Essays in Empirical Financial Economics

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Essays in Empirical Financial Economics

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Executive Summary

This dissertation consists of four chapters. The first chapter presents joint work with Christophe Spaenjers. We use micro-level household finance data and investigate individuals' subjective life horizons. First, we document substantial cross-sectional variation in horizon beliefs, even after controlling for differences in age, gender, race, health status, income, net wealth, health and optimism. Second, we find that individuals with longer horizons allocate a larger fraction of their wealth to equities. We show that the effect of a shortening horizon on portfolio choice is offset by bequest motives.

In the second chapter, I examine the explanatory power of birth order for financial household decisions. I show that firstborns are more likely to save, to own equities, and to hold higher equity shares, conditional on participating in the equity market. Moreover, I find that firstborns gather more information when making financial decisions, hinting at higher financial sophistication. However, firstborns seem to act more on their optimistic beliefs than later borns, and tend to be more prone to stock picking. Altogether, these results provide evidence consistent with the hypothesis that family experiences play an important role for explaining variation in investor behavior.

In the third chapter, I study whether the social environment affects individuals' response

behavior in interviews. I use between- and within-interview variation in the presence of companions to show that the current presence of a companion decreases the probability of obtaining a reply. Moreover, companions induce respondents to overreport their self-assessed abilities. This overreporting may not reflect the true beliefs of the respondent, introducing a downward bias in the estimates of the importance of overconfidence.

The fourth chapter presents joint work with Thomas Bourveau and François Brochet. We hand-collect data on M&A lawsuits, where firms allegedly hid poor performance related to an acquisition. Using the announcement of a lawsuit as an industry shock, we show that in the period after a lawsuit, industry peers experience higher bidder announcement returns, choose methods of payment associated with better deals, and engage in fewer diversifying acquisitions. Moreover, firms that invest more than predicted by their growth opportunities reduce their investments. This effect is driven by firms that have higher ex ante litigation risk. Finally, firms with better pre-existing corporate governance react more to observing a lawsuit in their industry. Together, these results show that M&A lawsuits may discipline managers' investment behavior of industry peers.

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Sven Michael Spira (Paris, July 2014)

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Résumé

La théorie normative des décisions prédit des choix optimaux en considérant les individus parfaitement informés et rationnels. Dans les faits, les agents peuvent faire des choix non-optimaux au regard de la théorie. Dans la mesure où elles dérivent d'un processus cognitif, les décisions peuvent être impactées par des biais, une surabondance d'informations ou encore par leur cadre social. En conséquence, la compréhension du comportement des individus est un défi nécessitant une théorie descriptive, et non uniquement des modèles théoriques. Ainsi, Zeleny (1981) souligne l'utilité d'une approche empirique des décisions dans l'étude du processus de prise de décision des individus.

En finance, depuis la mise en évidence d'importantes variations cross-sectionnelles, les déterminants des décisions des ménages et entreprises sont devenus un sujet primordial de la recherche académique. Dans cette thèse, je m'attache à examiner certaines questions de recherche contribuant à une littérature croissante sur les décisions financières des agents.

Dans les sections suivantes de l'introduction, je présente les deux principales thématiques de mes recherches : (i) la finance des ménages et (ii) le droit et la finance d'entreprise. Dans la section qui suit, j'offre un bref aperçu des quatre chapitres de ma thèse. Enfin, je résume mes principales contributions.

La finance des ménages

L'étude des décisions individuelles, telles que l'épargne, l'investissement, les choix de portefeuille, l'emprunt et le recours à des conseils professionnels, a été baptisé "Household Finance" par John Campbell dans son *Presidential Adress to the American Finance Association* (2006).

Un des phénomènes les plus connus en recherche sur la finance des ménages est le *stock market participation puzzle*. Depuis sa mise en évidence dès 1963 par Crockett et Friend, la recherche empirique montre que seule une fraction des ménages détiennent des actions (Blume et al., 1974; Blume and Friend, 1978). Cette observation persiste aujourd'hui et contraste avec les modèles classiques qui prédisent que tous les ménages devraient profiter du rendement supérieur des actions (*equity premium*). Dans la recherche récente, l'*asset allocation puzzle* fait référence au fait que la composition du portefeuille d'actifs risqués diffère énormément d'un investisseur à l'autre (Canner et al., 1997). Cette observation est, elle aussi, incohérente avec les modèles classiques de choix d'investissement, qui prédisent que tous les investisseurs devraient détenir le même portefeuille et que seule la part de la richesse allouée à ce portefeuille diversifié devrait varier.

L'identification de l'origine de l'hétérogénéité des choix financiers est compliquée par un obstacle empirique (Campbell, 2006). Les micro-donnés sur les ménages sont difficiles à collecter. En effet, les discussions d'argent sont un des tabous les plus importants de la société. Dès lors, les individus souhaitent protéger leur vie privée et sont en général peu enclins à partager publiquement des informations sur leurs finances. Pour cette raison, la recherche en finance des ménages utilise des données collectées au cours d'enquêtes anonymes ainsi que des données fiscales. Les enquêtes offrent l'avantage d'offrir potentiellement des

indices sur le processus de décisions mais sont sujettes à des obstacles méthodologiques. Les données fiscales sont avantageuses au regard de leur fiabilité et de leur représentativité, mais se limitent aux informations requises par les déclarations d'impôts et peuvent être difficiles d'accès.

Dans les premiers deux chapitres de cette thèse j'utilise les micro-donnés des enquêtes européennes et américaines. Dans le troisième chapitre, je prends un approche méthodologique à analyser ces données des enquêtes.

Poursuite judicaire et finance d'entreprise

Les actionnaires embauchent des dirigeants pour prendre les décisions les plus favorables aux intérêts des propriétaires de l'entreprise. Pour autant, les dirigeants ne possèdent souvent qu'une petite fraction des entreprises qu'ils gèrent et poursuivent en conséquence des intérêts privés plutôt que de maximiser la valeur des capitaux propres. Ce problème principal-agent vient du mauvais alignement des incitations. Shleifer et Vishny (1997) offrent une revue bibliographique de la littérature sur la gouvernance d'entreprises, résumant les moyens d'atténuer ces coûts d'agence. La menace d'une offre publique d'achat, des actionnaires dominants, le conseil d'administration et le risque de poursuites civiles sont parmi les mécanismes les plus fréquents.

Il est néanmoins important d'examiner et de comprendre l'efficacité de ces instruments de gouvernance. Une menace peut, par exemple, être ignorée si elle n'est pas jugée crédible. Le problème peut se révéler sévère si l'instrument de gouvernance est coûteux. Dans le cas de la responsabilité au civil, l'efficacité des plaintes à dissuader de mauvais comportements des

gestionnaires est depuis longtemps débattue. Par exemple, la recherche existante montre que les entreprises ciblées sont les plus riches, que le stade du procès est rarement atteint et que les accords n'aboutissent qu'à de faibles dédommagements. En conséquence, la responsabilité civile pourrait détériorer l'attractivité d'un marché financier plutôt que de l'améliorer. Dans le chapitre 4, je montre le degré de considération des dirigeants pour leur environnement, ici le risque d'être poursuivi, lors de décisions financières.

Aperçu de la thèse

Cette thèse est constituée de quatre chapitres distincts. A l'aide de modèles empiriques, j'étudie les facteurs déterminants des décisions financières des individus.

Chapitre 1 : Espérance de vie perçue et choix de portefeuille

Ce chapitre est issu d'une collaboration avec Christophe Spaenjers. Sur la base de données d'un questionnaire administré aux Etats-Unis, nous étudions la relation empirique entre l'espérance de vie perçue (c'est-à-dire l'espérance de vie attendue par le répondant) et ses choix de portefeuille. En premier lieu, nous trouvons que plus d'un tiers de la variance de l'espérance de vie perçue ne peut être expliquée par les facteurs traditionnels des tables de mortalité tels que l'âge, le genre et l'ethnicité. Deuxièmement, nous montrons que des horizons plus distants corrèlent positivement avec une planification financière et un horizon de retraite auto-déclarés plus longues, ainsi qu'une épargne retraite plus importante, et une plus grande tolérance au risque financier. Dans notre principal test empirique, nous trouvons que la part du portefeuille en actions est plus importante pour les investisseurs ayant un horizon plus distant, *ceteris paribus*, en accord avec les prédictions de la théorie. Une variation

d'un écart-type dans l'horizon peut expliquer plus de 4.2% d'un écart type de la part du portefeuille de marché. Les célibataires semblent davantage prendre en compte l'idée qu'ils se font de leur espérance de vie que les chefs de ménages de plus d'une personne (quoique la différence n'est pas statistiquement significative). L'effet de l'horizon est robuste à la prise en compte de l'endogénéité de la participation aux marchés actions, où à l'usage de la survie des parents comme variable instrumentale de l'espérance de vie perçue. Nous documentons aussi le fait que l'horizon affecte l'investissement en action sur la marge extensive, de sorte que des horizons plus long augmentent la probabilité de participer au marché actions. Enfin, nous montrons que l'effet d'une réduction de l'horizon sur les choix de portefeuille est quatre fois plus important pour les ménages sans préoccupation d'héritage. Ainsi, ce chapitre offre de nouvelles indications de la relation qu'entretiennent épargne et choix d'investissements avec leur horizon, et met en lumière l'importance des attentes subjectives dans les décisions économiques des individus.

Chapitre 2 : Le monde appartient à ceux qui se lèvent tôt ? Des aînés et leurs décisions financières

Motivé par une branche de la littérature qui documente l'importance des expériences économiques et professionnelles, dans ce chapitre j'examine si la séquence de naissance, une mesure des expériences familiales, peut expliquer une partie de la variation des décisions financières des ménages. A la suite de la littérature documentant le poids des expériences économiques et professionnelles, j'étudie dans ce chapitre si l'ordre de naissance entre enfants d'une même famille est à même d'influencer les décisions financières. Je me concentre tout particulièrement sur les différences entre les aînés et leurs frères et soeurs. Premièrement, je

documente que les aînés montrent une plus grande propension à épargner, ce qui est en partie expliqué par leur décision de partir à la retraite à un âge plus avancé, et qu'ils sont plus probables de souscrire à une assurance vie. Deuxièmement, les aînés ont une plus grande appétence pour le risque, investissent plus en obligations et actions, et ont un pourcentage plus important de leur portefeuille investi en actions, conditionnellement à différentes caractéristiques observables. Troisièmement, les aînés font preuve d'une plus grande sophistication : ils collectent plus d'informations avant d'emprunter ou d'investir, consultent des conseillers financiers et comparent plus en détail les conditions offertes par différentes banques. Ensuite, je trouve que des aînés agissent plus sur leur optimise, même s'ils ne sont pas plus probable d'être optimistes, et pareil, ils agissent plus sur leur goût du risque. Quatrièmement, les aînés ont plus tendance à choisir des actions individuelles. Les comportements des aînés ne sont qu'en partie expliqués par les contrôles standards en finance des ménages, qui sont eux-mêmes dépendants de l'ordre de naissance. Les résultats sont robustes à une division de l'échantillon entre répondants âgés et moins âgés, ainsi qu'au contrôle pour l'âge des parents au moment de la naissance. Par ailleurs, je ne trouve aucun résultat pour les répondants enfants uniques ou les cadets, et je montre, en contrôlant pour les différences entre famille, que l'effet vient de différences à l'intérieur des familles. Contrôler pour des différences entre des familles montre que les effets de la séquence de naissance qui sont documenté dans ce chapitre, viennent d'une variation à l'intérieur des familles. Dans l'ensemble, ce chapitre tend à montrer que les expériences familiales jouent un rôle important pour les décisions des individus.

Chapitre 3 : Comportement de réponse et le rôle des accompagnants : L'évidence des enquêtes des ménages

Dans ce chapitre, j'étudie si l'environnement influence le comportement des répondants aux enquêtes. Je distingue trois groupes de répondants dans des conditions différentes au moment d'être interviewés. Les premiers étaient seuls, les seconds accompagnés pendant une partie de l'entretien et les derniers accompagnés pendant des autres parties du sondage. Il m'est ainsi possible d'exploiter l'impact de la présence des accompagnants en utilisant les différences entre les différents groupes et au sein même des entretiens où les accompagnants ont été partiellement présents. De surcroît, je peux étudier l'impact de différents types d'accompagnants. Primo, je trouve que la présence d'un compagnon pendant un instant de l'entretien diminue la probabilité d'une réponse dans ce moment, et l'effet qui vient des personnes présentes sans rapport avec le répondeur est plus important que l'effet qui vient des compagnons familials comme des partenaires ou des enfants du répondeur. Je trouve tout d'abord que la présence d'un accompagnant diminue la probabilité de réponse, l'effet étant d'autant plus fort que les accompagnants sont proches du répondant (enfants, partenaires). Ceci est cohérent avec le répondant souhaitant préserver sa vie privée. Par ailleurs, les répondants sont plus enclins à surestimer leurs capacités en présence d'autrui, ce qui semble cohérent avec l'existence de biais dépendant de l'environnement social (*valorisation de soi*). Ce résultat n'est pas produit par des dérangements du test. En plus, les effets sont mesurés dans l'échantillon des répondeur plus et moins âgés que la médiane, atténuant la préoccupation que des répondeurs ajustent leurs réponses pour pas inquiéter leurs compagnons. Les surestimations des auto-évaluations des aptitudes introduisent une sous-estimations de l'effet de l'aplomb pour les

décisions financières et le comportement des individus. En tout, mes résultats suggèrent que des individus ajustent leur comportement à l'environnement sociale, même s'ils connaissent ou sont apparentés avec leur compagnon.

Chapitre 4 : Les litiges d'acquisitions disciplinent-ils les décisions d'investissement des dirigeants ?

Ce chapitre est le résultat d'une collaboration avec Thomas Bourveau et François Brochet. Utilisant les litiges liés aux opérations d'acquisitions au sein d'une industrie, nous testons si ces derniers disciplinent le comportement d'acquisitions d'autres dirigeants dans la méme industrie. Nous trouvons en effet que dans les deux années après un litige lié à une acquisition, où une entreprise est accusée d'avoir caché des informations sur les mauvaises performances d'une acquisition, les entreprises dans la même industrie réalisent des acquisitions de meilleure qualité et ayant plus grande rentabilité. Nous trouvons aussi que les acquisitions sont moins risquées selon plusieurs critères (taille, diversification, financement). D'autre part, nous trouvons que les entreprises dans la même industrie réduisent leurs niveaux d'investissements au niveau prédit par leurs opportunités de croissance. L'effet est plus prononcé pour les entreprises ayant un risque plus important d'étre impliqué dans un tel litige, ainsi que pour celles ayant plus de goodwill et ayant une meilleure gouvernance. Au niveau de l'industrie, le nombre de litiges futur est positivement corrélé avec les litiges passés et ces derniers ont un impact négatif sur le volume d'acquisition. Nos résultats tendent à montrer que les litiges d'acquisitions dans une industrie donnée peuvent avoir des effets sur le comportement d'investissements de l'ensemble des entreprises dans cette industrie.

Contributions à la littérature

Cette thèse contribue à littérature en documentant plusieurs aspects influençant la prise de décision.

Les deux premiers chapitres mettent en lumière de nouveaux paramètres influençant les décisions financières des ménages : l'espérance de vie et l'ordre de naissance. Ils contribuent ainsi à expliquer l'hétérogénéité observée dans le choix d'investissements des individus (Guiso et al., 2002; Curcuru et al., 2009). Les chapitres 3 et 4 s'intéressent aux facteurs externes influençant les prises de décisions des individus : le chapitre 3 se concentre sur le rôlé de l'environnement social, le chapitre 4 sur l'effet des litiges d'acquisitions sur la gouvernance d'entreprise.

Différents articles ont avancé que la part optimale risquée d'un portefeuille devrait dépendre de l'horizon temporel d'investissement (Barberis, 2000; Campbell et Viceira, 2002; Bec et Gollier, 2009; Benartzi et Thaler, 1995; Berkelaar et al., 2004; Bovenberg et al., 2007), hypothèse rejetée par certains (Merton, 1969). Le premier chapitre de cette thèse est le premier travail empirique explorant ce sujet. Nous y introduisons une nouvelle mesure subjective de l'horizon temporel d'investissement. Cette dernière varie ainsi au sein d'un groupe d'individu du même âge, ce qui nous permet d'isoler l'effet de l'horizon temporel d'autres facteurs potentiellement corrélé avec l'âge et affectant les décisions d'investissement (niveau de vie, attitude envers le risque). Nous contribuons ainsi à la littérature soulignant l'importance des facteurs subjectifs dans les choix économiques (Hamermesh, 1985; Manski, 2004; Hurd, 2009; Weber et al., 2013), en examinant dans le chapitre 1 les décisions d'investissement des individus conditionnellement à leur espérance de vie subjective. Ce chapitre étudie aussi le rôle du

désir de transmettre un héritage sur le comportement des ménages en donnant une preuve indirecte que ce dernier peut allonger l'horizon d'investissement des individus (Barro, 1974; Jappelli, 1999) à travers la comparaison de l'impact de l'espérance de vie entre des personnes ayant des enfants et ceux n'en ayant pas.

Bien que les expériences personnelles ne devraient pas influencer les comportements financiers dans la théorie classique, je montre au chapitre 2 que l'ordre des naissances semble expliquer une partie de l'hétérogénéité du comportement des ménages (Guiso et al., 2002). Deuxièmement, je montre que c'est bien le fait d'être l'aîné, et non un enfant unique, qui est important. Je trouve en effet que l'effet est inexistant pour les enfants uniques (Mancillas, 2006; Black et al., 2007 ou les enfants nés après l'aîné (Black et al., 2005). Les résultats ne sont pas influencés par des facteurs génétiques (Barnea et al., 2010; Cesarini et al., 2009; Cesarini et al., 2010). Dans la limite de mes connaissances, c'est la première fois qu'est montrée que les aînés acceptent de plus grands risques financiers, mais de plus faibles risques physiques en montrant que ces derniers investissent une plus grande partie de leur épargne dans des actions, conditionnellement aux autres variables observables. Ce résultat est en contradiction avec certains articles existant, comme Argys et al. (2006), bien que ces derniers ne peuvent faire la distinction entre la prise volontaire de risque et des effets de fraudes.

Dans le troisième chapitre, j'ajoute à la littérature sur le rôle de l'optimisme (Puri et Robinson, 2007), en montrant que l'identification du degré d'optimisme peut être compliquée par l'environnement social : la non prise en compte du biais de valorisation sociale peut amener à une sous estimation du rôle de ce dernier. Je documente par ailleurs que la présence des partenaires rend les réponses des interviewés particulièrement sensible à ce biais, et qu'elle

peut aussi expliquer certains biais de non réponses. Ce résultat présente aussi un intérêt pour la littérature sur le design des enquêtes. [1]

Le quatrième chapitre est relié à la littérature de gouvernance d'entreprises en montrant les effets des litiges d'acquisition sur le comportement d'investissements des dirigeants d'entreprises (Shleifer et Vishny, 1997). Contrairement à dans McTier et Wald (2011) qui se concentre sur l'impact de ces litiges sur les entreprises directement impliquées, nous montrons qu'ils modifient aussi le comportement des autres entreprises dans la même industrie. Nous montrons ainsi que les marchés financiers peuvent bénéficier d'un plus grand respect des lois boursières, quand Rose (2008) et Coffee (2006) avancent que les actions légales visent surtout les entreprises les plus riches, n'ont pas d'effet sur les comportements de fraude et ne parviennent pas à indemniser les victimes. Dernièrement, cet article contribue à la littérature sur les effets de peer. Si nous savons que les dirigeants sont attentifs aux cours boursiers de leurs concurrents (Foucault et Frésard, 2013), ainsi qu'à la publication de leurs comptes (Durnev et Mangen, 2009), leurs offres publiques d'achat hostiles (Servaes et Tamayo, 2013) et leurs recours collectifs (Arena et Julio, 2013), nous sommes les premiers qui étudient si le risque spécifique d'un litige lié aux acquisitions a un effet dans l'industrie et s'il discipline les décisions financières des dirigeants.

Pour conclure, ma thèse contribue à notre compréhension du processus de décision (financier) et permet ainsi d'aider les individus à améliorer leurs décisions financières. Les conseillers financiers pourraient considérer l'espérance de vie subjective et l'ordre de naissance des investisseurs pour mieux les accompagner et les conseiller. Lors d'interviews, il est

[1] Par exemple, Eurosystem Household Finance and Consumption Survey - Methodological Report for the First Wave - Statistics Paper Series No. 1 / April 2013, European Central Bank.

important de prendre en compte l'environnement social dans lequel le répondant se trouve pour interpréter le plus correctement possible ses réponses. Enfin, les responsables politiques devraient prendre en compte l'effet positif des litiges d'acquisition lorsqu'ils décident de la validité juridique du renforcement privé des recours collectifs.

Introduction

Normative decision theory predicts optimal choices, often assuming that agents are fully informed and rational. However, in practice, agents may deviate from theoretically optimal actions. Because decision-making is a cognitive process, for instance, biases, information overload or the social framework may affect individuals' choices. Thus, the challenge of understanding agents' behavior implicates the need for descriptive decision theory instead of solely applying normative models. As such, Zeleny (1981) describes the usefulness of empirically studying decision outcomes in order to learn about the decision-making process of individuals.

In finance, since the documentation of large cross-sectional variation, understanding the determinants of individuals' decision outcomes in private households and corporations has become of primary interest for academic research. In this dissertation I strive to examine research questions that contribute to the growing literature on explaining agents' financial decision-making.

In the following part of the introduction, I present the two main areas in which I conduct my research: (i) household finance and (ii) law and corporate finance. In the subsequent section I provide a brief overview of the four chapters of this dissertation. Finally, I summarize

the main contributions.

Household finance

The study of individuals' decisions, such as saving, investing, portfolio choice, borrowing, and usage of advisory services, was named "Household Finance" by John Campbell in his Presidential Address to the American Financial Association (2006).

One of the widely known phenomena in household finance research is the stock market participation puzzle. Since its early documented in 1963 by Crockett and Friend, empirical research shows that only a fraction of households participate in the stock market (Blume et al., 1974; Blume and Friend, 1978). This phenomenon persists until today and stands in contrast with classic models that predict for all households to take advantage of the equity premium. In more recent research, the asset allocation puzzle documents the fact that the composition of risky assets varies greatly among investors (Canner et al., 1997). This is also inconsistent with the prediction of classic portfolio models, which show that all investors should hold the same portfolio and only deviate in the share of their wealth allocated to this fully diversified portfolio.

Identifying the source of the heterogeneity in individuals' financial choices is complicated by a measurement challenge (Campbell, 2006). Micro-data about private households is generally difficult to collect. Indeed, "do not talk about money" is in the popular press one of the common unwritten rules of society for conversations and friendships. Hence, people want to protect their privacy and are generally unwilling to publicly share information about their finances. Therefore, empirical household finance research typically draws on data raised

through either anonymous surveys or tax registers. Surveys offer the advantage of potentially providing insights into the decision-making process but entail typical methodological challenges. Official tax registers score highly on data accuracy and representativeness, but are limited to information required by tax forms in selected countries, and may be difficult to access.

In the first two chapters of this dissertation I use micro-level data from European and U.S. household finance surveys. In the third chapter, I take a methodological approach to analyzing such survey data.

Law and corporate finance

Managers are hired by shareholders to take decisions that are in the best interest of the company's owners. However, CEOs tend to only hold a small fraction of the firms they control and may therefore choose to pursue private goals instead of maximizing shareholder value. This classical principal-agent problem arises from the misalignment of incentives. Shleifer and Vishny (1997) provide a survey of the literature on firm governance, outlining the attempts of how to mitigate the problem of such agency costs. Takeover threats, larger shareholders, boards of directors, and the risk of civil liability are some of the common mechanisms.

However, it is important to examine and understand the effectiveness of governance instruments. For instance, individuals may choose to ignore a threat if they deem it non-credible. This can be a particularly severe problem if costs are associated with the governance tool. For civil liability, the efficacy of lawsuits as a deterrent of misconduct by firm managers, has

been long debated. For instance, previous research finds that richer firms are targeted, cases rarely go to trial, and settlement amounts are low. Therefore, instead of improving, civil liability may deteriorate the attractiveness of a financial market. In the fourth chapter, I present to which degree managers consider their external environment, in this case the risk of being sued, when making financial decisions.

Dissertation overview

This dissertation is made of four distinct chapters. With empirical models, I examine the question of what factors determine individuals' financial decision-making.

Chapter 1: Subjective life horizon and portfolio choice

This chapter is joint work with Christophe Spaenjers. Using data from a U.S. household survey, we investigate the empirical relation between subjective life horizon (i.e., the self-reported expectation of remaining life span) and portfolio choice. First, we find that more than one third of the variation in horizons cannot be explained by factors that are typically considered in period life tables, such as age, gender and race. Second, we show that longer horizons correlate positively with longer self-reported planning and retirement horizons, (pension) savings and financial risk tolerance. In our main empirical tests, we find that equity portfolio shares are higher for investors with longer horizons, ceteris paribus, in line with theoretical predictions. A one standard deviation change in horizon can explain more than 4.2% of one standard deviation in the risky share. Singles seem to consider their horizon beliefs more compared to household heads with a partner (although the difference is statistically insignificant). The effect of horizon is robust to accounting for the endogeneity of

equity market participation, or instrumenting subjective life horizon with parental survival. We also document that horizons affect equity investments on the extensive margin, such that longer horizons increase the likelihood of participation in the equity market. Finally, we show that the effect of a shortening horizon on portfolio allocation is four times stronger for households without bequest motives. Thus, this chapter provides new evidence on how savings and investment choices vary with horizons, and highlights the importance of subjective expectations in individual economic decision-making.

Chapter 2: Does the early bird catch the worm? Firstborns and their financial decisions

Motivated by a stream of literature that documents the importance of economic and career experiences, in this chapter I examine whether birth order, a proxy for personal family experiences, can explain variation in financial household decisions. First, I document that compared to later borns, firstborns are more likely to save, even though they plan to retire later and are more likely to hold life insurance. Second, I show that firstborns are more likely to accept financial risks, to participate in the bond and equity market, and to hold higher conditional equity shares. Third, consistent with higher financial sophistication, firstborns gather more information when borrowing or investing, by consulting financial advisors and comparing conditions offered by different banks. Next, I find that firstborns seem to act more on their optimism, although they are not more likely to be optimistic, and likewise they act more on their risk tolerance. Finally, firstborns also tend to be more prone to engage in stock picking. Only part of the firstborn effect is captured by standard variables in household finance that also depend on birth order, such as education and income. The findings are

not driven by the younger or older half of the sample. Moreover, the results are robust to controlling for parents' age at birth and are not found for only children or last borns. Finally, controlling for differences between families shows that the documented birth order effects are driven by within-family variation. Thus, this chapter presents that family experiences play an important role for financial choices of individuals.

Chapter 3: Response behavior and the role of third parties: Evidence from household surveys

In this chapter I study whether the social environment influences survey respondents' behavior. I distinguish between respondents that were (i) alone, (ii) accompanied during a specific test section, and (iii) accompanied during other parts of the interview. This allows me to exploit between- and within-interview variation in the presence of third parties. Moreover, I can differentiate between various companion types. First, I find that the presence of a third party at a specific time decreases the probability of a reply, and the effect stemming from unrelated third parties is more pronounced compared to the effect from familial companions, such as the respondent's partner or child. These findings are consistent with respondents' privacy concerns. Second, respondents are more likely to overestimate their abilities in front of others, in line with the social desirability bias. The finding is not driven by test impairments. Moreover, the effects arise in the older and younger sub-sample, mitigating the concern that respondents alter their answers in order to avoid unsettling companions. The overreporting of the self-assessed abilities introduces a downward bias in the estimates of the overconfidence effect on financial decisions and behavior. Taken together, my findings suggest that individuals adjust their behavior to the social environment, even when they are

familiar with or related to the third party.

Chapter 4: Do M&A lawsuits discipline managers' investment behavior?

This chapter is joint work with Thomas Bourveau and François Brochet. Using securities lawsuits related to M&A as an industry shock, we investigate whether litigation risk acts as an external governance mechanism by disciplining managers' investment decisions. In the two years following an M&A lawsuit (i.e., a lawsuit where plaintiffs allege that the firm hid poor performance related to a prior acquisition), we find that industry peers experience higher bidder announcement returns, choose methods of payment associated with better acquisitions, and engage in fewer diversifying, large or accretive takeovers. Collectively, this evidence is consistent with post lawsuit deals being of higher quality. Furthermore, we find that peer firms respond to the increased litigation risk by reducing investment expenditures that exceed the level predicted by their growth opportunities. This effect is more pronounced for industry peers with higher ex ante litigation risk, and firms with more goodwill on their balance sheet. Finally, the reactions are stronger among firms with better corporate governance. At the industry level of the sued firm, we find that M&A lawsuits are a positive predictor of M&A lawsuits in the subsequent year and affect negatively the total deal volume in the acquirer's industry. Overall, our results show that M&A lawsuits can have an industry-wide deterrence effect on firms' suboptimal investment behavior.

Contributions to the literature

This thesis contributes to the literature by focusing on different aspects of decision development. Chapter 1 and chapter 2 give new insights into the dependence of household finance

decisions on subjective life horizon and birth rank, both of which are immanent to each individual person. Thus, the first two chapters contribute to explaining part of the heterogeneity in investor choices (Guiso et al., 2002; Curcuru et al., 2009). Chapter 3 and chapter 4 deal with whether and how *external* factors affect decision-making of individuals: Chapter 3 reveals the impact of the social environment on a person's response behavior and chapter 4 shows the influence of the announcement of M&A lawsuits against peer firms as a corporate governance mechanism.

A number of papers have argued that optimal risk-taking behavior should be determined by the investment horizon (Barberis, 2000; Campbell and Viceira, 2002; Bec and Gollier, 2009; Benartzi and Thaler, 1995; Berkelaar et al., 2004; Bovenberg et al., 2007), although other papers suggest no such relationship (e.g., Merton, 1969). Chapter 1 presents the first work that empirically investigates the matter. We introduce a new measure that reflects the existing variation in horizon beliefs within age groups, in order to disentangle horizon effects from portfolio determinants that may vary with an individual's age, such as economic attitudes and background risk. We also contribute to an existing literature that stresses the importance of subjective expectations for economic choices (e.g., Hamermesh, 1985; Manski, 2004; Hurd, 2009; Weber et al., 2013). In this context, in chapter 1, we provide the first examination of investment choices. Finally, this chapter adds to the discussion of how the desire to leave a bequest affects household behavior. We provide an indirect test of the hypothesis that bequest motives extend households' investment horizons (Barro, 1974; Jappelli, 1999), by studying how subjective life horizon manifests itself differently for households with and without children.

Although life experiences should not matter according to classic finance models, ceteris

paribus, in chapter 2, I show that birth order can explain part of the heterogeneity in financial household decisions (Guiso et al., 2002). A second contribution of this chapter is the finding that the relevance of birth order for individuals' financial choices is indeed a firstborn effect that stems from having younger siblings. This is because I do not find effects for *only children* (Mancillas, 2006; Black et al., 2007) or *last borns* (Black et al., 2005), and the results are not driven by genetic differences (Barnea et al., 2010; Cesarini et al., 2009; Cesarini et al., 2010). Third, to the best of my knowledge this research is the first that shows that firstborns accept greater financial risks but smaller physical risks. I document that, compared to later borns, firstborns are more willing to accept financial risks and hold higher conditional equity shares. In contrast, existing research such as the study of Argys et al. (2006) finds firstborns to accept lower risks, although they cannot distinguish between "risky or delinquent behaviors".

In chapter 3, I contribute to the literature on the importance of optimism (Puri and Robinson, 2007) by showing that the identification of optimistic individuals can be complicated by the social environment during the interview. Failing to take the social desirability bias into account thus leads to underestimating the importance of optimism on respondents' behavior. Next, I highlight that companions can induce a social desirability bias – while the trend towards computer-administered or web-based surveys may mitigate interviewer effects, this is not necessarily the case for the documented companion effects. Moreover, I show that the potential bias stemming from non-responses can be mitigated by accounting for the presence of companions. Finally, by documenting that information on the social environment is needed to correctly interpret the data, I contribute to the literature on survey design.[2]

[2]E.g., Eurosystem Household Finance and Consumption Survey - Methodological Report for the First Wave - Statistics Paper Series No. 1 / April 2013 from the European Central Bank.

The fourth chapter adds to the corporate governance literature by identifying that M&A-related lawsuits embody a mechanism that can contribute to disciplining managers' investment behavior (Shleifer and Vishny, 1997). Instead of focusing on the sued firm, as in McTier and Wald (2011), we show that M&A-related lawsuits lead industry peers to engage in higher-quality investment activity. Second, we shed light on a channel through which financial markets may benefit from private enforcements of securities law, in comparison to the legal literature, where Rose (2008) and Coffee (2006) argue that lawsuits target deep-pocketed firms, and fail to deter fraudulent behavior and to compensate wronged investors. Third, and finally, we contribute to the literature on industry peer effects. While managers consider competitor's stock price movements (Foucault and Frésard, 2013), accounting restatements (Durnev and Mangen, 2009), hostile takeovers (Servaes and Tamayo, 2013) and securities lawsuits (Arena and Julio, 2013), we are the first to investigate whether the specific risk of M&A litigation has an intra-industry spillover effect, and whether it disciplines managers' investment behavior.

Overall, my dissertation contributes to our understanding of the (financial) decision-making process, and hence provides a potential step towards helping improve individuals' choices. Financial advisors may consider expected life horizon or birth order of investors, in order to understand and better explain possible advantages of investment decisions, such as participating in the stock market. Moreover, when asking questions in surveys, interviews or any other social interaction, the inquirer should be aware of the social environment in order to correctly interpret the given answers. Finally, policy makers may consider the positive externalities of M&A lawsuits when deciding the lawfulness of private enforcements of securities lawsuits.

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Chapter 1

Subjective Life Horizon and Portfolio Choice

Joint work with

Christophe Spaenjers (HEC Paris)

1.1 Introduction

Prior research has argued that the optimal risky asset allocation is higher for investors with longer horizons, for two reasons. First, there is substantial evidence that stock returns are mean-reverting, implying that stocks are safer in the long run (Barberis, 2000; Campbell and Viceira, 2002; Bec and Gollier, 2009). Second, if household preferences are characterized by loss aversion, the optimal risk exposure typically increases with the investment horizon (Benartzi and Thaler, 1995; Berkelaar et al., 2004; Bovenberg et al., 2007).[1] The importance of horizon in theoretical models coincides with popular investment advice (e.g., Malkiel, 2011, p. 364: "the longer the time period over which you can hold on to your investments, the greater should be the share of common stocks in your portfolio"). However, virtually no evidence exists on how horizon affects the behavior of investors in practice. This paper uses self-reported expected remaining life span as a proxy for investment horizon, and investigates whether it helps explaining observed equity shares in household portfolios.

Our paper builds on a literature that highlights the importance of individuals' subjective assessments of the probabilities of certain outcomes in explaining economic choices (e.g., Manski, 2004). Subjective probabilities are particularly relevant when concerning parameters about which people have private information, such as survival (Hurd, 2009). Longevity expectations indeed predict mortality, even after controlling for observable demographic and socio-economic characteristics (Smith et al., 2001; Hurd and McGarry, 2002). While subjective survival probabilities have been related to saving and consumption patterns among

[1] It should be noted that e.g., classical Merton models predict a flat line between the investment horizon and the equity share, and that some evidence opposes the concept of mean reversion in stock returns. However, as outlined, substantial evidence yields a positive relationship between horizon and the optimal risky asset allocation, so that we test whether a relationship exists empirically.

the elderly (e.g., Bloom et al., 2006), no study has investigated their empirical relation with portfolio choice.

The data used in this paper come from the Survey of Consumer Finances, a survey of U.S. households. Each iteration of the Survey since 1995 has included the following question: "About how old do you think you will live to be?". We compute a respondent's subjective life horizon as this self-assessed life expectancy minus his or her current age. We find substantial variation in subjective life horizons. For example, in the category of 45-year olds, the interquartile range covers horizons from 30 to 45 years; more generally, one third of the variation in horizons cannot be explained by differences in age, gender, race, and survey year between respondents. We find positive conditional correlations of subjective life horizon with a self-reported planning horizon measure, with retirement intentions, and with (pension) savings behavior. These initial results validate our measure, and suggest that households indeed take into account their expected life horizon when making economic decisions. Moreover, we find that self-reported risk tolerance increases with horizon, consistent with the arguments put forward by previous papers.

Our main empirical tests examine the relation between subjective life horizon and equity holdings. Throughout our analysis, we control for nonlinear age effects, which should mitigate concerns that our results are driven by variation in labor income risk (or other portfolio determinants correlated with age) over the life cycle. Our regression results consistently show that, conditional on stock market participation, the share of financial assets allocated to equities is positively related to subjective life horizon. This finding is in line with theoretical predictions. In economic terms, the effects are rather small, but certainly not negligible. In

our baseline setting, which controls for a range of demographic and socio-economic characteristics, age effects, survey year effects, and cohort effects (based on five-year intervals of year of birth), a horizon that is one year longer is associated with an equity share that is 0.07 percentage points higher. This implies that a one standard deviation change in horizon can explain more than 4.2% of one standard deviation in the risky share, independent of the effect of variation in age.

We then perform a number of tests on the robustness of our main finding that subjective life horizon and equity shares are positively correlated. First, we present evidence that horizon also affects equity investments on the extensive margin: equity market participation is positively related to subjective life horizon. In contrast, we do not find an effect on direct stock holdings, which should reduce worries that we are picking up the direct effects of optimism rather than variation in horizon. Second, we account for the endogeneity of the equity market participation decision by applying a Heckman selection model. The effect of subjective life horizon on equity shares remains unchanged. Third, we use data from the Health and Retirement Study to construct an alternative subjective life horizon measure that is moreover instrumented with the current age or age at death of the respondent's parents. This procedure mitigates concerns about measurement error, focal points, and reverse causality (Bloom et al., 2006), and about dispositional optimism driving our results. As before, we find a statistically significant positive effect of horizon on equity shares.

In the final part of our empirical analysis, we examine how horizon effects interact with bequest motives. In line with the hypothesis that households with bequest motives behave as if their investment horizon is infinite (Barro, 1974; Jappelli, 1999), we find evidence that

the presence of children attenuates the impact of a shortening horizon on equity shares. For childless households, a horizon that is shorter by one year is associated with an equity share that is 0.20 percentage points lower - implying that a one standard deviation change in horizon can explain more than 12% of one standard deviation in the risky share - while the effect only equals 0.05 percentage points for households with children. The impact of horizon on the risky asset share is thus four times stronger for households without bequest motives.

This paper relates to different strands of the literature. First, a number of papers have argued that optimal risk-taking behavior is affected by the investment horizon, thereby going against the constant-portfolio result of Mossin (1968), Merton (1969), and Samuelson (1969). Barberis (2000) and Campbell and Viceira (2002) present evidence for mean reversion in U.S. stock returns, while Bec and Gollier (2009) find similar results in France. These results imply that stocks are relatively less risky over longer horizons; the excess volatility of stocks relative to bonds may decrease even further with the length of the horizon if bond returns exhibit mean aversion (Bec and Gollier, 2009). But not only return predictability can make horizon a determinant of portfolio choice. Benartzi and Thaler (1995), Berkelaar et al. (2004), and Bovenberg et al. (2007) show that, if investors exhibit loss aversion (Kahneman and Tversky, 1979, 1992), risky assets become less attractive over shorter time horizons (or, at least, shorter evaluation periods). We can thus expect the risky asset share to decrease with subjective life horizon because of both return predictability and loss aversion. However, if investors acknowledge the statistical uncertainty about return predictability (Barberis, 2000) or behave myopically and evaluate their portfolios unnecessarily frequently (Benartzi and Thaler, 1995), the effect of subjectively expected life horizon on portfolio choice will be limited. To our knowledge, our paper is the first to empirically investigate this matter.

Second, a central issue in household financial decision-making is how to modify one's savings and investment behavior over the life cycle. Economic attitudes, background risks, and other determinants of portfolio choice may show age-related patterns. For example, variation in labor income risk (e.g., Viceira, 2001; Cocco et al., 2005; Benzoni et al., 2007) may induce variation in optimal portfolios over an investor's working life. Empirically, several papers have studied the explanatory power of age for portfolio choice (e.g., Poterba and Samwick, 2001; Ameriks and Zeldes, 2004; Fagereng et al., 2013). The goal of our paper is to disentangle horizon effects from portfolio determinants that vary with an individual's age, despite the close relation between age and remaining life span, through the introduction of a measure that reflects the existing variation in horizon beliefs within age groups.

Third, an existing literature stresses the importance of using subjective expectations in analyzing economic choices (e.g., Hamermesh, 1985; Manski, 2004; Hurd, 2009; Weber et al., 2013), and a number of studies specifically examine how individual financial decisions are influenced by beliefs about mortality. Hurd et al. (1998) find that the probability of saving depends on subjective beliefs about longevity. Brown et al. (2012) document that the expected likelihood of survival affects the choice between different types of streams of pension payments. Gan et al. (2004) argue that subjective survival rates perform better than objective probabilities in predicting wealth levels in a dynamic life-cycle model. Bloom et al. (2006) report that, at least for couples, a longer expected life horizon leads to more wealth accumulation. Salm (2010) shows that consumption growth is smaller for individuals with lower subjective survival probabilities, which is in line with the predictions of the standard life-cycle model of saving and consumption. However, in contrast to our work, these papers

do not consider investment choices.[2]

Fourth, and finally, this paper adds to the discussion of how the desire to leave a bequest affects household behavior. Research on wealth patterns among aging individuals faces difficulties in identifying the effects of bequest motives; saving for a bequest may be hard to disentangle from precautionary saving (Modigliani, 1988; Dynan et al., 2002), while wealth decumulation during retirement may reflect gifts to children rather than selfish behavior (Jappelli, 1999). We take a different approach to examining the relevance of bequests for financial decision-making, by studying how subjective life horizon manifests itself differently for households with and without children. We thus provide an indirect test of the hypothesis that bequest motives extend households' investment horizons (Barro, 1974; Jappelli, 1999).

The remainder of this paper is structured as follows. Section 2 describes the data and our horizon measure. Section 3 presents the empirical results. Section 4 checks the robustness of our findings. Section 5 investigates how bequest motives mediate the impact of subjective horizon on portfolio choice. Section 6 concludes.

1.2 Data and variables

1.2.1 Data collection

This study uses pooled cross-sectional data on U.S. households from the triennial Survey of Consumer Finances (SCF), which is conducted by the Federal Reserve Bank. Until 2007,

[2] At least since Yaari (1965), there has also been a literature on the effects of longevity risk, i.e., uncertainty about (changes in) survival rates, on economic decisions. For example, Cocco and Gomes (2012) study the implications of longevity risk on savings, investment, and retirement decisions. More closely related to our own work, Post and Hanewald (2013) relate dispersion in subjective survival expectations to objective longevity risk measures. However, our paper focuses on the cross-section of the point forecasts of remaining life span, not on uncertainty.

each survey covered approximately 4,400 households; in 2010, more than 6,000 households were interviewed. The sample is designed to overrepresent higher-income individuals. In this study, we use data from the SCF over the period 1995-2010, giving us a sample of 28,464 households. Because of missing values, range answers, and disclosure limitations, the SCF provides multiple imputations for its data (Kennickell, 1998). Each household therefore appears five times in our sample. Throughout our analysis, we account for these multiple imputations by adjusting our standard errors following techniques described by Little and Rubin (1987) and Montalto and Sung (1996). In line with prior work, we aggregate financial-economic data per household, while other information is collected at the level of the household head.

The SCF contains data on many demographic and socio-economic characteristics known to have explanatory power for risk tolerance and financial decision-making, such as age, gender, race, household composition, employment, education, and household income and wealth. Table 1.1 provides a detailed description of all control variables. It also introduces all dependent variables presented and used later in this study.

[Insert Table 1.1 about here]

Table 1.2 shows the descriptive statistics, which are informative about the composition of our sample. 78% of all household heads in the survey are male, 79% are white, 59% are married, and 86% have children. In terms of education and employment, we find that 46% of survey participants have a college degree, 17% are retired, and 24% are self-employed.

[Insert Table 1.2 about here]

1.2.2 Subjective life horizon

The SCF data have been used by a number of studies that examine lifetime asset allocation, such as Poterba and Samwick (2001) and Ameriks and Zeldes (2004). In contrast to this earlier research, we want to evaluate the role of horizon rather than age. To do so, we use responses to a question added to the SCF in 1995: "About how old do you think you will live to be?". We then define each respondent's subjective life horizon by subtracting his or her age from this self-assessed life expectancy:

$$subjective\ life\ horizon = expected\ age\ at\ death - current\ age. \tag{1.1}$$

Expected life span data were also utilized by Puri and Robinson (2007), who construct a measure of optimism by subtracting actuarial life expectancies (based on age, gender, and race, and with a correction for smoking behavior and education) from expected age at death. In other words, while our focus is on personal horizon beliefs, Puri and Robinson (2007) are interested in a miscalibration in beliefs. Importantly, a number of papers have established that variation in longevity expectations do not just reflect optimism relative to life tables. Subjective survival probabilities covary with factors such as income and health status, which are known to impact life expectancy but are not considered in the relatively coarse life tables (Hurd and McGarry, 1995, 2002). Moreover, subjective survival probabilities predict mortality even after controlling for a wide range of observable characteristics (Smith et al., 2001; Hurd and McGarry, 2002). Individuals thus possess private information on their mortality risk.

However, optimism may affect portfolio choices at least twofold. First, optimistic out-

looks, for instance about the development of the stock market, can directly lead to higher allocations of wealth to equities. Indeed, Puri and Robinson (2007) and Kaya (2012) examine the empirical relation between optimism and portfolio allocation. Second, optimism can imply a longer expected life horizon, which in turn may lead to larger equity market allocations due to the longer investment horizon. Similarly, health status can directly affect portfolio choices, as studied by Rosen and Wu (2004), Berkowitz and Qiu (2006), and Bogan and Fertig (2013). However, better health can also lead to longer investment horizons, which may affect portfolio allocations. Throughout our main empirical tests, we control for the direct effects of optimism and health on portfolio choice – although the aim of this paper is not to explain what drives expectations of remaining life span – we want to study whether horizon is a significant determinant of investment decisions after controlling for the direct effects of optimism and health on equity shares.[3]

The average household head in our study is 50.5 years old, and has a horizon of 32.1 years. Figure 1 shows the average subjective life horizon per age group for our sample of households. Unsurprisingly, we observe that horizon is a decreasing convex function of age. Also, in each group, the mean subjectively expected horizon is close to a gender-weighted average objective life horizon that is computed from the period life tables for each survey year provided by the National Center for Health Statistics (2012). Respondents report life expectancies that are on average 2.3 years above those warranted by the mortality rates in period life tables; the discrepancy is slightly more pronounced for males than for females. These findings are in line with Puri and Robinson (2007). A small positive difference may

[3]A poor health dummy equals one if the respondent rates his or her own health to be poor. An economic optimism dummy equals one for respondents who believe that the economy as a whole will do better over the next five years than it has done over the past five years. A final dummy indicates whether the respondent expects the household's total income to go up more than prices over the next year.

be expected as the SCF only surveys the non-institutionalized population, for whom the objective life expectancies exceed those of institutionalized individuals (Hurd and McGarry, 2002). In addition, a positive difference between the subjective and the objective period life horizon may reflect anticipated longevity increases over the respondent's life.

[Insert Figure 1.1 about here]

It is clear that examining the relation between investor horizon and portfolio choice is only relevant if horizons vary sufficiently within age groups. Figure 1.1 therefore also shows the 25^{th} and 75^{th} percentiles. There is substantial dispersion in subjective life horizons among households of the same age. For example, in the category of 45-year olds, the interquartile range covers horizons from 30 to 45 years. (The 5^{th} and 95^{th} percentiles of the distribution of life horizons for 45-year olds are 18 years and 55 years.) The quartiles converge to the average estimates for older respondents.

A linear regression of our horizon measure on a number of controls illustrates even better the variation in beliefs. In the first column of Table 1.3, we show that age and gender, race, and year – the factors typically considered in life tables – together explain 59.4% of the variation in subjective life horizon in our sample. In the second column, we add proxies for education, income, wealth, and health status – factors that have been shown to covary with objective life expectancy – to the model. All supplementary variables enter with the expected signs, but the R-squared increases by less than two percentage points. More than one third of the variation in horizon thus remains unexplained.[4]

[4]Results are similar when adding an indicator for whether the respondent has shown signs of sadness, which also has been documented to correlate with the objective life horizon.

[Insert Table 1.3 about here]

1.3 Results

1.3.1 Validating the horizon measure

To better understand the newly introduced horizon measure, we first examine its relation with a number of other variables in the SCF survey. Our general regression equation can be expressed as follows:

$$y_i = \beta_0 + \beta_1 subjective\ life\ horizon_i + \theta^{'} X_i + A_i + Y_i + C_i + \epsilon_i \tag{1.2}$$

where β_1 is the coefficient of interest, X is a vector of control variables, A represents age dummies for 1-year age groups, respectively, for single female, single male, couple female or couple male household heads, Y is a vector of survey year dummies, and C are cohort effects. Unless otherwise noted, all models are estimated using ordinary least squares. A particular methodological issue in household finance research is the multicollinearity between age, survey year, and year of birth effects (Ameriks and Zeldes, 2004). We break the collinearity by creating cohorts for individuals born in the same half decade; the results are robust to using different interval widths. An alternative identification strategy consists of proxying for cohort effects by the stock market returns during the respondent's youth, as individuals who experience higher stock market returns during their lives may be more likely to invest in equities (Malmendier and Nagel, 2011; Fagereng et al., 2013). All results presented in this paper are robust to replacing the cohort dummies by a variable that equals the return

of the S&P500 during the respondent's youth (age 15 to 25), mitigating concerns about multicollinearity issues or misidentification of cohort effects driving our results.

Both in this and the following sections, we limit our analysis to respondents with a subjective life horizon of between one and 50 years, as the relative relevance of a marginal change in horizon is limited for individuals with very long horizons. Excluding horizons of more than 50 years may furthermore reduce concerns that our findings are driven by respondents not understanding or refusing to answer the question truthfully. All results are also robust to trimming observations at the 1^{st} and 99^{th} percentile of subjective life horizon per age group.

In a first model, we look at how subjective life horizon correlates with a self-reported (albeit not very precise) categorical financial planning horizon measure. All households are asked which time period is the most important in planning saving and spending; the options range from "the next few months" (1) to "longer than 10 years" (5). In the first column of Table 1.4, we relate this variable to subjective life horizon and to gender, race, household composition, education, employment status, income and wealth, ownership of non-public equity, age dummies, survey year dummies, and cohort effects. We see a statistically highly significant positive correlation between the self-reported planning horizon and our own proxy for investor horizon.

[Insert Table 1.4 about here]

Second, for those respondents in the SCF survey that are working full-time, we have information on their expected retirement age. We can thus define the subjective retirement horizon as follows:

$$\textit{subjective retirement horizon} = \textit{expected age at retirement} - \textit{current age}. \tag{1.3}$$

The retirement horizons vary markedly within age groups, although less than the life horizons. (In the category of 45-year olds, the interquartile range now goes from 14 to 20 years.) The second column in Table 1.4 shows that, even after controlling for the same household characteristics as before, there is a positive relation between subjective life horizon and retirement intentions. This finding confirms recent evidence for the Netherlands presented by Van Solinge and Henkens (2010).

Finally, we look at savings behavior; whether to save for precautionary and life cycle motives or not is a key decision in household finance. Households with longer subjective life horizons can be expected to save more. The dependent variable in the third column of Table 1.4 is a dummy that equals one for households that claim to have spent less than their income over the year prior to the interview. The probit model is estimated using maximum likelihood. As an alternative to self-reported saving behavior, we examine the total dollar amount accumulated in retirement accounts and other annuity accounts, conditional on owning such accounts. We find statistically significant relations between subjective life horizon and both of our proxies for savings behavior. This result is in line with previous evidence that, among elderly individuals, saving is not only correlated with observable characteristics that covary with life expectancy (De Nardi et al., 2010), but also with subjective survival probabilities (Hurd et al., 1998; Bloom et al., 2006).

These initial findings validate our horizon measure, and suggest that households indeed take into account their expected life horizon when making economic and financial decisions.

1.3.2 Subjective life horizon and risk tolerance

We have argued before that households with longer horizons should be more tolerant to risk, and therefore invest more in equities. Before investigating the relation between horizon and portfolio choice, we examine the correlation between horizon and self-assessed risk tolerance. Our dependent variable is an indicator variable that equals one if the household declares to be willing to take "average" to "substantial" financial risks in expectation of average to substantial returns. It equals zero if the household is "not willing to take any financial risks"; 34% of all households belong to this category. The last column of Table 1.4 shows the results of our probit model, estimated using maximum likelihood. We find that households with longer horizons are significantly more tolerant of financial risk. The probit coefficient implies that a one-year lengthening of subjective life horizon increases the likelihood of being willing to take some financial risks by 0.12 percentage points. Over the full range of horizons considered, i.e., from one to 50 years, variation in subjective life horizon is thus associated with differences in the dependent variable of up to 6 percentage points.

1.3.3 Subjective life horizon and equity portfolio shares

We now turn to investigating the relation between subjectively expected life horizon and equity portfolio shares. We know for each respondent whether he or she participates in the equity market (directly or indirectly, for example through investments in mutual funds or IRAs). For the respondents with equity investments, we compute the importance of equities relative to all financial assets in the household's portfolio. For 59% of all household-year combinations, we observe non-zero equity holdings; conditional on participation, respondents

have on average approximately half of their financial assets invested in equities.

To motivate the analysis, we first compute the average equity share for each 1-year subjective life horizon group, conditional on owning equities. This average equity share correlates significantly and positively with the subjective life horizon, and increases by 4.7% when moving from respondents with a horizon of less than 10 years, to respondents with a horizon between 40 and 50 years. Indeed, in a simple regression model without any control variables, a 1-year longer horizon is associated with an increase in the equity share of 0.12 percentage points (unreported).

We repeat the multivariate model presented before, but now with equity share as the dependent variable. We also limit the sample to households that participate in the equity market. The baseline regression results are reported in the first column of Table 1.5. In line with expectations, we find that the risky asset share is a statistically significant positive function of subjective life horizon. Keeping other characteristics unchanged, an investor with a horizon that is longer by one year is predicted to allocate 0.07 percentage points more to equities. A one standard deviation change in horizon can explain 4.2% of a standard deviation in the equity share.[5] The effect of subjective life horizon on portfolio choice is thus certainly not negligible. (Comparable results are obtained in a non-parametric set-up that replaces the continuous horizon variable with five-year horizon interval dummies. In an alternative test we also employ a tobit estimator with trunctuation at zero, and find a horizon coefficient that is more than 23% larger compared to the results from the conditional

[5] A difference in horizon of 50 years is thus associated with a difference in equity share of three and a half percentage points. (To put this result in perspective: owners of a college degree allocate almost five percentage points more to equities, while self-employed individuals have a risky share that is about three percentage points lower, ceteris paribus.) Since the average equity share is 0.48, such an absolute difference corresponds to a relative difference of about 7% in the allocation to equities.

OLS model (unreported).) The coefficients on the control variables in the regression model in Table 1.5 generally carry the expected signs.[6]

[Insert Table 1.5 about here]

Rosen and Wu (2004) argue that pooling single household heads with married ones leads to estimation issues. In the second and third column of Table 1.5, we therefore report the estimated coefficients for singles and couples separately. Not surprisingly, we find a larger horizon effect for singles than for married individuals, although the coefficient remains statistically significant in both subgroups. To study spouse's survival, in a separate analysis we examine the importance of partner's horizon beliefs while controlling for partner's age (unreported). However, only the expected horizon of the household head is a significant determinant of the equity share. As another robustness test, replacing the marital status by an indicator for the existence of a partner (or spouse), does not change the importance of the household head's horizon.

1.4 Robustness checks and extensions

1.4.1 Equity market participation and stock-picking

So far we have considered decisions made on the intensive margin – the proportion of financial assets allocated to equities. We can also examine the impact of horizon on equity investments along the extensive margin, by using as the dependent variable an indicator that equals one when the household participates in the equity market. We limit our sample to households

[6]Because net income and net worth are skewed in our data, we repeat all analyses with decile indicators. The effects of horizon are robust in these alternative specifications (unreported).

that own at least $5,000 in financial assets to reduce the potential bias arising from fixed participation costs, but the results are robust to applying different thresholds. We estimate a probit model using maximum likelihood in the first column of Panel A in Table 1.6. We find a relation between equity market participation and expected horizon that is significantly positive. A computation of the marginal effect shows that a difference in horizon of one year is associated with a difference in probability of equity market participation of 0.06 percentage points.

[Insert Table 1.6 about here]

We can also examine the proportion of equity wealth that is held directly (rather than in stock mutual funds, for example), conditional on equity market participation. The results in the second column of Table 1.6 show that, as expected, there is no relation between expected horizon and stock-picking. These results further support our argument that expected life horizon is not just a proxy for optimism. (Puri and Robinson (2007) find a strong relation between optimism and direct holdings.)

1.4.2 Heckman selection model

We now account for the endogeneity of the equity market participation decision, by applying a Heckman selection model. The selection equation models the decision of a household to participate in the stock market. The outcome equation explains the equity portfolio share, conditional on equity market participation. In both equations we include the same set of control variables as in our baseline model. Additionally, we use as an exclusion restriction a dummy variable that equals one if the household's financial wealth exceeds $5,000. Indeed,

fixed participation costs are often cited as a reason for limited equity market participation. However, the threshold should not determine the equity share conditional on participation.[7] We estimate our selection model using maximum likelihood. The results are reported in Panel B of Table 1.6. Subjective life horizon positively affects both the probability of participating in the equity market and the equity share conditional on participation, in line with the results presented before.

1.4.3 Instrumenting subjective life horizon

Potential disadvantages of using subjective probabilities or expectations include measurement errors, focal point answers, and reverse causality (Bloom et al., 2006). As there is strong evidence that individuals rely on the longevity of relatives when forming expectations of their own age at death (Hamermesh, 1985; Hurd and McGarry, 1995, 2002; Smith et al., 2001), instrumenting subjective life expectancy with parental survival may correct for these issues. Indeed, Bloom et al. (2006) find that instrumented survival probabilities better predict mortality than non-instrumented ones. An instrumented horizon measure should also be unrelated to cross-sectional variation in optimism.

As the SCF does not provide detailed information on the respondents' parents, we use data provided by the Health and Retirement Study (HRS). This longitudinal study surveys a panel of American individuals of 50 years or older every two years. We use the RAND HRS data files, which contain cleaned and derived variables, for the years 1992-2010. We consider each household in the year in which it entered the survey for the first time. The HRS

[7]Financial wealth as an exclusion restriction is also consistent with the classic Merton portfolio model that implies that the conditional equity share is independent from financial wealth (Fagereng et al., 2013).

asks for the subjective probabilities of reaching 75 and 85, not the expected age at death, but we translate these probabilities into an implied subjective life horizon. The details of this procedure can be found in Appendix A. We then instrument this alternative life horizon measure with the age of the respondent's parents at the time of the survey or their age at death. Following Bloom et al. (2006), we consider 12 instrumental dummies for the mortality experience of the parents. For both mother and father, we have the following six indicator variables: alive and younger than 75, alive and between 75 and 85, alive and older than 85, age at death below 75, age at death between 75 and 85, and age at death above 85.

Table 1.7 re-examines the relation between equity shares and subjective life horizon when instrumenting horizon. We include the same demographic and socio-economic controls as before. For the first stage, we see that subjectively expected life horizon generally increases with the current age or age at death of the parents. The F-test on the instruments gives a value of 7.09. In the second stage, we find a coefficient that is much larger than before: a horizon that is one year longer is now associated with an equity share that is 1.66 percentage points higher. The effect is statistically significant at the ten percent level.

[Insert Table 1.7 about here]

1.5 The impact of bequest motives

For household with bequest motives, variation in subjective life horizon should matter less for decision-making, because these households can be expected to behave as if their horizon were infinite (Barro, 1974; Jappelli, 1999). We investigate whether there are indeed differences in the effects of horizon on equity investments between respondents with and without bequest

motives. In line with prior work by Hurd (1987, 1989) and Inkmann and Michaelides (2012), we assume that a respondent has bequest motives if he or she has children. We are thus interested in the coefficient on a new interaction term between the children indicator and the horizon variable.

Table 1.8 shows how horizon determines equity shares for bequest households versus no-bequest households. For households without children, the effect of subjective life horizon is substantially more pronounced than before. For instance, a one-year longer horizon is associated with an equity share that is 0.20 higher, implying that a one standard deviation change in horizon can explain more than 12% of one standard deviation in the risky share. The interaction term of interest takes a negative sign, consistent with the hypothesis that the portfolios of households with children are affected less by changes in life horizon. The effect of horizon on the equity share is four times larger for households without children than for households with children. Bequest motives thus appear to partially offset the horizon effect on risky asset allocation decisions. Figure 1.2 plots the predicted average equity shares, and illustrates that households with children sell off less of their equity positions as their horizon shortens.

[Insert Table 1.8 and Figure 1.2 about here]

These results are robust to a number of untabulated sensitivity checks, such as adding an indicator variable that equals one if saving for the family is listed as one of the household's most important reasons for saving.

1.6 Conclusion

Motivated by a literature that highlights the importance of investor horizon in portfolio allocation, this paper examines the relationship between subjective expectations of remaining life span and financial risk-taking. We document substantial variation in subjective life horizon, even after controlling for age, gender, and various demographic and socio-economic characteristics.

Subjective life horizon correlates positively with a self-reported financial planning horizon, the subjective retirement horizon, and (pension) savings. Also subjective risk tolerance increases with the expected horizon.

Our main empirical result is that longer subjective life horizons are associated with higher equity shares, ceteris paribus. The effect is stronger for singles than for couples. The result is also robust to accounting for the endogeneity of equity market participation through a Heckman selection model, or instrumenting subjectively expected life horizon with the mortality experience of the respondent's parents. Finally, we find that the effect of a shortening life horizon on portfolio choice can be offset by bequest motives.

Our results provide empirical evidence on the relative importance of the life horizon of individual investors. They also highlight the role played by subjective expectations in household financial decision-making.

Appendix A. Computation of implied subjective life horizon

For each respondent we compare the subjective survival probability to reach age 75 to the objective probability, based on the respondent's transition probabilities by age and gender (Richards, 2010). For example, a 60-year old woman may estimate the subjective probability of reaching age 75 of 90%, instead of the objective probability of 80% that follows from life tables. Indeed, with 90% probability it can only be said that the woman reaches age 70 (instead of her estimated age 75). We add this difference of five years to the objective life horizon for a 60-year old woman to obtain a proxy for her subjective life horizon. Thus, we map the deviation from the actuarial survival probability, Δp, into a discrepancy in horizon relative to life tables, Δh, as illustrated in Figure A1. We repeat the procedure starting from the respondent's subjective probability to reach 85, giving us a second approximation of the respondent's subjective life horizon. We then take the average of the two values to obtain the implied subjective life horizon.

[Insert Figure 3 about here]

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Table 1.1: Definitions

This table presents definitions for the control and the dependent variables used in this study. The data come from the Survey of Consumer Finances (1995-2010).

Variable	Description	Values
Age	Year of survey - year of birth	
Male	Sex of the respondent	male=1; female=0
Race: white, hispanic, other	'Which of these categories do you feel best describe you: white, black or African-American, Hispanic, Asian, Native American, or another race?'	Black as baseline
Married	'Are you currently married, or living with a partner, separated, divorced, widowed, or (have you) never been married?'	married=1; other=0
Children	Does the respondent indicate to have at least one child?	yes=1; no=0
College	'Did you get a college degree?'	yes=1; no=0
Highschool	Does the respondent have a high school diploma as highest degree?	yes=1; no=0
Retired	'Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a student, a homemaker, or what?'	retired=1; other=0
Self-employed	'Do you work for someone else, (are you) self-employed, or what?'	self-employed=1; other=0
Net income	Net income	
Net worth	Total assets - total liabilities	
Business equity	'Do you own or share ownership in any privately-held businesses, farms, professional practices, limited partnerships or any other types of partnerships? Do not include corporations with publicly-traded stock.'	yes=1; no=0
Economic optimism	'Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years?'	better=1; other=0
Income optimism	'Over the next year, do you expect your total income to go up more than prices, less than prices, or about the same as prices?'	up more=1; other=0
Poor health	'Would you say your health is excellent, good, fair, or poor?'	poor=1; other=0
Fin. wealth >$5,000	(Quasi-) liquid accounts + certificates of deposit + investment funds + stocks + bonds + cash-value life insurance + other fin. assets	fin. wealth >$5,000 = 1; other=0
Financial plan. horizon	'In planning your saving and spending, which of the time periods listed on this page is most important to you?'	few months (1) to $\geq$ 10 years (5)
Subjective ret. horizon	Expected age at retirement - current age	
Saving	'Over the past year, would you say that your spending exceeded your income, that it was about the same as your income, or that you spent less than your income?'	spent less than income=1; other=0
Pensions	Total retirement accounts + other annuities	
Risk tolerant	'Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?'	willing to take some financial risk=1; other=0
Equity market participation	Does the household have a non-zero investment in directly held stock, stock mutual funds, or retirement and saving accounts in stocks?	yes=1; no=0
Equity share	(Directly held stock + stock mutual funds + retirement and saving accounts in stock) / financial assets	
Direct holdings	Directly held stock / (directly held stock + stock mutual funds + retirement and saving accounts in stock)	

Table 1.2: Descriptive statistics

This table presents descriptive statistics (number of observations and mean, and 25th percentile, median, and 75th percentile for continuous variables) for the control and dependent variables used in this study. All variables are defined in Table 1.1. Net income and net worth are trimmed at the 1st and 99th percentile. The data come from the Survey of Consumer Finances (1995-2010).

Variable	N	Mean	P25	P50	P75
Age	142,319	50.53	38	50	62
Male	142,319	0.78			
White	142,319	0.79			
Hispanic	142,319	0.07			
Other race	142,319	0.04			
Married	142,319	0.59			
Children	142,319	0.86			
College	142,319	0.46			
Highschool	142,319	0.26			
Retired	142,319	0.17			
Self-employed	142,319	0.24			
Net income	135,211	158,265	24,674	51,712	115,897
Net worth	135,198	1,782,767	17,000	146,955	815,000
Business equity	142,319	0.29			
Poor health	142,319	0.05			
Economic optimism	142,319	0.36			
Income optimism	142,319	0.25			
Fin. wealth >$5,000	135,198	0.77			
Financial planning horizon	142,319	3.15	2	3	4
Subjective retirement horizon	76,296	17.68	9	16	25
Saving	142,319	0.51			
Pensions	82,184	283,731	15,000	66,000	263,300
Risk tolerant	142,319	0.66			
Equity market participation	142,319	0.59			
Equity share	84,397	0.49	0.25	0.48	0.73
Direct holdings	84,397	0.37	0.00	0.00	0.51

Table 1.3: Explaining variation in subjective life horizon

This table reports the results of set of regressions explaining subjective life horizon (i.e, self-assessed life expectancy minus current age). The dependent variable is trimmed at the 1st and 99th percentile per age group. All models are estimated using OLS. Age effects are indicator variables for each 1-year age group by gender. All independent variables are defined in Table 1.1. The data come from the Survey of Consumer Finances (1995-2010). Standard errors corrected for multiple imputations are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Subj. life horizon	Subj. life horizon
White	-3.7584***	-4.7512***
	(0.2754)	(0.2724)
Hispanic	-4.4405***	-4.3312***
	(0.3721)	(0.3608)
Other	-4.8497***	-5.8614***
	(0.4249)	(0.4169)
College		1.2471***
		(0.1856)
Highschool		-0.6158***
		(0.1893)
Ln(net income)		0.0833
		(0.0783)
Ln(net worth)		0.3149***
		(0.0480)
Poor health		-8.5175***
		(0.3472)
Economic optimism		0.9918***
		(0.1508)
Income optimism		1.3107***
		(0.1651)
Age effects	Yes	Yes
Year effects	Yes	Yes
Adjusted R-squared	0.5941	0.6171
Observations	128,439	128,439

Table 1.4: Validating the horizon measure and the relation with risk tolerance

This table shows the results of a set of regressions explaining the financial planning horizon, the subjective retirement horizon, (pension) savings behavior, and risk tolerance. The probit models in the third and fifth column are estimated using maximum likelihood. All other models are estimated using OLS. Subjective life horizon is defined as self-assessed life expectancy minus current age. Age effects are indicator variables for each 1-year age group by gender and marital status of the household head. All other variables are defined in Table 1.1. Cohort effects group together respondents born in the same half decade. The data come from the Survey of Consumer Finances (1995-2010). Standard errors corrected for multiple imputations are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Planning horizon	Subj. ret. horizon	Saving	Ln(pensions)	Risk tolerant
Subj. life horizon	0.0071***	0.0670***	0.0035***	0.0055***	0.0044***
	(0.0011)	(0.0069)	(0.0011)	(0.0015)	(0.0012)
White	0.2454***	1.8687***	0.0812**	0.1907***	0.2178***
	(0.0336)	(0.2328)	(0.0368)	(0.0645)	(0.0378)
Hispanic	-0.0837*	0.8454***	0.0514	-0.0989	-0.2506***
	(0.0466)	(0.3256)	(0.0512)	(0.0856)	(0.0523)
Other race	0.1921***	0.9853***	0.2335***	0.0963	-0.0496
	(0.0539)	(0.3357)	(0.0587)	(0.0923)	(0.0617)
Children	-0.0449	0.3748**	-0.2674***	-0.1584***	-0.0948***
	(0.0285)	(0.1907)	(0.0321)	(0.0432)	(0.0354)
College	0.1651***	0.4289***	0.0597**	0.4780***	0.4377***
	(0.0219)	(0.1602)	(0.0248)	(0.0323)	(0.0267)
Highschool	-0.0100	-0.0340	0.0250	-0.0389	-0.0253
	(0.0228)	(0.1734)	(0.0253)	(0.0389)	(0.0260)
Retired	0.0904***	0.0000	-0.0800**	-0.1022**	0.0468
	(0.0282)	(0.0000)	(0.0324)	(0.0418)	(0.0360)
Self-employed	-0.0657***	0.7420***	-0.0315	-0.2579***	-0.0034
	(0.0253)	(0.1692)	(0.0294)	(0.0378)	(0.0344)
Ln(net income)	0.0727***	0.1577**	0.2133***	0.0573***	0.1592***
	(0.0095)	(0.0800)	(0.0116)	(0.0147)	(0.0129)
Ln(net worth)	0.1087***	-0.5772***	0.1099***	0.5187***	0.1484***
	(0.0062)	(0.0531)	(0.0070)	(0.0119)	(0.0075)
Business equity	-0.0063	0.2509	-0.1015***	-0.2732***	0.0413
	(0.0259)	(0.1819)	(0.0294)	(0.0367)	(0.0340)
Poor health	-0.2379***	-0.9242	-0.3029***	-0.2086**	-0.3171***
	(0.0403)	(0.5842)	(0.0468)	(0.0880)	(0.0477)
Economic optimism	0.0067	-0.2641**	0.0500**	0.0059	0.1322***
	(0.0176)	(0.1274)	(0.0200)	(0.0256)	(0.0221)
Income optimism	-0.0120	-0.0567	0.1314***	-0.0337	0.1211***
	(0.0201)	(0.1285)	(0.0235)	(0.0294)	(0.0271)
Age effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.1940	0.6385	0.1594	0.5605	0.2647
Observations	111,068	58,181	111,068	70,922	111,068

Table 1.5: Subjective life horizon and equity portfolio shares

This table shows the results of a set of regressions explaining equity portfolio shares. All models are estimated using OLS. Subjective life horizon is defined as self-assessed life expectancy minus current age. Age effects are indicator variables for each 1-year age group by gender and marital status of the household head. All other variables are defined in Table 1.1. Cohort effects group together respondents born in the same half decade. The data come from the Survey of Consumer Finances (1995-2010). Standard errors corrected for multiple imputations are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Equity share *Full sample*	Equity share *Singles*	Equity share *Couples*
Subj. life horizon	0.0007**	0.0014**	0.0006*
	(0.0003)	(0.0007)	(0.0003)
White	0.0422***	0.0474**	0.0373*
	(0.0152)	(0.0229)	(0.0193)
Hispanic	0.0211	0.0403	0.0189
	(0.0220)	(0.0411)	(0.0252)
Other race	0.0212	0.0695	0.0057
	(0.0218)	(0.0431)	(0.0247)
Children	0.0030	0.0091	0.0118
	(0.0093)	(0.0143)	(0.0124)
College	0.0485***	0.0257	0.0554***
	(0.0072)	(0.0171)	(0.0079)
Highschool	-0.0020	0.0066	-0.0032
	(0.0082)	(0.0182)	(0.0093)
Retired	-0.0119	-0.0428**	-0.0026
	(0.0086)	(0.0184)	(0.0095)
Self-employed	-0.0317***	-0.0412**	-0.0297***
	(0.0073)	(0.0202)	(0.0076)
Ln(net income)	0.0019	-0.0034	0.0056
	(0.0030)	(0.0064)	(0.0039)
Ln(net worth)	0.0120***	0.0123***	0.0122***
	(0.0023)	(0.0047)	(0.0029)
Business equity	-0.0118	-0.0229	-0.0109
	(0.0076)	(0.0202)	(0.0079)
Poor health	-0.0342*	-0.0102	-0.0394*
	(0.0204)	(0.0380)	(0.0232)
Economic optimism	0.0155***	0.0192*	0.0128**
	(0.0053)	(0.0115)	(0.0061)
Income optimism	0.0139**	0.0044	0.0147**
	(0.0060)	(0.0146)	(0.0067)
Age effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes
Adjusted R-squared	0.0535	0.0672	0.0590
Observations	72,477	18,938	53,539

Table 1.6: Robustness checks and extensions

This table shows in Panel A the results of a set of regressions explaining equity market participation and direct stock holdings. The probit model in the first column is estimated using maximum likelihood, and the second column is estimated using OLS. Panel B reports the results of a Heckman selection model that explains equity portfolio shares accounting for the endogeneity of the equity market participation decision. The first column shows the selection equation, while the second column shows the outcome equation. The model is estimated using maximum likelihood. Subjective life horizon is defined as self-assessed life expectancy minus current age. Age effects are indicator variables for each 1-year age group by gender and marital status of the household head. All other variables are defined in Table 1.1. Cohort effects group together respondents born in the same half decade. The data come from the Survey of Consumer Finances (1995-2010). Standard errors corrected for multiple imputations are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Extensive margin and stock picking			Panel B: Heckman selection model	
			Selection eq.	*Outcome eq.*
	Equity market participation	Direct holdings	Equity market participation	Equity share
Subj. life horizon	0.0027*	-0.0003	0.0025*	0.0008**
	(0.0015)	(0.0004)	(0.0014)	(0.0003)
White	0.3059***	0.0035	0.3609***	0.0404***
	(0.0499)	(0.0167)	(0.0469)	(0.0131)
Hispanic	-0.1753**	-0.0274	-0.0813	0.0115
	(0.0730)	(0.0236)	(0.0680)	(0.0189)
Other race	0.0165	0.0094	0.0602	0.0135
	(0.0760)	(0.0227)	(0.0716)	(0.0176)
Children	-0.0862**	-0.0069	-0.0582	0.0059
	(0.0423)	(0.0106)	(0.0398)	(0.0086)
College	0.3375***	-0.0059	0.3535***	0.0509***
	(0.0313)	(0.0080)	(0.0253)	(0.0070)
Highschool	-0.0357	-0.0042	-0.04648	-0.0011
	(0.0327)	(0.0097)	(0.03072)	(0.0079)
Retired	-0.0945**	0.0524***	-0.1001**	-0.0136*
	(0.0423)	(0.0100)	(0.0403)	(0.0081)
Self-employed	-0.4365***	0.0020	-0.4507***	-0.0300***
	(0.0399)	(0.0088)	(0.0387)	(0.0072)
Ln(net income)	0.1884***	0.0175***	0.1907***	0.0022
	(0.0163)	(0.0036)	(0.0154)	(0.0029)
Ln(net worth)	0.2146***	0.0446***	0.1970***	0.0126***
	(0.0111)	(0.0028)	(0.0104)	(0.0026)
Business equity	-0.0779**	0.0062	-0.0358	-0.0144**
	(0.0389)	(0.0087)	(0.0377)	(0.0070)
Poor health	-0.3030***	0.0303	-0.3133***	-0.0260
	(0.0651)	(0.0216)	(0.0615)	(0.0180)
Economic optimism	0.0550**	0.0004	0.0649**	0.0131**
	(0.0266)	(0.0062)	(0.0253)	(0.0051)
Income optimism	0.0352	0.0140**	0.0349	0.0127**
	(0.0324)	(0.0069)	(0.0307)	(0.0056)
Fin. wealth >$5,000			0.9011***	
			(0.0527)	
Age effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Adjusted R-squared	0.2295	0.1971		
Observations	89,101	72,477	111,068	111,068

Table 1.7: Instrumenting subjective life horizon

This table reports the results of a two-step regression analysis in which an implied subjective life horizon measure is instrumented with parental survival in a first stage, and the effect of subjective life horizon on equity shares is re-examined in the second stage. The computation of the implied horizon measure is detailed in Appendix A of this paper. The data come from the Health and Retirement Study (1992-2010). Control variables similar to those used in Table 1.5 are included. Cohort effects group together respondents born in the same half decade. Standard errors are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	First stage	*Second stage*
	Implied subj. life horizon	Equity share
Implied subj. life horizon		0.0166*
		(0.0085)
Mother deceased at age <75	-0.5149	
	(1.2910)	
Mother deceased at age 75-85	0.4313	
	(1.3025)	
Mother deceased at age >85	0.7640	
	(1.3479)	
Father deceased at age <75	-0.7977	
	(1.0617)	
Father deceased at age 75-85	0.1026	
	(1.0752)	
Father deceased age >85	0.2800	
	(1.1323)	
Mother alive and age <75	0.5636	
	(1.3700)	
Mother alive and age 75-85	0.9272	
	(1.2869)	
Mother alive and age >85	2.7227**	
	(1.3375)	
Father alive and age <75	0.1534	
	(1.4034)	
Father alive and age 75-85	1.0450	
	(1.0929)	
Father alive and age >85	0.3417	
	(1.2192)	
Control variables	Yes	Yes
Age effects	Yes	Yes
Year effects	Yes	Yes
Cohort effects	Yes	Yes
F-test (first stage)	7.09***	
Observations	3,212	3,212

Table 1.8: Bequest motives and the effect of subjective life horizon

This table shows the result of a regression that explains equity portfolio shares. Subjective life horizon is defined as self-assessed life expectancy minus current age. The same control variables as in Table 1.5 are included. Age effects are indicator variables for each 1-year age group by gender and marital status of the household head. Cohort effects group together respondents born in the same half decade. All control variables are defined in Table 1.1. The data come from the Survey of Consumer Finances (1995-2010). Standard errors corrected for multiple imputations are reported below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Equity share
Subj. life horizon	0.0020***
	(0.0007)
Children x subj. life horizon	-0.0015**
	(0.0007)
Children	0.0477**
	(0.0245)
Control variables	Yes
Age effects	Yes
Year effects	Yes
Cohort effects	Yes
R-squared	0.0503
Observations	72,477

Figure 1.1: Distribution of subjective life horizons per age group

This figure presents the mean, the 25th percentile, and the 75th percentile of the distribution of subjective life horizons for each age group. Subjective life horizon is defined as self-assessed life expectancy minus current age. The data come from the Survey of Consumer Finances (1995-2010). The figure also shows the average objective life horizon, adjusted for the for the gender composition of our sample, for each age group. The objective life horizons are computed using period life tables for each survey year from the National Center for Health Statistics (2012).

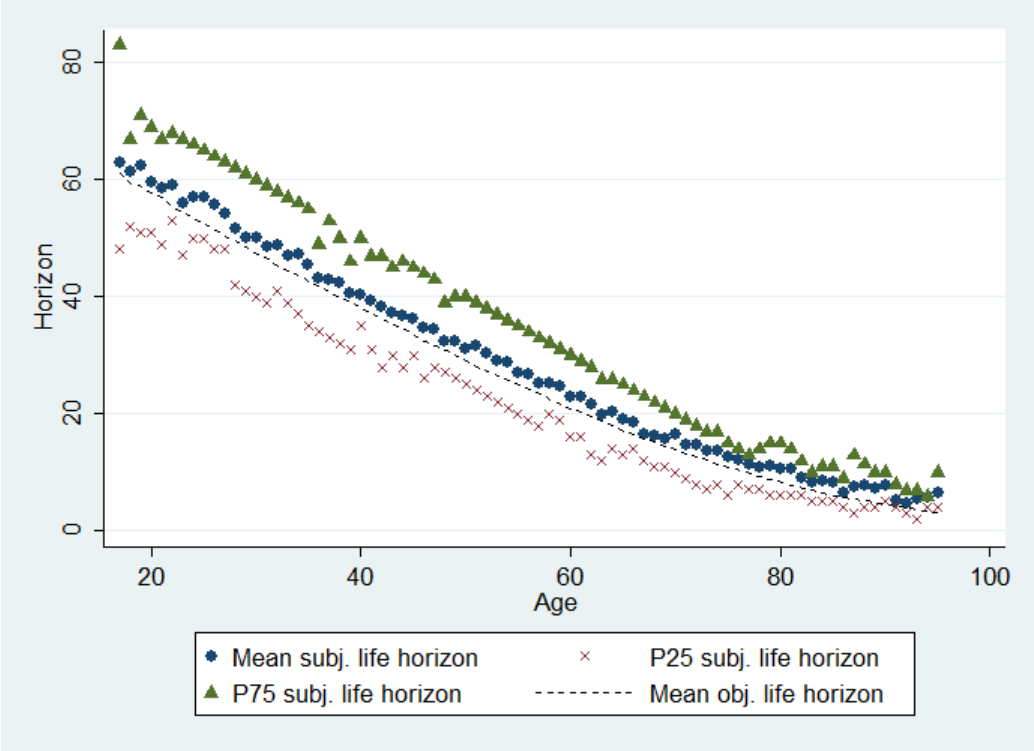


Figure 1.2: Bequest motives and the effect of subjective life horizon

This figure shows the predicted average equity share over subjective life horizons, for households without and with bequest motives, based on the regression result reported in Table 1.8.

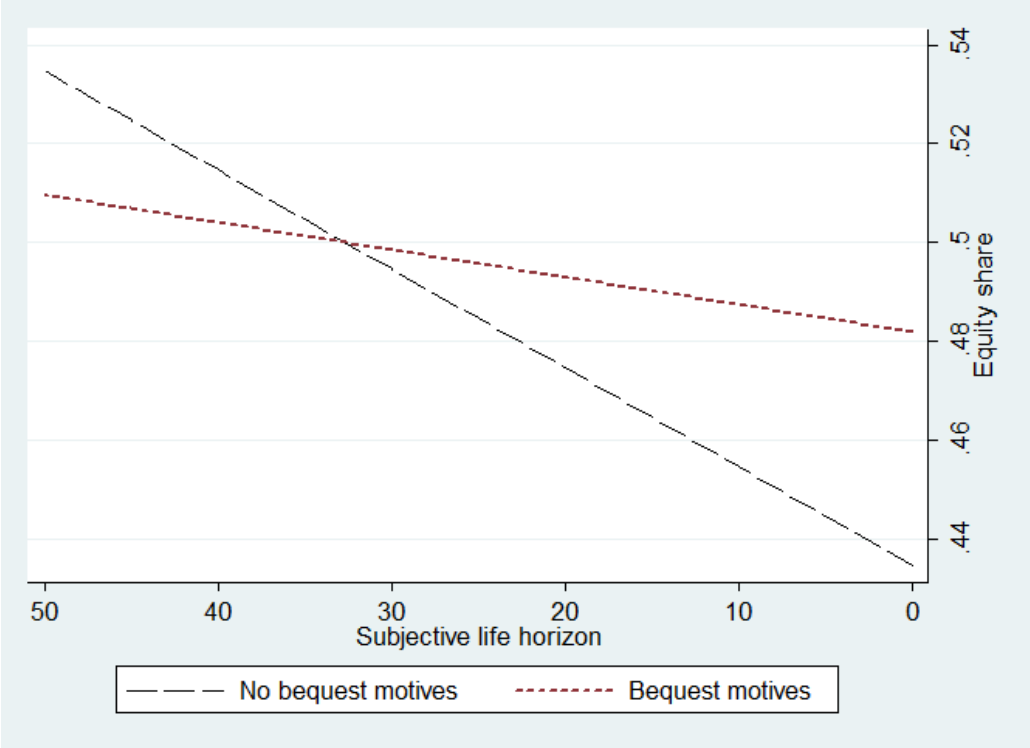
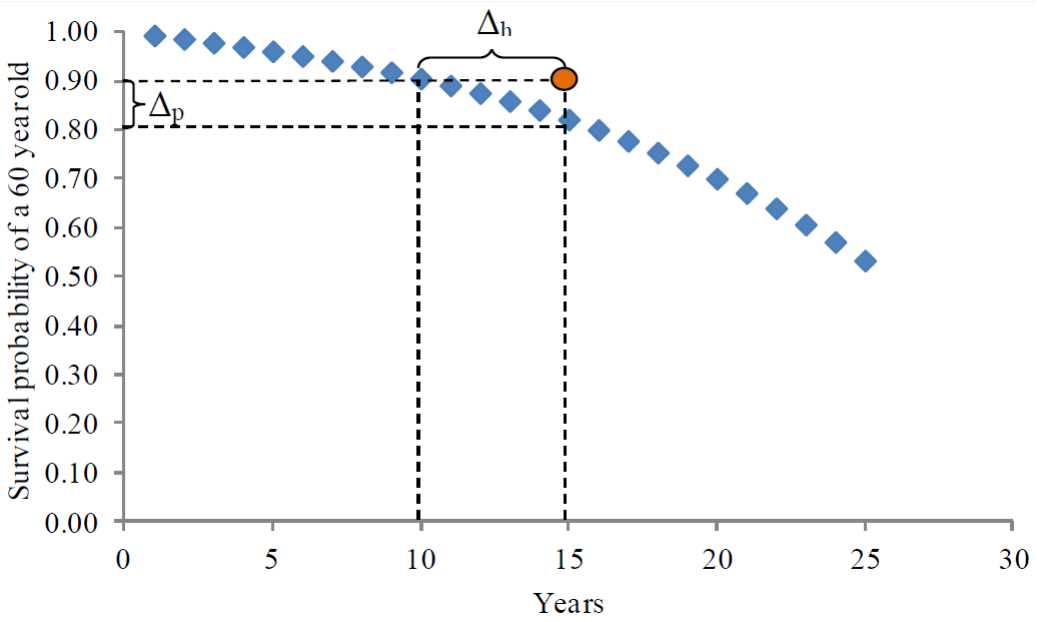


Figure 1.3: Computation of implied subjective life horizon

This figure shows how a difference between the subjective survival probability and the actuarial survival probability, Δ p, is mapped into an implied deviation of subjective life horizon from objective life horizon, Δ h. The example uses the case of a 60-year old woman who believes she has a 90% chance of reaching 75 years, while her objective probability of reaching that age is 80%.



Chapter 2

Does the Early Bird Catch the Worm? Firstborns and Their Financial Decisions

2.1 Introduction

"The family is our haven, the place where we all start off on equal footing - or so we like to think."

(Dalton Conley, 2004)[1]

Seminal theoretical papers predict homogenous behavior of households with respect to the optimal decision to participate in the stock market, to hold diversified portfolios and to save (Merton, 1969; Samuelson, 1969; Modigliani and Brumberg, 1954). In contrast, the empirical evidence consistently reports widespread investment mistakes such as households' non-participation in the equity market or stock picking behavior (Guiso et al., 2002). Despite continuous advances in the literature, the significant heterogeneity in financial household decisions remains a puzzle (Guiso et al., 2002; Curcuru et al., 2009).

A recent stream of empirical research shows that personal experiences of economic fluctuations affect choices of both households and companies (Kaustia and Knüpfer, 2008; Choi et al., 2009; Malmendier and Nagel, 2011; Malmendier and Nagel, 2013; Malmendier et al., 2011; Greenwood and Nagel, 2009). Similarly, career experiences in form of service in the military influence CEO decisions (Benmelech and Fryman, 2013; Malmendier et al., 2011). However, the question whether individuals' *family* experiences affect their decisions has received little attention. In particular, do differences in personal experiences that are systematically implied by birth order, matter for households' financial decision-making?

The importance of birth order as an experiential phenomenon has been documented for individuals' personality traits, such as being motivated, and for individuals' educational attainments and income (Eckstein et al., 2010). A large number of theories have been put

[1] Author of the book "The Pecking Order: A Bold New Look at How Family and Society Determine Who We Become"

forward that attempt to explain how birth order shapes individuals (Adams, 1972). While no consensus on the most appropriate theory has been reached, the common denominator of all current models is that birth order leads to different experiences.[2] I build on this existing literature and use birth order as a proxy for different family experiences.

I investigate data from the Survey of Consumer Finances (SCF) in order to identify the birth order of individuals. The data allows to control for demographic characteristics such as gender, race, number of siblings, age, cohort, and year effects. Moreover, I can add potentially correlated socio-economic control variables, such as educational attainment and income – factors that have been shown to depend on birth order (Black et al., 2005), but that are known to also determine financial decisions. Finally, I build an alternative dataset from the Panel Study of Income Dynamics (PSID) in order to distinguish between inter- and intra-family variation by including family fixed effects.

The first objective of the paper is to examine the potential relevance of birth order for financial household decisions. I document that in comparison to later borns, firstborns save more, although they plan to retire later and are more likely to hold life insurance. They are also more likely to participate in the stock market, to hold higher conditional equity shares, and to have undertaken profitable investments in the year prior to the interview. I find that firstborns gather more information by consulting financial advisors and by shopping around to learn about the different conditions that banks offer. Moreover, conditional on being optimistic, firstborns seem to act more on this bias. Finally, firstborns tend to be more

[2]In the past, firstborn effects have also been related to genetic differences. However, medical research shows that unless parents exceed certain age thresholds, no genetic differences are found between firstborns and later borns. Moreover, recent research finds little evidence that genetic differences could explain away birth order effects (Black et al., 2007).

prone to commit the investment mistake of stock picking.

The second objective of the paper is to explore the finding of the importance of birth order. First, I do not find any differences in portfolio choices between later borns and individuals without siblings (only children). Second, in contrast to firstborns, last borns do not differ in their financial decisions from middle children. Thus, the effects indeed stem from being firstborn in combination with having siblings. Third, although parents are inevitably younger at the time of birth of their first child compared to subsequent siblings, I show that parents' age is not driving the reported firstborn effects. Fourth, the findings do not seem to be age-dependent and firstborns are also not more likely to be optimistic. Finally, I identify that my results arise from intra- instead of inter-family variation.

The present paper makes three contributions to the literature. First, while life experiences should not matter according to classic finance models, ceteris paribus, I document that birth order can explain part of the heterogeneity in financial household decisions. The firstborn effect for financial decisions seems to be generally consistent with higher financial sophistication. Indeed, firstborns seek more financial information and such information acquisition has been shown to be important for overcoming ignorance and misperceptions (Haliassos and Bertaut, 1995). However, because firstborns are at least as likely as later borns to do the common mistake of stock picking, differences in financial sophistication do not seem to fully explain the findings (Canner et al., 1997).

Second, I find that the importance of birth order for individuals' financial decision-making is de facto a firstborn effect. Similar to firstborns with siblings, *only children* have been associated with higher IQs and higher resource allocation of their parents (Mancillas, 2006;

Black et al., 2007). However, investors without siblings do not differ in their investment behavior from later borns. Thus, the effect seems to stem from having younger siblings instead of the listed characteristics that are associated with *only children*. Moreover, last born individuals also do not seem to differ in their portfolio choices from other non-firstborns, casting doubt on the relevance of an optimal stopping model, in which parents stop having children when they have a "poor quality" child (Black et al., 2005). While the role of genes for portfolio choices have been documented (Barnea et al., 2010; Cesarini et al., 2009; Cesarini et al., 2010), genetic differences do not seem to cause the firstborn effect. This is because parents' age, which measures the risk of genetic mutations, does not explain away the predictive power of birth order. Finally, firstborns are not more likely to be optimistic, which casts doubt on differences in behavior due to "effort optimism", i.e., the belief that acquiring skills and knowledge will be worthwhile (Matthew, 2011).

Third, I document that firstborns accept greater financial risks but smaller physical risks. In comparison to later borns, I find *higher* risk tolerance and conditional equity shares for firstborns. In contrast, Argys et al. (2006) report that firstborn children are less likely to use tobacco, alcohol, marijuana or be sexually active, in a paper called "Birth Order and Risky Adolescent Behavior".[3] Even though they cannot distinguish between "risky or delinquent behaviors", their results are easily misinterpreted as firstborns being generally more risk averse. Importantly, risk taking is defined in psychology and finance research as e.g., "any consciously, or non-consciously controlled behavior with a perceived uncertainty about its outcome, and/or about its benefits or costs for the physical, economic or psycho-social well-being of oneself or others." (Trimpop, 1994). Thus, there does not seem to be a universal

[3]In line with their results, I find smoking to be less common among firstborns in my data.

risk aversion but it varies with the nature of the activity.

Taken together, my results show that personal family experiences play an important role for the financial decision-making of individuals. This finding sheds light on an additional dimension of the importance of an individual's past for her economic choices (cf. supra). Life experiences, implied by birth order, seem to coin individuals' behavior. Adams (1972) suggests six categories of birth order theories. My results seem consistent with siblings acting as role models or competitors (*theory of sibling influence*), and firstborn children reacting to the arrival of newborn siblings in order to restore their place (*theory of dethronement*). I do not find that the documented firstborn effects on financial decision-making are driven by genetic differences, variation in parents' resources during early childhood, or changes in the anxiousness of parents or the economic environment (and thus, my findings are more difficult to reconcile with the *intrauterine or physiological theory*, *only-child uniqueness theory*, *anxious or relaxed parents theory*, and *economic theory*, respectively (Adams, 1972)).

The organization of this paper is structured as follows. Section 2 reviews the related literature and the data is described in Section 3. Section 4 presents the empirical results for savings and portfolio choices, and then investigates the decision-making process. Section 5 explores potential explanations and provides robustness tests. Section 6 discusses the results and relates the documented findings to existing birth order research. Section 7 concludes.

2.2 Related literature

2.2.1 Economic and career experiences affect economic choices

The rational choice theory describes the decision-making process as a set of personal functions so that an agent chooses the best action subject to existing constraints. The model is generally used to show how an agent, given her preferences, can rationally act, without elaborating where her preferences stem from (e.g., Becker, 1976).

A recent empirical literature highlights that an individual's experiences affect beliefs and preferences. Alesina and Fuchs-Schündeln (2005) find preferences for redistribution and state interventions among households that formerly lived under a Communist regime. The role of reinforcement learning, i.e., the importance of personal experiences, is highlighted by Kaustia and Knüpfer (2008) and Choi et al. (2009). Focusing on the Great Depression, Graham and Narasimhan (2004) and Schoar and Zu (2011) show a decrease in the faith in external capital markets. Malmendier and Nagel (2011) observe that the experienced states of the stock market affect individuals' willingness to take financial risks. Low experienced stock market returns make participation in the equity market less likely and, conditional on participation, decreases the equity share of financial wealth. Moreover, Guiso et al. (2013) document that risk aversion increases after experiencing crises.

Additionally, individual-specific experiences also have been shown to affect individuals' decisions. In particular military service and combat exposure are shown to affect life choices (Elder, 1986; Elder and Clipp, 1989). Analyzing corporate policies, Malmendier et al. (2011) find that firms whose CEOs served in the military have increased leverage. In turn, Benmelech and Frydman (2013) document that military CEOs are associated with lower investment

levels and more ethical behavior of firms.

2.2.2 The importance of birth order

In the psychology, education and labor economics literature, birth order is a well-documented experiential phenomenon.[4] Numerous theories exist why birth order may affect child outcome.[5] Adams (1972) proposes six categories of birth order theories, to which I relate respective hypotheses with regard to firstborn effects:

(1) *Intrauterine or physiological theory* suggests that the mother's age and number of births leads to genetic differences in children. Therefore, controlling for the risk of genetic mutations should explain away birth order effects.

(2) *Only-child uniqueness theory* builds on the undivided time and interest of parents at youth (Guilford and Worcester, 1930). Similar to Zajonc (1976), Behrman and Taubman (1986) write that "the oldest child has some periods, particularly during presumably critical early years, when he or she has less competition for mother's time". Hence, firstborn siblings may exhibit a similar behavior as only children.

(3) *Dethronement theory* describes that firstborns react to the arrival of a sibling to restore his or her place of preeminence (Adler, 1928). In this case, the effects should be exclusive to individuals with siblings.

(4) *Anxious or relaxed parent theory*, suggesting that parents are more protective of their

[4]Several bibliographies on birth order research have been composed. For instance, Stewart and Stewart (1995) identify 1,065 relevant birth order publications between 1976 and 1993. Based on the findings of this literature, some general hypotheses between birth order and financial decisions arise: Compared to later borns, firstborns are expected to be more likely to save, to be risk averse, to diversify and to seek financial advice.

[5]An exhaustive summary of birth order theories is beyond the scope of this paper. See Eckstein et al. (2010) for a survey of the literature.

firstborn child (Roberts, 1938). Such protectionism may lead to less risk taking by firstborn children (cf. supra).

(5) *Sibling influence theory* proposes that siblings act as role models or competitors. The importance of social interactions and role models, such as older siblings, as a determinant of aspirations and norms of individuals have been highlighted by Rodgers et al. (1992) and Haveman and Wolfe (1995). Similar to the theory of dethronement, birth order effects should be exclusive to children with siblings.

(6) *Economic theory* conjectures that the parents' economic resources vary with birth order. On the one hand, the firstborn may benefit from scarce educational funds that he or she can spend. On the other hand, later born children may experience greater spending since family income rises (Birdsall, 1991). Thus, birth order effects should vary with socio-economic levels. Because household income and net wealth tend to be a function of age, controlling for the parents' age at the time of birth should explain away birth order effects.[6]

It should be noted that many birth order theories are not mutually exclusive. Moreover, no consensus exists on the most appropriate category of birth order theories, let alone on the most adequate specific birth order model. However, in line with the medical literature, Black et al. (2007) find that effects stemming from birth order do not seem to be biologically determined (cf. infra). Therefore, the birth order theory of physiological differences finds less recent support. Importantly, the common denominator of the remaining theories is that they build on socialization, and therefore implied differences in experiences for firstborns compared to later borns.

[6] A cleaner test would be to directly control for parents' household income and net wealth at the time of birth. However, household finance surveys do not track individuals long enough to allow such an analysis (yet).

Surveying 200 birth order articles from the psychology and sociology literature, Eckstein et al. (2010) document that firstborns are typically associated with being "high achievers", "motivated", and "ambitious". In economics, Black et al. (2005) find that higher birth order has a strong negative effect on educational attainment and income, and they acknowledge that their results are consistent with numerous birth order theories.

2.3 Data and Variables

2.3.1 Data collection

This study draws on data from the Survey of Consumer Finances (SCF), a pooled cross-sectional dataset on U.S. households. I use data from the SCF waves 1995 until 2010, due to changes in the questionnaire prior to 1995. Similar to other household surveys, the SCF reports multiple imputations of data in order to address missing or range answers, as well as disclosure limitations (Kennickell, 1998). Because each household appears five times in the sample, standard errors have to be adjusted following techniques suggested by Little and Rubin (1987) and Montalto and Sung (1996). I aggregate financial data per household, and keep individual-specific information, such as race and age, at the level of the household head. A comprehensive list of the variables used in this study are detailed and defined in Table 2.1.

[Insert Table 2.1 about here]

The SCF does not provide complete information on the family structure, and in particular does not allow to identify descendents from the same family. Thus, I construct a second dataset from the Panel Study of Income Dynamics (PSID). In order to accurately identify

the number of siblings and their birth order, I limit the observations to respondents whose parents were interviewed in the first wave in the year 1968, and the whole family structure can be extracted in the latest wave. Since the number of variables is limited in this second dataset, I will use it for robustness tests. First and foremost, this data allows me to generate family fixed effects in order to test whether the firstborn effect is indeed an intra-family effect.

2.3.2 Descriptive statistics

Table 2.2 outlines the average descriptive statistics of the control variables and dependent variables used throughout this study. The average respondent is 50.5 years old. When comparing firstborns with later borns (untabulated), I find as expected that firstborns are on average older (51.8 years) than later borns (50.1 years). The difference of 1.7 years is rather small, but statistically significant. On average, 61.6% of firstborns are married and 58.6% of later borns. 86.6% of firstborns have children, compared to 85.5% of later borns. Moreover, of firstborns 50.7% have a college degree and 25.1% are self-employed, compared to only 44.0% and 23.6% among later borns, respectively. Finally, 78% of all household heads in the survey are male, 17% are retired. Because the data on net worth and net income are skewed I compute the natural logarithm. As a robustness check I test and find that the importance of birth order remains when controlling for net worth and net income with decile indicators (unreported).

[Insert Table 2.2 about here]

2.4 Results

To study the financial decision-making behavior of firstborns, I estimate a multivariate regression model. The regression equation can be expressed as follows:

$$y_i = \beta_0 + \beta_1 firstborn_i + \theta^{'} X_i + siblings_i + A_i + Y_i + C_i + \epsilon_i \tag{2.1}$$

where β_1 is the coefficient of interest. Blake (1989) describes in detail the rigorous data requirements to study birth order effects. The control variables include the usual age effects (A), a vector of survey year indicators (Y) and cohort groups (C). In particular, firstborns are older and likely to be from a different cohort than their siblings. Thus, I group cohorts for individuals born in the same half of a decade. Moreover, building on the result of Malmendier and Nagel (2011), I replace the cohort dummies by a variable that equals the return of the S&P500 during the respondent's youth (age 15 to 25). Since the findings are robust to this alternative specification, this mitigates the concern that my results are driven by multicollinearity issues or misidentification of cohort effects.

The number of siblings is a key control variable in order to not confound birth order with family size effects (*siblings*). For instance, wealthier and better educated families tend to have, ceteris paribus, fewer children. Thus, when interviewing a respondent from a small family, the likelihood of interviewing a firstborn is higher since the person is chosen from a smaller group. Hence, without controlling for the family size, firstborns may proxy for the social background of the family, and I would confound the effects of birth order with family size (and related economic differences between families). Thus, I control for the number

of siblings in all regression models. Because the majority of the birth order theories relate the effects to the existence of siblings, I restrict the sample to respondents with siblings. However, in an extension, I will include individuals without siblings in the analysis.

Finally, for the main results I estimate the regression models with and without a vector of additional control variables (X). While I always control for gender and race, socio-economic control variables such as education and income have been shown to depend on birth order (Black et al., 2005). Without controlling for these correlated variables, the specification measures the total explanatory power of birth order for an economic decision. When including all control variables, *firstborn* only captures the effect of birth order that does not affect the economic decision indirectly through other observable characteristics.[7] In order to test for potential multicollinearity concerns in this second specification, I compute the variance inflation factor (VIF) (Woolridge, 2004). The VIF equals 1.09, suggesting that the standard error of the firstborn coefficient is inflated by less than 10% compared to if the additional control variables were uncorrelated.

2.4.1 The decision to save, work and take insurance

The saving decision is one of the key financial decisions a household makes.[8] Therefore, I examine the savings behavior of firstborns in comparison to later borns. The dependent variable is a saving indicator equal to one if the household spent less than their income over

[7]The problem of "bad controls" would only arise if the financial decision conditional on the socio-economic characteristics does not have a causal interpretation. However, birth order may affect financial decision-making manifold. For instance, educational attainment and income could be channels through which birth order could affect decisions. Nonetheless, even when controlling for the factors that act as channels, birth order may be important due to differences in personality, preferences or beliefs, either directly or due to different weightings of these characteristics among firstborns.

[8]For an extensive review of the literature see Browning and Lusardi (1996).

the twelve months prior to the interview. As an alternative specification, I examine the dollar amount saved in retirement accounts, conditional on the existence of such accounts. The results in Table 2.3 show a statistically highly significant relation between being firstborn and both measures of savings behavior. For instance, a computation of the predicted marginal effect indicates that firstborns are 2.71 percentage points more likely to be saving than later borns, corresponding to a 5.3% relative increase in the saving probability (column 1).[9] When introducing all control variables, this effect decreases by 40% but remains statistically significant (column 2). Moreover, the order of magnitude is comparable to the importance of a college degree.

[Insert Table 2.3 about here]

A potential explanation for differences in savings behavior is that some individuals plan to retire sooner. Columns 5 and 6 of Table 2.3 examine the planned retirement age and, indeed, larger pension savings lead to a younger planned retirement age. However, firstborns plan to work between 3 and 4 months longer than later borns. In comparison, self-employment status leads to a planned retirement age that is 10.7 months higher, indicating that the first-born effect is not negligible. Moreover, the finding of later retirement among self-employed individuals is consistent with previous research (e.g., Bartel and Sicherman, 1993).

Finally, Lusardi (1998) documents the importance of the precautionary saving motive for retirement. Therefore, some individuals may regard saving and insurance as substitutes. Since I find that firstborns are more likely to be savers, I examine their holding of insurance.

[9]When using maximum likelihood estimation, I compute predicted marginal effects for the economic interpretation of the (birth order) variables in the text, while I report the simple regression coefficients in the tables due to the computing capacity required when using data with multiple imputations.

The dependent variable in columns 9 and 10 (Table 2.3) is a dummy equal to one if a household holds a life insurance contract. The results report that firstborns are statistically more likely to own insurance. The size of the effect corresponds to more than 30% of the importance of the marital status, a natural determinant of insurance taking.

2.4.2 Portfolio choices

Now, I turn to investigating how birth order affects portfolio choices. For each respondent, I examine the self-assessed risk tolerance, stock market participation, and for respondents who participate in the equity market, the fraction of financial assets invested in equities, and self-reported past investment success.

In Panel A of Table 2.4, I first examine whether individuals are willing to take "average or higher" financial risks, when they can expect "average or higher" returns. The dependent variable is zero otherwise. Columns 1 and 2 show that firstborns report to be significantly more risk tolerant. The effect again decreases by 30% when all control variables are included but stays significant at the 10% level.

[Insert Table 2.4 about here]

Next, I study the decision to participate in the stock market. In columns 3 to 6 of Panel A, I examine the probability to hold bonds and the decision to hold equities. In all specifications, firstborns are more likely to participate in either market. Indeed, the predicted marginal increase in the likelihood of participating in the bond and equity market equals 6.7% and 6.2%, respectively. The introduction of all potentially correlated control variables reduce the effects by approximately a third. Moreover, the control variables generally carry

the expected signs, so that educated and wealthier individuals are more likely to participate in the stock market.

In Panel B of Table 2.4 I study the explanatory power of being firstborn for the equity shares in household portfolios, conditional on holding equities. In the first two columns, I observe that being firstborn increases the financial wealth allocated to equities between 1.3 and 1.7 percentage points. Thus, birth order can explain up to 6% of one standard deviation in the risky share allocation. In magnitude, this also corresponds to more than 37% of the gender effect, an economically important determinant of risk taking (Barber and Odean, 2001). Moreover, columns 3 and 4 report that firstborns are significantly more likely to report successful past investments.[10]

2.4.3 The decision-making process

This section examines how firstborns may differ in the decision-making process from later borns. I investigate first the information seeking behavior of firstborns, and second, the relative importance of beliefs.

Seeking of information when making financial decisions

Haliassos and Bertaut (1995) highlight the importance of the information acquisition for overcoming ignorance and misperceptions, which otherwise may lead to not investing in the stock market. However, Bhattacharya et al. (2012) find little demand for unbiased and free information in form of financial advice. They conclude that the problem of improving investors' investment decisions stems from a lack of demand for advice. For firstborns, the

[10]Because the SCF does not inquire detailed portfolio information, I cannot examine objectively how the superior performance was realized.

higher educational attainment has, among other factors, been attributed to the observance that firstborns are more information seeking during schooling (Bradley, 1968). Therefore, I examine the information seeking behavior of firstborns versus later borns when making financial decisions.

The SCF asks four questions that can be used to examine the information gathering behavior of household heads. First, the dependent variable is an indicator if individuals consult a financial advisor when making borrowing or investment decisions. Second, I replace the indicator with a variable that measures whether respondents contact multiple banks in order to compare conditions when borrowing or investing.

Columns 1 and 2 of Panel A in Table 2.5 examine the decision to consult a financial advisor when borrowing. On average, only 16.5% of the sample ask for such advice. Thus, the predicted margin of a 1.1 percentage point increase in the probability to consult an advisor when being a firstborn, corresponds to a 6.5% relative increase (column 1). The effect remains significant and equally important when adding the correlated control variables in column 2. When investing, 40.3% of the households in the sample consult with a financial advisor, so that being born first, leads to a 8.4% relative increase in the probability to consult an advisor (column 3). However, although it stays significant, the effect drops to 3.3% when adding the correlated control variables (column 4).

[Insert Table 2.5 about here]

In Panel B of Table 2.5, the first two columns study the individual's behavior of shopping around at different banks in order to compare conditions when borrowing. Keeping other characteristics constant, I find that firstborns are significantly more likely to engage in shop-

ping around. Column 3 and column 4 confirm that the behavior of firstborns is consistent when making investment decisions.

The importance of beliefs

Individuals have limited attention so that they need to allocate their resources (Kahneman, 1973). Because the previous analysis shows that firstborns gather more financial information, I conjecture that firstborns are more attentive. This is consistent with Corwin and Coughenour (2008) who describe attention limits as not being able to continuously incorporate information. The supposition is further supported by two findings. First, for a small sample, the SCF captures two frequent measures of investor attention: the number and the frequency of trades.[11] Corwin and Coughenour (2008) show a temporary negative correlation of these measures with investor inattention. Being firstborn correlates positively with both attention proxies (untabulated). Second, Eckstein et al. (2010) report that the psychology literature describes firstborns as being more motivated and ambitious – characteristics that may be associated with increased attention (Bradley, 1968).

As part of the decision-making process, the importance of behavioral biases such as optimism or overconfidence have been well documented in the literature (e.g., Barber and Odean, 2000, 2001; Puri and Robinson, 2007). Peress and Schmidt (2014) present evidence that the effects of behavioral biases are mitigated if an investor is inattentive. In order to test for differences in the decision-making process, I examine the relative importance of beliefs, specifically optimism. Because firstborns seem more attentive, firstborns may be more likely to

[11]The SCF data is only available per year. Therefore, my analysis builds on the assumption that the total number and frequency of trades is not only a proxy of investor attention during the time of inattention, but can also be used at the yearly frequency in order to identify more (or less) attentive investors, i.e., person characteristics.

act on their beliefs. This hypothesis predicts that when investors are optimistic, the effect is more pronounced for firstborns than for later borns.

The SCF allows me to use three main proxies for optimism and investor sentiment. First, I define optimism similar to Puri and Robinson (2007) as the miscalibration in life expectancy, second, as optimistic forecasts for the U.S. economy, and third, as an indicator variable if the stock market performance of the S&P 500 in the year prior to the interview was positive. The main variable of interest in this analysis is now the interaction term between firstborns and optimism. I predict a positive coefficient as firstborns are more motivated, which leads to more attention, and results in a more pronounced optimism effect.

In Table 2.6, Panel A presents the results when distinguishing the optimism effect on portfolio choice by birth order. We can see that all interaction terms of firstborns and the optimism measures are positive, although only 4 out of 6 are statistically significant. Columns 1 to 3 examine the decision to participate in the equity market. For two out of the three optimism specifications I find that the effect of optimism for the participation decision is more pronounced for firstborns. Indeed, for the decision to participate in the equity market, only the effect of optimism about the U.S. economy is not different between firstborns and later borns (column 2).

[Insert Table 2.6 about here]

Columns 4 to 6 of Panel A show the results when examining the risky share allocation, conditional on participating in the equity market. Again, the effect of optimism tends to be more important for firstborns than for later borns. Only the interaction of firstborn and the

optimism proxy according to Puri and Robinson (2007) fails to show up significantly.[12] Taken together, this analysis suggests that if optimists are firstborn, they act more on their bias than later borns. This highlights an additional discrepancy in the decision-making process of firstborns and later borns. Moreover, the observed differences are in line with the hypothesis that firstborns are more motivated and, potentially, more attentive.[13]

A key concept that influences portfolio choice is the risk tolerance of individuals. Indeed, the theoretical literature suggests that while all individuals should participate in the equity market, the fraction of wealth allocated to equities should be determined by the individual's risk aversion. If firstborns act more on their beliefs, it may be expected that they also act more on their risk tolerance. I examine this relationship by introducing an interaction term of birth order and risk tolerance (*firstborn X risk tolerance*) to the equity share model, expecting a positive loading on the coefficient. Panel B of Table 2.6 reports the results. Independent from controlling for the socio-economic characteristics (columns 1 and 2), the interaction term is statistically significantly positive. The effect of risk tolerance on the conditional equity share is between 3.0 and 3.4 percentage points larger for firstborns compared to the effect of risk tolerance for later borns. This result supports the hypothesis that firstborns act more on their beliefs.[14]

[12]This may be expected because in their paper they do not obtain a significant effect of optimism on the equity share allocation.

[13]Different forms or levels of assuming responsibility may also be consistent with the observed effects.

[14]The analyses in Panel A and Panel B also show that in 7 out of 8 columns, the main effect of firstborns becomes statistically insignificant when adding interaction terms with optimism or risk tolerance. One potential explanation for this observation is that firstborns act on their beliefs so that if they are not optimistic or risk tolerant, and the interaction terms equal zero, they are not more likely to hold equities or a larger equity share. Therefore, the effects of birth order may be an effect that drives the degree to which individuals act on their beliefs.

2.5 Extensions and exploratory tests

In the following section, I explore the main results, in particular with regard to possible explanations for the reported findings. Moreover, I conduct and report robustness tests for the importance of birth order for individuals' financial decision-making.

2.5.1 Firstborns versus only children

While initially rejected by Rodgers et al. (2000), recent findings suggest that firstborns may have higher IQs (Black et al., 2007). Mancillas (2006) report comparable effects for *only children*. Thus, if intelligence is the main reason for my findings, I should find similar effects for only children as for firstborns with siblings. Similarly, if early, undiluted parental resources are a main driver of the firstborn effect, only children should display similar behavior (Blake, 1989). Finally, comparing the behavior of firstborns with and without siblings investigates whether firstborns invest differently as they may expect a larger bequest compared to later borns.[15]

In Table 2.7, I repeat the analyses of the portfolio choices of households. It can directly be seen that the *only child* indicator is insignificant in all specifications. Moreover, in 6 out of 10 regression specifications, the coefficients of *only child* bear the opposite signs of the firstborn effect. Finally, firstborn remains a significant, and almost unchanged, factor in all specifications. Thus, the firstborn effect seems to depend on having younger siblings.

[Insert Table 2.7 about here]

[15]However, differences in (expected) bequests are unlikely to drive the results since it stands in contrast with the findings on the savings behavior and only finds little support in the empirical literature.

2.5.2 Firstborns versus last born children

Among the many theories of birth order effects, an optimal stopping model has been proposed. The model states that parents continue to have children until they have a child of "poor quality". Black et al. (2005) report evidence that includes a potential "last child" effect, even though it is not the factor driving their birth order results. By introducing an indicator variable for last born children, I test whether the firstborn effects that I have documented are, instead, last born effects. Thus, the implied hypothesis predicts that the coefficient of last born enters the regression models with the opposite sign of the firstborn effect, and decreases the explanatory power of the firstborn indicator.

Table 2.8 shows the results when adding an indicator for individuals that are born last. First, the effect from being born last is never significant. Moreover, only once does *last born* enter the model with the opposite sign of the firstborn effect (for the decision to participate in the equity market). Second, the firstborn effect only becomes insignificant in the last specification when examining past investment success. Indeed, the coefficient is unchanged and the standard error increases (p-value 0.102). Thus, I do not find evidence consistent with an optimal stopping model and it does not seem to drive the documented firstborn effects.

[Insert Table 2.8 about here]

2.5.3 Firstborns and parents' age

Two explanations are frequently provided in the literature why the birth order effect may be (partly) driven by parental age. First, parents are inevitably younger when their first child is

born, compared to subsequent children. While later borns are not genetically different from firstborns, this only holds as long as parental age does not exceed certain thresholds (Brown et al., 2002; Hassold and Hunt, 2009; Kong et al., 2012). The medical literature documents that the risk of genetic mutations, measured as the child's risk of being affected by syndromes and diseases, increases when women are older than 35, or the man is older than 45 at the time of the child's birth. Since genetic variation is shown to affect portfolio choices, it is important to control for the risk of genetic mutations (Barnea et al., 2010; Cesarini et al., 2009; Cesarini et al., 2010). Second, households typically evolve as they age. For instance, wealth gets accumulated so that later born children may grow up in a wealthier family if parents are older at their time of birth. Similarly, parents may have had different experiences, energy or priorities when they are older, which could lead to differences in child outcomes.

I examine both potential explanations for the documented firstborn effect. For all reported values, first, I create indicator variables whether the mother's or father's age exceeds the critical thresholds for the risk of mutations. Second, I simply include parents' age as direct control variables. Comparable results are obtained for polynomial parental age functions, or the inclusion of indicator variables if no data is available available for deceased parents (not tabulated). Table 2.9 reports the results when controlling for both forms of parents' age. First, in 9 out of 10 specifications, the firstborn effect survives controlling for parents' age. Indeed, only the effect of firstborns on risk tolerance becomes insignificant when adding the linear age variables, but it continues to carry a positive sign and is close to significant (p-value 0.138). Second, only 4 of the 20 parents' age variables enter the models significantly. Therefore, the firstborn effect cannot be mainly attributed to parents' age and deduced explanations.

[Insert Table 2.9 about here]

2.5.4 Firstborns, age and optimism

In the following test, I examine whether the firstborn effect differs by age. This analysis is motivated by at least two reasons. First, the psychology literature does not provide a clear prediction whether the importance of birth order effects varies by age profile. Second, the SCF only allows me to identify living siblings, so that the risk of mis-identifying firstborns seems higher for older individuals. Thus, I interact the firstborn indicator with an binary variable for whether the respondent's age exceeds the median age of the sample (*older*).

Table 2.10 reports the results of a set of regressions when differentiating the firstborn effect by age. In Panel A and Panel B, the firstborn indicators, which measure the birth order effect for the younger half of the sample, continue to carry the same sign as before. Moreover, the interaction term (*Firstborn X Older*), which measures whether the birth order effect differs for older individuals, is insignificant in all specifications. In 6 out of 10 specifications the interaction term carries a positive sign, indicating that the firstborn effect may be more pronounced for older invidiuals, whereas in the remaining 4 specifications a negative sign is found.[16]

[Insert Table 2.10 about here]

[16]In another set of tests, I examine whether the firstborn effect is gender-specific. The psychology literature provides mixed evidence on whether firstborn effects are gender-specific. Because I examine the gender of the household head, it should be noted that the tests may suffer from a small sample bias (only 22% of respondents are female). Moreover, similar to other surveys, the SCF and PSID automatically define the household head as male in mixed-sex couples. Thus, this analysis is likely to suffer from biased estimates (Kleinjans, 2013). Overall, I do not find convincing evidence that the firstborn effect on portfolio choice is gender-specific.

In additional tests, I examine whether the firstborn effect depends on the marital status. In addition to estimation issues that may arise when pooling couples with single households (Rosen and Wu, 2004), a partner may mitigate the importance of the household head's personal characteristics. However, I do not find any evidence for differences in the importance of birth order by marital status (untabulated). A potential explanation for this could be a non-random selection in the type of partner an individual marries. Being a firstborn increases the likelihood of marrying a partner who is also firstborn by more than 6%, a statistically significant effect at the 1% level, controlling for the number of siblings of both partners. I also find that the birth order of the spouse tends to affect financial decisions in the same direction as the birth order of the respondent although the coefficients on the partner's birth order tend to be smaller and less significant (untabulated).

When studying portfolio choice, some of the firstborn effects seem consistent with the hypothesis that firstborns are simply optimists. Moreover, Matthew (2011) shows that "effort optimism", i.e., the belief that acquiring skills and knowledge will be worthwhile, can partly explain differences in educational outcomes, although his analysis focuses on the differences between black and white students. Therefore, the question arises whether firstborns may be generally more optimistic than later borns. The SCF enables me to study economic and income optimism, as well as stock picking behavior, which has been documented to be more frequent among optimists (Puri and Robinson, 2007).

Table 2.11 shows that firstborns are not more optimistic than later born respondents. In column 1, when studying economic optimism, *firstborn* carries a negative but insignificant coefficient. In turn, in the second column, an insignificant, positive coefficient is associated

with being firstborn. Finally, as measures for stock picking behavior, I divide direct stock-holdings by total equity holdings, and also consider the number of stocks held. I find no effect on the fraction of directly held stock holdings (column 3). However, column 4 shows that firstborns tend to hold statistically significantly fewer individual stocks. Therefore, I conclude that firstborns are at least not less likely to do the investment mistake of stock picking, and that this behavior is not driven by differences in optimism.

[Insert Table 2.11 about here]

In order to test for consistency of my SCF data and the identification strategy with other studies, I also examine the effect of firstborns on educational attainment and smoking behavior. In column 5 of Table 2.11, I find similar to Black et al. (2005) that firstborns are more likely to obtain a college degree. In addition, I also observe a negative effect of being firstborn on the probability to smoke (Argys et al., 2006).

2.5.5 Inter- and intra-family variation

A potential concern with my findings is that firstborn may be picking up inter-family instead of intra-family differences. Adding family fixed effects to the models would mitigate this concern. Because the SCF does not provide more detailed family information, I use the PSID in order to repeat the main tests of this paper. Of course, the number of siblings does not vary within families, so that I drop the collinear controls of the number of siblings from the regression model. Due to the different focus of the PSID, I can only reconstruct some of the dependent variables in this study. Moreover, the analysis is restricted to a small sample, since I have to limit the observations to respondents whose parents were interviewed

in the first wave in the year 1968, and the whole family structure can be extracted in the latest wave. Therefore, I also exclude the survey year fixed effects from the initial regression equation.

Using the PSID, Table 2.12 reports the results when I re-examine the main findings and add family fixed effects to the regression models. Column 1 shows the savings behavior of firstborns in comparison to later borns, and in the second column I control for inter-family differences. In both specifications firstborns have statistically significantly higher pension savings, and the effect is almost 67% larger when including family fixed effects, although the difference in the firstborn coefficients is statistically not significant. Thus, the firstborn effect seems to stem from *intra*-family variation.

[Insert Table 2.12 about here]

Similarly, in columns 3 and 4 I examine net income. Again, firstborns have higher net income in both regression models, and the effect seems more pronounced when including family fixed effects. Moreover, firstborns are more likely to hold insurance (columns 5 and 6), and the two models yield similar coefficients for being firstborn. Finally, equity market participation is more common among firstborns as shown in columns 7 and 8. When including family fixed effects, the firstborn indicator increases again but the difference in the firstborn coefficients remains statistically insignificant.

This analysis shows that when adding family fixed effects to the regression models, the statistical significance of firstborn effects tends to increase across financial decisions. However, the order of magnitude of the effects remains constant across specifications. Overall, this

analysis mitigates the concern that the findings documented in this paper are driven by or overestimated due to inter-family differences.

2.6 Discussion

2.6.1 Firstborns and risk tolerance

Argys et al. (2006) find that later children are more likely to use tobacco, alcohol, marijuana or be sexually active. They conclude that firstborns are less likely to engage in "risky adolescent behavior". However, the studied activities can be similarly described as "improper behavior" (Averett et al., 2011). Indeed, Argys et al. (2006) stay quiet on whether their firstborn effect relates to "risky or delinquent behaviors". Thus, their result may lead to the interpretation that firstborns are generally more risk averse. Since the concept of "risk aversion" in finance is clearly defined to relate to financial risk taking instead of delinquent activities, I can specifically examine whether firstborns are more risk averse when making financial decisions.

The two main tests in this paper examining financial risk aversion consist of the respondent's self-assessment of her risk tolerance and the risky share allocation, conditional on holding equities. In both models, the documented effect indicates *higher* risk tolerance among firstborns. Thus, my results imply that firstborns are not more but less risk averse when making portfolio choices. However, similar to Argys et al. (2006) I find that firstborns are less likely to smoke.

Importantly, the definition of risk taking does not differ in psychology and finance re-

search, and can generally be described as "any consciously, or non-consciously controlled behavior with a perceived uncertainty about its outcome, and/or about its benefits or costs for the physical, economic, or psychological well-being of oneself or others." (Trimpop, 1994). Therefore, it seems to be important to distinguish between financial and physical risk aversion. In particular, the existing psychology literature has exclusively documented lower physical risk taking of firstborns, and in contrast, my findings highlight that firstborns accept greater financial risks.

2.6.2 Birth order research

The main goal of this research is not to explain the nature of the birth order effect, but to build on the fact that different birth order implies different family experiences, which forms individuals' personalities. In this section I relate my findings to the most common birth order results in the psychology literature.

Taken together, my findings seem to generally support the consensus of the psychology literature (Eckstein et al., 2010). Saving can be associated with prudent behavior and conformance with social norms. The increased likelihood of holding equities can be seen as forgoing the mistake of non-participation in the equity market. However, it should be noted that firstborns are not less likely to make the mistake of stock picking. The seeking for information when making decisions is in line with the behavior of firstborn students. Finally, firstborn investors may be more risk tolerant due to their ambition, because Borghans et al. (2009) document that more ambitious individuals are less risk averse.

In the context of the six categories of birth order theories (Adams, 1972), my findings

do not seem to support the intrauterine theory or economic theory because parents' age does not explain away firstborn effects. As only children do not resemble firstborns in their financial decision-making, my findings also do not seem to be consistent with the only-child uniqueness theory. The anxious and relaxed parents theory predicts the opposite risk taking behavior than the one I document. Because I find the firstborn effects only for the sample with siblings, my findings are in line with the dethronement theory and/or sibling theory.[17]

2.7 Conclusion

Motivated by a recent literature that documents the relevance of economic and career experiences for the decision-making of households and corporate policies, this paper examines the importance of personal family experiences for household choices. Building on a stream of literature that documents birth order to be an important experiential phenomenon, I conduct the first investigation of its importance for financial decision-making.

Firstborns are more likely to save and have higher pension savings, conditional on owning retirement accounts. In addition, they want to retire later and are more likely to own a life insurance. Firstborns are more risk tolerant, more likely to participate in the bond and equity market, and hold a higher conditional equity share. Being firstborn also increases the likelihood to seek information when making financial decisions, and because firstborns may be more attentive, I find the effects of investor optimism to be more important for firstborns than for later borns. Importantly, this highlights an additional difference in the decision-

[17]For instance, firstborns could feel "dethroned", fueling their subsequent behavior; firstborns may assume responsibility for their siblings, shaping their different personalities; or parents may attempt to raise their firstborn child as a role model for later children.

making process of individuals by birth order. Finally, stock picking may be more common among firstborns.

All effects are robust to controlling for socio-economic characteristics, which partly depend on birth order. Family fixed effects mitigate concerns that the effects are driven by inter-family differences. Only children do not exhibit similar portfolio choices to firstborns with siblings, and I do not find evidence for an optimal stopping model with last born children. Parents' age also does not explain away the importance of birth order.

In future work, it would be important to understand better what differences in childhood experiences are caused by birth order. This exercise will allow to refine the experiential determinants of individuals' financial decisions.

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Table 2.1: Variables

This table presents definitions for the control and the dependent variables used in this study. The data come from the Survey of Consumer Finances.

Panel A - Control variables

Variable	Description	Values
Age	Year of survey - year of birth	
Female	Sex of the respondent	female=1; male=0
White	'Which of these categories do you feel best describe you: white, black or African-American, Hispanic, Asian, Native American, or another race?'	white=1; other=0
College	'Did you get a college degree?'	yes=1; no=0
Married	'Are you currently married, or living with a partner, separated, divorced, widowed, or (have you) never been married?'	married=1; other=0
Children	Does the respondent indicate to have at least one child?	yes=1; no=0
Retired	'Are you working now, temporarily laid off, unemployed and looking for work, disabled and unable to work, retired, a student, a homemaker, or what?'	retired=1; other=0
Self-employed	'Do you work for someone else, (are you) self-employed, or what?'	self-employed or partnership=1; other=0
Net income	Net income	
Net worth	Total assets - total liabilities	
Business equity	'Do you own or share ownership in any privately-held businesses, farms, professional practices, limited partnerships or any other types of partnerships? Do not include corporations with publicly-traded stock.'	yes=1; no=0
Subj. life horizon	Expected age at death - current age	
Nb. siblings	How many living brothers and sisters do you have?	
Fin. wealth >$5,000	(Quasi-) liquid accounts + certificates of deposit + investment funds + stocks + bonds + cash-value life insurance + other fin. assets	fin. wealth >$5,000 = 1; other=0

Panel B - Dependent variables

Variable	Description	Values
Saving	'Over the past year, would you say that your spending exceeded your income, that it was about the same as your income, or that you spent less than your income?'	spent less than income=1; other=0
Pensions	Total retirement accounts + other annuities	
Age retire	Expected age at retirement	
Life insur.	'[...] are any of your policies individual term insurance?'	yes=1; no=0
Financial advisor	Do you use information from a financial planner or banker to make decisions about borrowing (or investing)?	yes=1; no=0
Shopping around	'When making major decisions about borrowing (or investing), some people shop around for the very best terms.'	no shopping(0) to great deal of shopping (5)
Risk tolerance	'Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?'	willing to take some financial risk=1; other=0
Bond indicator	'Do you have any (kind of) bonds ?'	yes=1; no=0
Equity indicator	Does the household have a non-zero investment in directly held stock, stock mutual funds, or retirement and saving accounts in stocks?	yes=1; no=0
Equity share	(Directly held stock + stock mutual funds + retirement and saving accounts in stock) / financial assets	
Success investing	'Overall has there been a gain or loss in the value of this stock since you obtained it?'	gain=1; other=0
Economic optimism	'Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years?'	better=1; other=0
Income optimism	'Over the next year, do you expect your total income to go up more than prices, less than prices, or about the same as prices?'	up more=1; other=0
Direct holdings	Directly held stock / (directly held stock + stock mutual funds + retirement and saving accounts in stock)	
Number of stocks	'In how many different companies do you own stock?'	
Smoker	'Do you currently smoke?'	yes=1; no=0

Table 2.2: Descriptive statistics

This table presents descriptive statistics (number of observations and mean, and 25th percentile, median, and 75th percentile for continuous variables) for the explanatory and dependent variables used in this study. All variables are defined in Table 2.1. Net income and net worth are trimmed at the 1st and 99th percentile. The data come from the Survey of Consumer Finances (1995-2010).

Variable	N	Mean	P25	P50	P75
Firstborn	129,252	0.29			
Number of siblings	120,794	2.51	1	2	4
Age	142,319	50.53	38	50	62
Female	142,319	0.22			
White	142,319	0.79			
College	142,319	0.46			
Married	142,319	0.59			
Children	142,319	0.86			
Retired	142,319	0.17			
Self-employed	142,319	0.24			
Net income	135,211	158,265	24,674	51,712	115,897
Net worth	135,198	1,782,767	17,000	146,955	815,000
Business equity	142,319	0.29			
Subj. life horizon	142,319	32.10	19	31	44
Fin. wealth >$5,000	135,198	0.77			
Mothers' age at birth	80,088	25.66	22	25	29
Fathers' age at birth	58,221	27.98	24	27	32
Saving	142,319	0.51			
Pensions	82,184	283,731	15,000	66,000	263,300
Age retire	76,296	62.46	60	65	65
Insurance	98,888	0.75			
Advice borrowing	142,319	0.17			
Advice investing	142,319	0.40			
Shop around borrowing	142,319	3.87	3	5	5
Shop around investing	142,319	3.03	2	3	4
Risk tolerance	142,319	0.66			
Bond indicator	142,319	0.26			
Equity indicator	142,319	0.59			
Equity share	84,397	0.49	0.25	0.48	0.73
Success investing	42,243	0.70			
Economic optimism	142,319	0.36			
Income optimism	142,319	0.25			
Stock / Equity	84,397	0.37	0.00	0.00	0.51
Number of stocks	27,276	16.21	2	6	20
Smoker	142,319	0.21			

Table 2.3: Decision to save, work and take insurance

This table reports the results of a set of regressions explaining the savings behavior, expected retirement age, income and life insurance holdings of households. The logit models in columns 1, 2, 9 and 10 are estimated using maximum likelihood. All other models are estimated using OLS. Other controls include retired, subj. life horizon. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Saving	Saving	ln(pensions)	ln(pensions)	Age retire	Age retire	ln(income)	ln(income)	Life insur.	Life insur.
Firstborn	0.1263***	0.0891**	0.0954**	0.0473*	0.3389**	0.2629*	0.1669***	0.0617***	0.0927**	0.0731*
	(0.0381)	(0.0432)	(0.0376)	(0.0287)	(0.1459)	(0.1468)	(0.0207)	(0.0135)	(0.0433)	(0.0433)
Female	-0.9403***	-0.2345***	-1.2934***	-0.2790***	-0.0774	0.1444	-1.2347***	-0.2134***	-0.0396	-0.0890
	(0.0465)	(0.0673)	(0.0532)	(0.0526)	(0.2336)	(0.3059)	(0.0221)	(0.0197)	(0.0544)	(0.0755)
White	0.3960***	-0.0460	0.6436***	0.2026***	1.1370***	1.2175***	0.7106***	-0.0248	0.0493	0.2216***
	(0.0455)	(0.0526)	(0.0572)	(0.0465)	(0.2235)	(0.2324)	(0.0224)	(0.0158)	(0.0560)	(0.0603)
College		0.1097**		0.4897***		0.5827***		0.3245***		0.2670***
		(0.0447)		(0.0312)		(0.1515)		(0.0135)		(0.0482)
Married		-0.1111**		0.1919***		0.4603**		0.1864***		0.2368***
		(0.0557)		(0.0411)		(0.2112)		(0.0173)		(0.0622)
Children		-0.4776***		-0.1445***		0.4635**		0.1555***		0.0521
		(0.0678)		(0.0492)		(0.2314)		(0.0197)		(0.0757)
Self-employed		-0.1079*		-0.2752***		0.8944***		-0.0003		-0.2723***
		(0.0623)		(0.0415)		(0.2000)		(0.0203)		(0.0631)
ln(net income)		0.4085***		0.0382**		0.2859***				0.1267***
		(0.0265)		(0.0159)		(0.0982)				(0.0243)
ln(net worth)		0.1985***		0.5277***		-0.5883***		0.4117***		-0.2072***
		(0.0155)		(0.0131)		(0.0715)		(0.0033)		(0.0180)
Business equity		-0.1302**		-0.2778***		0.0903		0.2226***		0.0214
		(0.0628)		(0.0426)		(0.2083)		(0.0191)		(0.0647)
ln(pensions)						-0.1907***				
						(0.0520)				
Other controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,068	111,068	64,532	64,532	41,574	41,574	116,397	116,397	111,068	111,068

Table 2.4: Portfolio choice

This table reports the results of a set of regressions explaining in Panel A the risk tolerance, bond and equity market participation; and in Panel B the equity share and investment success, conditional on owning equities. All logit models in Panel A and columns 3 and 4 of Panel B are estimated using maximum likelihood. All other models are estimated using OLS. Other controls include business equity, subj. life horizon. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Participation in the stock market

	Risk tolerance	Risk tolerance	Bond indicator	Bond indicator	Equity indicator	Equity indicator
Firstborn	0.0614***	0.0429*	0.0628**	0.0455*	0.0697***	0.0442*
	(0.0204)	(0.0235)	(0.0244)	(0.0256)	(0.0227)	(0.0248)
Female	-0.5701***	-0.1831***	-0.3126***	0.0528	-0.5492***	-0.1083**
	(0.0221)	(0.0336)	(0.0349)	(0.0472)	(0.0325)	(0.0447)
White	0.5028***	0.2591***	0.4298***	0.3386***	0.3932***	0.1757***
	(0.0232)	(0.0274)	(0.0384)	(0.0407)	(0.0338)	(0.0371)
College		0.4772***		0.2498***		0.3598***
		(0.0246)		(0.0273)		(0.0258)
Children		-0.1296***		0.1905***		-0.1582***
		(0.0359)		(0.0441)		(0.0399)
Retired		0.0202		0.1418***		0.0897**
		(0.0401)		(0.0403)		(0.0423)
Self-employed		-0.0124		-0.1180***		-0.1280***
		(0.0367)		(0.0351)		(0.0345)
ln(net income)		0.1814***		-0.0002		0.0559***
		(0.0138)		(0.0142)		(0.0142)
ln(net worth)		0.1376***		0.1480***		0.2587***
		(0.0077)		(0.0113)		(0.0112)
Other controls	No	Yes	No	Yes	No	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100,047	100,047	79,926	79,926	79,926	79,926

Panel B - Equity share and success investing, conditional on holding equities

	Equity share	Equity share	Success investing	Success investing
Firstborn	0.0170***	0.0132**	0.0748**	0.0630*
	(0.0059)	(0.0058)	(0.0368)	(0.0381)
Female	-0.0434***	-0.0359***	-0.2452***	0.0381
	(0.0086)	(0.0116)	(0.0627)	(0.0796)
White	0.0362***	0.0294***	0.3426***	0.2443***
	(0.0093)	(0.0096)	(0.0647)	(0.0674)
College		0.0489***		0.1584***
		(0.0064)		(0.0436)
Married		-0.0146		0.0517
		(0.0091)		(0.0583)
Children		0.0037		0.1210*
		(0.0109)		(0.0643)
Retired		-0.0138		0.0124
		(0.0100)		(0.0629)
Self-employed		-0.0364***		-0.1440***
		(0.0085)		(0.0508)
ln(net income)		0.0040		0.0547**
		(0.0034)		(0.0219)
ln(net worth)		0.0111***		0.1137***
		(0.0027)		(0.0186)
Business equity		-0.0076		0.0168
		(0.0086)		(0.0513)
Subj. life horizon		0.0008**		0.0020
		(0.0003)		(0.0017)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	65,219	65,219	36,791	36,791

Table 2.5: Seeking of information

This table reports the results of a set of regressions explaining in Panel A the seeking of financial advice by households when borrowing and investing, and in Panel B the shopping around at different banks to compare the conditions offered when borrowing and investing. All logit models are estimated using maximum likelihood. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Seeking financial advice when making financial decisions

	Borrowing	Borrowing	Investing	Investing
Firstborn	0.0810**	0.0788*	0.1438***	0.0637*
	(0.0399)	(0.0420)	(0.0308)	(0.0336)
Female	-0.1055**	0.3264***	-0.4688***	0.0542
	(0.0482)	(0.0693)	(0.0347)	(0.0501)
White	0.2373***	0.0026	0.6433***	0.2570***
	(0.0512)	(0.0574)	(0.0351)	(0.0404)
College		0.3555***		0.6505***
		(0.0456)		(0.0330)
Married		0.0721		0.1611***
		(0.0587)		(0.0418)
Children		-0.1546**		-0.2291***
		(0.0678)		(0.0484)
Retired		0.1609**		0.1031*
		(0.0721)		(0.0561)
Self-employed		0.0159		-0.1906***
		(0.0587)		(0.0461)
ln(net income)		-0.0353		0.0277
		(0.0219)		(0.0173)
ln(net worth)		0.1772***		0.1760***
		(0.0159)		(0.0114)
Business equity		0.0319		-0.0520
		(0.0603)		(0.0464)
Subj. life horizon		0.0049***		0.0049***
		(0.0018)		(0.0014)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	116,855	116,855	116,855	116,855

Panel B - Comparing bank conditions when making financial decisions

	Borrowing	Borrowing	Investing	Investing
Firstborn	0.0500**	0.0457**	0.0571***	0.0356*
	(0.0249)	(0.0227)	(0.0206)	(0.0213)
Female	0.7534***	-0.0489	-0.1950***	0.0197
	(0.0284)	(0.0347)	(0.0219)	(0.0300)
White	-0.7756***	-0.3755***	0.0412*	-0.1357***
	(0.0295)	(0.0289)	(0.0222)	(0.0244)
College		0.0292		0.1767***
		(0.0244)		(0.0210)
Married		-0.5132***		0.0715***
		(0.0297)		(0.0260)
Children		-0.2186***		-0.0285
		(0.0357)		(0.0303)
Retired		-0.0012		0.0521
		(0.0402)		(0.0344)
Self-employed		0.1172***		-0.0066
		(0.0342)		(0.0289)
ln(net income)		0.2771***		-0.0382***
		(0.0119)		(0.0107)
ln(net worth)		-0.3871***		0.1030***
		(0.0076)		(0.0071)
Business equity		0.2360***		-0.0787***
		(0.0339)		(0.0292)
Subj. life horizon		0.0024**		0.0059***
		(0.0010)		(0.0008)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	116,855	116,855	116,855	116,855

Table 2.6: Importance of beliefs

This table reports the results of a set of regressions examining the importance of beliefs for portfolio allocation. In Panel A, the effects of optimism are studied and the logit model in columns 1 to 3 are estimated using maximum likelihood. In Panel B, the effects of risk tolerance are investigated. All other models are estimated using OLS. Optimism (PR, 2007) is a continuous variable of the miscalibration in life expectancy as in Puri and Robinson (2007). Positive past S&P return is an indicator if the S&P 500 had a positive return in the year starting 24 months prior to the interview. All other variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Effects of optimism

	Equity indicator	Equity indicator	Equity indicator	Equity share	Equity share	Equity share
Firstborn X optimism (PR, 2007)	0.0044*			0.0006		
	(0.0024)			(0.0007)		
Firstborn X economic optimism		0.0096			0.0204*	
		(0.0489)			(0.0120)	
Firstborn X positive past S&P return			0.0983**			0.0223*
			(0.0500)			(0.0131)
Firstborn	0.0311	0.0405	-0.0169	0.0123**	0.0057	-0.0014
	(0.0258)	(0.0309)	(0.0405)	(0.0059)	(0.0074)	(0.0102)
Optimism (PR, 2007)	-0.0010			0.0001		
	(0.0014)			(0.0005)		
Economic optimism		-0.0058			0.0096	
		(0.0306)			(0.0079)	
Positive past S&P return			1.1672***			-0.0077
			(0.2484)			(0.0560)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	No	No
Observations	79,926	79,926	79,926	65,219	65,219	65,219

Panel B - Importance of risk tolerance

	Equity share	Equity share
Firstborn X Risk tolerance	0.0335**	0.0303*
	(0.0169)	(0.0167)
Risk tolerance	0.0890***	0.0732***
	(0.0111)	(0.0111)
Firstborn	-0.0137	-0.0140
	(0.0158)	(0.0156)
Female	-0.0296***	-0.0291**
	(0.0085)	(0.0116)
White	0.0272***	0.0244**
	(0.0095)	(0.0097)
College		0.0399***
		(0.0064)
Married		-0.0142
		(0.0092)
Children		0.0076
		(0.0109)
Retired		-0.0139
		(0.0100)
Self-employed		-0.0363***
		(0.0084)
ln(net income)		0.0037
		(0.0034)
ln(net worth)		0.0088***
		(0.0027)
Business equity		-0.0085
		(0.0086)
Subj. life horizon		0.0006*
		(0.0002)
Nb. of siblings effects	Yes	Yes
Age effects	Yes	Yes
Cohort effects	Yes	Yes
Year effects	Yes	Yes
Observations	72,477	72,477

Table 2.7: Only children and portfolio choice

This table reports the results of a set of regressions explaining in Panel A the risk tolerance, bond and equity market participation; and in Panel B the equity share and investment success, conditional on owning equities. All logit models in Panel A and columns 3 and 4 of Panel B are estimated using maximum likelihood. All other models are estimated using OLS. Only child is an indicator if the respondent does not have any siblings. Other controls include self-employed, business equity, married, subj. life horizon and retired. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Participation in the stock market

	Risk tolerance	Risk tolerance	Bond indicator	Bond indicator	Equity indicator	Equity indicator
Firstborn	0.0581***	0.0427*	0.0617**	0.0447*	0.0590**	0.0434*
	(0.0204)	(0.0234)	(0.0244)	(0.0255)	(0.0231)	(0.0249)
Only child	-0.0268	0.0264	-0.0246	-0.0019	-0.0277	-0.0155
	(0.0557)	(0.0642)	(0.0510)	(0.0529)	(0.0637)	(0.0689)
Female	-0.5791***	-0.1814***	-0.3103***	0.0654	-0.5375***	-0.0929**
	(0.0207)	(0.0316)	(0.0320)	(0.0437)	(0.0311)	(0.0421)
White	0.5156***	0.2620***	0.4190***	0.3185***	0.4207***	0.2078***
	(0.0219)	(0.0261)	(0.0365)	(0.0383)	(0.0329)	(0.0361)
College		0.4662***		0.2377***		0.3540***
		(0.0229)		(0.0256)		(0.0247)
Children		-0.1327***		0.1406***		-0.1401***
		(0.0337)		(0.0415)		(0.0378)
ln(net income)		0.1701***		-0.0047		0.0453***
		(0.0127)		(0.0132)		(0.0139)
ln(net worth)		0.1399***		0.1561***		0.2640***
		(0.0072)		(0.0106)		(0.0107)
Other controls	No	Yes	No	Yes	No	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,068	111,068	89,101	89,101	89,101	89,101

Panel B - Equity share and success investing, conditional on holding equities

	Equity share	Equity share	Success investing	Success investing
Firstborn	0.0167***	0.0131**	0.0730**	0.0616*
	(0.0059)	(0.0058)	(0.0367)	(0.0380)
Only child	-0.0004	0.0048	0.0336	0.0391
	(0.0099)	(0.0099)	(0.0548)	(0.0563)
Female	-0.0375***	-0.0305***	-0.2811***	0.0284
	(0.0078)	(0.0104)	(0.0565)	(0.0721)
White	0.0360***	0.0300***	0.3239***	0.2278***
	(0.0092)	(0.0092)	(0.0623)	(0.0649)
College		0.0527***		0.1562***
		(0.0061)		(0.0404)
Married		-0.0159*		0.0756
		(0.0083)		(0.0533)
Children		0.0079		0.1001*
		(0.0105)		(0.0598)
Retired		-0.0142		-0.0153
		(0.0091)		(0.0568)
Self-employed		-0.0322***		-0.1248***
		(0.0080)		(0.0467)
ln(net income)		0.0019		0.0603***
		(0.0032)		(0.0213)
ln(net worth)		0.0119***		0.1128***
		(0.0025)		(0.0179)
Business equity		-0.0117		0.0047
		(0.0083)		(0.0472)
Subj. life horizon		0.0008**		0.0018
		(0.0003)		(0.0017)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	72,477	72,477	41,386	41,386

Table 2.8: Last borns and portfolio choice

This table reports the results of a set of regressions explaining in Panel A the risk tolerance, bond and equity market participation; and in Panel B the equity share and investment success, conditional on owning equities. All logit models in Panel A and columns 3 and 4 of Panel B are estimated using maximum likelihood. All other models are estimated using OLS. Last born is an indicator if the respondent is the youngest sibling in the family. Other controls include business equity, married, children, subj. life horizon and retired. All other variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Participation in the stock market

	Risk tolerance	Risk tolerance	Bond indicator	Bond indicator	Equity indicator	Equity indicator
Firstborn	0.0588***	0.0429*	0.0620**	0.0450*	0.0627***	0.0429*
	(0.0204)	(0.0234)	(0.0244)	(0.0256)	(0.0231)	(0.0250)
Last born	0.0664	0.0146	0.0569	0.0438	-0.0724	-0.1015
	(0.0802)	(0.0900)	(0.1344)	(0.1397)	(0.1302)	(0.1411)
Female	-0.5791***	-0.1814***	-0.3103***	0.0655	-0.5353***	-0.0929**
	(0.0207)	(0.0316)	(0.0320)	(0.0437)	(0.0310)	(0.0421)
White	0.5159***	0.2620***	0.4189***	0.3186***	0.4165***	0.2077***
	(0.0219)	(0.0261)	(0.0365)	(0.0383)	(0.0328)	(0.0361)
College		0.4662***		0.2377***		0.3539***
		(0.0229)		(0.0256)		(0.0247)
Self-employed		0.0105		-0.1241***		-0.1061***
		(0.0345)		(0.0328)		(0.0324)
ln(net income)		0.1701***		-0.0046		0.0452***
		(0.0127)		(0.0132)		(0.0139)
ln(net worth)		0.1399***		0.1560***		0.2641***
		(0.0072)		(0.0106)		(0.0107)
Other controls	No	Yes	No	Yes	No	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,068	111,068	89,101	89,101	89,101	89,101

Panel B - Equity share and success investing, conditional on holding equities

	Equity share	Equity share	Success investing	Success investing
Firstborn	0.0168***	0.0131**	0.0734**	0.0618
	(0.0059)	(0.0058)	(0.0367)	(0.0380)
Last born	0.0084	0.0097	0.0940	0.0545
	(0.0443)	(0.0448)	(0.2560)	(0.2642)
Female	-0.0375***	-0.0305***	-0.2809***	0.0286
	(0.0078)	(0.0104)	(0.0565)	(0.0721)
White	0.0361***	0.0300***	0.3232***	0.2274***
	(0.0091)	(0.0092)	(0.0623)	(0.0649)
College		0.0527***		0.1562***
		(0.0061)		(0.0404)
Married		-0.0159*		0.0758
		(0.0083)		(0.0533)
Children		0.0079		0.1001*
		(0.0105)		(0.0598)
Retired		-0.0142		-0.0152
		(0.0091)		(0.0568)
Self-employed		-0.0322***		-0.1247***
		(0.0080)		(0.0467)
ln(net income)		0.0019		0.0604***
		(0.0031)		(0.0213)
ln(net worth)		0.0119***		0.1128***
		(0.0025)		(0.0179)
Business equity		-0.0117		0.0046
		(0.0083)		(0.0472)
Subj. life horizon		0.0008**		0.0018
		(0.0003)		(0.0017)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	72,477	72,477	41,386	41,386

Table 2.9: Parents' age at birth and portfolio choice

This table reports the results of a set of regressions explaining in Panel A the risk tolerance, bond and equity market participation; and in Panel B the equity share and investment success, conditional on owning equities. All logit models in Panel A and columns 3 and 4 of Panel B are estimated using maximum likelihood. All other models are estimated using OLS. Mutation risk - mother and mutation risk - father are indicators if the mother or father were older than 35 or 45 at the respondent's age of birth, respectively. Other controls include ln(net income), ln(net worth), married, subj. life horizon, retired and self-employed. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Participation in the stock market

	Risk tolerance	Risk tolerance	Bond indicator	Bond indicator	Equity indicator	Equity indicator
Firstborn	0.0438*	0.0350	0.0485*	0.0501*	0.0484*	0.0433*
	(0.0236)	(0.0236)	(0.0257)	(0.0258)	(0.0249)	(0.0250)
Mutation risk - mother	0.0227		0.0771		0.1012*	
	(0.0540)		(0.0615)		(0.0576)	
Mutation risk - father	-0.0898		-0.2314		-0.6103	
	(0.3041)		(0.4639)		(0.5008)	
Mother age at birth		0.0005		-0.0004		-0.0001
		(0.0004)		(0.0004)		(0.0004)
Father age at birth		0.0010**		-0.0002		0.0003
		(0.0004)		(0.0004)		(0.0004)
Female	-0.1832***	-0.1832***	0.0529	0.0526	-0.1075**	-0.1080**
	(0.0336)	(0.0336)	(0.0472)	(0.0472)	(0.0447)	(0.0447)
White	0.2588***	0.2554***	0.3378***	0.3399***	0.1740***	0.1746***
	(0.0274)	(0.0275)	(0.0407)	(0.0407)	(0.0371)	(0.0371)
College	0.4768***	0.4738***	0.2485***	0.2511***	0.3583***	0.3593***
	(0.0246)	(0.0246)	(0.0273)	(0.0274)	(0.0258)	(0.0258)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,217	34,217	24,877	24,877	24,877	24,877

Panel B - Equity share and success investing, conditional on holding equities

	Equity share	Equity share	Success investing	Success investing
Firstborn	0.0137**	0.0139**	0.0718*	0.0718*
	(0.0059)	(0.0059)	(0.0385)	(0.0385)
Mutation risk - mother	0.0111		-0.0246	
	(0.0143)		(0.0898)	
Mutation risk - father	-0.0158		-1.7306**	
	(0.1095)		(0.7745)	
Mother age at birth		-0.0002*		-0.0007
		(0.0001)		(0.0006)
Father age at birth		0.0001		-0.0008
		(0.0001)		(0.0006)
Female	-0.0358***	-0.0359***	0.0376	0.0376
	(0.0116)	(0.0116)	(0.0797)	(0.0797)
White	0.0293***	0.0292***	0.2463***	0.2459***
	(0.0096)	(0.0096)	(0.0675)	(0.0674)
College	0.0488***	0.0490***	0.1601***	0.1609***
	(0.0064)	(0.0064)	(0.0437)	(0.0437)
Married	-0.0146	-0.0147	0.0517	0.0529
	(0.0091)	(0.0092)	(0.0583)	(0.0583)
Children	0.0038	0.0039	0.1164*	0.1200*
	(0.0109)	(0.0109)	(0.0644)	(0.0643)
Retired	-0.0137	-0.0142	0.0159	0.0134
	(0.0100)	(0.0101)	(0.0629)	(0.0629)
Self-employed	-0.0363***	-0.0364***	-0.1486***	-0.1424***
	(0.0084)	(0.0084)	(0.0509)	(0.0508)
ln(net income)	0.0041	0.0041	0.0550**	0.0562**
	(0.0034)	(0.0034)	(0.0220)	(0.0220)
ln(net worth)	0.0110***	0.0111***	0.1144***	0.1134***
	(0.0027)	(0.0027)	(0.0186)	(0.0186)
Business equity	-0.0076	-0.0077	0.0215	0.0175
	(0.0086)	(0.0086)	(0.0513)	(0.0513)
Subj. life horizon	0.0007*	0.0007*	0.0009	0.0009
	(0.0004)	(0.0004)	(0.0018)	(0.0018)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	16,198	16,198	8,962	8,962

Table 2.10: Age and portfolio choice

This table reports the results of a set of regressions explaining in Panel A the risk tolerance, bond and equity market participation; and in Panel B the equity share and investment success, conditional on owning equities. All logit models in Panel A and columns 3 and 4 of Panel B are estimated using maximum likelihood. All other models are estimated using OLS. Older is an indicator if the respondent belongs to the elder half of the sample. Other controls include self-employed, business equity, married, subj. life horizon and retired. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Participation in the stock market

	Risk tolerance	Risk tolerance	Bond indicator	Bond indicator	Equity indicator	Equity indicator
Firstborn	0.0454*	0.0386*	0.0567**	0.0450*	0.0629**	0.0572*
	(0.0237)	(0.0238)	(0.0287)	(0.0268)	(0.0262)	(0.0317)
Firstborn X Older	-0.0219	0.0328	0.0170	0.0036	0.0260	-0.0323
	(0.0617)	(0.0687)	(0.0524)	(0.0820)	(0.0504)	(0.0490)
Older	-0.5920***	0.0263	0.1087**	0.1368	1.5232*	0.1015
	(0.0387)	(0.0662)	(0.0546)	(0.0877)	(0.8427)	(1.4377)
Female	-0.5962***	-0.1818***	-0.3154***	0.0525	-0.5491***	-0.1082**
	(0.0206)	(0.0317)	(0.0348)	(0.0472)	(0.0325)	(0.0447)
White	0.4954***	0.2624***	0.4305***	0.3389***	0.3934***	0.1757***
	(0.0218)	(0.0261)	(0.0383)	(0.0407)	(0.0338)	(0.0371)
College		0.4644***		0.2495***		0.3599***
		(0.0230)		(0.0273)		(0.0258)
Children		-0.1340***		0.1897***		-0.1581***
		(0.0337)		(0.0441)		(0.0399)
ln(net income)		0.1701***		-0.0002		0.0559***
		(0.0127)		(0.0142)		(0.0142)
Other controls	No	Yes	No	Yes	No	Yes
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,068	111,068	89,101	89,101	89,101	89,101

Panel B - Equity share and success investing, conditional on holding equities

	Equity share	Equity share	Success investing	Success investing
Firstborn	0.0148**	0.0112*	0.0714*	0.0711*
	(0.0068)	(0.0067)	(0.0428)	(0.0441)
Firstborn X Older	0.0103	0.0090	-0.0180	-0.0378
	(0.0132)	(0.0130)	(0.0836)	(0.0854)
Older	-0.0071	0.0013	0.1000	0.2367***
	(0.0134)	(0.0139)	(0.0715)	(0.0760)
Female	-0.0414***	-0.0338***	-0.2256***	0.0406
	(0.0085)	(0.0115)	(0.0616)	(0.0783)
White	0.0366***	0.0301***	0.3477***	0.2419***
	(0.0093)	(0.0096)	(0.0639)	(0.0664)
College		0.0479***		0.1596***
		(0.0064)		(0.0430)
Married		-0.0145		0.0321
		(0.0091)		(0.0569)
Children		0.0041		0.0797
		(0.0109)		(0.0628)
Retired		-0.0126		0.0253
		(0.0100)		(0.0611)
Self-employed		-0.0363***		-0.1355***
		(0.0084)		(0.0502)
ln(net income)		0.0041		0.0600***
		(0.0034)		(0.0217)
ln(net worth)		0.0119***		0.1035***
		(0.0027)		(0.0183)
Business equity		-0.0080		0.0047
		(0.0086)		(0.0507)
Subj. life horizon		0.0008**		0.0018
		(0.0003)		(0.0017)
Nb. of siblings effects	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	72,477	72,477	41,386	41,386

Table 2.11: Optimism, stock picking, and additional robustness tests

This table reports the results of a set of regressions explaining economic and income optimism, stock picking, and educational attainment as well as smoking behavior. The logit models in columns 1, 2, 5 and 6 are estimated using maximum likelihood. All other models are estimated using OLS. All variables are defined in Table 2.1. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Economic optimism	Income optimism	Stock / Equity	ln(number of stocks)	College	Smoker
Firstborn	-0.0254	0.0226	0.0024	-0.0557*	0.0660***	-0.0516**
	(0.0222)	(0.0248)	(0.0070)	(0.0321)	(0.0240)	(0.0244)
Female	-0.1339***	-0.1023**	-0.0075	-0.0565	0.1385***	-0.2930***
	(0.0358)	(0.0410)	(0.0130)	(0.0703)	(0.0381)	(0.0341)
White	-0.2797***	-0.2175***	-0.0048	-0.0084	-0.0138	0.2200***
	(0.0289)	(0.0322)	(0.0110)	(0.0632)	(0.0318)	(0.0291)
College	0.0806***	0.1655***	-0.0016	0.2483***		-0.4439***
	(0.0244	(0.0266)	(0.0073)	(0.0386)		(0.0260)
Married	-0.0312	-0.0901***	-0.0384***	-0.0658	0.1098***	-0.3646***
	(0.0298)	(0.0328)	(0.0100)	(0.0508)	(0.0315)	(0.0294)
Children	0.0261	-0.0275	-0.0074	-0.0311	-0.4435***	0.1647***
	(0.0377)	(0.0402)	(0.0126)	(0.0600)	(0.0392)	(0.0364)
Retired	-0.0684*	-0.1548***	0.0477***	0.0949*		-0.0287
	(0.0367)	(0.0433)	(0.0115)	(0.0506)		(0.0450)
Self-employed	0.0417	0.0493	0.0006	0.0226	-0.1407***	-0.0485
	(0.0321)	(0.0337)	(0.0097)	(0.0413)	(0.0340)	(0.0378)
ln(net income)	-0.0230*	0.1201***	0.0245***	0.0398**	0.2539***	-0.0286**
	(0.0119)	(0.0130)	(0.0041)	(0.0190)	(0.0135)	(0.0134)
ln(net worth)	0.0122	0.0334***	0.0392***	0.3191***	0.1386***	-0.0828***
	(0.0079)	(0.0089)	(0.0031)	(0.0165)	(0.0087)	(0.0076)
Business equity	0.0038	0.1814***	0.0148	-0.0276	0.0197	-0.0514
	(0.0326)	(0.0349)	(0.0098)	(0.0426)	(0.0343)	(0.0381)
Subj. life horizon	0.0077***	0.0097***	-0.0003	-0.0010	0.0159***	-0.0136***
	(0.0011)	(0.0013)	(0.0004)	(0.0021)	(0.0013)	(0.0009)
Nb. of siblings effects	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111,068	99,947	65,219	27,276	64,532	41,574

Table 2.12: Robustness tests with family fixed effects using an alternative dataset

This table examines savings behavior, income, insurance and equity holdings of households, excluding and including family fixed effects. The logit models in columns 5 to 8 are estimated using maximum likelihood. All other models are estimated using OLS. The data come from the PSID. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	ln(saving)	ln(saving)	ln(net income)	ln(net income)	Insurance	Insurance	Equity indicator	Equity indicator
Firstborn	0.1272*	0.2015**	0.2743**	0.3249**	0.1185***	0.1194***	0.3154*	0.3682**
	(0.0771)	(0.0991)	(0.1225)	(0.1436)	(0.0173)	(0.0300)	(0.1886)	(0.1861)
Female	-0.1620*	-0.3246***	-0.6107***	-0.4876***	1.1093***	1.4752***	0.4998*	0.5994**
	(0.0893)	(0.1253)	(0.1350)	(0.1710)	(0.1522)	(0.2594)	(0.2690)	(0.3019)
White	0.1417*	-0.1530	0.2422*	0.4240	0.2554*	2.1760**	-0.4385	-0.5802
	(0.0801)	(0.3152)	(0.1281)	(0.4703)	(0.1551)	(1.0674)	(0.2693)	(0.6464)
College	0.6907***	0.2841*	0.7507***	0.6368***	0.8646***	0.5469	0.3240*	0.3582
	(0.0867)	(0.1492)	(0.1387)	(0.2189)	(0.2369)	(0.4326)	(0.1830)	(0.2393)
Married	0.1799*	-0.0295	1.2425***	1.2477***	1.6788***	2.3703***	0.4197*	0.5938**
	(0.0919)	(0.1338)	(0.1444)	(0.1894)	(0.1912)	(0.3529)	(0.2309)	(0.2679)
Retired	0.3687**	0.4745**	-3.4254***	-2.8919***	0.0445	0.8710	0.3578	0.4245
	(0.1751)	(0.2395)	(0.2699)	(0.3502)	(0.3301)	(0.6089)	(0.3448)	(0.3889)
ln(net income)	-0.0100	-0.0071			0.0047	0.0070	0.0607*	0.0956**
	(0.0114)	(0.0164)			(0.0176)	(0.0276)	(0.0353)	(0.0410)
ln(net worth)	0.3032***	0.3226***	0.3008***	0.2802***	0.3087*	0.5441**	0.4851***	0.4999***
	(0.0137)	(0.0201)	(0.0164)	(0.0217)	(0.1669)	(0.2552)	(0.0652)	(0.0782)
Nb. of siblings effects	Yes	No	Yes	No	Yes	No	Yes	No
Family effects	No	Yes	No	Yes	No	Yes	No	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,915	1,915	3,578	3,578	1,915	1,915	3,578	3,578

Chapter 3

Response Behavior and the Role of Third Parties: Evidence from Household Surveys

Disclaimer

This paper uses data from SHARE wave 4 release 1.1.1, as of March 28th 2013 or SHARE wave 1 and 2 release 2.5.0, as of May 24th 2011 or SHARELIFE release 1, as of November 24th 2010. The SHARE data collection has been primarily funded by the European Commission through the 5th Framework Programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life), through the 6th Framework Programme (projects SHARE-I3, RII-CT-2006-062193, COMPARE, CIT5- CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th Framework Programme (SHARE-PREP, N 211909, SHARE-LEAP, N 227822 and SHARE M4, N 261982). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11 and OGHA 04-064) and the German Ministry of Education and Research as well as from various national sources is gratefully acknowledged (see www.share-project.org for a full list of funding institutions).

3.1 Introduction

Social norms shape human behavior. In 1958, Ralf Dahrendorf formally coins this concept the *homo sociologicus*. Accordingly, economic agents can act rationally by maximizing not only expected material rewards but also expected social rewards. These social rewards include any kind of approval or disapproval by others, yielding satisfaction or embarrassment.[1] However, it is important to note that approval or disapproval can only occur if an individual's actions can be observed by others.

In this article I examine the importance of companions when respondents decide whether and how to answer questions. Experiments and surveys provide the opportunity to study an individual's decision-making while directly observing the social environment. It is well known, for instance, that interviewers influence survey participants' answers (Levitt and List, 2007; De Leeuw et al., 2008). However, it has not been studied whether the presence of other third parties during the interview affect respondent behavior. This is important for several reasons: First, effects may differ depending on whether the third party is a known companion or an unknown interviewer. On the one hand familiarity could lead respondents to reply (more) truthfully. On the other hand, interviewees may care more about how the third party judges them, which could stimulate responses that are viewed as socially desirable. Second, it is not evident whether and how additional companions affect respondents' answer behavior if an interviewer is already present that violates respondents' privacy. Third, no study has examined how behavioral biases and their effects may be over- or underestimated due to the social setting.

[1] See Elster (1989) for how norm-oriented behavior fits into the classic model of the homo economicus. Lindbeck (1997) examines the interaction of social and economic incentives.

I use data from the Survey on Health, Ageing and Retirement in Europe (SHARE), a multidisciplinary, cross-country database of micro data. I investigate respondents' answer behavior in the cognitive test section, which includes subjective self-assessment questions and objective skills questions. In contrast to other household surveys, the SHARE notes the presence of third parties at two different stages of the survey. This allows me to obtain two control groups: One that constitutes all respondents that were unaccompanied during a cognitive test section, and another that only includes respondents that were accompanied during a part of the interview. Moreover, the data allows me to disentangle the effects of different types of third parties depending on their relation to the respondent.

I start by examining the influence of third parties on respondents' decisions *whether* to answer a question. To ensure that the presence of companions does not proxy for some other variable, I control for age, health, and a variety of other socio-economic and demographic characteristics. Moreover, survey participants that required an assistant in order to complete the survey are excluded from the sample. I find that the presence of a third party significantly reduces the probability of answering a question. This result holds for subjective self-assessments as well as for objective skills tests. Refining the companion type, I find that all types have a significant negative effect. The presence of the respondent's partner constitutes the smallest effect, followed by the presence of children, and finally the presence of someone else. Overall, these findings are consistent with the hypothesis that privacy concerns reduce survey participation.

To examine the robustness of this result, I repeat the analyses, considering only observations where a third person was present at some point of the interview. This alternative

specification addresses the concern that the subsample of respondents that are accompanied during the test section is per se different from respondents that are alone. I document that the presence of companions continues to have the described negative effects on the probability of a reply. Moreover, using variation in the presence of companions at the beginning of the interview compared to during the cognitive test section, I conduct a placebo test and find that only the *current presence* of companions affects the answer behavior at that time.

Next, I explore a potential application of the finding that companions are affected by the current presence of companions when deciding whether to reply to questions. Prior research identifies "the determinants of economic success", such as education, gender and abilities (Jencks, 1979). I test and correct for an item non-response bias in the study of income determinants by estimating a Heckman selection model. In order to mitigate the concern of a selection bias I restrict the sample to accompanied respondents, using only the *current* presence of companions as an exclusion restriction in the self-selection to answer. Correcting for the endogenous decision to complete a cognitive test, shows that standard errors of the selection equation and of the outcome equation are significantly correlated. A comparison of the results from the Heckman selection model to a simple OLS regression yields that correcting for the non-response bias increases the positive effects of factors such as college and good health on household income.

In the second part of this paper, I study whether the presence of third parties affects *how* respondents answer questions. In the cognitive test section, respondents were asked to rate their own memory ability. I contrast these self-assessments with their actual test performance to arrive at a measure of respondents' overestimation of their abilities (referred

to as overconfidence).[2] This measure correlates positively with the presence of a companion, which is in line with the theoretical prediction of a social desirability bias. This result is mainly driven by the presence of the respondent's partner. The effect is reduced but remains statistically significant when I restrict the sample to observations where a third party was present at some point of the interview. Furthermore, since third parties may disturb the memory test, I verify that this finding is not driven by test impairments. Because the SHARE focuses on respondents aged 50 and above, I test whether older respondents decide to report inflated self-assessments in order to avoid unsettling companions. Using data from the Survey of Consumer Finances (SCF), which covers the whole age range, I show that the presence of companions leads to overconfident replies in the sub-sample of older as well as in the sub-sample of younger individuals.

Finally, I test whether respondents' tendency to overstate their abilities in front of others may lead us to categorize them as overconfident, even though this overstatement does not reflect their true beliefs. Overconfidence can induce households to spend a larger fraction of their income, to be more optimistic about making ends meet with a given income, to indicate to be happy, to exhibit other overconfident behavior during the interview, and to be more inclined to participate in the equity market. I conjecture that these effects may be underestimated if respondents overreport their self-assessed abilities due to social desirability induced by the interview situation, instead of genuine overconfidence. I find that the presence of third parties attenuates the overconfidence effect, suggesting that some accompanied respondents are misclassified as overconfident. Importantly, this additionally provides consistent evidence

[2]In this paper I do not attempt to distinguish between overconfidence and optimism. Related proxies have been equally labeled measures of optimism (e.g., Puri and Robinson, 2007).

for the finding that respondents are affected by the presence of companions when deciding how to answer to questions.

This paper makes several contributions to the literature on the determinants of respondents' decisions and behavior. In particular, Puri and Robinson (2007) document that optimism affects economic choices. However, the challenge and premise of this research is to correctly identify optimists. First, I show that the social desirability bias makes the identification of overconfident individuals more challenging. Failing to take the social desirability bias into account leads to underestimating the effects of overconfidence on respondents' behavior.

Second, I extend the research on the social desirability bias by identifying a new source in form of the presence of third parties, which may induce socially desirable answers in an interview or experiment. In comparison to the well-documented interviewer effect, which can have similar implications, the social desirability bias from third parties is not necessarily mitigated by the trend towards computer-administered or web-based surveys. Taken together, my findings highlight the importance and effects of the social environment for respondent behavior.

A third contribution lies in the potential bias stemming from non-responses. Either the self-selection to answer has to be accounted for in the model, or the data have to be imputed to replace missing values (e.g., Heckman, 1979; Kennickell, 1998).[3] Adding an exclusion restriction to the Heckman selection equation allows to identify the model not only based on distributional assumptions (Liao, 1995; Sartori, 2003). To the best of my knowledge, I am the first to propose the potential of current companionship during a specific stage of the

[3]Both procedures typically rely on distributional assumptions and the determinants of non-responses play a critical role. In particular for the Heckman selection model, the sensitivity of results to those assumptions has been documented (e.g., Mroz, 1987; Winship and Mare, 1992).

interview as an exclusion restriction for the item response decision in the imputation process.

Finally, the paper also contributes to the literature on survey design. Although the interview situation has been identified as a factor influencing answer behavior, the focus in the literature has been on the interviewer effect (e.g., Levitt and List, 2007). Moreover, methodological reports on the design of micro-level household finance surveys generally emphasize the anonymity of respondents.[4] Providing less detailed information should increase the number of survey participants and also their willingness to reply to personal questions. This paper highlights the importance of additional information about the interview environment in order to correctly interpret the provided data.

The remainder of this paper is structured as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 presents the data. Section 4 examines the relation between the presence of third parties at the interview and non-responses. Section 5 investigates how social desirability may inflate reported self-assessments. Section 6 concludes.

3.2 Related literature and hypotheses development

Behavioral economists introduce concepts grounded in psychology to model an individual's decision-making process (Mullainathan and Thaler, 2001). One of the concepts examines the potential importance of the social environment for an individual's decision-making. The Asch conformity experiments in the 1950s highlight that individuals are influenced by group opinions. Other phenomena exist that show the importance of the social setting for an agent's decision-making. First, an individual's well-being seems to depend on the relative consump-

[4] A recent example includes the Eurosystem Household Finance and Consumption Survey - Methodological Report for the First Wave - Statistics Paper Series No. 1 / April 2013 from the European Central Bank.

tion, described as the desire to "catch and keep up with", or "get ahead of the Joneses" (e.g., Abel, 1990; Campbell and Cochrane, 1999; Ljungqvist and Uhlig, 2000; Roussanov, 2010). Second, in the "the dictator game", which is a popular laboratory experiment, a decision maker often chooses to split an endowment with a passive receiver, in line with an extrinsic social motivation (e.g., Dana et al., 2006; Dana et al., 2007; Broberg et al., 2007; Andreoni and Bernheim, 2009; Lazear et al., 2012). For instance, Dana et al. (2006) explain that "just knowing that one is the anonymous dictator that the receiver will think badly of can be sufficient to compel giving".

3.2.1 The cognitive model

Surveys and experiments are often viewed as ideal environments in which decisions can be observed and studied (Thaler, 2005). In this context, the cognitive model describes the respondent's answer behavior in four steps: (i) interpreting the question, (ii) cogitating the required information, (iii) formatting the response, and (iv) adjusting the answer to the social setting of the interview (e.g., Tourangeau et al., 2000; Ongena and Dijkstra, 2007). Particularly during the last step of the cognitive model the social environment may affect answer behavior, i.e., both whether and how questions are answered. In what follows, I present the two problems that may arise from the social environment: First, the (non-) response bias and, second, the actual answer biases.

3.2.2 Bias through missing data

In line with rational choice theory, Riphahn and Serfling (2005) outline that the last step of the cognitive model can lead to non-responses when the cost of participation exceeds the expected rewards (Hill and Willis, 2001). This may introduce errors in surveys, making the identification of population parameters difficult because the survey sample is not representative. Such sample selection bias may be severe in surveys but can be addressed by correcting for the selection process (Heckman, 1979)[5] or sample weightings, ad hoc methods (e.g., filling the data with means), likelihood approaches that allow for missing values, or imputation-based methods.[6]

While Groves et al. (1992) summarize the conceptual and empirical determinants of survey participation, the factors can also be interpreted to be informative about non-responses to specific questions. In particular they highlight the importance of socio-demography, survey design and psychological concepts. For instance, Singer et al. (1993) identify confidentiality and privacy concerns to affect survey participation. Accordingly, the American Association for Public Opinion Research (2013) emphasizes "the privacy of respondents and the confidentiality of the information they provide" as best practices. The first hypothesis follows

[5]The reply decision can be seen as an omitted variable problem, which can be solved by introducing a selection (reply) equation in addition to the outcome equation. By assuming that the error terms in the selection and outcome equation follow a bivariate normal distribution, inferences about the population parameters can be made. With a range of specification tests, Mroz (1987) highlights the sensitivity of parameter estimates to economic and statistical assumptions. For missing data Horowitz and Manski (1995) note that usually untestable assumptions about the distribution have to be made. However, they further show that population parameters can be bounded in cases of errors and non-observed data (1995; 1998). Since Heckman's early work, a stream of the literature has attempted to impose fewer statistical assumptions on the distribution of the error terms, and still obtain unbiased parameters with semi- or non-parametric estimation strategies (e.g., Gallant and Nychka, 1987; Ahn and Powell, 1993; Das et al., 2003; Newey, 2009).

[6]Many micro-level data providers already include multiple imputations, and concurrently address range answers and disclosure limitations (Kennickell, 1998; Lillard et al., 1986). More advanced techniques include the fully conditional specification (FCS), a multivariate iterative procedure that attempts to keep the correlation structure of imputed items (e.g., Van Buuren et al., 2006). However, the challenge of finding the optimal imputation procedure has been emphasized by Little (1992), Jones (1996), and Dardanoni et al. (2011).

from the fact that privacy and confidentiality are not assured when third parties are present during the interview. Moreover, the severity of the effect stemming from the privacy violation may depend on the closeness of the interpersonal relationship between the respondent and the third party.

Hypothesis 1: The probability of obtaining a response to a question decreases when respondents are interviewed in front of companions.

Hypothesis 2: The probability of obtaining a response to a question decreases more when respondents are interviewed in front of non-familial companions.

3.2.3 Bias in given answers and social desirability

Besides the participation bias, several potential issues arise from the survey methodology. In comparison to the challenge of adequate coverage and sampling, which can both be addressed and validated by careful planning, design and evaluation of answers, measurement errors are associated with the collection of the data itself. De Leeuw et al. (2008) categorize measurement errors into four main sources: the questionnaire, the respondent, the method of data collection and the interviewer. Amongst others, potential issues include the acquiescence bias (i.e., "yea-saying"), potential effects of the interviewer on answers and unintentionally incorrect information. For instance, Bertrand and Mullainathan (2001) show that the measurement error in subjective questions correlates with respondents' characteristics and behaviors. Levitt and List (2007) argue that actual behavior in experiments is, inter alia, affected by the extent of scrutiny of respondents' actions by others.

A well-documented phenomenon stemming from the interviewer effect is the social desir-

ability bias. It follows from the notion that respondents tend to adjust answers to comply with social norms. For instance, Belli et al. (2001) document the overreporting of voting in elections, while Tourangeau and Yan (2007) show underreporting of undesirable behaviors, such as drug use and drinking. Computer administered interviews may inherently help attenuate the interviewer effect, because Tourangeau et al. (2000) report that the social desirability bias is less severe in situations without an interviewer. As the presence of the interviewer affects the severity of the social desirability bias, the presence of third parties may have similar implications for the reporting of desirable characteristics.[7]

Hypothesis 3: Respondents are more prone to over-estimate their abilities in front of companions.

The difference between subjective estimations and objective observations has been used by Puri and Robinson (2007) as a proxy for optimism. However, failing to take into account that respondents may overreport their subjective assessments due to social desirability could lead to underestimating the importance of optimism for household behavior. The last hypothesis follows from the postulate that respondents may inflate their self-reported beliefs, leading to misclassifying them as overconfident.

Hypothesis 4: Respondents that overreport their abilities due to social desirability, induced by the presence of third parties during the interview, are less likely to exhibit overconfident traits in their decisions and behavior.

[7]The social desirability effect could either be mitigated if the third party is well-known to the interviewee, or indeed be reinforced.

3.3 Data

3.3.1 Data collection

This research examines data from the Survey on Health, Ageing and Retirement in Europe (SHARE), a multidisciplinary survey that is representative of the population aged 50 years and older in 19 countries.[8] The source has been used amongst others by Georgarakos and Pasini (2011). The survey is designed as a computer-assisted personal interview (CAPI), where an interviewer is present to guide the respondent and make additional observations about e.g., the respondent's willingness to reply, question understanding and presence of other people during the interview.[9] Most of the analysis in this paper will rely on data from wave 2 and 4 since some questions were not present in the other waves. Nevertheless, wave 1 is included in the sample when possible.[10] Wave 1 was conducted in 2004, wave 2 in 2006-07 and wave 4 in 2010-11.

The SHARE provides multiple imputations for the main financial variables, with separate indicator variables denoting whether an information was imputed (Release Guide 1.0.0 Wave 4). For the main financial variables, which include total income, expenditure, and asset holdings, on average 8.8% of the observations are imputed, ranging from 4.5% for Sweden up to 13.6% in France (Kalwij and van Soest, 2005). The goal of this procedure is to address potential biases and loss of precision that may arise from missing values (De Luca, 2012). The main variables, income, expenditure and wealth-related items are imputed with fully

[8]The survey is conducted in Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland.

[9]Nowadays, CAPI interviews are the standard format for household finance surveys.

[10]Wave 3 focuses on people's life experiences (SHARELIFE). The questionnaire is significantly different and is thus disregarded in this study.

conditional specifications, based on the methodology suggested by Van Buuren et al. (2006). Because some variables are imputed, standard errors have to be adjusted, as described by Little and Rubin (1987) and Montalto and Sung (1996).

3.3.2 Presence of a third party

The main variable of interest in this study is the presence of third parties during the interview. In comparison to other household surveys, in the SHARE the interviewer indicates the presence of third parties and their relation to the respondent at two different stages of the interview (in wave 4 the presence of companions is even captured at three stages). At the beginning of the cognitive test section, the interviewer requests that the subsequent section should be completed alone. At the end of the cognitive test, the interviewer takes note of the presence of third parties that stayed nonetheless.[11] In approximately 9% of all cases, the respondent was accompanied *during the test section*. Of those accompanied, 83% had their partner or spouse present, 13% had at least one child present and 9% were accompanied by someone else. Respondents that could not answer the survey themselves but had a proxy respondent instead, are excluded from the test section.

At the end of the questionnaire, the interviewer is asked to state whether the respondent was accompanied *during any part of the* interview. A third party was present at 16.4% of all interviews at some point of the interview.[12] In 87% of those cases, the third party was the spouse or partner, while in 11% at least one child was present. Other companions stayed in 9% of the interviews. Thus, the distribution of present companions for the specific test section

[11] I test and reject that disturbances or interferences by the third party are biasing my results (cf. infra).

[12] This implies that in more than half of the interviews where a survey participant was accompanied, a respondent's companion stayed during the cognitive test.

is comparable to the distribution of companions for the overall interview. No information is provided as to how many people in total were present at a given interview.

Throughout the study I use two different control groups. First, I compare the answer behavior of respondents that were accompanied during the cognitive test to the responses of all other survey participants. Second, I limit the sample to the group of respondents that were accompanied at least during some part of the interview. While I lose 83.6% of the observations in the latter case, it mitigates the concern that the subsample of respondents that come to the interview with company is per se different from respondents that come alone.

3.3.3 Answer behavior

The data available in the SHARE allow me to study the response behavior for a range of questions. Questions in the cognitive test section can be categorized into two types. First, self-assessment questions about the subjective reading or writing ability ("How would you rate your reading skills?", "Rate your writing skills?"); second, questions with objectively correct answers, such as the current day of the month, or a simple numerical exercise (e.g., "Which day of the month is it?", "If the chance of getting a disease is 10%, how many people out of 1,000 would be expected to get the disease?"). For both types, I define dummy variables equal to one if the respondent chose to answer the question, independent from the actual answer and whether it is correct or not.

I create an overconfidence variable based on the difference between respondents self-reported memory ability, in comparison to the subsequent performance in a memory test.

The difference corresponds to the continuous variable overconfidence. In order to allow inferences on overconfidence, a separate dummy variable equals one if the miscalibration is positive.[13]

3.3.4 Control variables, and descriptive statistics

The SHARE captures standard financial household variables, such as household income, expenditure, and net wealth. Demographic and socio-economic characteristics such as age, household composition, employment, and education are also included. Because personal characteristics have been reported to affect individuals' behavior, it is important to control for them (e.g., Cappelen et al., 2013). An extensive description of the main variables used in this study is provided in Table 3.1. Table 3.2 outlines the descriptive statistics of the control variables and dependent variables used throughout this study. The average respondent is 65.4 years old, 74% survey participants are married and 89% have children.

[Insert Table 3.1 and Table 3.2 about here]

3.4 Sample selection bias: missing answers

First, I examine how the presence of a third party during the interview affects the probability of missing answers to questions, i.e., non-response items in the dataset. Second, I study whether inferences from a simple regression model are significantly biased if we fail to take into account the potential self-selection to complete the cognitive test.

[13]For instance, a positive correlation between a variable and the continuous overconfidence proxy could imply that the respondent is either less humble (smaller miscalibration) or more overconfident.

3.4.1 Item non-response

As a first empirical test, I examine whether the respondent decided to self-assess her reading abilities. A simple student's t-test shows that respondents that were accompanied when the question was asked, are 3.0% less likely to answer the question, and this difference is statistically significant at the 1% level (untabulated). The result remains qualitatively and quantitatively the same when limiting the sample to respondents that were accompanied at some point of the interview.

To study the response decision more formally, and to control for factors that can affect both the likelihood of companions and non-responses, I now estimate a multivariate regression model. The logistic regression equation can be expressed as follows:

$$Pr(response_i = 1) = \beta_0 + \beta_1 companion_i + \theta' X_i + Y_i + C_i + \epsilon_i \tag{3.1}$$

where the dependent variable is an indicator equal to one if the respondent chose to answer a question, independent from the correctness of the reply, and zero if the respondent did not provide an answer. The main variable of interest is *companion*, a dummy variable equal to one if the interviewee was accompanied during the question, X is a vector of control variables, Y is a vector of survey year effects, and C captures country effects.[14]

The results of the maximum likelihood estimation of Equation (3.1) are reported in Table 3.3.[15] Columns 1 to 4 in Panel A examine whether the respondent chose to self-assess her reading abilities. In column 1 all observations are included, while in the second column the

[14] See Groves et al. (1992) for an overview of the determinants of survey participation.

[15] The results are qualitatively and quantitatively similar when estimating the model using Firth's penalized maximum likelihood techniques.

sample is restricted to observations where a third person was present during some point of the interview. In both regression specifications the presence of a third person negatively affects the probability of a reply. The marginal treatment effect at the mean indicates that the probability of a response to the question decreases between 2.3% and 2.5% if another person is present, which is statistically significant at the 1% level. Unsurprisingly, healthy and wealthier respondents are more likely to reply to questions.

[Insert Table 3.3 about here]

Next, I study whether the effect of the presence of a third party depends on the companion type. The interviewer provides refined information for whether the partner, a child or some other person was present so that I replace the companion variable with indicators for each category. In columns 3 and 4 we can see the effect of the presence of each party on the probability of responses, again first including all observations, and then restricting the sample to respondents that were accompanied by a third party at some point of the interview. In both specifications, the presence of each party has a statistically significant negative effect on the response likelihood. The size of the effect ranges from 1.0% for partners to 4.6% for others, and the difference is statistically significant. I repeat the analysis for the probability to self-assess the writing abilities. Columns 5 to 8 of Panel A show consistent results. The negative effect is again more pronounced for the presence of others compared to the presence of the partner or children, and the order of magnitude remains.

In Panel B of Table 3.3, I replace the dependent variable with a dummy indicating whether the respondent answered to objective skill questions, which have distinctive, correct answers. The likelihood to respond to questions regarding the day of the month and simple numeric

problems are reduced when a companion is present (columns 1 to 8). The effect of the presence of companions on the probability of a response thus seems to be of similar importance for questions regarding self-assessments as for skills tests. The comparable effect from companions on the answer probability, independent from the question type, mitigates the concern that non-responses to objective questions are merely admittances of not knowing the answer.

3.4.2 Importance of current companion presence: Placebo tests and robustness checks

A potential concern with this finding is that the presence of a companion during the cognitive test may pick up population differences due to omitted variables, even when restricting the sample to observations where a third person was present at some point of the interview. With a placebo test I examine whether the respondents accompanied during the cognitive section are generally less likely to answer to questions.

At the beginning of the survey in wave 4, the interviewer accentuated the private nature of the questions and indicated whether a third person stayed nonetheless at this stage of the interview ($companion_{t=0}$).[16] I study the response probability ensuing the interviewer's instruction; the dependent variable $reply(weight)_{t=0}$ is a dummy equal to one if the respondent indicated her weight, and zero otherwise. The explanatory variable $companion_{t=1}$ captures the presence of third parties during the cognitive test section, which follows later in the interview. Figure 3.1 illustrates the timing of the questions. 66.3% of the respondents that are accompanied in the cognitive test section, are also accompanied in the early stage of the

[16]This information was just added in wave 4 of the SHARE. Therefore, the placebo test is only conducted for observations from wave 4.

interview.

[Insert Figure 3.1 about here]

First, I restrict the sample to respondents *accompanied* at the time of the weight question ($companion_{t=0}$ equal to 1). If respondents also accompanied during the later cognitive test section are less likely to answer questions throughout the survey, $companion_{t=1}$ should bear a statistically significantly negative coefficient. The regression equation for the placebo test can be expressed as follows:

$$Pr(response_{i,t=0} = 1 | companion_{i,t=0} = 1) = \beta_0 + \beta_1 companion_{i,t=1} + Controls + \epsilon_i \quad (3.2)$$

In Table 3.4, column 1 shows that the placebo effect is statistically insignificant and the order of magnitude of the effect is negligible. Similarly, column 2 replaces the explanatory variable of interest with the refinement of who the third person is in the cognitive test section. The coefficients are again close to zero (and non-negative). Second, I restrict the sample to respondents *not accompanied* at the time of the weight question ($companion_{t=0}$ equal to 0), and again examine the placebo effect of later presence during the cognitive test section ($companion_{t=1}$). The results in columns 3 and 4 confirm that the placebo effect is insignificant and non-negative.

[Insert Table 3.4 about here]

Finally, I revisit the importance of the current presence of companions for the answer behavior at that specific time of the interview. Column 5 shows that the presence of a

third person at the current time of the question decreases the answer probability, conditional on respondents having a companion present at the later cognitive test section. Column 6 concurrently confirms the negative effect, conditioning on the absence of the companion at the later stage of the interview. Overall, this mitigates the concern that the findings from the placebo test suffer from a small number of observations, i.e., a power issue. Lastly, when including both current ($companion_{t=0}$) and future presence ($companion_{t=1}$) in one analysis, I find again that only the current presence has a significantly negative effect on the reply probability while future presence has none (not tabulated).

3.4.3 Heckman selection model

The determinants of household income have been studied frequently (e.g., Jencks, 1979). But estimating a regression model only for a subsample that completes all survey questions introduces a response bias if those survey participants are not representative of the whole population. Heckman (1979) shows in his seminal work how to correct for such non-randomly selected samples.[17] I use the presence of third parties as an exclusion restriction to the Heckman selection model. To ensure comparability among survey participants, I restrict the sample to respondents that were accompanied at some point of the interview. Moreover, I include a dummy equal to one if the interviewer observed the respondent to be unwilling to provide information.[18] Including an additional interaction term of unwillingness to reply and presence of third parties during the cognitive test sheds light on whether third parties may

[17]However, e.g., Winship and Mare (1992) highlight that the results of the Heckman model are often sensitive to the assumption of bivariate normality. Indeed, Liao (1995) and Sartori (2003) explain that without an exclusion restriction, the model is solely identified on distributional assumptions.

[18]Similar results are obtained without the additional control variable. However, accounting for observed unwillingness may further mitigate endogeneity concerns of the companionship variable.

mitigate the interviewee's unwillingness to respond. Accordingly, I estimate the Heckman model for household income, where the selection equation reads

$$Pr(response_i = 1) = \beta_0 + \beta_1 companion_i + \beta_2(companion_i \, x \, unwilling_i) + \beta_3 unwilling_i + \gamma^{'} W_i + \epsilon_{si} \tag{3.3}$$

The outcome equation includes the vector of control variables, and country fixed-effects, so that I estimate the following multivariate regression

$$(y_i \mid reply_i = 1) = \beta_0 + \gamma^{'} X_i + C_i + \epsilon_{oi} \tag{3.4}$$

assuming that ϵ_{s} and ϵ_{o} have a bivariate normal distribution

$$\begin{bmatrix} \epsilon_s \\ \epsilon_o \end{bmatrix} = N \sim \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \sigma_{so} \\ \sigma_{so} & \sigma^2 \end{bmatrix} \right) \tag{3.5}$$

The Wald test of independent equations (ρ=0) provides a direct test of the correlation between the error terms in the selection equation (ϵ_{s}), and the ones in the outcome equation (ϵ_{o}). However, potentially omitted variables in the selection equation and the collinearity of the vectors W and X may limit the conclusions that can be drawn from the Wald test. Therefore, I separately estimate a simple OLS regression model, ignoring the non-reply decision

$$(y_i \mid reply_i = 1) = \beta_0 + \theta^{'} X_i + C_i + \epsilon_i \tag{3.6}$$

Hence, I also compare the results from the Heckman outcome equation to results from the simple OLS regression. Table 3.5 reports the results of estimating the Heckman selection

model with two-step consistent estimates.[19] In the first column of Panel A, the selection equation is estimated. As expected, the coefficients indicate that the presence of a third party and unwillingness to reply negatively affect the probability of a reply. The interaction term is also statistically significantly negative at the 1% level, implying that the reply probability is even lower if a respondent is accompanied by a third party and unwilling to reply to questions. Therefore, companions do not seem to offset the unwillingness to answer.

[Insert Table 3.5 about here]

In the second column of Panel A in Table 3.5 I report the estimated outcome equation for the dependent variable household net income, including the Heckman correction. Column 3 reports the simple OLS estimates without the Heckman correction. The Wald test shows that the ρ is statistically significant at the 1% level (χ^2 equals 53.25), so that we reject the hypothesis that the selection and outcome equations are independent. However, omitting to take the selection bias into account only implies incorrect inferences if the coefficient estimates in the Heckman outcome equation (column 2) differ from the simple OLS estimates (column 3). We can see that particularly the coefficients of *college*, *health*, and *married* are more pronounced when endogenizing the reply decision. Moreover, the coefficient of *male* changes to a positive sign.

In Panel B, columns 1 to 3 I repeat the analysis, replacing the dependent variable with the percentage of household income spent. As the selection equation remains the same, it is not surprising that its coefficient estimates remain almost the same. Indeed, the differences stem

[19] The coefficients of variables that are part of the selection equation (W), and also appear in the outcome equation (X), cannot be simply interpreted as the marginal effect on the outcome variable in maximum likelihood estimation. To correct the estimates in the outcome equation the coefficients from the selection equation and the inverse of the Mills' ratio have to be taken into account (Greene, 2011, p. 915).

from the change of the dependent variable in the outcome equation, which leads to a small change in the sample composition.[20] Again, the Wald test indicates a significant correlation in the error terms of the selection and outcome equation (at the 1% level). A comparison of the coefficients of the Heckman outcome equation and the simple OLS model shows that the bias in the estimates is less severe than in the income model.

3.5 Social desirability bias and overconfidence

3.5.1 Overreporting of abilities as implied overconfidence

I now turn to examining whether the presence of a third party during the interview affects *how* respondents answer, with the hypothesis that respondents with companions are more prone to overreport their abilities. I study both, the difference in self-rated memory minus tested memory ability, and an indicator variable equal to one if the miscalibration is positive and zero otherwise. The dichotomous specification also mitigates the concern whether findings are sensitive to extreme values in the difference between self-assessments and performance. The measure indicates that 61.0% of the sample are categorized as overconfident.

In Table 3.6, I regress the implied overconfidence on the presence of third parties, controlling for socio-economic and demographic characteristics. Columns 1 and 2 show a positive effect of the presence of a third person, and in particular the presence of the partner, which is statistically significant at the 1% level. The presence of children has no significant effect but the one of others is statistically significant at the 5% level. However, when the sample is restricted to respondents who had a third party present at some point of the interview, only

[20]The total number of observations varies between 6,592 and 6,787.

the coefficients of the companion indicator (column 3), and of the presence of the partner (column 4) remain statistically significantly positive.

[Insert Table 3.6 about here]

Similarly, in the dummy specification, the probability of giving an overconfident self-evaluation in columns 5 and 6 is positively affected by the presence of a third party, and in particular by the presence of the respondent's partner. As expected, a respondent's gender has a strong effect on overconfidence, increasing the probability to observe an overconfident answer by 5.9% if the respondent is male (Barber and Odean, 2001). In comparison, the presence of a third party increases this probability by more than 4.8%, which, in terms of order of magnitude, corresponds to 80% of the gender effect. When the sample is limited to only observations where at some point of the interview a third party was present, the effect of companions or partners remain statistically significant at the 1% level (columns 7 and 8). Thus, Table 3.6 provides consistent evidence that a companion's presence may indeed induce respondents to overreport their abilities, consistent with the social desirability bias.

3.5.2 Robustness check considering test disturbances

One concern about the effect of companions on overconfident responses is that the test could be impaired by the presence of the third party. While the interviewer captures specific reasons for potential impairments, this information is censored from the public dataset. However, anecdotal descriptions from the SHARE database managers indicate that the entering or leaving of a third person is frequently mentioned as a source of potential impairment. Therefore, it is not surprising that the presence of third parties and an indicator for disturbances

are positively correlated. The list of potential test impairments includes noise, such as the television, radio, phone calls, door bells, or other people's phone calls, and medical handicaps such as bad hearing, fatigue, or Alzheimer.

As a first robustness test, I restrict the sample to observations where no test impairment was observed by the interviewer. In Panel A of Table 3.7, the presence of a third person increases the likelihood of an overconfident response as before. Similarly, with the refined categories in column 2, we observe that the positive effect is mainly driven by the partner's presence. These findings mitigate concerns about test impairment driving the result.

[Insert Table 3.7 about here]

Moreover, by examining the interaction of presence of a third person and the disturbance indicator for the full sample I can further examine whether the effect of companions may be partly driven by test disturbances. The first column of Panel B in Table 3.7 shows that the two main effects are statistically positive. However, the interaction term of companion and disturbance, has a statistically insignificant coefficient and bears a negative sign. While test disturbances and companions consistently increase overconfident answers for the full sample and the accompanied subsample, the interaction remains insignificant. This also holds for disturbances in combination with the presence of specific persons (not tabulated). This suggests that the effect of third parties on overconfident answers is not driven by test impairments.

3.5.3 Robustness check of sample composition

It should be noted that the sample composition of the SHARE is not representative of the whole population. The survey focuses on the population of 50 years and older. Therefore, the question arises whether respondents may decide to report inflated self-assessments in order to avoid unsettling companions and not due to social desirability. In this case, the importance of companions should depend on respondents' age because younger respondents are less likely to have to hide bad news about their health from companions. To examine this alternative explanation, I explore a second dataset from the Survey of Consumer Finances. In this survey, the median age of respondents just exceeds 50 years.[21] As a measure of overconfidence, I use the difference in subjective and objective life expectancy, as suggested by Puri and Robinson (2007).

The first two columns of Table 3.8 show that the presence of companions leads to optimistic answers, even in a sample that is unrestricted by age. To see how the importance of companions depends on the age of the respondent, I split the sample into younger and older than the median respondent and exclude the age effects from the model. For the younger sample, I continue to find that companions lead to optimistic responses (column 3), although in column 4, the effect of partner's presence becomes now statistically insignificant (p-value 0.1850). Similarly, optimistic replies are more common among accompanied respondents in the older sample, as shown in columns 5 and 6. Overall, the importance of companions is comparable in the two sub-samples. Therefore, the effect of companion presence on optimistic

[21] While this data allows me to examine the effects of companion presence over a wider range of age profiles, I do not observe the current presence of companions. Thus, I can only use the presence of a companion at some point of the interview as a proxy for current presence. The preceding analysis shows that this seems to be a reasonable, albeit noisy proxy.

responses is not exclusive to a specific age group but can be observed more generally. This mitigates the concern that the observed companion effect only represents that respondents try to avoid unsettling respondents, as such a behavior would be expected to be much more common among the older respondents.

[Insert Table 3.8 about here]

3.5.4 Behavior of overconfident respondents

Household perceptions and financial decisions are, amongst others, determined by respondents' beliefs. However, if the reported beliefs that are captured with the questionnaire do not reflect the true household's assessments due to a potential desirability bias induced by the social environment of the interview, actual financial decisions and behavior will not correlate with these stated beliefs (hypothesis 4). In the following, I test the hypothesis that the effect of overconfidence differs between the group of respondents that were alone when they self-assessed their memory ability, and the one that was accompanied by a third party. Thus, I test whether the interaction of overconfidence and presence of a third party offsets the main effect of overconfidence.

First, Table 3.9 examines the percentage of income spent. All regressions include the same control variables and country fixed-effects as before. As expected, column 1 shows that households classified as overconfident spend a higher fraction of their income. The interaction term of companions and overconfidence is negative and statistically significant at the 10% level. Thus, we observe an offsetting effect consistent with the hypothesis of the social desirability bias stemming from the interview environment.

[Insert Table 3.9 about here]

Second, I replace the dependent variable with the self-rated ability to make ends meet and repeat the previous analysis. Indeed, overconfidence has a positive effect on the reported ability to make ends meet. In column 2, the interaction term of companion and overconfidence is again offsetting and statistically significant. Accordingly, in the third column I present the regression estimates for the likelihood to report having experienced sadness in the six months prior to the interview; and in the fourth column the dependent variable is an indicator equal to one if the respondent asked many questions during the interview. Both occurrences are typically negatively correlated with overconfident behavior (Ifcher and Zarghamee, 2011). In both specifications, the interaction of third parties and overconfidence offsets the initial negative overconfidence effect. These results provide further evidence that accompanied respondents may report inflated self-assessed memory abilities due to the desirability bias, which leads to misclassifying them as overconfident.

Finally, I repeat the analysis using data from the Survey of Consumer Finances. The measure of overconfidence (or optimism) is defined as the miscalibration in life expectancy. In column 5, the dependent variable is the probability to participate in the equity market. Again, the overconfidence effect is significantly less pronounced if a third party is present. Overall, this analysis consistently documents that failing to take the presence of companions into account introduces a downward bias in the estimates of overconfidence. However, because only 9% of respondents are accompanied during the test section, the downward bias due to the social environment can only be as high as 9% of the overconfidence effect.

3.6 Conclusion

Starting from the concept that the social setting can affect an individual's decision-making, this paper examines the role of companions present during the interview for the respondent's answer behavior. I show that the presence of third parties at a given time decreases the likelihood of a response to a question at that time, controlling for health, age, gender, and a range of demographic and socio-economic characteristics. This finding can be used to endogenize the decision to reply to a cognitive test when estimating the determinants of e.g., household income or percentage of income spent. Another application of this result lies in imputation procedures.

Moreover, I find that given answers are affected by the presence of companions as respondents are more likely to overreport their abilities in front of others. This result is consistent with the social desirability bias and not driven by test disturbances. Studying the overconfidence effect on financial decisions and behavior, I find that the presence of third parties mitigates these effects. This is in line with the hypothesis of inflated self-assessments caused by the interview situation. Ignoring the social desirability bias when examining the importance of overconfidence leads to a downward bias in the estimates. Importantly, this provides evidence that the presence of people also affects how respondents answer.

These results show empirically the importance of the social environment for respondents' answer behavior. Not only the interviewer can affect respondent behavior, but the presence of familiar and even familial companions influences decisions. Hence, in any situation where an individual's behavior and decisions are observed by others, such as working in a team, individuals may adapt their behavior.

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Table 3.1: Definitions

This table presents definitions for the dependent variables and control variables used in this study. The data come from the SHARE.

Variable	Description	Values
Companion	'Who was present during this section?'	anyone=1; no=0
Partner present	'Who was present during this section?'	partner present=1; no=0
Child present	'Who was present during this section?'	child present=1; no=0
Other present	'Who was present during this section?'	other person=1; no=0
Age	Year of survey - year of birth	
Male	Gender of the respondent	male=1; female=0
Married	'What is your marital status?'	married=1; other=0
Children	Does the respondent state to have at least one child?	yes=1; no=0
College	'Which degrees of higher education or vocational training do you have?'	college=1; none/other=0
Retired	'Which of the following best describes your current employment situation?'	retired=1; other=0
Self-employed	'[In your current main job] are you an employee, a civil servant, or a self-employed?'	self-employed=1; other=0
Net income	Household net income	
Net worth	Total assets - total liabilities	
Healthy	'For the past six months at least, to what extent have you been limited because of a health problem in activities people usually do?'	not limited=1; other=0
Test disturbance	'Were there any factors that may have impaired the respondent's performance on the tests?"	yes=1; no=0
Unwillingness	'How would you describe the willingness of the respondent to answer?'	bad=1; fair or better=0
Numeracy	Numeracy is measured with four questions and scored from one to five (see Dewey and Prince, 2005).	ranges from poor (1) to excellent (5)
Verbal fluency	'Now I would like you to name as many different animals as you can think of.'	count number of different animals
Poor reading	'How would you rate your reading skills needed in your daily life?'	ranges from excellent (1) to poor (5)
Poor writing	'How would you rate your writing skills needed in your daily life?'	ranges from excellent (1) to poor (5)
Incorrect day	'Which day of the month is it?'	Incorrect day=1; correct day=0
Memory self-assessed	'How would you rate your memory at the present time?'	ranges from poor (1) to excellent (5)
Memory test	'I am going to read a list of words from my computer screen [...] I will ask you to recall aloud as many of the words as you can.'	scaled from poor (1) to excellent (5)
Reply(subj. reading)	Did the respondent rate his/her reading skills?	yes=1; no=0
Reply(subj. writing)	Did the respondent rate his/her writing skills?	yes=1; no=0
Reply(obj. day)	Did the respondent attempt to name the day of the month?	yes=1; no=0
Reply(obj. numeric)	Did the respondent attempt to answer the first quantitative question?	yes=1; no=0
Reply(cognitive)	Did the respondent answer all questions in the cognitive test section?	yes=1; no=0
Spending share	Household expenditure / total income	
Meet ends	'Thinking of your household's total monthly income, would you say that your household is able to make ends meet?'	ranges from great difficulty (1) to easily (4)
Sad	'In the last month, have you been sad or depressed?'	yes=1; no=0
Asking questions	'Did the respondent ask for clarification on any questions?'	often/always=1; other=0

Table 3.2: Descriptive statistics

This table presents descriptive statistics (number of observations, mean, 25th percentile, median, and 75th percentile) for the variables used in this study. The data come from the SHARE.

Variable	N	Mean	P25	P50	P75
Companion	123,356	0.16			
Partner present	123,356	0.13			
Child present	123,356	0.02			
Other present	123,356	0.02			
Age	123,561	65.44	57	64	73
Male	124,021	0.46			
Married	124,015	0.74			
Children	92,911	0.89			
College	99,702	0.20			
Retired	122,564	0.52			
Self-employed	90,471	0.05			
ln(net income)	120,286	10.13	9.38	10.10	10.90
ln(net worth)	117,484	11.48	10.79	12.02	12.87
Healthy	123,411	0.55			
Test disturbance	121,689	0.07			
Unwillingness	122,523	1.45	1	1	2
Numeracy	102,998	3.32	3	3	4
Verbal fluency	120,461	19.25	14	19	24
Poor reading	83,439	2.37	1	2	3
Poor writing	83,432	2.50	1	3	3
Incorrect day	101,217	0.11			
Memory self-assessed	57,334	5.97	4	6	8
Memory test	121,199	3.61	2	4	5
Reply(subj. reading)	84,524	0.99			
Reply(subj. writing)	84,524	0.99			
Reply(obj. day)	103,058	0.98			
Reply(weight)	123,459	0.98			
Reply(obj. numeric)	103,000	0.95			
Reply(cognitive)	84,524	0.93			
Spending share	88,537	0.60	0.15	0.29	0.52
Meet ends	82,820	2.73	2	3	4
Sad	121,768	0.39			
Asking questions	123,076	0.26			

Table 3.3: Non-responses and presence of third parties

This table examines the reply decision. All models are estimated using maximum likelihood. Control variables also include income, retirement self-employment status. Panel A examines the probability to reply to subjective self-assessments, Panel B presents the results when studying the probability to reply to objective skill questions. The data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Probability to reply to subjective self-assessment questions

	Reply(reading) *Full sample*	Reply(reading) *Accompanied*	Reply(reading) *Full sample*	Reply(reading) *Accompanied*	Reply(writing) *Full sample*	Reply(writing) *Accompanied*	Reply(writing) *Full sample*	Reply(writing) *Accompanied*
Companion	-1.7715***	-2.0658***			-1.7353***	-1.9814***		
	(0.1316)	(0.2394)			(0.1297)	(0.2307)		
Partner present			-0.8964***	-1.0817***			-0.9300***	-1.0630***
			(0.1816)	(0.2215)			(0.1788)	(0.2172)
Child present			-1.5410***	-1.4064***			-1.5304***	-1.4230***
			(0.1881)	(0.2169)			(0.1855)	(0.2157)
Other present			-2.2096***	-2.0434***			-2.1470***	-1.9920***
			(0.1753)	(0.2103)			(0.1759)	(0.2117)
Male	-0.1372	-0.1483	-0.1775	-0.1775	-0.1092	-0.1542	-0.1459	-0.1825
	(0.1279)	(0.1837)	(0.1294)	(0.1875)	(0.1249)	(0.1812)	(0.1266)	(0.1850)
Married	0.6319***	1.2655***	0.3332**	0.9926***	0.6242***	1.2083***	0.3559**	0.9354***
	(0.1421)	(0.2149)	(0.1511)	(0.2893)	(0.1394)	(0.2153)	(0.1490)	(0.2884)
Children	0.0657	0.2601	0.0316	0.1572	0.0347	0.2593	0.0065	0.1780
	(0.1712)	(0.2351)	(0.1742)	(0.2461)	(0.1706)	(0.2365)	(0.1736)	(0.2485)
College	0.3006*	0.2365	0.3042*	0.2175	0.2220	0.1774	0.2235	0.1543
	(0.1807)	(0.3028)	(0.1820)	(0.3046)	(0.1744)	(0.2933)	(0.1755)	(0.2951)
Ln(net worth)	0.0462***	0.0484**	0.0405***	0.0424**	0.0430***	0.0494**	0.0372**	0.0429**
	(0.0151)	(0.0197)	(0.0155)	(0.0204)	(0.0152)	(0.0204)	(0.0155)	(0.0208)
Healthy	0.9193***	1.0309***	0.9151***	1.0355***	0.9330***	1.0558***	0.9276***	1.0573***
	(0.1408)	(0.2216)	(0.1421)	(0.2250)	(0.1404)	(0.2230)	(0.1417)	(0.2267)
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42,161	10,987	42,161	10,987	42,161	10,987	42,161	10,987

Panel B - Probability to reply to objective test questions

	Reply(day) *Full sample*	Reply(day) *Accompanied*	Reply(day) *Full sample*	Reply(day) *Accompanied*	Reply(numeric) *Full sample*	Reply(numeric) *Accompanied*	Reply(numeric) *Full sample*	Reply(numeric) *Accompanied*
Companion	-2.0033***	-2.0665***			-1.0925***	-0.8902***		
	(0.1053)	(0.1777)			(0.0562)	(0.0746)		
Partner present			-1.0320***	-1.0274***			-0.6279***	-0.5265***
			(0.1449)	(0.1642)			(0.0742)	(0.0851)
Child present			-1.7953***	-1.4215***			-1.2186***	-0.9380***
			(0.1487)	(0.1716)			(0.0985)	(0.1152)
Other present			-2.2588***	-1.9745***			-1.3379***	-1.1002***
			(0.1470)	(0.1763)			(0.1022)	(0.1190)
Male	-0.0078	-0.0126	-0.0501	-0.0414	0.4238***	0.3336***	0.4024***	0.3209***
	(0.1037)	(0.1403)	(0.1049)	(0.1427)	(0.0531)	(0.0807)	(0.0531)	(0.0811)
Married	0.5810***	1.1810***	0.2398*	0.8857***	0.2195***	0.7340***	0.0942	0.5173***
	(0.1140)	(0.1635)	(0.1225)	(0.2210)	(0.0570)	(0.0994)	(0.0588)	(0.1216)
Children	-0.1478	-0.2666	-0.1713	-0.3660	0.1359**	0.0740	0.1435**	0.0703
	(0.1482)	(0.2133)	(0.1522)	(0.2244)	(0.0688)	(0.1225)	(0.0696)	(0.1268)
College	0.0470	-0.0020	0.0559	-0.0060	0.6724***	0.4437***	0.6748***	0.4307***
	(0.1308)	(0.1976)	(0.1317)	(0.1988)	(0.0776)	(0.1293)	(0.0777)	(0.1293)
Retired	0.6751***	0.2091	0.6142***	0.1682	0.1193	-0.3325*	0.0919	-0.3279*
	(0.1903)	(0.3202)	(0.1934)	(0.3320)	(0.0921)	(0.1912)	(0.0923)	(0.1928)
Self-employed	0.1172	0.5644	0.1008	0.5074	0.1973	0.3098	0.2066	0.3175
	(0.3454)	(0.5551)	(0.3448)	(0.5555)	(0.1764)	(0.3121)	(0.1766)	(0.3140)
Ln(net income)	0.0114	0.0322	0.0232	0.0299	0.1034***	0.0531	0.1099***	0.0566*
	(0.0447)	(0.0586)	(0.0456)	(0.0607)	(0.0194)	(0.0337)	(0.0191)	(0.0333)
Ln(net worth)	0.0361***	0.0424**	0.0312**	0.0382**	0.0419***	0.0404***	0.0396***	0.0369***
	(0.0134)	(0.0168)	(0.0139)	(0.0175)	(0.0075)	(0.0123)	(0.0076)	(0.0125)
Healthy	0.9550***	0.9903***	0.9555***	0.9805***	0.5476***	0.5073***	0.5453***	0.4994***
	(0.1115)	(0.1591)	(0.1128)	(0.1609)	(0.0504)	(0.0814)	(0.0506)	(0.0816)
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	52,954	14,240	52,954	14,240	52,954	14,739	52,954	14,739

Table 3.4: Placebo tests and robustness checks

This table reports the results of a set of regressions differentiating between when a third person was present during the interview. All models are estimated using maximum likelihood. The dependent variable reply(weight)$_{t=0}$ is a dummy equal to one if the respondent answered a weight question and zero otherwise. The variable companion$_{t=0}$ is equal to one if the respondent was accompanied at that time of the interview, whereas companion$_{t=1}$ is a dummy equal to one if the respondent was accompanied during the cognitive test, a section that follows later in the interview. The sample restriction accompanied$_{t=0}$ denotes if a third party was present when the weight question was asked, and absent$_{t=0}$ denotes absence. Similarly, accompanied$_{t=1}$ and absent$_{t=1}$ denote presence and absence during the cognitive test. Other controls include college, retired, self-employed, ln(net worth), ln(income). The data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Reply(weight)$_{t=0}$ *Accompanied$_{t=0}$*	Reply(weight)$_{t=0}$ *Accompanied$_{t=0}$*	Reply(weight)$_{t=0}$ *Absent$_{t=0}$*	Reply(weight)$_{t=0}$ *Absent$_{t=0}$*	Reply(weight)$_{t=0}$ *Accompanied$_{t=1}$*	Reply(weight)$_{t=0}$ *Absent$_{t=1}$*
Companion$_{t=1}$	-0.0811		-0.0822			
	(0.3535)		(0.2757)			
Partner present$_{t=1}$		-0.0349		-0.4274		
		(0.3622)		(0.3153)		
Child present$_{t=1}$		0.1048		0.1585		
		(0.5338)		(0.5492)		
Other present$_{t=1}$		0.5504		1.3674		
		(0.5988)		(1.0449)		
Companion$_{t=0}$					-1.0896***	-0.9891***
					(0.3158)	(0.3078)
Male	0.2234	0.2185	1.1678***	1.1873***	0.3980	1.1722***
	(0.3179)	(0.3248)	(0.1764)	(0.1772)	(0.3266)	(0.1764)
Married	-0.1074	0.0784	0.1997	0.2393	-0.3467	0.2067
	(0.4988)	(0.5711)	(0.1466)	(0.1507)	(0.4662)	(0.1495)
Children	-0.0359	0.0409	0.6020***	0.6065***	0.0257	0.6172***
	(0.5910)	(0.5538)	(0.1669)	(0.1677)	(0.5357)	(0.1694)
Healthy	-0.2795	-0.2461	-0.0316	-0.0305	-0.6895**	0.0503
	(0.3709)	(0.3673)	(0.1358)	(0.1361)	(0.3083)	(0.1386)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	941	941	22,112	22,112	2,181	20,515

Table 3.5: Sample selection bias and presence of a third party

This table reports the results of a Heckman selection model that explains income and the share of income spent, accounting for the endogeneity of the decision to reply to cognitive test questions. The first columns in Panel A and B show the selection equation, while the second columns show the outcome equation. The OLS estimates solely based on respondents that answered all questions are reported in column 3, respectively. The data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Income determinants

	pr(reply) *Selection eq.*	ln(income) *Outcome eq.*	ln(income) *OLS*
Companion	-0.1899**		
	(0.0878)		
Companion X Unwilling	-0.1190***		
	(0.0432)		
Unwilling	-0.2553***	-0.2345***	-0.0974***
	(0.0345)	(0.0314)	(0.0225)
Age	-0.0139	0.0069	0.0030*
	(0.0176)	(0.0167)	(0.0018)
Age^2	-0.0000	-0.0001	-0.0000
	(0.0001)	(0.0001)	(0.0000)
Male	0.2672***	0.0515	-0.0414
	(0.0391)	(0.0372)	(0.0307)
Married	0.5383***	0.9986***	0.7212***
	(0.0483)	(0.0659)	(0.0521)
Children	0.1391**	0.0626	0.0241
	(0.0653)	(0.0610)	(0.0643)
College	0.4491***	0.3692***	0.2355***
	(0.0608)	(0.0490)	(0.0403)
Health	0.1682***	0.1529***	0.0922***
	(0.0403)	(0.0359)	(0.0321)
Numeracy		0.1023***	0.0949***
		(0.0167)	(0.0160)
Verbal fluency		0.0070***	0.0080***
		(0.0024)	(0.0029)
Poor reading		-0.0215	-0.0357
		(0.0235)	(0.0233)
Poor writing		-0.0594**	-0.0522**
		(0.0231)	(0.0226)
Incorrect day		-0.0972**	-0.0948**
		(0.0435)	(0.0398)
Memory test		-0.0032	-0.0053
		(0.0088)	(0.0090)
Memory self		-0.0159*	-0.0150*
		(0.0091)	(0.0091)
Country effects	Yes	Yes	Yes
Observations	6,787	6,787	5,598

Panel B - Spending share determinants

	pr(reply) *Selection eq.*	Spending share *Outcome eq.*	Spending share *OLS*
Companion	-0.2006**		
	(0.0885)		
Companion X Unwilling	-0.1098**		
	(0.0436)		
Unwilling	-0.2630***	-0.1236***	-0.0880***
	(0.0349)	(0.0291)	(0.0191)
Age	-0.0090	-0.0299**	-0.0088***
	(0.0178)	(0.0150)	(0.0018)
Age^2	-0.0001	0.0002	0.0000***
	(0.0001)	(0.0001)	(0.0000)
Male	0.2603***	0.0682**	0.0508*
	(0.0394)	(0.0332)	(0.0280)
Married	0.5650***	0.2798***	0.2293***
	(0.0491)	(0.0650)	(0.0550)
Children	0.1274*	0.0057	-0.0031
	(0.0659)	(0.0543)	(0.0669)
College	0.4564***	0.3029***	0.2532***
	(0.0611)	(0.0439)	(0.0419)
Health	0.1738***	0.1242***	0.1079***
	(0.0406)	(0.0320)	(0.0301)
Numeracy		0.0406**	0.0501***
		(0.0162)	(0.0158)
Verbal fluency		-0.0012	-0.0013
		(0.0023)	(0.0023)
Poor reading		-0.0132	-0.0001
		(0.0227)	(0.0237)
Poor writing		-0.0390*	-0.0603**
		(0.0223)	(0.0236)
Incorrect day		-0.0579	-0.0679*
		(0.0420)	(0.0406)
Memory test		0.0130	0.0165**
		(0.0083)	(0.0083)
Memory self		0.0279***	0.0228***
		(0.0088)	(0.0085)
ln(income)		-1.3153***	-1.3131***
		(0.0152)	(0.0422)
ln(net worth)		0.0054	0.0027
		(0.0064)	(0.0080)
Country effects	Yes	Yes	Yes
Observations	6,592	6,592	5,377

Table 3.6: Implied overconfidence and presence of a third party

This table presents the results of a set of regressions explaining the overconfidence (self-assessed abilities minus subsequent test performance) in answers and the likelihood to give an overconfident answer (positive absolute difference). The models in column 1 to 4 are estimated using OLS, the logit models in column 5 to 8 are estimated using maximum likelihood. The data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	OC	OC	OC	OC	OC indicator	OC indicator	OC indicator	OC indicator
	Full sample	*Full sample*	*Accompanied*	*Accompanied*	*Full sample*	*Full sample*	*Accompanied*	*Accompanied*
Companion	0.2761***		0.1307**		0.3002***		0.1936***	
	(0.0497)		(0.0647)		(0.0577)		(0.0722)	
Partner present		0.2548***		0.1565**		0.2615***		0.2059***
		(0.0557)		(0.0696)		(0.0645)		(0.0770)
Child present		0.1668		-0.0145		0.3139**		0.0818
		(0.1137)		(0.1250)		(0.1480)		(0.1606)
Other present		0.3596**		0.1353		0.2657		0.0390
		(0.1460)		(0.1514)		(0.1703)		(0.1818)
Male	0.3900***	0.3902***	0.2783***	0.2752***	0.3479***	0.3484***	0.2302***	0.2262***
	(0.0303)	(0.0304)	(0.0674)	(0.0676)	(0.0313)	(0.0313)	(0.0725)	(0.0726)
Married	-0.0463	-0.0455	-0.4290***	-0.4690***	-0.0158	-0.0135	-0.4403***	-0.4919***
	(0.0364)	(0.0367)	(0.1050)	(0.1138)	(0.0368)	(0.0371)	(0.1327)	(0.1447)
Children	-0.0995**	-0.0971**	-0.1766	-0.1618	-0.0717	-0.0728	-0.0274	-0.0297
	(0.0478)	(0.0478)	(0.1252)	(0.1259)	(0.0493)	(0.0494)	(0.1357)	(0.1369)
College	-0.2678***	-0.2679***	-0.3453***	-0.3447***	-0.2261***	-0.2264***	-0.2236**	-0.2234**
	(0.0362)	(0.0362)	(0.0860)	(0.0860)	(0.0350)	(0.0350)	(0.0908)	(0.0908)
Retired	0.0138	0.0139	0.0520	0.0521	0.0277	0.0279	0.0440	0.0442
	(0.0415)	(0.0415)	(0.0881)	(0.0881)	(0.0420)	(0.0420)	(0.0997)	(0.0995)
ln(income)	-0.0532***	-0.0532***	-0.0345	-0.0348	-0.0455***	-0.0454***	-0.0234	-0.0231
	(0.0149)	(0.0149)	(0.0313)	(0.0313)	(0.0151)	(0.0151)	(0.0332)	(0.0332)
ln(net worth)	-0.0168***	-0.0167***	-0.0057	-0.0060	-0.0149**	-0.0148**	-0.0168	-0.0167
	(0.0061)	(0.0061)	(0.0131)	(0.0131)	(0.0066)	(0.0066)	(0.0169)	(0.0169)
Healthy	0.3337***	0.3336***	0.3651***	0.3634***	0.2611***	0.2612***	0.3264***	0.3252***
	(0.0308)	(0.0308)	(0.0678)	(0.0679)	(0.0311)	(0.0311)	(0.0751)	(0.0751)
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,046	27,046	5,519	5,519	27,046	27,046	5,519	5,519

Table 3.7: Robustness checks

This table presents the results of a set of regressions explaining the overconfidence (self-assessed abilities minus test performance) in answers and the likelihood to give an overconfident answer (better self-assessment than test performance). Panel A limits the sample to observations without test disturbances. Panel B instead includes the whole or accompanied sample. In Panel A and Panel B, the models in column 1 and 2 are estimated using OLS, the logit models in column 3 and 4 are estimated using maximum likelihood. The data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A - Sample without potential test impairments

	OC	OC	OC indicator	OC indicator
	Accompanied	*Accompanied*	*Accompanied*	*Accompanied*
Companion	0.1124*		0.1747**	
	(0.0650)		(0.0723)	
Partner present		0.1605**		0.2045***
		(0.0697)		(0.0771)
Child present		-0.0419		0.0263
		(0.1265)		(0.1613)
Other present		0.0066		-0.0249
		(0.1509)		(0.1824)
Age	0.0402	0.0356	-0.0298	-0.0336
	(0.0350)	(0.0352)	(0.0415)	(0.0416)
Age^2	-0.0001	-0.0001	0.0004	0.0004
	(0.0002)	(0.0003)	(0.0003)	(0.0003)
Male	0.2632***	0.2584***	0.2260***	0.2209***
	(0.0674)	(0.0676)	(0.0726)	(0.0727)
Married	-0.4113***	-0.4794***	-0.4207***	-0.4913***
	(0.1055)	(0.1140)	(0.1325)	(0.1447)
Children	-0.1446	-0.1377	-0.0230	-0.0239
	(0.1247)	(0.1257)	(0.1358)	(0.1370)
College	-0.3450***	-0.3443***	-0.2211**	-0.2208**
	(0.0862)	(0.0862)	(0.0911)	(0.0911)
Retired	0.0712	0.0705	0.0564	0.0566
	(0.0888)	(0.0887)	(0.0999)	(0.0998)
ln(income)	-0.0346	-0.0349	-0.0228	-0.0226
	(0.0313)	(0.0313)	(0.0331)	(0.0331)
ln(net worth)	-0.0081	-0.0084	-0.0173	-0.0174
	(0.0131)	(0.0132)	(0.0169)	(0.0169)
Healthy	0.3789***	0.3761***	0.3267***	0.3245***
	(0.0678)	(0.0679)	(0.0752)	(0.0753)
Country effects	Yes	Yes	Yes	Yes
Observations	5,457	5,457	5,457	5,457

Panel B - Full sample, controlling for test impairments

	OC	OC	OC indicator	OC indicator
	Full sample	*Accompanied*	*Full sample*	*Accompanied*
Companion	0.2363***	0.1066	0.2529***	0.1557**
	(0.0525)	(0.0678)	(0.0605)	(0.0748)
Companion X Disturbance	-0.1796	-0.2182	0.0180	0.0549
	(0.1639)	(0.2382)	(0.2147)	(0.3078)
Disturbance	0.7001***	0.6935***	0.5597***	0.4831**
	(0.0793)	(0.1923)	(0.0928)	(0.2411)
Age	-0.0223	0.0436	-0.0391**	-0.0254
	(0.0180)	(0.0350)	(0.0194)	(0.0414)
Age^2	0.0004***	-0.0001	0.0005***	0.0004
	(0.0001)	(0.0002)	(0.0001)	(0.0003)
Male	0.3870***	0.2864***	0.3461***	0.2339***
	(0.0302)	(0.0672)	(0.0313)	(0.0726)
Married	-0.0393	-0.3980***	-0.0115	-0.4069***
	(0.0363)	(0.1057)	(0.0369)	(0.1328)
Children	-0.1073**	-0.1819	-0.0770	-0.0349
	(0.0477)	(0.1254)	(0.0494)	(0.1362)
College	-0.2752***	-0.3545***	-0.2293***	-0.2260**
	(0.0361)	(0.0859)	(0.0351)	(0.0912)
Retired	0.0171	0.0611	0.0316	0.0490
	(0.0414)	(0.0883)	(0.0421)	(0.0998)
ln(income)	-0.0509***	-0.0276	-0.0443***	-0.0189
	(0.0149)	(0.0313)	(0.0152)	(0.0331)
ln(net worth)	-0.0166***	-0.0072	-0.0141**	-0.0175
	(0.0061)	(0.0131)	(0.0066)	(0.0169)
Healthy	0.3379***	0.3690***	0.2639***	0.3305***
	(0.0307)	(0.0677)	(0.0312)	(0.0751)
Country effects	Yes	Yes	Yes	Yes
Observations	27,002	5,497	27,002	5,497

Table 3.8: Importance of sample composition

This table presents the results of a set of regressions explaining optimism (self-assessed life expectancy minus objective life expectancy as in Puri and Robinson (2007)). Younger and older are sub samples, split according to median age of respondents. Other controls include college, retired, ln(income), ln(net worth). All models are estimated using OLS. The data come from the SCF. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Optimism *Full sample*	Optimism *Full sample*	Optimism *Younger*	Optimism *Younger*	Optimism *Older*	Optimism *Older*
Companion	0.4123**		0.5499**		0.5765***	
	(0.1617)		(0.2413)		(0.1962)	
Partner present		0.3732*		0.3006		0.4923**
		(0.1962)		(0.2272)		(0.2241)
Child present		0.0056		0.3396		-0.6894
		(0.4914)		(0.5900)		(1.3188)
Other present		0.0049		-0.3136		0.9008
		(1.2852)		(1.9386)		(1.5788)
Male	1.7342***	1.7079***	1.6029***	1.5871***	2.0869***	2.0734***
	(0.2271)	(0.2286)	(0.3532)	(0.3545)	(0.2978)	(0.2992)
Married	0.2988	0.3044	0.1859	0.2289	-0.2455	-0.2448
	(0.1992)	(0.2014)	(0.3037)	(0.3071)	(0.2547)	(0.2577)
Children	-0.6669***	-0.6127***	-1.4459***	-1.3733***	0.0834	0.1031
	(0.2292)	(0.2279)	(0.3191)	(0.3184)	(0.3411)	(0.3403)
Healthy	8.6387***	8.6248***	15.0331***	15.0109***	6.4418***	6.4287***
	(0.3532)	(0.3534)	(0.7889)	(0.7893)	(0.3504)	(0.3504)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Age effects	Yes	Yes	No	No	No	No
Survey year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,924	24,924	12,462	12,462	12,462	12,462

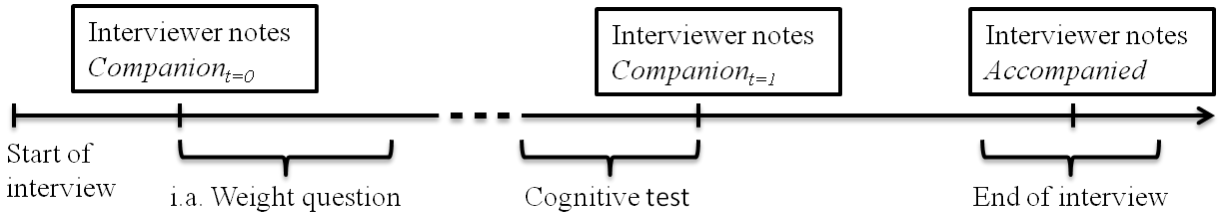
Table 3.9: Effects of implied overconfidence and the presence of a third party

This table presents the results of a set of regressions explaining spending share, self-assessed ability to make ends meet, likelihood of having experienced sadness in the past 6 months, and probability to ask many questions during the interview. The models in column 1 and 2 are estimated using OLS, the logit models in column 3, 4 and 5 are estimated using maximum likelihood. In column 5, data from the Survey of Consumer Finances are used. The OC variable represents optimism, as defined by Puri and Robinson (2007). All other data come from the SHARE. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Spending share	Make ends meet	Sad	Ask q.	Equity indicator
OC	0.0132***	0.0142***	-0.0577***	-0.0101	0.0052***
	(0.0026)	(0.0026)	(0.0057)	(0.0073)	(0.0012)
OC X Companion	-0.0144*	-0.0196*	0.0341*	0.0407*	-0.0039*
	(0.0084)	(0.0103)	(0.0189)	(0.0219)	(0.0023)
Companion	0.0357	0.0720**	-0.0349	0.3122***	0.0463**
	(0.0257)	(0.0354)	(0.0589)	(0.0700)	(0.0218)
Age	-0.0281***	0.0261***	-0.0150	-0.0993***	0.0043
	(0.0089)	(0.0083)	(0.0188)	(0.0245)	(0.0089)
Age^2	0.0002**	-0.0001	0.0000	0.0009***	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Male	0.0312**	0.0089	-0.5312***	0.0229	-0.0553
	(0.0130)	(0.0131)	(0.0309)	(0.0389)	(0.0408)
Married	0.5738***	0.0338**	-0.2714***	-0.0870*	0.1053***
	(0.0183)	(0.0150)	(0.0356)	(0.0452)	(0.0348)
Children	0.0685***	-0.1309***	0.1030**	0.0619	-0.0766*
	(0.0207)	(0.0195)	(0.0469)	(0.0592)	(0.0412)
College	0.2530***	0.1501***	0.1172***	-0.1421***	0.3667***
	(0.0159)	(0.0147)	(0.0353)	(0.0504)	(0.0259)
Retired	-0.1825***	-0.1490***	0.0580	0.1405**	-0.0903**
	(0.0218)	(0.0211)	(0.0499)	(0.0681)	(0.0414)
Self-employed	0.0541*	-0.0808***	-0.0113	0.2751***	-0.4197***
	(0.0300)	(0.0268)	(0.0657)	(0.0876)	(0.0393)
ln(income)	-1.3385***	0.1422***	0.0648***	-0.0283	0.1914***
	(0.0200)	(0.0074)	(0.0157)	(0.0196)	(0.0159)
ln(net worth)	0.0065*	0.0626***	-0.0045	-0.0302***	0.2102***
	(0.0036)	(0.0028)	(0.0063)	(0.0073)	(0.0109)
Healthy	0.0777***	0.2140***	-0.6281***	-0.2438***	0.4981***
	(0.0135)	(0.0131)	(0.0305)	(0.0390)	(0.0474)
Country effects	Yes	Yes	Yes	Yes	No
Observations	22,834	17,133	22,802	23,042	18,242

Figure 3.1: Question sequence in the interview

This figure presents the timeline of the question sections, and illustrates when the interviewer notes the presence of third parties during the interview of the SHARE of Wave 4 (2010-11).



Chapter 4

Do M&A Lawsuits Discipline Managers' Investment Behavior?

Joint work with

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4.1 Introduction

Under the traditional principal-agent framework, corporate managers make investment and reporting decisions that are not always in the best interest of their shareholders. Poor investment and reporting decisions are often co-mingled. That is, managers are likely to resort to financial reporting manipulation to disguise suboptimal investment decisions, such as perceived value-destroying acquisitions (Bens et al., 2012). Shareholders have access to a variety of mechanisms to either prevent or punish managers who engage in bad investment and/or reporting decisions. In the U.S., one of those mechanisms is the use of class-action securities lawsuits. Shareholders can resort to those lawsuits to seek compensation for damage when managers allegedly mislead them through improper disclosure. If those misleading disclosures are motivated by the need to cover up bad investment decisions, their detection and punishment signals a higher cost of engaging in suboptimal investments. Accordingly, we conjecture that, upon observing the litigation of an industry peer who is blamed for hiding poor post-acquisition performance, managers update their subjective probability of being brought into litigation themselves for a similar motive (Arena and Julio, 2013). Thus, because hiding poor acquisition performance is perceived as more costly by managers when observing a lawsuit, we examine the hypothesis that the perceived risk of litigation acts as an external governance mechanism and helps discipline opportunistic managers.

Securities lawsuits have been identified as major corporate events with severe consequences for executives and directors of sued firms (e.g., Romano, 1991; Fich and Shivdasani, 2007). However, their role in disciplining managers has been debated in the law and financial economics literature. On the one hand, prior studies find that shareholder lawsuits can lead

to desirable outcomes such as management accountability (Romano, 1991) and improved governance (Cheng et al., 2010). On the other hand, critics argue that shareholder litigation may harm the attractiveness of the U.S. financial market and fail to deter fraudulent behavior (Bondi, 2010; Zingales, 2006; Coffee, 2006).

We investigate the disciplining role of securities litigation by innovating along two important dimensions. First, while Rule 10b-5 or Section 11 lawsuits are filed in response to allegedly misleading disclosures, we use a sample of lawsuits where the plaintiffs specifically claim that managers overpromised and hid poor performance after acquisitions (thereafter, "ex post M&A lawsuits") to examine the hypothesis that M&A lawsuits discipline manager's investment behavior. Thus, in comparison to Arena and Julio (2013) who examine all types of securities lawsuits, we focus on the relationship between *investment-related lawsuits* and *investment behavior*. Second, instead of focusing on the investment behavior of litigated firms, as in McTier and Wald (2011), we use ex post M&A lawsuits as a shock to the industry, and conjecture that the incidence of a lawsuit increases the (perceived) risk in the industry for also being targeted by an M&A lawsuit. This is likely to arise, in part, because lawsuits tend to cluster by industry (Kim and Skinner, 2012), and the sued firm's misleading disclosures may have influenced peers' investment behavior during the class period (Beatty et al., 2013). Therefore, our paper builds on a recent literature that highlights the importance of intra-industry spillovers and learning effects (e.g., Servaes and Tamayo, 2013; Foucault and Frésard, 2013). However, in comparison to Servaes and Tamayo (2013) we do not focus on hostile takeovers attempts but M&A lawsuits. While peer effects have been documented for lawsuits, no study has investigated their effect on the moral hazard

problem of the principal-agent relationship outside of the sued firm.[1]

We obtain detailed information of federal securities class-action lawsuits in the U.S. from the Institutional Investor Services (ISS) Securities Class Action database, and read plaintiffs allegations to identify ex post lawsuits where the allegations claim that managers overpromised and hid poor performance related to a past merger or acquisition.[2] In our sample period 1996-2011, we match 89 relevant cases with the COMPUSTAT firms, which correspond to 79 industry-years with at least one filing of ex post M&A lawsuit. We examine peer firm's total investment, as well as specific M&A deals in the two-year period after an M&A lawsuit is filed in the industry, which we define at the 2-digit SIC level.

Our main empirical tests investigate the quality of subsequent deals after a peer firm is subject to an M&A lawsuit, using a Difference-in-Differences regression model. We use the bidder's cumulative abnormal return (CARs) around the deal announcement as a proxy for the quality of the investment decision, which is, on average, also reflective of the acquisition's long-run performance (Bens et al., 2012; Sirower and Shani, 2006). Throughout our analysis, we control for industry and year effects, as well as acquirer, target and deal characteristics that have been shown to affect deal quality. Our regression results consistently show that in the two-year period after a lawsuit, bidders' announcement CARs are significantly higher for industry peers of litigated firms. Peers' announcement three-day CARs in the period following an M&A lawsuit are, ceteris paribus, 0.80% higher than the sample average, which is economically significant. This finding supports the hypothesis that post lawsuit deals are

[1]For instance, Gande and Lewis (2009) show that peer firms' stock prices react to the filing of a securities lawsuit. Moreover, according to Arena and Julio (2013), competitors hold more cash in anticipation of future litigation costs.

[2]For brevity, we refer to "ex post M&A lawsuits" as "M&A lawsuits" or "lawsuits" interchangeably in this paper. Otherwise, we specifically refer to "imminent M&A lawsuits" that occur during the acquisition.

of higher quality.

We further investigate how deal characteristics change in reaction to peer firms' lawsuits. We first examine payment methods. The optimal payment method depends on the target type, due to an asymmetric information problem (e.g., Eckbo and Thorburn, 2000; Hege et al., 2009). Theoretical and empirical research suggests that when the target is a public firm, cash acquisitions are a positive signal to the market. For private firms and subsidiaries, the uncertainty about the true value of the target is higher, so that stock financing is preferred. We find that after an M&A lawsuit in the industry, acquisitions of public targets are more likely to be paid for in cash, and acquisitions of private targets and subsidiaries are more likely to be paid for in stock. Second, we find evidence that deals after an M&A lawsuit are less likely to be diversifying, large, or of an accretive nature. All three characteristics have been associated with value-destroying acquisitions. Thus, overall, these findings consistently suggest that post M&A lawsuit deals are of better quality.

Next, we investigate whether the firm's total investment behavior changes. We examine deviations from expected levels of investment, modeled as a function of firms' growth opportunities (Biddle and Hilary, 2006; Chen et al., 2011). Consistent with our disciplining hypothesis, we find that, after an M&A lawsuit, peer firms deviate to a lesser extent from their predicted level of investment. Furthermore, we observe that the effect is driven by firms reducing their over-investment, whereas under-investing firms do not react. We obtain similar results when we replace industry fixed effects with firm fixed effects.

We perform additional cross-sectional tests to identify firms that are more likely to be sensitive to peers' M&A lawsuits. In particular, we focus on firms with more goodwill on

their balance sheet prior to the lawsuit (which proxies for a greater likelihood of having overpaid for past acquisitions), and firms with high ex ante litigation risk. We observe that the disciplining effect is stronger for firms with more goodwill, and for firms with higher ex ante litigation risk, as estimated based on Kim and Skinner (2012). All in all, the results suggest that M&A lawsuits contribute to reducing industry peers' over-investment behavior.

Finally, we examine whether managers' response to a peer M&A lawsuit depends on the quality of the firm-level corporate governance in place. We use the G-Index as a proxy of firm governance (Gompers et al., 2003). When we interact the G-Index with the occurrence of a lawsuit, we document that better governed firms react more strongly to the increase in the perceived litigation risk. This suggests that an increase in the risk of litigation is an externally reinforcing mechanism of existing firm internal governance.

We perform a number of robustness tests and extensions to validate our main assumptions. First, we test and observe that, at the industry level, M&A lawsuits are a positive predictor of M&A lawsuits in the following year, controlling for year and industry effects, and for the number of acquisitions in the industry. This suggests that managers' perceived increase in litigation risk is genuine. Consistent with our prior results, we also find that the total deal volume in the industry of the acquirer is negatively affected by a lawsuit. Second, managers may change their behavior not because of a change in litigation risk, but because they observe a value-destroying takeover within their industry. Thus, we introduce controls for the observation of poor acquisitions undertaken by peer firms. Our main results continue to hold after we control for the learning effect. Third, following Bertrand and Mullainathan (2003) and Atanassov (2013), we conduct an additional test to examine the potential endo-

geneity of M&A lawsuits. We find that M&A lawsuits bear no significant association with bidder announcement CARs one or two years before their filings, which rules out reverse causality. Fourth, we test and find that the documented changes in investment behavior are driven by the threat of acquisition-related lawsuits, instead of an increase in general litigation risk, which can be caused by allegations of improper accounting, insider trading or options backdating. Finally, we explore alternative industry classifications and find similar effects using the Hoberg and Philips product-based specifications, even though we can only repeat the analyses for a smaller sub-sample (Hoberg and Philips, 2010).

This paper makes several contributions. First, the corporate governance literature has identified a variety of mechanisms, such as the threat of takeovers, board composition and large shareholders, that can contribute to disciplining managers (Shleifer and Vishny, 1997). We highlight a new channel of corporate governance. We show that firms adjust their investment behavior in response to the threat of M&A-related lawsuits. McTier and Wald (2011) document a decrease in overinvestment by those firms that are subject of securities lawsuits. We find that a specific set of lawsuits - those where plaintiffs allege that a firm covered up poor performance following prior acquisitions - lead industry peers to engage in higher-quality M&A and investment activity.

Second, the role of securities lawsuits vis-à-vis the attractiveness of the U.S. financial market has been subject to debate among scholars. In the legal literature, Rose (2008) and Coffee (2006) argue that lawsuits target deep-pocketed firms, while failing to deter fraudulent behavior and to compensate wronged investors. By looking at the effect of a previously unexplored subset of securities lawsuits, i.e., ex post M&A lawsuits, we shed light

on a vehicle through which financial markets can possibly benefit from private enforcements of securities law.

Third, and finally, a recent literature stresses the importance of industry peer effects. For instance, managers learn from competitor's stock price movements (Foucault and Frésard, 2013), accounting restatements (Durnev and Mangen, 2009) and securities lawsuits (Arena and Julio, 2013). Our paper is closely related to Servaes and Tamayo (2013), who find that firms make investment and governance changes when an industry peer is targeted in a hostile takeover attempt. However, over the last decade, the number of hostile takeovers has been decreasing due to stronger antitakeover provisions, whereas the number of securities lawsuits has remained steady. To our knowledge, ours is the first paper to investigate whether the specific risk of M&A litigation has an intra-industry spillover effect, and whether it disciplines managers' investment behavior.

The remainder of this paper is structured as follows. Section 2 briefly summarizes the related literature and Section 3 describes the data. Section 4 presents the empirical results and Section 5 reports cross-sectional results based on firm-level governance. Section 6 investigates the robustness of our results and the validity of our identification strategy and Section 7 concludes.

4.2 Related literature and hypothesis development

The classical principal agent problem that arises from the separation of ownership and control in the modern corporation is central to financial economic research. There are numerous factors, internal and external to the firm, that shape the severity of those agency costs across

companies and jurisdictions. Shleifer and Vishny (1997) provide a survey of the literature and the most common mechanisms that may mitigate this moral hazard problem, such as takeover threats, large shareholders and boards of directors. For example, Bertrand and Mullainathan (2003) find that managers appear to enjoy the quiet life when antitakeover laws are introduced, and Gompers et al. (2003) document that firms with stronger corporate governance provisions (as captured by their "G-index") outperform their peers. Bebchuk et al. (2009) use a refinement of the G-index and find that the entrenchment index ("E-index") drives this superior performance of firms with better corporate governance.

Another external corporate governance mechanism is the civil liability through the risk of class-action lawsuits. A class-action is a legal mechanism by which a group of plaintiffs collectively bring a claim to court. In the case of securities lawsuits under Rule 10b-5 of the Securities Exchange Act of 1934, investors sue the firm and its directors for fraudulent behavior such as accounting manipulation, illegal insider trading, or questionable practices during an IPO. The efficacy of those lawsuits as a deterrent of corporate misconduct has been debated for decades. Rose (2008) observes that relatively rich firms are targeted by lawsuits, and Coffee (2006) finds that securities lawsuits fail to deter fraudulent behavior, possibly due to the limited financial liability of directors and officers through the D&O insurance. Moreover, cases almost never to go to trial. The low settlement amounts do not compensate violated investors, and the costly process for firms in terms of legal and expert fees, are usually listed by critics in the legal literature against securities lawsuits, which are often seen as a burden for the attractiveness of the U.S. financial market. Nonetheless, the risk of shareholder litigation limits managers' proclivity to make opportunistic reporting choices (Hopkins, 2013). Indeed, studies show that lawsuits can impose reputational costs to

sued firms (Karpoff and Lott, 1993), executives (Romano, 1991) and directors (Brochet and Srinivasan, 2013).

Corporate governance need not apply to firms in isolation. Servaes and Tamayo (2013) outline that industry peers react when a firm in the industry is the target of a hostile takeover attempt. Inter alia, rival firms cut capital spending, free cash flows and cash holdings. Thus, as expected, firms take into account news about their competitors in their own decision-making. An emerging field of research examines such industry spillovers and intra-industry learning (see e.g., Foucault and Frésard, 2013).

Managers' decisions to manipulate reported financial information has received extensive attention from accounting scholars.[3] Bens et al. (2012) document that executives are more likely to misreport after a poorly perceived acquisition, in an attempt to hide poor performance. This behavior stems from the fact that poor post-acquisition performance leads to severe consequences for the CEO in terms of pay and career trajectories (Lehn and Zhao, 2006). We hypothesize that the threat of securities lawsuits can partly mitigate this behavior. Our hypothesis is based upon three key assumptions. First, the credibility of the threat of securities lawsuits should determine whether it functions as an effective disciplining device. Second, we assume that an industry peer's actual lawsuit can serve as an ex ante threat of lawsuit. This assumption is likely to be valid insofar as securities lawsuits tend to be clustered by industries (Kim and Skinner, 2012), and prior studies document spillover effects of securities lawsuits on firms' cash holdings (Arena and Julio, 2013) and stock prices (Gande and Lewis, 2009). Third, we assume that lawsuits that allege misrepresentation related to

[3]See for instance Dechow et al. (2010), Healy and Wahlen (1999) or McNichols (2000) for thorough reviews of this strand of literature.

M&A will discipline peers' M&A activity, and more broadly, investment decisions. As explained above, this critically hinges on the notion that firms are inclined to disguise poor performance following acquisitions (Bens et al., 2012), as ex post securities lawsuits do not solely arise because of bad M&A, but the attempt to disguise them.[4] Hence, our hypothesis is that, upon observing an M&A lawsuit in the industry, competitors update their perceived risk of being sued if they were to hide poor post-acquisition performance, making this behavior more costly. Consequently, managers will attempt to undertake "better" acquisitions so that they do not have to try to hide poor subsequent performance. Thus, we expect peer firms to become more selective in their acquisitions.

Of course, not all firms in an industry are equally likely to be concerned with litigation risk. We develop additional cross-sectional hypotheses in that regard. We posit that firms with greater ex ante litigation risk are likely more sensitive to the external threat of a securities lawsuit. While ex ante litigation risk is attributable to many firm- and industry-characteristics, we also expect firms with recent M&A activity to be more sensitive to the threat of an M&A lawsuit. In particular, firms with large goodwill on their balance sheet are more likely, all else equal, to have overpaid for past acquisitions, and may therefore be exposed to allegations of misrepresentations (e.g., for failing to impair goodwill in a timely fashion).

Finally, different fundamental reasons may drive industry peers to react to observing an M&A lawsuit. On the one hand, CEOs may be rational to respond to potential "lawsuit

[4]In recent years, M&A deals have been targeted by plaintiff lawyers, often on behalf of target shareholders. We refer to those lawsuits (which are not always filed in a federal court) as ex ante M&A lawsuits. Indeed, Cornerstone reports that over the last 5 years almost all deals in excess of $500m have been litigated (See, for example, Cornerstone's report issued in February 2013 entitled *Shareholder Litigation Involving Mergers and Acquisitions*). See Krishnan et al. (2012) and Krishnan and Masulis (2013) for more details.

waves". On the other hand, a saliency bias may confound managers' assessments of the risk of lawsuits (Tversky and Kahneman, 1974; Dessaint and Matray, 2013).

4.3 Data and variables

4.3.1 Lawsuit data collection

This study uses data on securities class-action lawsuits in the U.S. over the period 1996-2011 from the ISS Securities Class Action database. We filter out all lawsuits not related to M&A activities through keyword searches in the plaintiffs' allegations and obtain a sample of 588 observations. Many of those lawsuits are filed during the takeover in order to receive additional information from the acquirer based on breach of fiduciary duties (Krishnan et al., 2012; Krishnan and Masulis, 2013). Since we are interested in ex post lawsuits that accuse acquirers of overpromising, we perform a detailed lexicographic analysis of the lawsuit allegations to further identify those lawsuits.

We generate a score based on whether the allegations contain the keywords "synergies", "integration", "inflate", "goodwill", "write-off", "deceive", or variations of these words. Next, we verify by hand whether the identified cases are indeed related to ex post M&A allegations, and whether cases with a zero score are irrelevant.[5] We provide examples of allegations in Appendix A, which received median lexicographic scores and were finally coded as relevant because they relate to ex post integration issues that were initially hidden by the firm. Overall, we identify 132 different lawsuits, of which we can match 116 acquirers by hand with their names and identifiers in COMPUSTAT. We drop regulated industries, eliminating

[5]Indeed, no case with a zero score relates to ex post M&A allegations.

27 lawsuits, leading to 89 relevant lawsuits, and 79 industry-years with at least one filing of an ex post M&A lawsuit; industries are defined at the 2-digit SIC code and later we conduct robustness tests with a product-based industry identification (Hoberg and Philips, 2010).

4.3.2 Sample construction and summary statistics

Panel A in Table 4.1 reports the distribution of lawsuits per year. On average, there are 5.5 lawsuits per year. Except in 1998, the yearly number of lawsuits is in the single digits, with no clear time-series trend. Panel B in Table 4.1 indicates that most lawsuits occur in the manufacturing industry (34), followed by the service sector (27). Thus, these two industries account for approximately two thirds of the sued cases. We define a lawsuit shock at the SIC2 industry-level if an acquirer from the industry was sued in the preceding 2 year period.

[Insert Table 4.1 about here]

In addition to using COMPUSTAT data, we create a second dataset of M&A deals from SDC Platinum. A detailed description of all the main dependent and independent variables is provided in Appendix B. Table 4.2 presents the descriptive statistics. The sample includes 11,373 deal-level observations, and 77,563 firm-year observations for the tests of investment behavior.

[Insert Table 4.2 about here]

4.4 Results

To test our main hypothesis that an increase in the risk of lawsuits disciplines managers' investment behavior, we examine two main ideas. First, as a reaction to an M&A lawsuit, industry peers are expected to be more carful in the selection and execution of their deals. Second, when seeing that competitors are sued for misspending, industry peers are expected to cut back their investments. In this context we perform three different analyses. First, we focus on the immediate market reaction around M&A deals announced by sample firms as a proxy for their quality. Second, we examine the methods of payment and other characteristics of those deals. Lastly, we study firms' overall investment decisions.

4.4.1 Market reaction around subsequent transactions by industry peers

Prior research uses the announcement returns surrounding an M&A transaction as a signal about the quality of this investment decision (Bens et al., 2012). Hence, we examine whether the market perceives M&A transactions more positively in a given industry following an ex post M&A related lawsuit.

Specifically, we measure bidder announcement effects using cumulative abnormal returns (CARs) around initial acquisition announcements. We obtain the announcement dates from the SDC U.S. Mergers and Acquisitions database. We report the results using 7-day CARs (-3,+3) windows where event day 0 is the announcement date. However, the effects are qualitatively and quantitatively similar for the 3-day announcement CARs (-1,+1) (not tabulated). The CARs are estimated with a market model using the CRSP equal-weighted return

as the market return. To examine the impact of observing an investment-related lawsuit of an industry peer, we estimate the following Difference-in-Differences regression model:

$$CARs_{ijt} = \beta_0 + \beta_1 Post\ Lawsuit_{ijt} + Controls_{ijt} + \alpha_j + \alpha_t + \epsilon_{ijt} \tag{4.1}$$

In this model, we include two sets of control variables. The first set includes the following bidder's characteristics: firm size, market-to-book ratio, and leverage. The second set includes the following deal characteristics: private target, diversifying deal, merger of equals, relative deal size, cash financing, cross-border deal, divesture and tender offer. All these bidder's and deal's characteristics are associated with the immediate market reaction around the announcement of an M&A transaction (e.g., Masulis et al. 2007 or Fuller et al. 2002). All variables are defined in greater detail in Appendix B. Moreover, α_j indicates industry fixed effects and α_t year fixed effects.

Table 4.3 reports the results of estimating the regression model using OLS. In column (1), we report a baseline model with no control variables, except for industry and year fixed effects. In column (2), we add firm-level controls, and deal-level controls in column (3). In column 4, we replace the industry fixed effects with firm fixed effects. We systematically find a positive and statistically significant coefficient for the *Post Lawsuit* indicator, ranging from 0.79 to 0.82 percentage points. This suggests that the market assessment of deal quality is higher in the years following a lawsuit in a given industry, and is consistent with managers engaging in better M&A as a response to an increase in ex ante litigation risk.

[Insert Table 4.3 about here]

4.4.2 Method of payment and deal characteristics

Methods of payment

Myers and Majluf (1984) show that firms are more likely to acquire targets by stock if they believe that their company is overvalued. Since target shareholders can anticipate this behavior, bidders of higher value can choose cash payment in order to reveal their value to the market (e.g., Fishman, 1989; Berkovitch and Narayanan, 1990; Eckbo et al., 1990). Accordingly, Brown and Ryngaert (1991), and Martin (1996) empirically document that acquisitions of public targets paid for in stock are perceived as negative signals.

However, with increasing uncertainty about the target's value, cash offers become less appealing because targets will only accept offers that exceed their true value (Hansen, 1987; Eckbo and Thorburn, 2000). Hege et al. (2009) highlight the critical importance of asymmetric information for targets in takeover negotiations. Moreover, other studies document that for private targets, for which uncertainty is ceteris paribus higher, stock acquisitions are viewed more positively (Martin, 1996; Chang, 1998; Fuller et al., 2002; Masulis et al., 2007). Besides, Masulis et al. (2007) show empirically that for subsidiary acquisitions, bidder announcements returns tend to be more positive for stock deals as well.

Thus, we test whether the method of payment changes in the post-lawsuit period depending on the target type. In our model, the dependent variable equals one if at least 50% of the transaction value was paid for in cash, and zero otherwise. As we categorize three types of targets (subsidiaries, private and public), we choose subsidiaries as the baseline scenario and control for the target type by adding an indicator for private and public deals, respectively.[6]

[6]This approach is similar to Masulis et al. (2007).

The change in cash payments for (i) subsidiary targets will be measured by the post lawsuit dummy, (ii) for public targets by the interaction term of the post lawsuit dummy and public target indicator, and (iii) for private targets by the interaction of post lawsuit and private target. We predict that industry peers of firms targeted by an M&A lawsuit will choose those payment methods that are associated with better acquisitions, i.e., a positive coefficient on *Post Lawsuit * Public Target*, and a negative coefficient on *Post Lawsuit * Private Target*.

Table 4.4 reports results for our analysis of payment methods, where the dependent variable indicates deals for which at least 50% of the payment is in cash, and the regression specification is logistic. In column (1), the negative coefficient on *Post Lawsuit* is statistically significant. The marginal likelihood of paying for a target in cash, ceteris paribus, decreases between 3.24 and 3.36 percentage points after a lawsuit. Because the average transaction value corresponds to approximately $260m in our sample, on average, a lawsuit leads to a 8.58 million decrease in cash payments for peers' M&A, which is economically not negligible. This average reduction in the use of cash as a method of payment is consistent with Bens et al. (2012), who document that the M&A-related pressure on the probability of financial statement misstatements correlates positively with payments in cash. Moreover, an increase in stock payments is in line with the result from Arena and Julio (2013), who document that firms that are more exposed to litigation risk hold more cash in anticipation of settlements. Firms preserve their cash reserves, and in our case, are less likely to use their cash to acquire targets. The coefficients of the control variables in Table 4.4 generally carry the expected signs.

[Insert Table 4.4 about here]

In column (2), we add the interaction terms of the post lawsuit indicator and target types. The significantly positive coefficient on *Post Lawsuit * Public Target* indicates that public targets are more likely to be acquired using cash, while subsidiaries and private targets are more likely to be paid for with stock. At the margin, the predicted likelihood of paying for a public target with cash increases by 3.26 percentage points. In turn, for a private target, the predicted likelihood of cash payment decreases by 5.42 percentage points. While the interaction term *Post Lawsuit * Private Target* is statistically insignificant, the marginal effect is computed by adding the main effect of the lawsuit indicator. A χ^2 test confirms that the private target interaction term and post-lawsuit main effect are jointly statistically significant at the 1% level (p=0.0042). Finally, the likelihood of paying for a subsidiary with cash decreases by 3.50 percentage points. We test and find that our results are similar when using a continuous method of payment variable (not tabulated). Thus, upon observing a lawsuit in the industry, acquirers change the methods of payment for each target type in such a way that is associated with better acquisitions according to the theoretical and empirical literature.

Deal characteristics

In the empirical M&A literature, certain deal characteristics have been associated with poor acquisition performance. More specifically, we consider diversifying acquisitions, hostile takeovers, target size and price-to-earnings (P/E) ratio as deal features that may be affected by peers' M&A lawsuits. First, according to Morck et al. (1990), diversifying acquisitions generally destroy shareholder value. Similarly, when studying bidder announcement returns, Masulis et al. (2007) document that diversifying acquisitions tend to be perceived as negative

news by the market, even though the effect is only close to significant. Second, Betton et al. (2008) document that the number of hostile deals has significantly decreased since the 1980s, and only a small fraction of unfriendly deals remain. For a sample from the 1980s, Servaes (1991) finds that hostile takeovers are perceived as bad news by the market for acquirers. Third, Fuller et al. (2002) reports a negative correlation between target size and acquisition performance. In addition, Krishnan et al. (2012) find that larger transactions are more likely to be sued in the context of imminent M&A lawsuits. Fourth and last, firms may decide to acquire firms and structure M&A deals in order to boost their earnings per share (EPS), even if it comes at the expense of value creation. Lys and Vincent (1995) analyze the characteristics of AT&T's acquisition of NCR in 1991. They conclude that AT&T was willing to pay an extra of $500 million to acquire NCR using the pooling accounting method. This change in accounting treatment had no effect on cash flow but boosted EPS by around 17%. Accordingly, we test whether peers of sued firms engage in M&A deals that are less likely to be value destroying, i.e., whether they are less likely to undertake diversifying acquisitions, hostile takeovers, EPS accretive deals, and to acquire larger targets.

Table 4.5 reports the results of our deal characteristic analysis. In column (1), the dependent variable is an indicator variable equal to one if the acquirer operates in a different industry than the target's, and zero otherwise. The negative coefficient on *Post Lawsuit* shows that the likelihood of diversifying acquisitions decreases after a lawsuit. The predicted marginal decrease is equal to 2.73 percentage points. Since less than half of the takeovers in our sample are diversifying, this corresponds to a 5.94% relative decrease.

[Insert Table 4.5 about here]

Furthermore, we find evidence that after a lawsuit, targets tend to be smaller, as per the significantly negative coefficient on *Post Lawsuit* (Table 4.5, column 2). In column (3), the dependent variable is an indicator equal to one if the deal attitude is not categorized as friendly in SDC, and zero otherwise. While the coefficient on *Post Lawsuit* is negative it is statistically insignificant. This may be due to the very low frequency of hostile takeovers in recent years, i.e., a power issue.[7] Finally, we investigate the target's P/E ratio relative to the one of the acquirer, using the difference in P/E ratios as a proxy for accretive acquisitions. Indeed, the acquirer's (EPS) increases, the more the acquirer's P/E ratio exceeds the P/E ratio of the target.[8] Column (4) documents that the difference in P/E ratios is significantly smaller after a lawsuit. In particular, the difference is reduced by 8.89 after a lawsuit. This corresponds to a large relative change, since the average difference in P/E ratios in our sample is -12.65. Overall, the results in Table 4.5 suggest that managers are more likely to make value-enhancing acquisitions after a peer's lawsuit.

4.4.3 Investment model

In this section, we expand the scope of our analysis by investigating whether peer firms' total investment behavior changes in the wake of a lawsuit. We examine all industry peer firms' behavior, as prior studies suggest that value-destroying investment decisions due to the free cash flow problem are not firm-specific but more industry-specific (Jensen, 1986; Shleifer and Vishny, 1988; Servaes and Tamayo, 2013).

[7]Because we do not find a positive lawsuit coefficient, this could be interpreted as evidence that targets do not resist more when they deem the acquirer as not appropriate.

[8]Appendix A provides examples of shareholders' allegations in cases of ex post M&A lawsuits. The second allegation states that increasing earnings reported by the company came from accretion of revenues from past acquisitions.

First, we estimate the level of expected investment using the following model[9]

$$Investment_{ijt} = \beta_0 + \beta_1 Sales\ Growth_{ijt-1} + \beta_2 Neg_{ijt-1} + \beta_3 Sales\ Growth_{ijt-1} * Neg_{ijt-1} + \alpha_j + \alpha_t + \epsilon_{ijt} \quad (4.2)$$

In this model, *Investment* is the sum of capital expenditures, R&D expenditures, and acquisitions expenditures minus the sale of fixed assets, scaled by lagged total assets. *Sales Growth* is the percentage change in annual sales and *Neg* is a dummy variable that takes the value of one if sales growth is negative, and zero otherwise.[10] It allows for a non-linear relationship between investment and revenue growth conditional on cases of revenue increases or decreases (McNichols and Stubben, 2008; Chen et al., 2011). Since our unit of analysis is the industry, we cannot estimate this model separately by year and industry. Thus, we estimate a pooled version of the model with year (α_t) and industry (α_j) fixed effects, similar to Boochun et al. (2013).

In the second step, we use the residuals of this investment model to measure abnormal levels of investment, with higher values representing higher absolute deviation from the predicted level. Consistent with our disciplining hypothesis, we predict that peer firms will invest more in line with their growth opportunities following an increase in their litigation risk, i.e., will have a lower absolute residual. We estimate the following model:

[9]This two steps model is consistent with that used in Biddle et al. (2009), Chen et al. (2011) and Boochun et al. (2013).

[10]We use *Sales Growth* as an accounting proxy for growth opportunities as Gande and Lewis (2009) document a negative stock market reaction for all industry peers following the filing of a securities lawsuit. Thus, using a market proxy such as Tobin's Q would bias our estimation.

$$Residuals_{ijt} = \beta_0 + \beta_1 Post\ Lawsuit_{ijt} + Controls_{ijt-1} + \alpha_j + \alpha_t + \epsilon_{ijt} \tag{4.3}$$

In this model, our coefficient of interest is β_1, which captures whether firms are closer to or further from the expected investment level in the period after a lawsuit has occurred in their industry.[11] Following prior research, we also control for the following lagged firm characteristics as determinants of firm investment: size, leverage, market-to-book ratio, return on assets, quick ratio, standard deviation of sales, the amount of tangible assets and whether the firm paid dividends or made a recent loss (Boochun et al., 2013; Chen et al., 2011).[12]

In addition, the two-step model allows us to test whether there is an asymmetric response to an increase in litigation risk conditional on cases of over-investment versus under-investment. Specifically, we assume that firms are more likely to be sued for undertaking value destroying investment decisions, if they invest more than predicted by their growth opportunities. Thus, we expect that an increase in litigation risk is more likely to discipline peer firms with positive residuals from the first stage. For under-investing firms, we multiply negative residuals by minus one so that higher values present less investment than predicted by the growth opportunities.

Table 4.6 reports the results obtained from estimating the model using OLS. In Panel A, column 1 reports the baseline model, including industry fixed effects so that our coefficient of interest captures within-industry changes in investment behavior following a lawsuit. As

[11]For brevity, we only report our results for the two years after a lawsuit but we also find similar results when limiting our analysis to the first year following a lawsuit(not tabulated).

[12]The detailed variable definitions are provided in Appendix B.

expected, the negative and statistically significant coefficient on the lawsuit indicator suggests that firms invest more in line with their growth opportunities after a lawsuit. This result holds when we replace industry fixed effects with firm fixed effects, in order to isolate within-firm changes in investment behavior (column 2). Furthermore, when we split the sample between firms that exhibit abnormally high (columns 3 and 4) versus low (columns 5 and 6) investment, we find that the results are driven by the over-investing firms. Indeed, the coefficient on *Post Lawsuit* is significantly negative in columns (3) and (4), but not in columns (5) and (6).

[Insert Table 4.6 about here]

We also test our cross-sectional predictions regarding which firms are more likely to be sensitive to peer lawsuits. Table 4.6, Panel B reports results where we account for firms that recently overpaid acquisitions. To do so, we construct a variable equal to the ratio of goodwill divided by total assets in the year of the lawsuit. In column (1), we find a negative and significant coefficient on the interaction term between *Post Lawsuit* and *Goodwill*, suggesting that firms that recently undertook M&As and that are more likely to have overpaid for prior acquisitions react more to an increase in litigation risk. This is in line with our prediction. Additionally, this effect appears to be driven by a reduction of over-investment, as per column (2).

Table 4.6, Panel C reports results where we interact *Post Lawsuit* with firm-level estimated ex ante litigation risk (see Kim and Skinner, 2012 for details). In column (1), the significantly negative coefficient on *Post Lawsuit * Litigation Risk* indicates that firms with greater litigation risk are more likely to reduce their over-investment following a peer's law-

suit. Furthermore, the results in columns (2) and (3) indicate that the results are attributable to over-investing firms. Of note, the positive coefficient on *Litigation Risk* in columns (1) and (2) (negative in column (3)) suggests that firms with greater ex ante litigation risk tend to over-invest, on average.

4.5 Pre-existing level of firm governance and response to lawsuits

In this section, we examine whether the level of pre-lawsuit corporate governance reinforces or offsets the external governance role of litigation with respect to firms' investment behavior. Theoretically, the relationship between internal and external governance, and its effect on agency costs, can go both ways (Bebchuk and Weisbach, 2010). While Acharya et al. (2011) find that external governance complements internal governance, Cohn and Rajan (2013) find that internal and external governance are substitutes (complements) when external governance is weak (strong). Our setting is closest to the Cohn and Rajan (2013) model. If one considers a peer's M&A lawsuit as an industry shock that signals a shift from weak to strong external governance, then this suggests a complementary effect of M&A lawsuits and firm-level governance on firms' investment behavior. That is, we would expect firms with stronger pre-existing internal governance to respond more significantly to the increase in litigation risk.

Empirically, limited evidence supports either hypothesis. For example, Giroud and Mueller (2010) document that only firms in less competitive industries increase managerial slack when

antitakeover laws are introduced (i.e., weaker industry-level product market pressure leads to managerial slack if a second governance channel disappears). This suggests a substitute effect between two industry-level governance forces. Conversely, Aggarwal et al. (2009) find evidence which they interpret as consistent with a complementary effect between firm- and country-level governance. Little is known about the interactive effect between firm-level governance and litigation, though. While Brochet and Srinivasan (2013) find that directors of poorly governed firms are more likely to be held accountable for corporate fraud through securities lawsuits, they do not examine subsequent changes in firm investment and reporting. Hence, the impact of firm-level governance in our setting remains an empirical question.

We test the complement versus substitute hypotheses by interacting the G-Index as a proxy for pre-existing firm governance with the post-lawsuit indicator from our previous sections, and by replicating our analyses in terms of bidder announcement returns, methods of payment, and investment behavior. The G-Index is a continuous variable with higher values denoting relatively worse corporate governance.[13] Table 4.7 presents the results. In Panel A, the dependent variable is the seven-day bidder CAR around deal announcements. The significantly negative coefficient on *Post Lawsuit * G-Index* indicates that announcement returns in the period after a lawsuit increase less for firms with poorer governance in place. Since the interaction term is 10% of the main effect from the lawsuit, we can infer that only firms with a G-Index lower than 10 react to observing a lawsuit of an industry peer. This corresponds to roughly 65% percent of our sample. These findings are robust to adding firm fixed effects as shown in column 2. Moreover, we can infer that the firms with the

[13]We find similar results if we use a dummy variable equal to one for G-Index values that exceed the median G-Index, and zero otherwise (not tabulated).

best governance improve their announcement CARs by approximately 1.55-2.04 percentage points, which is economically large.

[Insert Table 4.7 about here]

Panel B in Table 4.7 shows that firms with better governance choose more frequently the method of payment that is associated with better deals for public targets. This effect corresponds again to approximately 10% of the main effect. However, in the case of private targets, the interaction term of governance and post lawsuit is statistically insignificant and small.

Finally, Panel C reports the results for the investment model, where we find again that better governed firms react more to observing a lawsuit in the industry. That is, the positive coefficient on *Post Lawsuit * G-Index* indicates that firms with weaker governance reduce their abnormal investment to a lesser extent. As before, this effect is driven by firms reducing their investment if it exceeded the predicted level (column (2)), whereas the effect is not significant for under-investing firms (column (3)).

4.6 Extensions and robustness tests

4.6.1 Validity of the identification strategy

We perform additional tests to rule out potential concerns about our identification strategy. Our first concern is that managers have no material reason to update their assessment of the risk to be sued for investment-related decisions. In Panel A of Table 4.8, we document that for an industry, M&A lawsuits are a positive predictor of M&A lawsuits in the following

year, controlling for year and industry effects. This result is robust to also controlling for the number of deals per year and industry. This suggests that managers have objective reasons to update the probability of their firm to being sued as well. Besides, we find that the ex post M&A lawsuits display the same dismissal rate and similar settlement amounts (expressed either in raw amounts or as a percentage of total assets) compared to the entire sample of lawsuit as from the ISS Securities Class Action Database (untabulated). It rules out a potential concern that managers should not respond to our cases because they exhibit less merit than other securities lawsuits.

[Insert Table 4.8 about here]

As a second test, we examine whether the occurrence of a lawsuit affects the M&A activity in the industry. If managers' perceived litigation risk increases, the industry as a whole may be less active in the M&A market. We define deal volume as the logarithm of the total transaction value per year, aggregated at the acquirers' SIC 2 industry levels. Then we test whether the number of lawsuits in a given year and industry decreases the deal volume in the subsequent year in the industry. As reported in Panel B of Table 4.8, lawsuits lead to a reduction in deal volume in an industry. We obtain similar results when we replace the continuous variable of lawsuits with a lawsuit indicator (column (2)).[14]

Third, managers may change their behavior not due to a change in litigation risk, but rather because they observe a value-destroying takeover within their industry, and respond

[14]A potential concern would be that the sued cases simply capture the end of industry mergers waves. However, when we examine the number of deals we find that lawsuits do not have a negative effect on the subsequent number of acquisitions in an industry. Moreover, in all our main specifications we control for the bidder's MtB ratio that should proxy for merger waves. Besides, the higher announcement CARs could be driven by a decline in the competitiveness of the takeover market. However, in a separate analysis we test and find that bidder premia do not seem to be affected by lawsuits (untabulated).

by being more careful in their target selection and due diligence efforts. The occurrence of a lawsuit would simply coincide with poor acquisitions as a signal to industry peers. We repeat our analysis of deal announcement returns by adding controls for industry performance and for the quality of recent acquisitions in the industry. Table 4.9 presents the results. While industry ROA bears no significant association with deal announcement returns (column (1)), we observe that when the average deal announcement CARs for deals announced in the industry in the past year is relatively low, in the year afterwards the bidder's CARs increase significantly (column (2)). As shown in column (3), if a peer undertook one of the worst takeovers in a year, defined by belonging to the lowest decile in terms of bidder's announcement CARs per year, the industry tends to have deals of better quality in the following year, although the effect is not statistically significant. Hence, the results in Table 4.9 suggest that firms, to some extent, may react to peers' recent underperforming acquisitions (column (4)). However, the litigation indicator remains statistically significant across all specifications. Thus, the risk of being sued seems to matter in addition to a potential learning effect that arises from the mere observation of poor acquisitions by peers.

[Insert Table 4.9 about here]

Finally, following Bertrand and Mullainathan (2003) and Atanassov (2013), we conduct an additional test to examine the potential endogeneity of M&A lawsuits. Specifically, we repeat our analysis of bidders' returns by applying a placebo treatment at the industry level one year and two years before the actual observation of a lawsuit. Table 4.10 shows that we do not observe an effect for the pre-lawsuit period, as the coefficients on *Placebo 1 Year* and *Placebo 2 Years* are not significant. This mitigates the concern of endogeneity driving our

results.

[Insert Table 4.10 about here]

4.6.2 Robustness tests

We focus on acquisition-related lawsuits in order to identify a direct link between lawsuit risk and investment decisions. However, firms may react to any kind of lawsuit, due to an overall increase in the litigation risk, instead of an increase in the acquisition-specific litigation risk. Table 4.11 introduces the additional control variable of the logarithm of the number of any Rule 10b-5 or Section 11 class-action securities lawsuits in the industry (as per the ISS database). The coefficients are insignificant in both specifications, and the effect of our main variable of interest *Post Lawsuit* is robust to controlling for overall industry-level litigation.

[Insert Table 4.11 about here]

Last, we examine whether our findings are robust to alternative industry classifications other than the SIC2, which is based on production processes. We repeat our main tests using the Hoberg and Phillips product specification in order to define competitors (Hoberg and Philips, 2010). We find that our main results remain qualitatively and quantitatively the same, although we lose parts of our sample for which we do not have the needed firm identifiers (not tabulated).

The results documented in this paper seem to phase out for periods longer than 2 years after the lawsuit (untabulated). Several explanations come to mind for this observation.

First, if the risk of lawsuits is clustered by industry and years, managers may rationally respond over a limited period of time. We document such auto-correlation in the occurrence of lawsuits, which seems consistent with anecdotal evidence (recall Panel A of Table 4.8). Second, behavioral economists could argue that managers do not correctly judge the risk of lawsuits, and may suffer from a saliency bias (Tversky and Kahneman, 1974; Dessaint and Matray, 2013). Third, the signal-to-noise ratio may become less precise for longer time periods after observing that a peer firm was sued. We do not take a stand for or against these or other explanations but choose a time window of two years, similar to e.g., Servaes and Tamayo (2013).

4.7 Conclusion

In this paper, we show that, after observing an ex post M&A lawsuit in the industry, managers alter their investment behavior. This is in line with the hypothesis that the risk of a lawsuit increases the perceived litigation risk, which disciplines manager's investment decisions. Therefore, securities lawsuits can provide a channel of corporate governance enforcement, and may help solve the moral hazard problem.

In particular, we find that post-lawsuit acquisitions are perceived more positively by the market, indicating better deal quality. In line with the methods of payment that are associated with better acquisitions, public targets are more likely to be paid for in cash, whereas private targets are more likely acquired with stock, respectively. Moreover, there are fewer diversifying takeovers in the industry. Finally, we document that peer firms adjust their investment to the level predicted by their growth opportunities. This adjustment is driven

by firms reducing their abnormally high investment, whereas under-investing firms do not react to observing a lawsuit. The results are stronger for firms with higher ex ante litigation risk and/or with higher amount of goodwill before the lawsuit, consistent with those firms being more susceptible to the risk of being sued themselves. Finally, the results are generally driven by better governed firms, which are the ones reacting more strongly to observing a lawsuit in their industry.

These results provide empirical evidence on the importance and disciplining effect of securities lawsuits. They also highlight the role played by litigation risk in corporate governance enforcement.

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Appendix A

We provide below several examples of allegations of *ex post* M&A-related lawsuits extracted from the ISS Securities Class Action database.

1. First, an allegation against TIBCO Inc. in 2005 would state that:

   Defendants' Class Period representations regarding TIBCO were materially false and misleading when made for the following reasons: (i) TIBCO's integration of the Staffware PLC ("Staffware") acquisition was not proceeding as well as Defendants represented; (ii) that Staffware was performing well below expectations; and (iii) TIBCO did not maintain an adequate system of internal financial, operational or disclosure controls so as to reasonably assure the accuracy, completeness and veracity of the Company's public statements and representations to investors. On March 1, 2005, Defendants announced that TIBCO's results for Q1:F05 were well below guidance. In fact, shares of TIBCO were halted in after-market trading after the Company revealed that preliminary data showed that Q1:F05 revenues would reach well below the FirstCall consensus mean estimates. While Defendants had previously stated that the Staffware acquisition was substantially completed and that the integration was proceessing as expected.

2. Second, an allegation against Razorfish, Inc. in 2000 would state that:

   The Complaint alleges as follows: Defendants misled investors, in filings with the SEC, regarding Razorfish's success in integrating recent acquisitions, particularly International Integrated Incorporated ("I-Cube"); its achievements of sharp earnings and revenue growth due to internal growth when in fact it was due to accretion of revenues and earnings from recent acquisitions; [...].

3. Third, an allegation against The Cooper Companies Inc. in 2006 would state that:

   The Complaint alleges that defendants violated federal securities laws by issuing a series of materially false statements regarding Cooper's business condition. Specifically, defendants failed to disclose that: (i) Cooper improperly accounted for assets acquired in the Ocular Sciences, Inc. ("Ocular") merger, as reported in the Proxy Statement, by misclassifying intangible assets as tangible, which had the effect of lowering amortization expense; (ii) Cooper's aggressive earnings guidance reflected the improper accounting for intangible assets and was inflated by the amount of the understated amortization expense; (iii) the merger synergies touted by defendants were unrealistic; (iv) Ocular had stuffed the channel with its Biomedics products; [...].

4. Finally, an allegation against Honeywell International, Inc. in 2001 would state that:

   Defendants knowingly or recklessly disseminated materially false and misleading statements and omissions regarding the success of the merger of Honeywell International, Inc. and Allied Signal, Inc. ("Allied") and the Company's financial projections and disclosures during the first half of the year 2000. Specifically, Defendants failed to disclose that the merger was problem-ridden and not yielding operational synergies and millions in cost savings, and that the new Honeywell's business was not nearly as strong as represented and did not have nearly as strong prospects as forecast by Defendants. Furthermore, the misrepresentations and omissions by Defendants influenced the views of securities analysts and fostered an unrealistically positive assessment of Honeywell and its business, prospects and operations. As a result of such misinformation, its stock traded at artificially inflated prices throughout the Class Period.

Appendix B

The table below defines the main dependent and control variables used in this study as well as the different data sources.

Variable	Definition	Source
CAR [-3;3]	Bidders CARs over seven days	CRSP
Cash	1 if Cash/Value of Transaction >=50%	SDC Platinum
Diversify	1 if SIC2 target ! = SIC2 bidder	SDC Platinum
Hostile	1 if Deal Attitude ! = Friendly	SDC Platinum
$PE_{acq.} - PE_{target}$	Acquirer P/E ratio minus target P/E ratio	SDC Platinum
Investment Residual	Residuals of a model as in Biddle et al. (2009)	Compustat
Size	ln(cshot $*$ prcc$_f$) lagged	Compustat
MtB	(cshot $*$ prcc$_f$ / ceq) lagged	Compustat
Leverage	(lt / at) lagged	Compustat
Sales Growth	(sale - sale lagged) / sale lagged	Compustat
Relative Dealsize	Value of Transaction / Size Acquirer	Compustat, SDC Platinum
Target Private	1 if Target Public Status = Private	SDC Platinum
Target Public	1 if Target Public Status = Public	SDC Platinum
Number of Bidders	Number of Bidders	SDC Platinum
Crossborder	1 if Crossborder = Yes	SDC Platinum
Divesture	1 if Divesture = Yes	SDC Platinum
Tender Offer	1 if Tender Offer = Yes	SDC Platinum
Toehold	1 if creeping acquisition = Yes	SDC Platinum
Past Merger Activity	Number of completed deals per year	SDC Platinum
Past M&A	1 if (aqc / at) lagged > 0.05	Compustat
ROA	(oibdp / at) lagged	Compustat
Quick Ratio	(rect + che) / lct lagged	Compustat
Loss	1 if lagged ni < 0	Compustat
Std Dev Sales	Standard deviation of sales over 5 years	Compustat
Tangible	(ppent / at) lagged	Compustat
Dividend Payer	1 if lagged dvt > 0	Compustat
Goodwill	1 if lagged (gdwl / at) is above the median	Compustat
Litigation Risk	Probability of lawsuit as in Kim & Skinner (2012)	Compustat, CRSP & SSCACD
Goodwill	gdwl / at; set to 0 if missing	Compustat

Table 4.1: Distribution of Events per Year and Industry

This table presents the distribution of industries targeted by at least one ex post M&A lawsuits in a given year. Panel A shows the distribution of lawsuits per year. Panel B reports the number of lawsuits per industry. The data come from the ISS Securities Class Action database, and the cases are identified when allegations claim that managers overpromised and hid poor performance.

Panel A: Distribution of Events per Year

Year	No. of Lawsuits
1996	3
1997	8
1998	11
1999	3
2000	9
2001	6
2002	5
2003	5
2004	5
2005	8
2006	5
2007	2
2008	3
2009	4
2010	3
2011	9
Total	89

Panel B: Distribution of Events per Industry

Industry	No. of Lawsuits
Agriculture, Forestry, and Fishing (01-09)	2
Mining and Construction (10-19)	5
Manufacturing (20-39)	34
Transportation and Utilities (40-49)	9
Trade (50-59)	12
Services (70-89)	27
Total	89

Table 4.2: Descriptive statistics

This table reports the summary statistics of the main variables used in the analysis. For each variable we report the mean, number of non-missing observations, and for the continuous variables the median, 25th and 75th percentiles. All variables are defined in Table 4.2. In the upper panel, we present the statistics for the dependent variables used in this study. In the lower panel, we present the statistics for the control variables. The sample period is from 1996 to 2011.

Variable	N	Mean	P25	P50	P75
CAR [-3;3]	5,827	0.01	-0.03	0.00	0.04
Cash	6,246	0.86			
Diversify	11,373	0.46			
Hostile	11,338	0.07			
$PE_{acq.} - PE_{target}$	1,603	-15.67	-30.45	-2.83	17.36
Investment Residual	77,563	0.20	0.04	0.08	0.15
Size ($bil)	77,563	5.12	3.42	5.04	6.77
MtB	77,563	2.49	1.18	1.93	2.94
Leverage	77,563	0.37	0.29	0.48	0.64
Sales Growth	77,563	0.12	-0.05	0.07	0.22
Relative Dealsize	11,373	0.25	0.04	0.09	0.27
Target Private	11,373	0.35			
Target Public	11,373	0.19			
Number of Bidders	11,373	1.01	1.00	1.00	1.00
Crossborder	11,373	0.05			
Divesture	11,373	0.35			
Tender Offer	11,373	0.05			
Toehold	11,373	0.00			
Goodwill	77,563	0.08	0.00	0.02	0.12
Litigation Risk	65,584	0.021	0.003	0.011	0.028
ROA	77,563	0.01	0.00	0.10	0.16
Quick Ratio	77,563	1.93	0.68	1.16	2.15
Loss	77,563	0.33			
Std Dev Sales	77,563	0.17	0.07	0.14	0.12
Tangible	77,563	0.28	0.09	0.21	0.42
Dividend Payer	77,563	0.37			
G-Index	25,177	8.65	7	9	11

Table 4.3: Peer M&A Lawsuit and Deal Announcements Returns

This table presents regression results for the analysis of bidder's announcement CARs. We compute 7-day CARs using the (-3,+3) window where the event day zero is the announcement date of the merger. We estimate abnormal returns with a market model using the CRSP equal-weighted return as the market return. Post Lawsuit is an indicator variable equal to one if a peer firm was subject to an ex post M&A lawsuit one or two years before the merger announcement. Industry peers are defined at the 2-digit SIC level. Standard errors are clustered at the firm level. All other variables are defined in Table 4.2. All models are estimated using OLS. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]
Post Lawsuit	0.0082**	0.0081**	0.0079**	0.0080**
	(0.0034)	(0.0034)	(0.0034)	(0.0038)
Size Acquirer		-0.0014	-0.0013	0.0082***
		(0.0010)	(0.0011)	(0.0031)
Mtb Acquirer		0.1320*	0.1558*	0.2957**
		(0.0811)	(0.0837)	(0.1250)
Leverage Acquirer		0.0199**	0.0156*	0.0124
		(0.0084)	(0.0083)	(0.0084)
Private Target			0.0064*	0.0030
			(0.0034)	(0.0039)
Diversifying			-0.0037	-0.0066**
			(0.0026)	(0.0033)
Merger of Equals			-0.0159	0.0017
			(0.0665)	(0.0508)
Relative Dealsize			-0.0000**	-0.0000***
			(0.0000)	(0.0000)
Cash Financing			0.0001***	0.0000
			(0.0000)	(0.0000)
Crossborder			-0.0090	0.0295
			(0.0097)	(0.0377)
Divesture			0.0133***	0.0057
			(0.0035)	(0.0042)
Tender Offer			0.0214***	0.0178***
			(0.0058)	(0.0066)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	No
Firm Fixed Effects	No	No	No	Yes
Observations	5,818	5,818	5,818	5,818
Adjusted-R^2	0.0252	0.0275	0.0315	0.1755

Table 4.4: Peer M&A Lawsuits and Method of Payment for Acquisitions

This table presents logistic regression results for the method of payment. Post Lawsuit is an indicator variable equal to one if a peer firm was subject to an ex post M&A lawsuit 1 year or 2 years before the merger announcement. Additional Controls include Sales Growth Acquirer, cross-border, diversifying and number of bidders. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

Cash	Cash	Cash
Post Lawsuit	-0.3080**	-0.3383*
	(0.1227)	(0.1940)
Post Lawsuit X Target Public		0.5792**
		(0.2612)
Post Lawsuit X Target Private		-0.1216
		(0.2014)
Target Public	-0.5629**	-0.7890***
	(0.2541)	(0.2786)
Target Private	-0.2667	-0.1980
	(0.2230)	(0.2359)
Size Acquirer	0.2315***	0.2322***
	(0.0267)	(0.0266)
Leverage Acquirer	0.8755***	0.8759***
	(0.2725)	(0.2718)
MtB Acquirer	0.0002	0.0004
	(0.0024)	(0.0024)
Relative Dealsize	-0.0018***	-0.0018***
	(0.0007)	(0.0007)
Hostile Takeover	2.8443***	2.9493***
	(0.3155)	(0.3229)
Divesture	0.7726***	0.7803***
	(0.2298)	(0.2284)
Tender Offer	1.5628***	1.6036***
	(0.2417)	(0.2473)
Additional Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	6,246	6,246

Table 4.5: Peer M&A Lawsuits and Deal Characteristics

This table presents regression results for the analysis of acquisitions' methods of payment. Columns 1 and 3 have indicator variables as dependent variables and are logistic regression models, whereas columns 2 and 4 are estimated using OLS. Post Lawsuit is an indicator variables equal to one if a peer firm was subject to an ex post M&A lawsuit 1 year or 2 years before the merger announcement. Other controls include target types, hostile takeover, divesture, tender offer, merger of equals, toehold and relative dealsize, when available. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

	Diversify	Rel. Dealsize	Hostile	$PE_{acq.} - PE_{target}$
Post Lawsuit	-0.1383**	-6.7873***	-0.0410	-8.8936*
	(0.0670)	(1.9334)	(0.1146)	(5.3517)
Size Acquirer	0.0710***	7.5112***	0.0661***	2.4828**
	(0.0186)	(0.4997)	(0.0198)	(1.1650)
Leverage Acquirer	-0.0309	16.0547***	-1.1726***	-33.5198***
	(0.1553)	(3.5474)	(0.2691)	(12.9516)
MtB Acquirer	-0.0214	-0.0470**	0.0176***	16.6670
	(0.0235)	(0.0221)	(0.0054)	(14.3904)
Sales Growth Acquirer	0.0050	0.0009	-0.0055	-0.2799
	(0.0040)	(0.0025)	(0.0058)	(0.4802)
Number of Bidders	-0.4661**	27.2716***	0.1210	0.5966
	(0.1859)	(8.7431)	(0.2323)	(7.7753)
Additional Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	11,374	11,373	11,338	1,603
Adjusted-R^2		0.1804		0.0963

Table 4.6: Peer M&A Lawsuit and Abnormal Investment

This table presents regression results the analysis of firms' abnormal investment. The level of expected investment is estimated based on past sales growth (see Chen et al., 2011). The residuals of the investment model are then used as dependent variables. Panel A reports the result of our baseline model with columns 1 and 2 using the entire sample of residuals. Columns 3 and 4 study positive residuals, representing over-investment are used, whereas in columns 5 and 6, negative residuals are multiplied by minus one and we study under-investment. Panel B reports the results of our model interacted with firms' past mergers activity where Column 1, 2 and 3 use all residuals, positive residuals and negative residuals, respectively. Panel C reports the results of our model interacted with firms' *ex ante* litigation risk where Column 1, 2 and 3 use all residuals, positive residuals and negative residuals, respectively. Post Lawsuit are indicator variables equal to one if a peer firm was subject to an ex post M&A lawsuit two years before the merger announcement. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. All models are estimated using OLS. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

Panel A: Total Investment - Baseline Model

	Residual Full	Residual Full	Residual Over-I	Residual Over-I	Residual Under-I	Residual Under-I
Post Lawsuit	-0.0037**	-0.0023*	-0.0102**	-0.0087**	0.0006	0.0009
	(0.0016)	(0.0013)	(0.0047)	(0.0042)	(0.0006)	(0.0007)
Leverage	0.0118***	0.0068***	0.0276***	0.0173***	0.0054***	0.0041***
	(0.0027)	(0.0011)	(0.0039)	(0.0029)	(0.0008)	(0.0009)
Size	-0.0075***	-0.035***	-0.0188***	-0.0714***	-0.0033***	0.0084***
	(0.0004)	(0.0008)	(0.0013)	(0.0025)	(0.0003)	(0.0006)
ROA	-0.1090***	-0.0966***	-0.1509***	-0.1597***	-0.0031	-0.0004
	(0.0074)	(0.0026)	(0.0114)	(0.0064)	(0.0022)	(0.0027)
Quick Ratio	-0.0021***	-0.0007**	-0.0034***	-0.0023**	-0.0025***	-0.0007***
	(0.0003)	(0.0003)	(0.0008))	(0.0009)	(0.0002)	(0.0002)
Loss	-0.0227***	-0.0195***	-0.0589***	-0.0609***	0.0061***	0.0062***
	(0.0022)	(0.0013)	(0.0056)	(0.0047)	(0.0010)	(0.0006)
Std Dev Sales	0.0006	0.0002**	0.0002*	0.0007*	0.0000	-0.0005
	(0.0005)	(0.0001)	(0.0001)	(0.0004)	(0.0004)	(0.0006)
MtB	0.0008***	0.0001*	0.0010***	0.0001	-0.0004***	0.0001**
	(0.0001)	(0.0001)	(0.0003)	(0.0002)	(0.0000)	(0.0000)
Tangible	0.0006	0.0201***	-0.0086	0.0496***	-0.0236***	-0.0153***
	(0.0048)	(0.0061)	(0.0107)	(0.0190)	(0.0033)	(0.0039)
Dividend Payer	0.0028	0.0016	0.0034	-0.0021	0.0048***	-0.0016*
	(0.0020)	(0.0018)	(0.0047)	(0.0057)	(0.0009)	(0.0009)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	77,563	77,563	23,950	23,950	53,613	53,613
Adjusted-R^2	0.1921	0.3319	0.2072	0.4024	0.3672	0.6044

Panel B: Total Investment and Goodwill

	Residual Full	Residual Over-I	Residual Under-I
Post Lawsuit (A)	-0.0006	-0.0004	0.0001
	(0.0011)	(0.0003)	(0.0004)
Goodwill (B)	0.0957***	0.2234***	0.0241***
	(0.0044)	(0.0112)	(0.0032)
(A) X (B)	-0.0182***	-0.0485***	-0.0009
	(0.0059)	(0.0149)	(0.0045)
Leverage	0.0027***	0.0025*	0.0052***
	(0.0008)	(0.0013)	(0.0007)
Size	-0.0062***	-0.0126***	-0.0038***
	(0.0002)	(0.0006)	(0.0002)
ROA	-0.0403***	-0.0658***	-0.0019
	(0.0021)	(0.0031)	(0.0018)
Quick Ratio	-0.0012***	-0.0010***	-0.0024***
	(0.0002)	(0.0005)	(0.0002)
Loss	-0.0065***	-0.0197***	0.0057***
	(0.0008)	(0.0021)	(0.0006)
Std Dev Sales	0.0000	-0.0007	0.0001
	(0.0004)	(0.0009)	(0.0004)
MtB	0.0002***	0.0005***	-0.0004***
	(0.0000)	(0.0001)	(0.0000)
Tangible	0.0140***	0.0459***	-0.0165***
	(0.0027)	(0.0063)	(0.0025)
Dividend Payer	0.0025**	-0.0015	0.0052***
	(0.0012)	(0.0021)	(0.0008)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	77,563	23,950	53,613
Adjusted-R^2	0.1843	0.2239	0.3497

Panel C: Total Investment and *ex ante* Litigation Risk

	Residual Full	Residual Over-I	Residual Under-I
Post Lawsuit (A)	-0.0016*	-0.0042*	-0.0003
	(0.0009)	(0.0022)	(0.0008)
Litigation Risk (B)	0.0766***	0.1727***	-0.0230**
	(0.0116)	(0.0235)	(0.0097)
(A) X (B)	-0.0251*	-0.0724**	0.0267
	(0.0148)	(0.0349)	(0.0174)
Leverage	0.0118***	0.0049	0.0194***
	(0.0019)	(0.0032)	(0.0020)
Size	-0.0049***	-0.0094***	-0.0027***
	(0.0003)	(0.0007)	(0.0003)
ROA	-0.0385***	-0.0593***	-0.0015
	(0.0027)	(0.0035)	(0.0027)
Quick Ratio	-0.0017***	-0.0011**	-0.0019***
	(0.0002)	(0.0004)	(0.0003)
Loss	-0.0080***	-0.0236***	0.0040***
	(0.0009)	(0.0020)	(0.0008)
Std Dev Sales	-0.0000*	-0.0000**	-0.0000
	(0.0000)	(0.0000)	(0.0000)
MtB	0.0001	0.0006***	-0.0007***
	(0.0001)	(0.0002)	(0.0001)
Tangible	-0.0093***	0.0001	-0.0285***
	(0.0026)	(0.0058)	(0.0026)
Dividend Payer	0.0018**	-0.0033	0.0054***
	(0.0009)	(0.0020)	(0.0008)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	65,584	20,514	45,070
Adjusted-R^2	0.2087	0.1508	0.3493

Table 4.7: Corporate Governance and Peer M&A Lawsuits

This table presents the results of a set of regressions that interact corporate governance with post lawsuit period. The G-Index is used as a proxy for the level of governance in firms. In Panel A, we compute 7-day CARs using the (-3,+3) window where the event day zero is the announcement date of the merger. We estimate abnormal returns with a market model using the CRSP equal-weighted return as the market return. Panel B presents logistic regression results for the method of payment. Panel C reports regression results for deviation from the predicted investment level. The expected investment level is estimated using, inter alia, past sales growth in the first stage (similar to Chen et al., 2011). The residuals of the investment model are then used as dependent variables in column 1, in column 2 we study positive residuals, representing over- investment, whereas in column 3, negative residuals are multiplied by minus one and under-investment is investigated. In all panels, Post Lawsuit is an indicator variable equals to one if a peer firm was subject to an ex post M&A lawsuit 2 years before the merger announcement. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

Panel A: Market Reaction and Corporate Governance

	CAR [-3;3]	CAR [-3;3]
Post Lawsuit	0.0224***	0.0168**
	(0.0082)	(0.0087)
Post Lawsuit X G-Index	-0.0020**	-0.0013*
	(0.0008)	(0.0008)
G-Index	0.0001	
	(0.0005)	
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Observations	3,978	3,978
Adjusted-R^2	0.0370	0.0657

Panel B: Method of Payment and Corporate Governance

	Cash	Cash	Cash
Post Lawsuit	-0.3319*	-0.1174	-0.2839
	(0.1742)	(0.2039)	(0.2551)
Post Lawsuit X Public Target	2.1748***		2.1489**
	(0.8000)		(0.8379)
Post Lawsuit X Public Target X G-Index	-0.1982**		-0.2007**
	(0.0860)		(0.0865)
Post Lawsuit X Private Target		-0.3163	0.0104
		(0.4446)	(0.4784)
Post Lawsuit X Private Target X G-Index		0.0088	-0.0094
		(0.0471)	(0.0473)
G-Index	0.0437*	0.0294	0.0461*
	(0.0238)	(0.0269)	(0.0276)
Private Target	-0.5769*	-0.5026	-0.5510*
	(0.3039)	(0.3153)	(0.3257)
Public Target	-0.9991***	-0.8532**	-0.9834***
	(0.3581)	(0.3369)	(0.3668)
Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	4,328	4,328	4,328

Panel C: Investment and Corporate Governance

	Residual Full	Residual Over-I	Residual Under-I
Post Lawsuit	-0.0089*	-0.0210*	0.0004
	(0.0043)	(0.0012)	(0.0017)
Post Lawsuit X G-Index	0.0007**	0.0094*	0.0014
	(0.0003)	(0.0054)	(0.0019)
Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	25,177	7,827	17,730
Adjusted-R^2	0.2227	0.2882	0.6273

Table 4.8: Peer M&A Lawsuits and M&A Industry Activity

This table presents regression results for occurrence of lawsuits and M&A deals. In Panel A, the number of lawsuits in an industry are estimated by the lagged number of lawsuits. In Panel B, the deal volume in an industry is the logarithm of the total transaction value of deals computed by the industry of the acquirer. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. All models are estimated using OLS. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

Panel A: *Ex Post* M&A Lawsuit Occurrences

	No. of Lawsuits	No. of Lawsuits
Number of Lawsuits$_{t-1}$	0.1094***	0.0512**
	(0.0237)	(0.0223)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Deal Activity Controls	No	Yes
Observations	1,865	1,865
Adjusted-R^2	0.2260	0.3373

Panel B: M&A Deal Volume

	Deal Volume	Deal Volume
Number of Lawsuits$_{t-1}$	-0.0831*	
	(0.0482)	
Lawsuit Indicator$_{t-1}$		-0.1093*
		(0.0643)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	1,865	1,865
Adjusted-R^2	0.6739	0.6740

Table 4.9: Past Industry Performance, Average Deal Quality, and Bad Acquisitions

This table presents regression results for the analysis of bidder's announcement CARs. We compute 7-day CARs using the (-3,+3) window where the event day zero is the announcement date of the merger. We estimate abnormal returns with a market model using the CRSP equal-weighted return as the market return. Post Lawsuit is an indicator variable equal to one if a peer firm was subject to an ex post M&A lawsuit one or two years before the merger announcement. Industry ROA is equal to the lagged mean ROA computed at the industry level. Industry CARs is equal to the lagged mean of bidders' announcement CARs computed at the industry level. Industry low decile CARs is a lagged indicator variable equal to one if a peer firm bidder's announcement CARs belonged to the lowest decile of all announcement CARs in a given year. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. All models are estimated using OLS and standard errors are clustered at the firm level. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]
Post Lawsuit	0.0077**	0.0067*	0.0064*	0.0071*
	(0.0034)	(0.0038)	(0.0038)	(0.0038)
Industry ROA	0.0362			0.0372
	(0.0374)			(0.0408)
Industry CARs		-0.1386***		-0.1290**
		(0.0522)		(0.0551)
Industry low decile CARs			0.0058	0.0022
			(0.0042)	(0.0045)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,448	5,448	5,448	5,448
Adjusted-R^2	0.0350	0.0366	0.0348	0.0368

Table 4.10: Endogeneity Test - Deal Announcement Returns during Placebo Period

This table presents regression results for the analysis of bidder's announcement CARs. We compute 7-day CARs using the (-3,+3) windows where the event day zero is the announcement date of the merger. We estimate abnormal returns with a market model using the CRSP equal-weighted return as the market return. Placebo 1 Year and Placebo 2 Years are indicator variables equal to one in the 1 year or 2 year period before a peer firm was subject to an ex post M&A lawsuit. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. All models are estimated using OLS. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]	CAR [-3;3]
Placebo 1 Year	-0.0019		-0.0060	
	(0.0059)		(0.0060)	
Placebo 2 Years		-0.0053		-0.0093
		(0.0046)		(0.0060)
Size Acquirer	-0.0009	-0.0009	0.0098***	0.0099***
	(0.0011)	(0.0011)	(0.0032)	(0.0031)
MtB Acquirer	0.1636*	0.1652*	0.3423***	0.3471***
	(0.0846)	(0.0846)	(0.1266)	(0.1266)
Leverage Acquirer	0.0160*	0.0160*	0.0191	0.0196
	(0.0084)	(0.0084)	(0.0165)	(0.0165)
Private Target	0.0063*	0.0063*	0.0033	0.0034
	(0.0034)	(0.0034)	(0.0040)	(0.0040)
Diversifying	-0.0035	-0.0035	-0.0066**	-0.0065*
	(0.0026)	(0.0026)	(0.0033)	(0.0033)
Merger of Equals	-0.0181	-0.0181	-0.0047	-0.0047
	(0.0688)	(0.0690)	(0.0517)	(0.0517)
Relative Dealsize	-0.0000**	-0.0000**	-0.0000***	-0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Cash Financing	0.0001***	0.0001***	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Crossborder	-0.0087	-0.0090	0.0298	0.0288
	(0.0097)	(0.0097)	(0.0384)	(0.0384)
Divesture	0.0132***	0.0133***	0.0060	0.0060
	(0.0036)	(0.0036)	(0.0042)	(0.0042)
Tender Offer	0.0224***	0.0223***	0.0181***	0.0179***
	(0.0058)	(0.0058)	(0.0067)	(0.0067)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes
Observations	5,818	5,818	5,818	5,818
Adjusted-R^2	0.0342	0.0345	0.1753	0.1757

Table 4.11: Industry-Level Litigation Risk and Deal Announcement Returns

This table presents regression results for the analysis of bidder's announcement CARs. We compute 7-day CARs using the (-3,+3) window where the event day zero is the announcement date of the merger. We estimate abnormal returns with a market model using the CRSP equal-weighted return as the market return. Post Lawsuit is an indicator variable equal to one if a peer firm was subject to an ex post M&A lawsuit in the 2 years before the merger announcement. Other Lawsuits corresponds to the logarithm of the number of all securities lawsuits in the industry in the two year period before the merger announcement. Industry peers are defined at the 2-digit SIC level. All other variables are defined in Table 4.2. All models are estimated using OLS and standard errors are clustered at the firm level. ***, **, and * indicate significance level at the 1%, 5%, and 10% level, respectively.

	CAR [-3;3]	CAR [-3;3]
Post Lawsuit	0.0088**	0.0087**
	(0.0035)	(0.0040)
Other Lawsuits	-0.0053	-0.0054
	(0.0038)	(0.0035)
Size Acquirer	-0.0013	0.0088***
	(0.0011)	(0.0034)
MtB Acquirer	0.1108	0.2029
	(0.0895)	(0.1377)
Leverage Acquirer	0.0149*	0.0195
	(0.0089)	(0.0177)
Private Target	0.0064*	0.0020
	(0.0037)	(0.0043)
Diversifying	-0.0040	-0.0060*
	(0.0028)	(0.0036)
Merger of Equals	-0.0192	0.0002
	(0.0660)	(0.0516)
Relative Dealsize	-0.0000*	-0.0000***
	(0.0000)	(0.0000)
Cash Financing	0.0001**	0.0000
	(0.0000)	(0.0000)
Crossborder	0.0006	0.0436
	(0.0119)	(0.0443)
Divesture	0.0138***	0.0054
	(0.0039)	(0.0046)
Tender Offer	0.0198***	0.0184**
	(0.0063)	(0.0072)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Observations	5,818	5,818
Adjusted-R^2	0.0318	0.1889

Conclusion

In this dissertation, I explore factors that influence individuals' financial decision-making in households and corporations. In the first two chapters, I show that individuals consider their subjective beliefs and personal experiences when making financial household decisions. In the third and fourth chapters I highlight that individuals behavior is shaped by their environment, either in form of the immediate social context, or the filing of a lawsuit concerning an industry peer.

Understanding where differences in financial decisions stem from is a first step towards helping individuals make optimal choices. For future research, in particular in household finance, I find it interesting to examine the effectiveness of programs that teach basic finance concepts and rule of thumbs for guiding individuals when they face complex financial decisions - in the laboratory and/or the real world. In particular, the interaction of finance and misinformation deserves attention. Correcting people's misperceptions has been shown to be difficult in the context of health, politics, and racial biases. Therefore, whether and how false beliefs about finance can be corrected is a promising and important research question.

Essays in Empirical Financial Economics

This dissertation consists of four distinct chapters. The first chapter presents joint work with Christophe Spaenjers. We find that individuals with longer subjective life horizons hold higher conditional equity shares, and the effect of a shortening life horizon on portfolio choice is offset by bequest motives. In the second chapter, I examine the explanatory power of birth order for financial household decisions. I show that firstborns differ in their financial decision-making from later born siblings. The results highlight the importance of personal family experiences for household choices. In the third chapter, I document that, in surveys, the presence of companions decreases the probability of respondents replying, and increases the probability of respondents overreporting their self-assessed abilities. The overreporting leads to a downward bias in the estimates of the importance of overconfidence for individuals' behavior. The fourth chapter presents joint work with Thomas Bourveau and François Brochet. We identify M&A lawsuits, where plaintiffs allege that the firm hid poor performance related to a prior acquisition. Using the filing of a lawsuit as an industry shock, we show findings consistent with a disciplining effect from the lawsuit for the investment behavior of peer firms' managers.

Keywords: investor behavior, portfolio choice, horizon, bequests, social desirability, household finance, litigation, investment decisions, corporate governance.

Essais en Economie Financière Empirique

Cette thèse est constitutée de quatre chaptires distincts. Le premier chapitre présente un travail écrit en collaboration avec Christophe Spaenjers. Nous montrons que les individus avec une espérance de vie subjective qui est plus longue, ont une fraction d'actions conditionelle qui est augmentée. L'effet d'une espérance de vie qui diminue est atténué par des motifs de légation. Dans le deuxième chapitre, j'étudie l'importance de la séquence de naissance pour les décisions financières. Je montre que les aînés diffèrent de leurs frères et sœurs par leurs décisions. Les résultats accentuent l'importance des expériences familiales pour les choix des agents. Dans le troisième chapitre, je montre que la présence d'un entourage diminue la probabilité d'une réponse, et augmente la propension d'une auto-évaluation exagérée des aptitudes. Cette observation implique une sous-estimation de l'importance de l'aplomb pour le comportement des individus. Le quatrième chapitre est le résultat d'une collaboration avec Thomas Bourveau et François Brochet. Nous identifions les plaintes dont les plaignants allèguent que l'entreprise ait caché une mauvaise performance liée à une acquisition. Utilisant la proclamation des plaintes comme un traitement de l'industrie, nous trouvons des résultats cohérents avec un effet disciplinant le comportement d'investir des autres dirigeants de l'industrie.

Mots clefs: investisseurs individuels, investissement du portefeuille, horizon, héritage, désirabilité sociale, finance des ménages, poursuite judiciaire, décision d'investissement, gouvernance d'entreprise.