How Do People Save? Estimating the Marginal Propensity to Invest for Different Asset Classes

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In this proposal, we outline our approach to estimating the marginal propensity to invest out of each additional dollar of current-account balances, differentiating among investment into stocks, bonds, money market funds, and savings accounts. While there exists a large literature estimating the marginal propensity to consume, attempts to estimate the marginal propensity to invest are scarce. However, the marginal propensity to invest is not simply the reverse of the marginal propensity to consume, but of independent interest as individuals can invest into many different asset classes. To estimate the marginal propensity to invest considering different asset classes separately will inform recent theoretical literatures. For instance, a theoretical literature emerged explaining high marginal propensities to consume with individual holdings of liquid and illiquid assets. Moreover, a theoretical literature emerged explaining life-cycle portfolio choice with transaction costs. Two recent papers, Briggs et al. (2015) and Andersen and Nielsen (2011), estimate the marginal propensity to invest into stocks using administrative data and large wealth shocks but focus on first-time participants. In contrast to these two papers, we focus on stock-market participants and aim to use a more high-frequency data and identification approach.

Beyond documenting how current-account balances induce individuals to invest and rebalance, we will document high-frequency empirical patterns of spending, balances, and credit limits and how they relate to individual stock, bond, and money market funds purchases as well as savings account balances to understand how and why individuals invest into stocks and bonds, rebalance, and save. To alleviate endogeneity concerns, we utilize plausibly exogenous variation in current-account balances due to automatic income and bill payments and time variation in clearing of check and merchant transactions as well as authorizations and multiple postings of pending transactions that get resolved by banks eventually. We expect to find that individual investment is less determined by perfectly rational decision-making in line with standard models but more so by rules of thumb and mental accounting. To shed additional light on mental accounting, we plan to look at the investment but also spending responses to variation in current as well as credit card account balances. To obtain exogenous variation that does not have any wealth implications, we again utilize authorizations and multiple postings of pending transactions that get resolved by banks eventually.

The day of week and therefore clearing times of automatic payments, getaways speeds, pending transactions and authorizations, and automatic check deposits by the receiving agency are plausibly orthogonal to individual decisions to spend, save, or invest on a high-frequency basis. Additionally, we employ a fixed-effects approach controlling for day-of-week, day-of-month, holiday, month-by-year, and individual fixed effects. The fixed effects absorb all planned spending, income, and bill payments for which no variation is introduced by weekends and holidays or clearing and getaways.

We use data from Personal Capital, a wealth management company that offers free online software to the general public which includes account-aggregation technology. We follow Gelman et al. (2014) in using data from a financial aggregation and service software provider, which overcomes the accuracy, scope, and frequency limitations of the existing data sources of consumption and income as it is derived from the actual transactions and account balances of individuals. Users can link all their online financial accounts, including checking, savings, investments, credit, loans, pension, mortgage, and others. Assets with no electronic presence, such as real estate and art, can be added manually. Additionally, we may utilize a second source of data from a different FinTech company, which includes transaction level data for more than 6 million individuals. This sample was constructed to represent the US population based on income, wealth, and geographical dispersion. We expect to obtain access to all account data in July 2017.

We are interested in when individuals decide to transfer money to their investment accounts, such as brokerage accounts and retirement accounts, to buy stocks and bonds or transfer money to money market funds or liquid savings accounts. As a first pass, we consider all such transfers as an attempt to dedicate money to savings or investment for future consumption as opposed to current consumption. In turn, we will look separately at stock or stock funds

purchases, bond or bond funds purchases, money market funds purchases, and transfers to savings accounts. To understand when individuals decide to purchase stocks and bonds or transfer money to savings accounts, we first gather some reduced-form evidence. More specifically, we correlate individual stock and bond purchases or transfers with individual spending as well as balances in current, credit card, and savings accounts and the accounts' limits or individual liquidity. Here, we are only interested in within-individual variation. Thus, we sort individual-date observations into ten deciles of say balances relative to individuals' own histories of these balances. For instance, an individual is in his or her first decile of current-account balances, if he or she is holding larger current-account balances on the remaining 90% of the time. In turn, we correlate individual investment with the individual deciles of balances and holdings relative to individuals' own histories.

To estimate the marginal propensity to invest out of each dollar of current-account balances, we need to identify exogenous variation in balances. We construct an instrument for current-account balances using the collection of plausibly pre-determined automatic payments, such as regular salary payments, child support, and benefits on the income side as well as rent, bills, insurance, and any other subscriptions on the payments side. The exact transaction date of automatic payments depends on the day of the week and time of the day they happen to fall on. For instance, delays in clearings occur for transactions on evenings, weekends, and holidays. Furthermore, check transactions, e.g., for rent payments, are deposited by the receiving agency on a date plausibly exogenous to the check writer.

More generally, the speed that transactions are cleared varies considerably over time, across transaction types, and across getaways. For instance, the entire process from authorization to settlement to funding typically takes 3 days of regular credit-card transactions. In contrast, debit-card transactions may take seconds, depending on the day of the week and time of the day as well as PIN or signature transactions authorizations, while ACH transactions take up to one week. Additionally, transactions are oftentimes shown as pending with a different than the final amount or in multiple instances (authorizations of merchants cause pending transactions to show up multiple times and automatically resolved by the banks after a few days). Nevertheless, such pending transactions are reflected in balances and thus a source of variation plausibly exogenous to individuals.

The day of week of automatic payments, clearing as well as getaways speeds, pending transactions and authorizations, and automatic check deposits by the receiving agency are plausibly orthogonal to individual decisions to spend, save, or invest on a daily basis. Additionally, we employ a fixed-effects approach controlling for day-of-week, day-of-month, holiday, month-by-year, and individual fixed effects. The fixed effects absorb all planned spending, income, and bill payments for which no variation is introduced by weekends and holidays or clearing transactions and getaways. The identification approach follows in spirit the ones by Kuchler (2015) and Bos and le Coq (2016).

To test for mental accounting, we are interested in detecting an investment or spending response when we restrict the instrument and changes in balances to those that do not have a wealth effect, such as authorizations that get cleared eventually and multiple pending transactions that get resolved by the bank eventually. Authorizations and multiple pending transactions generate substantial variation in available balances over multiple days without any associated wealth effects. Under standard preferences, we would not expect a spending or investment response. However, if individuals engage in mental accounting, having multiple transactions pending artificially increases the credit card balance and make individuals feel they have spent more and are more constrained.

References

Andersen, S. and K. M. Nielsen (2011). Participation constraints in the stock market: Evidence from unexpected inheritance due to sudden death. *Review of Financial Studies 24*(5), 1667–1697.

Bos, M. and C. le Coq (2016). Economic scarcity and consumers' credit choice. *Working Paper*.

Briggs, J., D. Cesarini, E. Lindqvist, and R. Oestling (2015). Windfall Gains and Stock Market Participation. *Working Paper*.

Gelman, M., S. Kariv, M. D. Shapiro, D. Silverman, and S. Tadelis (2014). Harnessing naturally occurring data to measure the response of spending to income. *Science 345*(6193), 212–215.

Kuchler, T. (2015). Sticking to your plan: Empirical evidence on the role of present bias for credit card paydown. *Browser Download This Paper*.

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Budget justification for
Project with title: "How Do People Save? Estimating the Marginal Propensity to Invest for Different Asset Classes"
Yaron Levi and Michaela Pagel

Direct costs

Research Assistance
Funds are requested to support one PhD student working on the project for less than one year. Graduate student time is calculated at $20/hour as follows:

- 20 hours/week for 24 weeks 20*20*24 = $9,600
- No fringe is budgeted for the GRA

Materials and Supplies
Hard- and software for data collection, storage, support, and analysis are requested for a total of $4,000 (laptop, hard-drive, working memory, software).

Travel
Travel to company headquarters is required to collect the data and address data issues.

- $1000 per trip for flight, accommodation, and subsistence and 3 trips total

Indirect costs
Columbia University computes Indirect Costs using Modified Total Direct Costs. Columbia University's federally negotiated indirect cost rate is 60%. $0

Total costs
The total costs are $16,600.

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ACADEMIC APPOINTMENTS

Marshall School of Business, University of Southern California

Assistant Professor of Finance and Business Economics — 2015-Present

EDUCATION

Ph.D. in Finance, UCLA Anderson School of Management — 2009-2015

Visiting Scholar in Economics, Brown University — 2007-2009

B.A. in Economics, Haifa University, Summa Cum Laude — 2006-2008

RESEARCH INTERESTS

Household Finance, Behavioral Economics, Corporate Finance, Field Experiments

RESEARCH

Publications

- "Best Practice For Cost-of-Capital Estimates" (with Ivo Welch) *Journal of Financial and Quantitative Analysis, forthcoming*

Working Papers

- "Information Architecture and Intertemporal Choice: A Randomized Field Experiment in the United States"
- "Decision Fatigue and Heuristic Analyst Forecasts" (with David Hirshleifer, Ben Lourie, and Siew Hong Teoh)

Work in Progress

- "Do Business School Rankings Matter?" (with Ivo Welch)
- "Financial Anxiety and Stock Market Participation" (with Enrichetta Ravina, and Paola Sapienza)
- "Observer Effect and Cash Holdings: A Randomized Field Experiment in the United States"
- "The Effect of Going Mobile on Economic Behavior: A Natural Field Experiment in the United States" (with Shlomo Benartzi)

- "Earnings determinants of Startup Financing " (with Mark Garmaise)

HONORS, AND SCHOLARSHIPS

- NBER Retirement Research Center grant, 2016-2017
- Fink Center for Finance & Investments Scholarship for Field Research, 2013-2014
- UCLA Dissertation Year Fellowship, 2013-2014
- UCLA Anderson Graduate School Fellowship, 2009-2013
- Sidney Frank Merit Scholarship for Excellent Achievement in the Field of Economics, Brown University, 2007-2008

INVITED PRESENTATIONS

* discussant, ** presented by coauthor

- 2017:
  University of Washington (scheduled)
  UCLA-USC-UCI Accounting Reseach Conference** (scheduled)
- 2016:
  UCI Paul Merage School of Business**
  FIRS Conference*
  Claremont Graduate University
  Columbia Business School
  American Finance Association Annual Meeting
- 2015:
  CEPR European Summer Symposium in Financial Markets
  Boulder Summer Conference on Consumer Financial Decision Making
  SFS Finance Cavalcade
  Annual Conference in Financial Economics, IDC
  London School of Economics
  USC Marshall School of Business
  Northwestern Kellogg SOM
  UT-Austin McCombs Business School
  Wharton School of the University of Pennsylvania
  Emory Goizueta Business School
  Boston College Carroll SOM
  Vanderbilt Owen GSM
- 2014:
  UCLA Anderson Finance Seminar
  UCLA Anderson-Economics Ph.D Seminar

UCLA Behavioral Decision Making seminar at UCLA

PROFESSIONAL ACTIVITIES

- Referee: *Review of Financial Studies; Journal of Law, Economics, and Organization; Journal of Economic Behavior and Organization*
- FMA Annual Meeting Program Committee (2017)

TEACHING

- Business Finance (BS), University of Southern California, Fall 2016
- Corporate Financial Policy and Corporate Governance (MSF), University of Southern California, Fall 2015
- Financial Policies and Corporate Governance (BS), University of Southern California, Fall 2015
- Fundamentals of Corporate Finance and Risk Management (MBA), TA to Professor Ivo Welch, UCLA, Winter 2014
- Corporate Finance (MBA), TA to Professor Ivo Welch, UCLA, Winter 2012, Winter 2013, Winter 2014
- Behavioral Finance (MBA), TA to Professor Avanidhar Subrahmanyam, UCLA, Winter 2013
- Foundations of Finance (MBA), TA to Professor Avanidhar Subrahmanyam and Professor Bhagwan Chowdhry, UCLA, Spring 2011

ADDITIONAL EXPERIENCE

- Lieutenant Commander, Israeli Navy Special Forces, IDF 1996-2006

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ACADEMIC APPOINTMENTS

07/2014 Columbia Business School, Division of Economics and Finance: *Assistant Professor*

10/2016 Research Affiliate, Center for Economic Policy Research (CEPR)

DOCTORAL STUDIES

2008-14 University of California at Berkeley: *PhD in Economics*

Dissertation title:	*"Essays on Expectations-Based Reference-Dependent Consumption and Portfolio Choice"*
Principal Advisers:	Matthew Rabin and Adam Szeidl
Other References:	Ulrike Malmendier, Nicholas Barberis, and Botond Koszegi

2013 Yale School of Management (Finance Group): *Visiting PhD student*

PRE-DOCTORAL STUDIES

2006-08 Humboldt-University of Berlin, Germany: *Diplom in Economics (Masters Degree equivalent)*

2007 Universitat Pompeu Fabra, Spain: *Exchange student within the Erasmus program*

2004-06 University of Hamburg, Germany: *Vordiplom in Economics*

RESEARCH INTERESTS

- ⋆ Primary: Household Finance and Behavioral Economics
- ⋆ Secondary: Asset Pricing, Macroeconomics, and Experimental Economics

RESEARCH PAPERS

- ⋆ Expectations-Based Reference-Dependent Preferences and Asset Pricing *(2015, Journal of the European Economic Association (JEEA))*
- ⋆ Expectations-Based Reference-Dependent Life-Cycle Consumption *(accepted 2016, Review of Economic Studies (ReStud))*
- ⋆ A News-Utility Theory for Inattention and Delegation in Portfolio Choice *(revise and resubmit 2016, Econometrica)*
- ⋆ The Liquid Hand-to-Mouth: Evidence from Personal Finance Management Software *(joint with Arna Olafsson, revise and resubmit 2016, Review of Financial Studies (RFS))*
- ⋆ The Ostrich in Us: Selective Attention to Financial Accounts, Income, Spending, and Liquidity *(work in progress, joint with Arna Olafsson)*

- ⋆ Technology Adoption Across Generations: Financial Fitness in the Information Age *(work in progress, joint with Bruce Carlin and Arna Olafsson)*
- ⋆ Family Finances: Intra-Household Bargaining, Spending, and Capital Structure *(work in progress, joint with Arna Olafsson)*
- ⋆ Fresh Air, Easy Work – The Effect of Air Quality on Individual Investor Trading *(work in progress, joint with Steffen Meyer)*
- ⋆ Expectations-Based Reference-Dependent Life-Cycle Consumption and Portfolio Choice: Evidence from the Lab *(joint with Thomas Meissner, Philipp Pfeiffer, and Christopher Zeppenfeld)*
- ⋆ Starring on a Curve: Are Mutual Fund Managers Responding to Incentives? *(work in progress, joint with Xing Huang)*
- ⋆ Payday Borrower's Consumption: Revelation of Self-Control Problems? *(work in progress, joint with Arna Olafsson)*
- ⋆ Hot or Not: Can Managers Charge High Fees After Lucky Strikes? *(work in progress, joint with Oege Dijk and Steven Malliaris)*

Invited Presentations

2017 Seminar presentations: National University of Singapore (scheduled), Cornell (scheduled), University of Zurich (scheduled), University of Melbourne (scheduled), University of New South Wales (scheduled), University of Technology Sydney (scheduled), University of Queensland (scheduled); Conferences: AEA/AFA conferences, AFFECT conference at the University of Miami, Conference at the University of Maryland on Information Acquisition and Disclosure in Financial Markets (scheduled)

2016 Seminar presentations: UC Berkeley, Imperial College London, NYU, Stanford, University of Konstanz, Humboldt-University Berlin, Leibniz-University Hannover, Maastricht University, Tilburg University, Boston Fed, University of Utah; Conferences: CEPR Workshop on Household Finance (discussion), BEAM Behavioral Economics Annual Meeting, European Conference on Household Finance, Yale SOM Awesome Junior Finance Conference (co-organized and discussion), Quantitative Society for Pensions and Saving, Boulder Summer Conference on Consumer Financial Decision Making, Workshop on Behavioral Economics of Financial Markets (organized by Ernst Fehr), WFA (paper and discussion), Early-Career Behavioral Economics Conference, SED, Research in Behavioral Finance Conference, AEA/AFA conferences, Behavioral Finance Junior Faculty Conference at Caltech (organized by Lawrence Jin), 13th Annual Meeting of the Financial Research Association in Las Vegas, CFPB Research Conference, German Economists abroad Conference

2015 Seminar presentations: University of Pennsylvania Wharton, University of British Columbia, Carnegie Mellon University, and Goethe University Frankfurt; Conferences: AEA/AFA conferences, Cornell Bi-Annual Household and Behavioral Finance Symposium, CEPR ESSFM 2015 in Switzerland, European Conference on Household Finance, Conference on Behavioural Aspects in Macroeconomics and Finance, U Penn Annual Behavioral Economics and Health Symposium, and Christmas Meeting of German Economists Abroad

2014 Seminar presentations: Durham University Business School, LBS, Columbia GSB, University of Toronto, Michigan State University, UC Irvine, University of Toronto Rotman, IESE, NHH, IIES Stockholm, Sciences Po Paris, UCLA Anderson, USC Marshall, University of Washington Foster, Federal Reserve Board, University of Pennsylvania Wharton, EIEF Rome, and Stony Brook University Business School; Conferences: CEPR ESSET 2014 in Switzerland, NBER Summer Institute Household Finance Meeting, Yale SOM Conference in honor of Jon Ingersoll

2013 Seminar presentations: Cornell University, Federal Reserve Bank St. Louis, Yale School of Management, UC Berkeley (economics Department and Haas); Conferences: Stanford Institute for Theoretical Economics (SITE) Psychology and Economics segment, 2013 Annual Meeting of the Academy of Behavioral Finance and Economics, Tilburg Experimental Finance Conference, Quantitative Society for Pensions and Saving Huntsman School of Business, Thurgau Meeting in Kreuzlingen; Posters: All-California Labor Economics Conference

2012 Seminar presentations: UC Berkeley (Haas and the Breslauer Group); Conferences: Boulder Summer Conference on Consumer Financial Decision Making, Behavior Change Research Network at UC Berkeley, Graduate Economics Mini Symposium (GEMS) at UC Berkeley

2011 Seminar presentations: UC Berkeley, Hamburg Institute of International Economics; Conferences: Whitebox Conference at Yale University, 8th Annual Conference at Washington University St. Louis, Graduate Economics Mini Symposium (GEMS) at UC Berkeley

Honors and Awards

2015 Recipient of the Provost's Grant for Junior Faculty who Contribute to the Diversity Goals of Columbia University ($25,000)

2013 Graduate Division Summer Grant, UC Berkeley Conference Travel Grant, and Graduate Assembly Travel Grant

2012 UC Berkeley Psych and Econ student prize, IBER Grant, Graduate Division Summer Grant, and Russel Sage Foundation Behavioral Camp

2011 Dean's Normative Time Fellowship, UC Berkeley Conference Travel Grant, and Yale Behavioral Finance Summer School

2009 Fellowship of the German Academic Exchange Service for PhD research studies at UC Berkeley

2008 Beneficiary of Zempelin Stipend (Studienstiftung des deutschen Volkes)

2006 Affiliated to the sponsorship program of the German National Academic Foundation (Studienstiftung des deutschen Volkes)

Professional Experience

2012-13 Psychology and Economics Seminar and Departmental Seminar Coordination

2008 Writing the final thesis (Diplomarbeit) at the Swedish Central Bank in Stockholm

Referee for the American Economic Review, Econometrica, Journal of Finance, Journal of Political Economy, Review of Financial Studies, Review of Economics and Statistics, AEJ Policy, Journal of the European Economic Association, Management Science, Journal of Economic Dynamics and Control, and Economics Letters

Teaching Experience

2015/6/7 Capital Markets and Investments for Columbia Business School MBAs

2011 Psychology and Economics for UC Berkeley Undergraduates (Graduate Student Instructor)

2010 Introduction to Economics for UC Berkeley Undergraduates (Graduate Student Instructor)

Outside Activities

Columbia Business School requires faculty members to disclose any activities that might present a real or apparent conflict of interest. I have no outside activities.