2016), with startups competing with financial incumbents like Vanguard, Schwab, and TIAA-CREF who are building out their own offerings. At the same time, the amount of assets under “robo” management constitute a large and fast-growing segment of the market. As of 2018, roboadvisors collectively managed more than half a trillion dollars of client money representative of nearly twenty-six million accounts.¹³⁰ According to industry forecasts, this sum will grow to more than \$2 trillion by the year 2020, and by 2025 it is estimated that in excess of \$7 trillion globally will be managed by roboadvisors, making up an impressive fifteen percent of all retail investment (Srinivas and Goradia, 2015). Roboadvisors are *already* an important group of financial actors that work on behalf of ordinary investors, whose influence is likely to grow in the coming years – and which remains an under-studied sociological object.

¹³⁰ <https://www.statista.com/outlook/337/100/robo-advisors/worldwide>

It is important to my argument to show that the portfolios constructed for these tens of millions of roboadvised accounts predominantly follow the principles of Modern Portfolio Theory (Vukovic and Bjerknes, 2017), which, as shown above, prescribes the formula for producing the ideal type investor. Indeed, as I quote elsewhere (Hayes, 2019), the head of investments and strategy at one prominent roboadvisor emphasized: “I think you can say robots’ use of Modern Portfolio Theory, mean-variance optimization,...that we’re making the argument that that’s how you should be investing. That that is the model you should be using and it’s the rational way to go about it.” Harry Markowitz himself sits on the academic advisory board at another.

Examining the websites and mandatory regulatory filings of twenty North American roboadvisors that represent a popular cross-section of the space, it is clear that MPT plays an important role in how they construct and manage client portfolios, the findings of which are summarized in Table 1.¹³¹ Either MPT is used directly, or it is enhanced with additional optimization layers, or with the Black-Litterman approach that incorporates expert opinions of predicted asset class returns. In the empirical analysis below, I test how well roboadvisors do in performing MPT in practice, that is, how well they enact the ideal type investor.

¹³¹ Since roboadvisors manage client money for lay investors, they fall under the regulatory scrutiny of the securities and exchange commission (SEC) as registered financial advisors. Because of this they are required to file mandatory disclosures speaking to the investment methodology used and the extent to which algorithms are deployed in their practice, in what is known as the Form ADV Part 2 Brochure.

Roboadvisor	Uses MPT?	Excerpt
Acorns	Yes	'Acorns manages client portfolios in the Program with strategies based on Modern Portfolio Theory.' ^a
Ally Invest	Yes	'services are based on Modern Portfolio Theory ("MPT")' ^b
Betterment	Yes, w/Black-Litterman	'Betterment's asset allocation is based on a theory by economist Harry Markowitz called Modern Portfolio Theory' ^c
Covestor (Interactive Brokers)	Yes, w/Black-Litterman	'We use an approach that is guided by the Black-Litterman approach to portfolio construction.' ^d
Ellevest	Yes	'The asset allocations are based upon tenets of modern portfolio theory.' ^e
E*TRADE Core Portfolios	Yes	'E*TRADE Capital Management follows a disciplined investment strategy based on principles of modern portfolio theory.' ^f
FidelityGO	Yes	'The model portfolio construction process ... when viewed as a portfolio, are designed to be similar to those of an appropriate asset allocation strategy for a particular risk profile of an investor.' ^g
Future Advisor (Blackrock)	Yes	'Our asset allocation strategy incorporates Modern Portfolio Theory, which suggests that investors should build portfolios that are as well diversified as possible among assets expected to provide positive long term return.' ^h
Honest Dollar (Goldman Sachs)	Probably	'The investment recommendation relies entirely on the responses you provide regarding your time horizon and risk tolerance.' ⁱ
Merrill Lynch Guided Investing	Yes, w/Black-Litterman	'We forecast long-term expected return, risk, and correlation assumptions for each asset class.' ^j
Schwab Intelligent Portfolios	Yes, w/Full Scale Optimization	'The optimized portfolio is equal to the average weights of the results from the mean variance optimization and full scale optimization.' ^k
SigFig	Yes	'SigFig creates portfolios matched to a range of risk tolerances through the Modern Portfolio Theory ("MPT") techniques' ^l
SoFi	Yes	'We use mean-variance optimization ... rooted in the modern portfolio theory work of Harry Markowitz and others.' ^m
TD Essential Portfolios	Yes	'The asset allocation tactical asset allocation tool based on modern portfolio theory' ⁿ
TIAA Personal Portfolio	Probably	'the model portfolios are based on the portfolio management team's judgment of how different combinations of Funds can achieve exposure to each asset class targeted for a strategic asset allocation, while also limiting the correlation among the investments.' ^o
Vanguard Personal Advisor	Probably	'methodology uses a strategic approach by first focusing on the mix of asset classes (i.e., stocks, bonds, cash) that align with your willingness and ability to take risk' ^p
Wealthfront	Yes	'Wealthfront Advisers offers an automated investment advisory service based on Modern Portfolio Theory' ^q
WealthSimple	Yes	'Using proprietary models and research based on Modern Portfolio Theory (MPT), Wealthsimple manages individually tailored Client portfolios through primarily a passive investment strategy' ^r
Wisebanyan	Yes	WiseBanyan's focuses on building fully diversified model portfolios while minimizing fees and tax consequences. This strategy is based upon Modern Portfolio Theory' ^s
Zack's Advantage	Yes	'Zacks Investment Management developed our own strategic approach for allocating assets within investment portfolios. The first step in the process is to apply the MVO (Mean Variance Optimization) within a portfolio based upon the Modern Portfolio Theory (MPT) of investing.' ^t

Notes:

- a https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=530981
- b https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=529386
- c <https://www.betterment.com/resources/research/betterment-portfolio-strategy/>
- d <https://fbkram.com/white-papers/asset-allocation>
- e https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=531278
- f https://us.etrade.com/frequently-asked-questionstab_1
- g https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=521166
- h <https://www.futureadvisor.com/content/what-we-do/investment-philosophy/overview>
- i <https://help.honestdollar.com/hc/en-us/articles/360000091288-How-do-you-recommend-what-portfolio-I-should-invest-in->
- j https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=531133
- k <https://intelligent.schwab.com/public/intelligent/insights/whitepapers/asset-allocation.html>
- l https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=495038
- m https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=516931
- n https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=530900
- o https://www.tiaa.org/public/pdf/TIAA_Personal_Portfolio_Fee_Wrap_Program_Disclosure_Brochure_FormADV.pdf
- p <https://personal.vanguard.com/pdf/vpabroc.pdf>
- q https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=530796
- r https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=530234
- s https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=493823
- t http://go.pardot.com/1/375142/2017-07-14/575bej/375142/218333/ZA_white_paper1a.pdf

Data & Methodology

In order to determine if and to what extent roboadvisors enact ideal type investors in the framework of Modern Portfolio Theory, I first obtained the actual portfolio allocations of twenty popular North American roboadvisors by opening and funding accounts (listed in Table 1). The roboadvisors in my sample collectively represent roughly 90% of the American roboadvisor market and represent the offerings of both start-ups and incumbent financial firms. I then use the MPT equations *in reverse* in order to back out each portfolio's objective risk and return, and how that would plot against the efficient frontier. This entailed becoming a participant-user to analyze the roboadvisors' asset allocation, selection, and optimization algorithms (see also: Hayes, 2019; Lange, Lenglet, & Seyfert, 2018). In addition, I conducted interviews with 28 well-informed roboadvisor executives, employees, or former employees, each lasting approximately one hour. Interviews were open-ended and followed a semi-structured format. Finally, I engaged in an extensive archival review of regulatory documents filed by the roboadvisors in my sample with the Securities and Exchange Commission's investment advisor public disclosure website.¹³²

I established accounts at sixteen of the roboadvisors in my sample posing as both a hypothetical 55-year old and 35-year old with moderate risk tolerance (an older investor has a shorter time horizon and thus a lower objective risk tolerance). At four other roboadvisors I was unable to open a live account due to practical issues including larger account minimums than I could muster, but was nonetheless able to begin the account opening process and view what my proposed portfolio would be.¹³³

¹³² <https://www.adviserinfo.sec.gov/IAPD/>

¹³³ Personal Capital requires a starting balance of \$100,000, Vanguard Personal Advisor \$50,000, Zack's Advantage because it uses Schwab's roboadvisor to implement its allocation, where I already had an account established, and Honest Dollar which only offers retirement accounts.

The first step in the account opening process is to complete a risk-profiling questionnaire to determine the appropriate level of portfolio risk (the x-axis on the efficient frontier). This provides the input that the MPT model requires to operate. Different roboadvisors approached this step in nuanced ways, however, all of them ultimately employ an algorithm to take this client input and quantify it as an objective risk preference (an example of *Wealthfront's* risk-profiling questionnaire appears in the Appendix. I will continue to use *Wealthfront* as an exemplar roboadvisor for the procedure employed at all twenty roboadvisors analyzed). Each roboadvisor subsequently assigned a risk score, where I answered the questionnaires in such a way as to produce a “moderate” level of risk across each roboadvisor in my sample. For instance, my responses to *Wealthfront's* risk assessment produced a score of 5.5 out of 10. Based on these assigned risk scores, the roboadvisors then provided a specific portfolio recommendation consisting almost universally of various ETFs, each representing a particular asset class or industry sector: the portfolio recommended to me for a 55-year old at *Wealthfront* produced the following six asset class weights:

Asset Class	Allocation	ETF Ticker	ETF Provider and representative index
U.S. Stocks	26%	VTI	Vanguard Total Stock Market
Foreign Stocks	16%	VEA	Vanguard FTSE Developed Markets
Emerging Markets Stocks	5%	VWO	Vanguard FTSE Emerging Markets
Real Estate (REITs)	9%	VNQ	Vanguard REIT Index
U.S. Corporate Bonds	31%	LQD	iShares iBoxx Invest Grade Corp Bond
Emerging Markets Bonds	13%	EMB	iShares JPM Emerging Mkts Bond Indx

Following the formulae provided by MPT, these target portfolio weights were then used to back out each portfolio's ex-post annualized return over the study period Jan 1, 2015 through December 31, 2017, along with each portfolio's corresponding variance of returns (i.e. risk) for the same period.¹³⁴ Details of this stepwise procedure appear in the Methodological Appendix to the paper.

¹³⁴ Operationalized as annualized standard deviation, or the square root of the variance over the same period.

Results

Do roboadvisors provide rational outcomes on behalf of investors? Using the above methodology, it is possible to answer this question objectively by comparing the risk-return characteristics of the portfolios constructed by roboadvisors' algorithms in reference to the efficient frontier. To recall, the efficient frontier is the set of optimal portfolios defined by MPT that offers the theoretically highest expected return (the y-axis) for a defined level of risk (the x-axis). Put differently, the portfolio of an instrumentally rational actor would lie as close to the efficient frontier as possible.

Figure 2 confirms that the average roboadvised portfolio (indicated by open circles) for both the hypothetical 55- and 35-year old plot remarkably close to the efficient frontier – indicating that they do indeed approximate rational outcomes.¹³⁵ While the 35-year old's portfolio plots farther to the right (they are riskier), the distance from the efficient frontier is just as close as the more risk-averse 55-year old, indicating that the two are equivalently efficient portfolios. I also account for the 0.25% modal fee charged by roboadvisors, where the return net-of-fees is plotted beneath, indicated by the smaller circles.

If the allocations that lie on (or very close to) the efficient frontier represent the portfolios of ideal type investors, it is important to also frame the risk-return characteristics of roboadvised portfolios in reference to alternative ways of investing, plotted in the same risk-return space. In this manner, I first compare roboadvised portfolios to the average of sixteen so-called “lazy portfolios” (indicated on Figure 2 by the open square), which are a class of basic off-the-self portfolio allocations that support the paradigm of passive index investing, but which lack both formal economic theory and the algorithmic machinery of roboadvisors. These set-it-and-forget-it

Roboadvisors are a relatively new phenomenon with the majority of those in my sample launching since the year 2014. Therefore, this study period was used to capture overlapping multi-year data covering my entire sample.

¹³⁵ Portfolio returns are pre-tax annualized historical returns from Jan. 1, 2015 through Dec. 31, 2017. Portfolio standard deviations of returns are annualized over the same period.

strategies are often promulgated by financial ‘gurus’ or are found in self-help investment books like Bill Schultheis’ (2013) *The Coffeehouse Investor* and David Swenson’s (2005) *Unconventional success*; as well as on investor education websites like *Bogleheads*.¹³⁶ Most of these portfolios contain a small number of low-cost index funds that make it easy to manually rebalance. They are "lazy" in that the investor can maintain the same asset allocation for an extended period of time and they generally contain 30-40% bonds, suitable for most pre-retirement investors.

As Figure 2 shows, while the average lazy portfolio carries a similar risk exposure as the average 55-year old roboadvised portfolio, they fail to achieve returns approaching the efficient frontier.¹³⁷

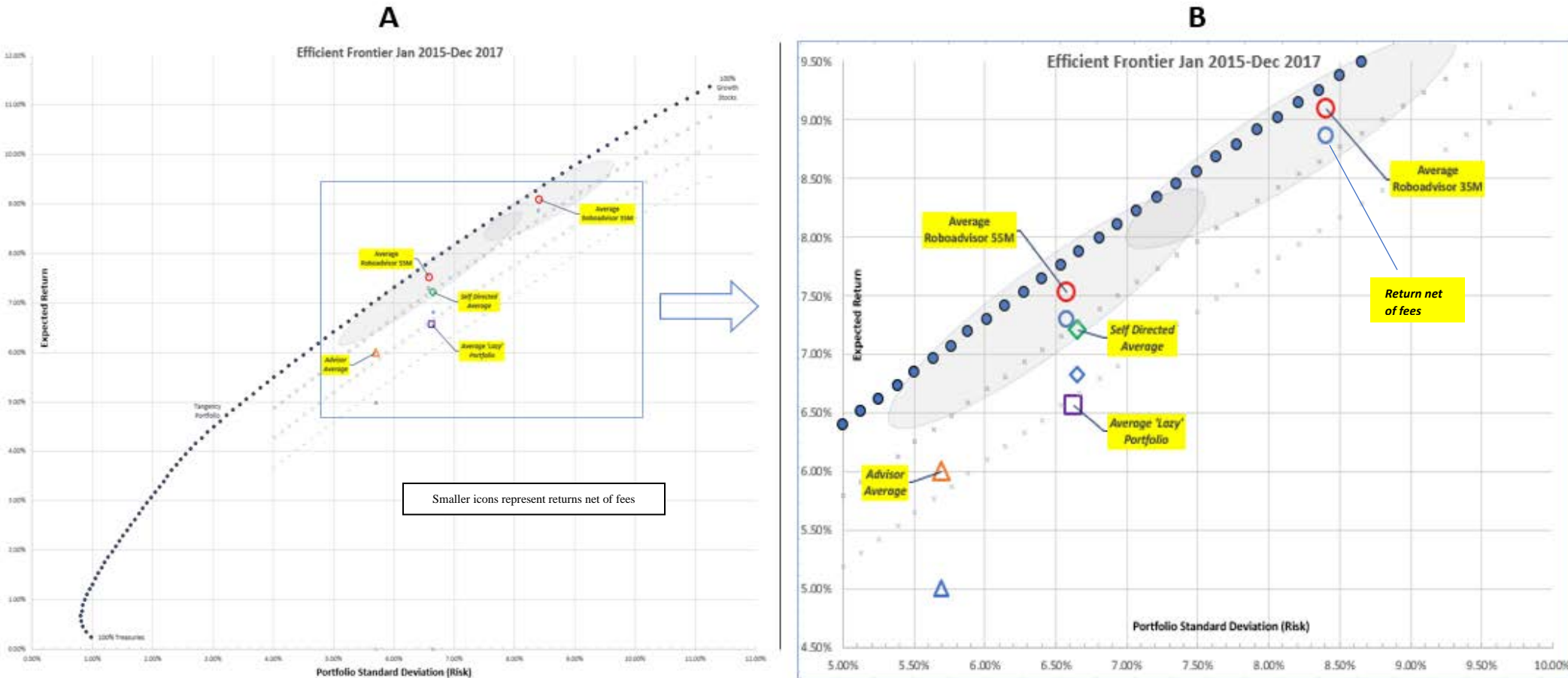
Next, I plot the results of the average self-directed (do-it-yourselfer) portfolio over the same timeframe, denoted by the diamond shape in Figure 2. The risk-return characteristics of self-directed portfolios were sourced from the American Association of Individual Investor’s (AII) Asset Allocation Survey using the average of monthly survey results over the study period.¹³⁸ Self-directed portfolios, on average, carry approximately the same risk levels as the 55-year old roboadvised portfolio, but experience noticeably lower returns. Net-of fee results are even more indicative of portfolio *inefficiency*. According to Barber & Odean (2000), the average individual investor sees their annual return reduced by five-and-a-half percent due to transaction costs and trading fees (e.g. a 7.2% gross return would be reduced to 6.8%). After-fee returns are represented by the smaller figure plotted below the larger diamond in Figure 2. On an after-fee basis, roboadvised portfolios have significantly greater returns for a comparable amount of risk than self-

¹³⁶ https://www.bogleheads.org/wiki/Lazy_portfolios

¹³⁷ Since lazy portfolios are low-maintenance set-it-and-forget-it allocations there is no meaningful annual cost associated with them.

¹³⁸ <https://www.aaii.com/files/surveys/asset.xls>

Figure 2: Roboadvisor portfolio allocation risk-return characteristics plotted against the historical efficient frontier (Jan 1, 2015 through Dec 31, 2017).



Note: This figure plots how well investment portfolios maximise expected return (y-axis) for a given level of risk (x-axis). The efficient frontier is denoted by the solid dots. A rational economic actor would allocate to portfolios that lie on or very close to efficient frontier. Portfolios that lie below the efficient frontier are sub-optimal because there exists an alternative portfolio configuration that provides a greater expected return for the same level of risk. No portfolios exist that can fall above the efficient frontier. Grey tick marks that run parallel to the efficient frontier are simply points of reference as to the objective distance to the efficient frontier.

The circles plotted in this risk-return space represent the average roboadvised portfolios constructed for a hypothetical 35- and 55-year old male. Returns net of fees are indicated by the smaller shape directly below. The grey shaded areas represent the distribution of the twenty individual portfolios in risk-return space for each demographic. Triangles represents the average risk-return characteristics of portfolios represented by traditional financial advisors before and net-of-fees. Diamonds represents the average risk-return characteristics of portfolios constructed by self-directed investors, and squares represents the average risk-return characteristics of so-called "lazy portfolios," off-the-shelf passive indexed strategies found in investment advice books or promulgated by investment "gurus."

directed accounts, and even perform somewhat better than self-directed accounts before fees are taken into account.

Finally, I compare the roboadvisors to investors advised by human financial planners over the study period, marked in Figure 2 by the triangle, which is representative of the asset allocation of the typical financial advisor (Shepherd et al. 2018: 2-10).¹³⁹ These portfolios are noticeably more risk-averse *and* farther from the efficient frontier than any other option, especially after taking account of the average 1% fee that advisors charge their clients. The difference between human-advised and roboadvised accounts illustrates a striking dichotomy, especially since human advisors typically grant access to their services only to the more affluent.

Roboadvised portfolios as a whole are the most efficient; they appear to approach rational outcomes for their users that exceed the competency of all other options, providing compelling evidence for their ability to enact lay investors as the ideal type investor.

Discussion and Conclusions

The roboadvisors are a phenomenon that implicate a Weberian ideal type turned practical reality. On paper, roboadvisors are transforming (presumably ignorant, unskilled, and irrational) lay investors into hyper-rational market actors. Consequently, an objective of this paper is to show empirically that the portfolio choices made by roboadvisors are what a rational actor would do; and, the data generated from the above analysis supports this claim with objectively verifiable

¹³⁹ These data for the study period were sourced from Research Affiliates, LLC's (RA) Asset Allocation Interactive Tool. RA is an investment manager and financial analytics firm that provides its services mainly to investment companies. See also Shepherd, et al. (2018). <https://interactive.researchaffiliates.com/asset-allocation#!/?category=Model¤cy=USD&model=ER&scale=LINEAR&selected=225&terms=REAL&type=Portfolios>

portfolios that, on average, lie close to the efficient frontier. Moreover, roboadvisors as a group construct the *most* efficient portfolios (both before and net of fees) compared to alternative methods of market participation including self-directed investment or through a professional human advisor.¹⁴⁰ In fact, a roboadvised account with just \$5.00 invested is far more likely to possess an efficient portfolio than that of a wealthy investor with \$5 million and a pricey human advisor, leading to a potential inversion of rationality across the SES distribution as roboadvisors vie for an individual's first investible dollar. But, if we were to look these roboadvised users in the eye, we would not see *Homo economicus* staring back – just ordinary human beings. The ideal type investor is a chimera, an abstraction translated through formal mathematical procedures and enacted by algorithmic systems. Thus, I devote much of the discussion to unpacking the algorithmic performance of ideal types.

MPT along with the algorithms of the roboadvisors and their end-users together form a socio-technological assemblage. In this way, MacKenzie (2009: 20) explains, “an economic actor is not simply an individual human being, nor even a human being ‘embedded in institutions, conventions, personal relationships or groups.’” Instead, economic action is comprised of humans combined with “technical elements, incorporated competencies, rules, ... sets of theories, models and statements” joined with material devices of calculation (Callon, 1998: 20). Several other necessary antecedents must also be enrolled into the roboadvisor assemblage, such as the capacity to place trades electronically and the advent of low-cost ETFs that cover a multitude of asset class indices (see e.g.: Braun 2016). Consequently, it is the “actor-network” (Callon, 1986; Latour, 1999), i.e. the roboadvisor assemblage in its totality, that constitutes the ideal type investor; and

¹⁴⁰ It is revealing that having a human advisor produces, on average, the least efficient portfolios, especially on an after-fee basis.

what differentiates a roboadvised user from other investors is that this assemblage is precisely attuned to MPT and executes it flawlessly and tirelessly.

Following Deleuze and Guattari (1998), an ideal type like this is perhaps more accurately an ‘*agencement*,’ a word that Callon (2008) identifies as more nuanced and flexible in meaning than the related ‘assemblage’. *Agencement* conveys the more acute idea that specific combinations of heterogeneous elements have been carefully adjusted to one another for a specific purpose, “endowed with the capacity of acting in different ways depending on their configuration” (Ibid.: 320). From this perspective, the economic action that is articulated through roboadvisors forms ideal type *agencements* that can serve an array of efficient portfolios, each one suited to a particular individual that will approach the efficient frontier at various spots along the x-axis.¹⁴¹ This suggests that there is no one universal ideal type investor—rational action is not necessarily homogenous action. Rather, just as different prescriptions are needed to bring various people up to 20/20 (optimal) vision, meaningful action, too, is often configured in individualized ways. Regardless of one’s eyes, the means of enhancing near-sightedness is through the use of corrective lenses. Similarly, given any particular individual’s risk profile the remedy is still MPT for an efficient portfolio. Glasses without eyes to see through them are moot. The economic action coordinated through roboadvisors, too, relies crucially on human inputs (objective and subjective information obtained from the risk-profiling questionnaire, the client’s money, etc.) just as much as it does on the algorithmic processing and execution based upon those inputs.

¹⁴¹ This is an important distinction that sets the like of roboadvisors apart from other passive indexed strategies such as target-date funds, which take a one-size-fits-all approach. Thus, while a particular target-date fund that matures in the year 2035 may prove optimal for some small subset of investors, its underlying portfolio will fail to be the rational (efficient) choice for many others – even if they do plan to retire in that year.

This describes a *synthetic* ideal type. Not only because it is fashioned with manmade artifacts, but also because it is synthesized from the very mental constructs (what Weber called *gedankenbild*) that idealize some phenomena: it is not used to confront reality, but to fashion it. This is where an ideal type such as this can be construed as a type of *performativity*, following Callon (1998) and elaborated by MacKenzie (2006). In the performativity thesis (as scholars in economic sociology and the social studies of finance understand it), a theoretical model possesses the force to make aspects of the empirical world in its image (as MacKenzie [Ibid.] explains, a financial model is more like an engine that shapes the economy rather than a camera that objectively and passively captures the economic world [see also: MacKenzie and Millo, 2003]). Studying roboadvisors affords the opportunity to look under the hood at one of these engines. Indeed, Callon (2005: 5) affirms, “the performativity program starts with an ethnography of socio-technical agencements.”

Beneath the surface, performativity research has often provoked Weber’s ideal types, though this relationship has only been alluded to – for instance, in the construction of a French strawberry market in the image of a neoclassical (“Walrasian”) auction (Garcia-Parpet, 2007), the conformation of law schools to printed rankings (Espeland and Sauder, 2007), or with ideal romantic matches made through online dating sites (Roscoe and Chillas, 2013). Similarly, rare concrete examples of ideal types that have been identified in the past, such as Benthamite panopticon prisons (Foucault, 1977), illustrate how social theory (e.g. disciplinary power through surveillance) performatively shapes certain microcosms of society.

The results presented in Figure 2 could thus be interpreted as a measure of how successfully various socio-technical assemblages succeed in creating an ideal investor. Aside from MacKenzie’s descriptive of strong ‘Barnesian’ cases, here we can see that various configurations

of theory and technology produce a spectrum of ‘goodness of fit’ with MPT’s prescription for rational action (i.e. enactments of “effective performativity”). Certainly, professional financial advisors come equipped with theory and technology, yet they produce only very weak performativity, on average. Likewise, contemporary self-directed investors have several calculative tools and theoretical frameworks at their disposal from books and newsletters to web-based tools offered through online brokerage platforms. This way, one could think of performativity as that performance measured against the yardstick of the ideal type market actor implied by a dominant model.

What is novel about how MPT is performed through the roboadvisors is that neither the enactment of the model nor the ideal type outcome is directly accomplished from human agency. The agency is instead located within the algorithms and technological systems that carry out the theory, that execute all buy and sell orders directed by that theory, and that continuously monitor and rebalance to ensure portfolios remain efficient even as markets move—on behalf of the user, of course. Indeed, no human being could plausibly do those things unaided. This practical fact is not too different from the ability of HFT algorithms to execute trades on the millisecond-scale on behalf of Wall Street professionals, trades which are not humanly possible for even the most dexterous and skilled trader. However, as work in the social studies of finance reveals, human agency is still privileged in that these algorithms are continuously tinkered with, adjusted, and ultimately carry out strategies proposed by human traders (see e.g. Svetlova, 2012; MacKenzie, 2018). The roboadvisors seem to dislocate human agency more fully by distributing investment strategy and execution wholly to the models and algorithms.

Is this point at odds with Weber’s conception of ideal types as portraying *socially meaningful* action? While the locus of agency is transferred to the roboadvisor *agencement*, the

investor alone maintains *intent* in desiring the best portfolio returns possible – even if the investor lacks the knowledge or skill to be his or her own agent. While the semantic and theoretical distinctions between “intent” and “agency” are beyond the scope of this paper, Weber does provide some clarity as it relates to social action: “An unintended collision of two cyclists, for example, shall not be called social action,” he writes (Weber, 1981[1913]: 159), “But we will define as such their possible prior attempts to dodge one another.” Thus, social action is meaningful insofar as it is oriented to others in *intention*, where investors purposefully confront a sea of anonymous others that constitute the stock market (others who may themselves delegate algorithmic agency). A second, and perhaps more nuanced point made by Weber is that social action can be characterized by “its meaningful orientation to the *expectations* of certain behavior on the part of others...In particular, instrumentally rational action, as defined earlier, is oriented toward such expectations. In principle, therefore, it seems initially immaterial whether an action is guided by the expectation that certain *natural* [i.e. non-social] events will occur, with or without the actor's purposive intervention” (Ibid.; emphases in original). If investors reasonably believe that other market actors are also striving to be instrumentally rational, then “the meaning orientation therefore is, in general, to one's own interests in one's own want satisfaction and also indirectly, to the perceived individual interests of others in their own want satisfaction” (Ibid.: 166). Indeed “the market” is itself an ideal type that agglomerates rational calculation through a variety of material devices and economic formulae (see: Callon, 1998; Fourcade and Healy, 2017). Therefore, the behavior of roboadvisors is social action since these assemblages involve meaningful relatedness to the behavior of others in the market (but cf. Gane, 2012).¹⁴²

¹⁴² In the most basic form, a buyer of securities must confront a seller and vice-versa.

This nevertheless leaves the end-user as a sort of residual actor once their information has been taken up and processed: Even as a portfolio is constructed and optimized, rebalanced and monitored, the human user can remain perfectly ignorant to MPT or the basic facets of financial literacy – and still achieve ostensibly rational outcomes. The mathematician and philosopher Alfred North Whitehead (1992 [1911]: 46) wrote, “civilization advances by extending the number of important operations which we can perform without thinking about them.” Indeed, granting financial calculation to the masses could be a positive and egalitarian achievement for society, especially since economic outcomes of individuals are increasingly tied to their navigation of securities markets. Identifying this sort of idealized investor, however, is also to recognize a disjuncture between knowledge and agency. Is the fount of rational action in calculating risks and returns when choosing investments, or is it simply with choosing to use a roboadvisor in the first place? If it is indeed the latter, then rational choice need not be essentially tied to one’s own competence for calculation. Instead, an altogether different set of skills are favored that can discriminate between different roboadvisors in order to choose the best possible platform.¹⁴³

Once calculative devices are a given, maintaining individuals as ideal type investors shifts focus from computation to regulating other elements of human behavior. Hayes (2019) shows that managers and executives at various roboadvisory firms are acutely aware of the self-defeating consequences of emotions and other biases or errors that pervade actual human behavior. As a result, the roboadvisors have consciously built corrective nudges into design elements of the user experience that draw directly from behavioral economics (e.g. Thaler and Sunstein, 2009). The purpose is to counteract the natural propensity to tinker, second-guess, or otherwise override the

¹⁴³ From my own engagement with these platforms, this choice seems to boil down essentially to cost, since all the roboadvisors are effectively doing the same thing (see Table 1).

algorithms' decisions (cf. Svetlova, 2018, Borch and Lang, 2017). These tendencies arise from biases like overconfidence, myopic loss-aversion, and emotions like fear and greed. Behavioral elements again come in to play when profiling users in order to tailor messaging that also attends to keeping emotions in check (for instance, proactively emailing only those users who log on frequently following a market crash with a message to stay the course, while avoiding those users who did not). The idea is to perform ideal type investors not only on behalf of, but *despite* the end-users. "It's our job," remarked the head of behavioral finance and investing at a major American roboadvisor, "to sort of help manage the psychological side of things so that you can do the rational thing" (quoted in Hayes, 2019).

Through combining behavioral economics and MPT, roboadvisors mobilize a conceptual basket in which their joint use, in effect, *functions as a counterperformative invalidation of the former*.¹⁴⁴ The irrational aspects of investment are well-recognized by roboadvisors, but the influence of these is minimized through adherence to MPT while strategically deploying behavioral elements as disciplinary checks. Put differently, the corrective usage of behavioral economics makes roboadvisor users appear *less like* the behavioral model's depiction of investors—leaving users to appear instead as MPT-following ideal types.

This is not the only possibility for counterperformativity that roboadvisors call forth. As MacKenzie (2006: 60) cautions, "economically rational action may not always promote stability." The rise of the roboadvisors can therefore have important implications on the socio-technological structuration of securities markets and on investor behavior. As more lay investors come to follow MPT there is less "noise" in the market (Preda, 2017) for professionals to respond to. Indeed, if

¹⁴⁴ My gratitude to the anonymous reviewer who pointed out this apparent paradox.

we take the limiting case where every single market participant uses a mean-variance model and that's it, then the market *cannot* be efficient and MPT itself falls apart. The fundamental reason here is that MPT is price *insensitive* – it only prescribes the asset class weights for what indices to own since the model assumes that markets are efficient. If people only own index funds, however, then nobody is left to do the fundamental research necessary to fairly price the components of those indices, and so markets become *inefficient* (for an extended discussion of the counterperformative potential of MPT and roboadvised investments see Hayes, 2019; as well as Fichtner and Heemskerk, 2018, for an explanation of some consequences of widespread passive index investing). Paradoxically, too much 'efficient' investing can itself lead to market failure. In reality, this risk is likely small because any new market inefficiencies created by a slavish devotion to MPT would be quickly exploited by active traders such as arbitrageurs or HFT bots.¹⁴⁵

But, if Lopreato and Alston (1970) are correct that ideal types are inherently “deliberate distortions of reality”, then the algorithmic performance thereof could still have a distorting effect. Indeed, while it may be individually rational to use a roboadvisor, it is impossible for it to be collectively rational for every investor to use MPT. Similarly, if every driver were enacted as an ideal type route optimizer, traffic jams could actually get worse. Cabannes, et al. (2017) show how GPS and traffic-beating apps are logical for individuals, but make congestion worse overall, “and autonomous vehicles, touted as an answer to traffic-y streets, could deepen the problem.” These

¹⁴⁵ It is worth noting that just as too much MPT investing can lead to instability, so too can a large proportion of high-frequency trading—which has been blamed for the occurrence of “flash-crashes” (Lewis, 2015; Lange, et al., 2018), sudden price drops facilitated by negative feedback loops where certain HFT algorithms trigger others in a downward spiral. But, interestingly, it may be the HFT's active orientation that balances the potential dangers of MPT-following algorithms. It is important to note that HFTs already trade against roboadvisor order flow since the former acts as market-maker in many ETFs. Ultimately, a new market logic may establish itself where the more passive algorithms of roboadvisors and the active ones of high-frequency trading end up supporting and sustaining one another, as well as promoting systemic stability as they trade against each other.

examples depict a *tragedy of the common 'ideal'*, where the social capacity for rationality is taken as a limited and shared resource – where individual users, acting independently according to their own self-interest, behave contrary to the common good of all users by depleting or spoiling the shared resource through their collective action (Hardin, 1968).¹⁴⁶

To conclude, I draw attention to Roscoe and Chillas' (2014) advice that a performativity analysis must include a critical politics: “what sort of world would we like to see performed?” (MacKenzie, 2006: 275). While Portes (2010: 227) dismisses this point of issue as rhetorical flourish, the question carries new weight in a society where ideal types can be readily assembled and performed. Scholars and practitioners alike should additionally ask: which ideal types do we want to see in the world? While an ideal type investor may be positive for ordinary people, do we also desire technological systems that can put in place ideal type bureaucracies where Weber's “iron cage” can trap and restrict individual freedom and creativity in the name of rational-legal efficiency?

When an ideal type leaps off the paper or out of the mind of the social analyst and instead becomes the practical tool of businessmen, policymakers, or computer programmers working on a hobby project, we must consider who is the one introducing the ideal type. Who gets to decide what the ideal type specifications are, and at the exclusion of what alternatives? Some roboadvisors are beginning to offer portfolios built around ideologies of social responsibility and ESG investing, but this is still not widespread.¹⁴⁷ Yet, these ‘social’ portfolios are still optimized around MPT principles that privilege the tradeoff between risk and return rather than any other value dialectic.

¹⁴⁶ These examples are similar to “paradoxes of rationality” invoked in game theory; see e.g. Grüne-Yanoff, 2012.

¹⁴⁷ ESG stands for ‘environmental’, ‘social’, and ‘governance’.

As another example, GPS routes allow drivers to optimize shortest distance or shortest time but exclude equally 'ideal' options like most emissions-efficient or most scenic route (but see: Zheng, et al., 2013).

In addition to the questions posed above, future work should ask which people get access to ideal type-making platforms and who are left out? If cost is no longer a material consideration for enrolment into an ideal type *agencement*, how do competing versions of that enactment (e.g. to choose one roboadvisor over another) attract new users? Once there is a critical mass of enrollees, if there is some threshold level of rationality that a microcosm of society can bear, who is to say to the next person that they should forgo being enacted as an ideal type?

Moreover, what happens to ideal type enactments when technological systems fail? And, what becomes of the residual human beings who outsource more and more modes of action to optimizing systems? As algorithmic systems in finance and elsewhere become ever more commonplace, these and other questions are ripe for sociological inquiry and provide a basis for new and exciting directions for future research.

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Methodological Appendix to Chapter 4

MPT starts out with the following proposition: Suppose there are N risky assets (6 in the case of our example case, *Wealthfront*), whose rates of return are given by the random variables R_1, \dots, R_N , where we purchase an asset n for $S(0)$ dollars on one date and then later sell it for $S(1)$ dollars:

$$R_n = \frac{S_n(1) - S_n(0)}{S_n(0)}, n = 1, 2, \dots, N$$

Next, let $\omega = (\omega_1 \dots \omega_n)^T$, where ω_n denotes the proportion of funds invested in asset n , with $\sum_{n=1}^N \omega_n = 1$. The total rate of return for a diversified portfolio of risky assets is the simple weighted average:

$$R_p = \sum_{n=1}^N \omega_n R_n \quad (1).$$

The goal of MPT is then to choose the optimal portfolio weighting factors that maximizes the rate of return, constrained by some minimal level of variance (i.e. risk) (Markowitz, 1952; Burke ,2017: 2), where the variance of the rate of return of an instrument is taken as its risk. But, since asset returns are not perfectly correlated with one another, the total variance of a portfolio must be computed while considering a series of pairwise interaction effects:

$$\sigma_p^2 = \text{var}(R_p) = \sum_{i=1}^N \sum_{j=1}^N \omega_i \omega_j \text{cov}(R_i R_j) = \sum_{i=1}^N \sum_{j=1}^N \omega_i \omega_j \sigma_{i,j} \quad (2).$$

Let Ω denote the covariance matrix among asset class returns such that: $\sigma_p^2 = \omega^T \Omega \omega$.

For example, when we have just $n = 2$ asset classes:

$$(\omega_1 \ \omega_2) \begin{pmatrix} \sigma_{1,1} & \sigma_{1,2} \\ \sigma_{2,1} & \sigma_{2,2} \end{pmatrix} \begin{pmatrix} \omega_1 \\ \omega_2 \end{pmatrix} = \omega_1^2 \sigma_1^2 + \omega_1 \omega_2 (\sigma_{1,2} + \sigma_{2,1}) + \omega_2^2 \sigma_2^2$$

Thus, in order to work MPT in reverse, I needed as inputs the historic annualized return and standard deviation over the study period for each asset assigned to my portfolio, as well as the

correlations between asset class returns over the same period, which I computed with Excel. (Historical price data obtained from Morningstar, a publicly available website for obtaining price and performance data on mutual funds and ETFs.) For *Wealthfront*, this amounted to:

Table A1: Roboadvisor Portfolio Allocation and Asset Class Correlations

Ticker	Return	Standard Deviation
VTI	11.70%	10.28%
VEA	9.60%	11.13%
VWO	8.66%	15.04%
VNQ	6.21%	13.58%
LQD	4.06%	4.96%
EMB	6.93%	5.47%

Ticker	VTI	VEA	VWO	VNQ	LQD	EMB
VTI	1.00					
VEA	0.82	1.00				
VWO	0.61	0.77	1.00			
VNQ	0.43	0.34	0.29	1.00		
LQD	0.09	0.26	0.41	0.71	1.00	
EMB	0.31	0.50	0.67	0.47	0.78	1.00

Portfolio return as defined by equation (1) above is the simple weighted average of asset class returns and so R_p for *Wealthfront* is:

$$0.26(.117) + 0.16(0.096) + 0.05(0.0866) + 0.09(0.0621) + 0.31(0.0406) + 0.13(0.0693) = \underline{7.73\%}$$

Portfolio risk is operationalized as its annualized standard deviation and calculated according to equation (2) above:

$$\begin{aligned} \sigma_p = & [0.262(.1028)^2 + 0.162(.1113)^2 + 0.052(.1504)^2 + 0.092(.1358)^2 + 0.312(.0496)^2 + 0.132(.0547)^2 + \\ & 2(.26)(.16)(.1028)(.1113)(.82) + 2(.26)(.05)(.1028)(.1504)(.61) + 2(.26)(.09)(.1028)(.1358)(.43) + \\ & 2(.26)(.31)(.1028)(.0496)(.09) + 2(.26)(.13)(.1028)(.0547)(.31) + 2(.16)(.05)(.1113)(.1504)(.77) + \\ & 2(.16)(.09)(.1113)(.1358)(.34) + 2(.16)(.31)(.1113)(.0496)(.26) + 2(.16)(.13)(.1113)(.0547)(.5) + \\ & 2(.05)(.09)(.1504)(.1358)(.29) + 2(.05)(.31)(.1504)(.0496)(.41) + 2(.05)(.13)(.1504)(.0547)(.67) + \\ & 2(.09)(.31)(.1358)(.0496)(.71) + 2(.09)(.13)(.1358)(.0547)(.47) + 2(.31)(.13)(.0496)(.0547)(.78)]^{1/2} \\ = & \underline{6.62\%} \end{aligned}$$

The *Wealthfront* asset allocation for a 55-year old with moderate risk tolerance thus corresponds to (6.62%, 7.73%) in the risk-return space with which the efficient frontier exists.

This procedure was carried out for all of the roboadvisors in the sample, and then the portfolio risks and returns were averaged. These results are presented in Table A2:

Table A2: Roboadvisor portfolio risk-return characteristics

Roboadvisor	Std.Dev.	Return
Betterment	8.08%	8.84%
Wealthfront	6.62%	7.73%
Ellevest	7.67%	8.49%
Acorns	6.15%	7.15%
WiseBanyan	7.39%	8.22%
WealthSimple	5.31%	6.85%
Schwab Intelligent Portfolio	7.42%	7.68%
eTrade Adaptive Portfolio	6.07%	7.39%
FutureAdvisor	6.18%	6.63%
TIAA Personal Portfolio	7.64%	7.61%
Fidelity Go	6.90%	8.43%
Honest Dollar (GS)	6.83%	7.67%
Ally/TradeKing	5.80%	7.23%
SigFig	6.83%	7.40%
Hedgeable	7.54%	8.79%
TD Essential Portfolio	4.92%	6.25%
Zack's Advantage	6.28%	7.62%
ML Guided Portfolio	5.72%	7.02%
Vanguard	5.95%	7.36%
SoFi	6.38%	7.35%
Covestor (IB)	5.78%	6.38%
Average	6.55%	7.53%
(standard deviation of columns)	(0.85%)	(0.71%)

Source: Author's calculations

Appendix B: Roboadvisor Risk Profiling

Risk Profiling Questionnaire Example using roboadvisor: *Wealthfront*:¹⁴⁸

1. What is your primary reason for investing?
 - a. General savings
 - b. Retirement
 - c. College Savings
 - d. Other

2. What are you looking for in a financial advisor?
 - a. I'd like to create a diversified investment portfolio
 - b. I'd like to save money on my taxes
 - c. I'd like someone to completely manage my investments, so that I don't have to
 - d. I'd like to match or beat the performance of the markets

3. What is your current age?

¹⁴⁸ <https://www.wealthfront.com/questionnaire>

- a. 55
4. What is your current pre-tax income?
a. \$75,000
5. Which of the following best describes your household?
- a. Single income, no dependents
 - b. Single income, at least one dependent
 - c. Dual income, no dependents
 - d. Dual income, at least one dependent
 - e. Retired or financially independent
6. What is the total value of your cash and liquid investments? e.g. savings, CDs, mutual funds, IRAs, 401(k)s, public stocks
a. \$150,000
7. When deciding how to invest your money, which do you care about more?
- a. Maximizing gains
 - b. Minimizing losses
 - c. Both equally
8. The global stock market is often volatile. If your entire investment portfolio lost 10% of its value in a month during a market decline, what would you do?
- a. Sell all of your investments
 - b. Sell some
 - c. Keep all
 - d. Buy more

“Based on your answers, here's your recommended investment plan that aims to maximize your returns while managing your risk: Risk Score: 5.5”
(from 0.0 to 10.0) [this is a *moderate* risk tolerance]

Conclusion

The preceding chapters highlight the role that social forces including culture and position in the social structure, relationships and relationality, and technology play in shaping individual economic behavior and financial decision-making. In particular, the papers highlight the influence of these forces on private decisions, often involving matters of risk and objective rationality. Rationality in the sociological canon was once written off as the domain of economists, and according to Stinchcombe (1986: 2-3), “[the] movement to reintroduce rationality into the analysis of social structure and social structure into the analysis of rational action has been closely related to a program of methodological individualism...”; adding that for many sociologists, “one ought not pay attention to individuals at all because individual level explanation was selling our birthright as a discipline for a mess of social-psychological pottage.” Indeed, much of rational action theory (RAT) among contemporary sociologists has sought to identify individual-level causation for bringing about structural-level phenomena like social movements, firms, institutions, or even entire societies, granting explanatory primacy to individual action in relation to social phenomena (Goldthorpe, 1998). Thus, analysis of rational action theory in sociology most often interrogates the consequences (intended or not) of individual action in the direction of the micro to the macro (Coleman, 1990).

What I introduce in this dissertation is not another explanation of social structure by way of individual choice, but to analyze individual choice by dint of social structure. Using behavioral economics as a guide, the papers presented show how individual decision making can be steered toward or away from what objectively (and instrumentally) rational. But unlike the abundant scholarship from behavioral economics, I do not seek explanations for human behavior that originate from within the confines of isolated brains nor rely on cognitive psychology. Instead, I

draw from sociological theory, both contemporary and classical. At the same time, I do not reject nor attack the psychological focus of the behavioralists. Rather, I recognize that there are certain limitations in our understanding of economic choice if one only considers the operations of the mind. While behavioral economics approaches decision making from the bottom-up, as it were, I approach the same objects of study from the top-down. This creates complimentary scholarship that can open intellectual dialogue and build bridges between these disciplines. Moreover, situating my work within sociological frameworks allows for the discovery of new empirical phenomena that could not otherwise be knowable from a strictly cognitive lens.

This ambitious project sets out a new agenda in economic sociology that confronts individual economic action with the full force of sociology, in much the same way that behavioral economics has gained prominence by confronting economic action with psychology. Each strand in this project has yielded important empirical and theoretical insights that describe, for instance, how those in some groups (e.g., among the poor or uneducated) can make systematically imprudent economic choices that perpetuate class distinctions and wealth and income inequality—with already financially disadvantaged demographic groups like women or minorities further penalized. My work also reveals how the objective enactment of economic rationality, which is now an empirical fact brought about via technological systems, can have both desirable and undesirable ramifications for individuals, the structure of markets and economic institutions, and for society as a whole.

New research that extends my dissertation promises to produce several new and exciting strands that can move the field forward and also provide practical or policy recommendations to alleviate certain forms of economic inequality that stem from “irrational” tendencies. One of the major contributions of behavioral economics over the past two decades has been to counsel

organizational and political leaders for improving individual outcomes in a paternalistic fashion. So-called nudges (Thaler and Sunstein, 2009) have been adopted at several levels of society and in various contexts to steer individual choice to something more preferred or more optimum. Examples include forcing employees to opt-out (rather than opting-in) to retirement savings plans, placing healthier food options at eye-level in school cafeterias, and fitting office trash cans with toy basketball nets to reduce desktop clutter, office waste, and litter. Many nudges indeed serve socially desirable improvements in individual behavior, but are again grounded specifically in cognitive science. By understanding how supra-individual matters bear on choice, similar nudges might be developed to benefit social outcomes.

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