

Long-run discounting

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1 Summary of the Project

Many important individual and policy decisions require a consideration of costs and benefits that arise in the distant future. For example, individuals have to decide the amounts to save for the old age and for their descendants. Pension funds or universities as well need to take a long-term perspective when investing. Finally, the evaluation of macroeconomic risks for the purpose of risk management and insurance demand needs to consider potentially large long-run risks such as long-term climate change.

A crucial step in evaluating the very long run is the choice of an appropriate discount rate: how much do individuals value cash flows that arise hundreds of years from now and will accrue to future generations? One approach employs exponential discounting using discount rates that have been shown to adequately capture the decisions of household's facing time-value tradeoffs over periods of a few years – assuming that these discount rates apply equally well to the very long run. Unfortunately, it has been hard to verify that the resulting discount rates correspond to household's true valuation of long run costs and benefits. One challenge is that we generally do not observe the price of securities the payoff of which occurs very far into the future and consequently we have been unable to understand the long-run discount rates that households actually apply.

We propose to fill this fundamental gap in the body of knowledge on risk and investment by studying the valuation of very long (but finite) maturity assets. We exploit the fact that real estate ownership in Singapore and the UK comes in two forms, either as freeholds (permanent ownership) or as leaseholds, which are ownership contracts with a finite maturity, for example of 70, 100 or 125 years. The price discount for very long-term leaseholds relative to prices for otherwise similar properties that are traded as freeholds helps to inform us about the implied discount rates of agents trading these housing assets. This allows us to gather information of discount rates much beyond the usual horizon of 20-30 years spanned by bond markets.

In work currently in progress, we rely on private data on transactions in the residential real estate market in Singapore and the UK. We have obtained promising results on the UK and Singapore housing market. We find that long-term discount rates are low, much

lower than routinely assumed in asset pricing or macroeconomics models. For example, a 100-year lease trades at a 10-15% discount compared to an otherwise identical freehold. Given the observed growth rate of rents, model estimates imply that discount rates as low as 2.5% are necessary to match that data.

Our results have several areas of application where household financial decisions are at the very core. First, they are directly relevant for understanding the real estate market and how house prices evolve both over time and in their term structure. Given that housing is the primary vehicle through which agents save for future generation, a better understanding of the risk and return properties for the real estate market in the long run is crucial for evaluating and guiding individual investment choices.

Second, our results provide an empirical base for important policy debates that involve individual and collective decisions whose effects develop in the very long run. Intergenerational fiscal policy and climate change reduction policies are two cases in which understanding the long-run preferences of individuals is a necessary element of analysis. Our research helps us calibrate and estimate the preferences of household with respect to very long-run decisions.

Third, our research can shed light on the pure time preferences of households, for example with respect of the possibility of time-inconsistency and hyperbolic discounting, but in the context of very long-run horizons as opposed to the standard short-run horizons where time discounting is typically studied.

So far our research on long-run discount rates has produced two NBER working papers: “Very Long-Run Discount Rates”, where the main analysis of long-term housing claims is performed, and “No-Bubble Condition: Model-free Tests in Housing Markets”, where we analyze claims of 1000 years or more. Several directions of study however remain open, all of which have direct implications for household finance. These are the areas where we will focus our future studies. First, we plan to explore the implications for long-term individual and collective choices of our empirical results: what climate change policies are optimal? How do the results affect fiscal policy? How do they affect individual saving decisions? Second, we plan to investigate the geographical and household heterogeneity in the discount rates that are applied to these long-term claims: how do different household perceive the very distant future? How does this relate with their characteristics and how does it affect their savings behavior? In addition, how does climate change exposure affect the way different households perceive the long run – do agents in areas more exposed to climate change risk (for example potential flood areas) behave differently in their long-run saving decisions?

2 Funding Needs

We would be most grateful if you could support our research with a grant in the amount of **\$10,250**. We have previously received grants from the University of Chicago and from NYU that covered about 85% of the purchase price of the main datasets. For the analysis going forward, we plan to buy further data that allow us to understand the geographic and household-level characteristics that determine the attitude towards the very long-run. We also face monthly expenses for the use of computers needed to store and analyze the data. In addition, we plan to hire research assistants to help us with the data analysis and the construction and calibration of theoretical models, both of individual and collective decisions.

The budget for the funding of \$10,250 that you may kindly provide us with is as follows:

- \$5,000: data acquisition (including flood geographic data), data storage and computer processing costs.
- \$5,250: research assistanship (150 hours @ \$35/h)

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Date of Birth: 4/26/1982

ACADEMIC APPOINTMENTS

University of Chicago, Booth School of Business Assistant Professor of Finance	2011 – present
NBER Faculty Research Fellow	2012 – present
Federal Reserve Bank of Boston Visiting Scholar	2008 – 2011

EDUCATION

Harvard University Ph.D. in Economics A.M. in Economics	2006 – 2011
Bocconi University M.Sc. in Economics (110/110 <i>cum laude</i>) B.A. in Economics (110/110 <i>cum laude</i>)	2001 – 2006

RESEARCH INTERESTS

Financial Economics
Macroeconomics

PUBLICATIONS

“No News is News: Do Markets Underreact to Nothing?”, with Kelly Shue, *Review of Financial Studies*, 2014

As illustrated in the tale of “the dog that did not bark,” the absence of news and the passage of time often contain information. We test whether markets fully incorporate this information using the empirical context of mergers. During the year after merger announcement, the passage of time is informative about the probability that the merger will ultimately complete. We show that the variation in hazard rates of completion after announcement strongly predicts returns. This pattern is consistent with a behavioral model of underreaction to the passage of time and cannot be explained by changes in risk or frictions.

“Hard Times”, with John Campbell and Christopher Polk, *Review of Asset Pricing Studies*, 2013

We show that the stock market downturns of 2000–2002 and 2007–2009 have very different proximate causes. The early 2000s saw a large increase in the discount rates applied to profits by rational investors, while the late 2000s saw a decrease in rational expectations of future profits. We reach these conclusions by using a VAR model of aggregate stock returns and valuations, estimated both without restrictions and imposing the cross-sectional

restrictions of the intertemporal capital asset pricing model (ICAPM). Our findings imply that the 2007–2009 downturn was particularly serious for rational long-term investors, whose losses were not offset by improving stock return forecasts as in the previous recession.

“Intangible Capital, Relative Asset Shortages, and Bubbles”, with Tiago Severo, *Journal of Monetary Economics*, March 2012

Purely technological factors can be a fundamental force behind the emergence of asset price bubbles in developed economies. We analyze an economy in which the production technology utilizes both physical and intangible capital, where the latter cannot be used as collateral for borrowing. Technological change, in the form of increased importance of intangible capital in production, sharpens the borrowing constraints of entrepreneurs, leading to a scarcity of high-yield assets relative to low-yield ones. This can create the conditions for asset bubbles. Additionally, due to the financial frictions, standard dynamic efficiency tests are not valid, and bubbles are not Pareto improving.

“Forced Sales and House Prices”, with John Y. Campbell and Parag Pathak, *American Economic Review*, August 2011

This paper uses data on house transactions in the state of Massachusetts over the last 20 years to show that houses sold after foreclosure, or close in time to the death or bankruptcy of at least one seller, are sold at lower prices than other houses. Foreclosure discounts are particularly large on average at 28% of the value of a house. The pattern of death-related discounts suggests that they may result from poor home maintenance by older sellers, while foreclosure discounts appear to be related to the threat of vandalism in low-priced neighborhoods. After aggregating to the zipcode level and controlling for regional price trends, the prices of forced sales are mean-reverting, while the prices of unforced sales are close to a random walk. At the zipcode level, this suggests that unforced sales take place at approximately efficient prices, while forced-sales prices reflect time-varying illiquidity in neighborhood housing markets. At a more local level, however, we find that foreclosures that take place within a quarter of a mile, and particularly within a tenth of a mile, of a house lower the price at which it is sold. Our preferred estimate of this effect is that a foreclosure at a distance of 0.05 miles lowers the price of a house by about 1%.

WORKING PAPERS

“No-Bubble Condition: Model-Free Tests in Housing Markets”, with Matteo Maggiori and Johannes Stroebe, May 2014

We test for the existence of infinitely-lived bubbles in housing markets by directly measuring failures of the terminal pricing condition that requires the present value of payments occurring infinitely far in the future to be zero. The failure of this no-bubble condition is central to the workhorse model of bubbles in macroeconomics and finance. We study housing markets in the U.K. and Singapore, where residential property ownership takes the form of either leaseholds or freeholds. Leaseholds are temporary, pre-paid, and tradable ownership contracts with maturities often exceeding 700 years. Freeholds are perpetual ownership contracts. The price difference between leaseholds with extremely long maturities and freeholds reflects the present value of a claim to the freehold after leasehold expiry, and is thus a direct empirical measure of the no-bubble condition. We estimate this price difference, and find no evidence for infinitely-lived bubbles in U.K. and Singaporean housing markets, even during periods when a sizable bubble was often thought to be present by the general public.

“Very Long Run Discount Rates”, with Matteo Maggiori and Johannes Stroebe, May 2014

We provide direct estimates of how agents trade off immediate costs and uncertain future benefits that occur in the very long run, 100 or more years away. We exploit a unique feature of housing markets in the U.K. and Singapore, where residential property ownership takes the form of either leaseholds or freeholds. Leaseholds are temporary, pre-paid, and tradable ownership contracts with maturities between 50 and 999 years, while freeholds are perpetual ownership contracts. The difference between leasehold and freehold prices reflects the present value of perpetual rental income starting at leasehold expiry, and is thus informative about very long-run discount rates. We estimate the price discounts for varying leasehold maturities compared to freeholds and extremely long-run leaseholds via hedonic regressions using proprietary datasets of the universe of transactions in each country. Agents discount very long-run cash flows at low rates, assigning high present values to cash flows hundreds of years in the future. For

example, 100-year leaseholds are valued at 10% to 15% less than otherwise identical freeholds, implying discount rates below 2.6% for 100-year claims. Given the riskiness of rents, this suggests that both long-term risk-free discount rates and long-term risk premia are low. We show how the estimated very-long run discount rates are informative for climate change policy.

“Asset Pricing in the Frequency Domain: Theory and Empirics”, with Ian Dew-Becker, August 2013

In affine asset pricing models, the innovation to the pricing kernel is a function of innovations to current and expected future values of an economic state variable, for example consumption growth, aggregate market returns, or short-term interest rates. The impulse response of this priced variable to fundamental shocks has a frequency (Fourier) decomposition, which captures the fluctuations induced in the priced variable at different frequencies. We show that the price of risk for a given shock can be represented as a weighted integral over that spectral decomposition. The weight assigned to each frequency then represents the frequency-specific price of risk, and is entirely determined by the preferences of investors. For example, standard Epstein-Zin preferences imply that the weight of the pricing kernel lies almost entirely at extremely low frequencies, most of it on cycles longer than 230 years; internal habit-formation models imply that the weight is shifted to high frequencies. We estimate the frequency-specific risk prices for the equity market, focusing on economically interesting frequencies. Most of the pricing weight falls on low frequencies - corresponding to cycles longer than 8 years - broadly consistent with Epstein-Zin preferences.

“Systemic Risk and the Macroeconomy: An Empirical Evaluation”, with Bryan Kelly and Seth Pruitt, October 2013

We propose a unique criterion to evaluate the empirical success of systemic risk measures, based on their predictive ability for low quantiles of the conditional distribution of macroeconomic outcomes. We also propose a general methodology to construct systemic risk indices that capture the joint information content of a large cross-section of systemic risk measures. After constructing more than 20 measures of systemic risk extending mostly back to the 1960s (some to the 1920s), we first describe and characterize common and unique variation in these measures. Next, we show that taken individually, these measures reveal low predictive ability for macroeconomic downturns. However, an index that aggregates them using the proposed methodology consistently outperforms them both in and out of sample.

“Credit Default Swap Spreads and Systemic Financial Risk”, August 2013

This paper measures the joint default risk of financial institutions by exploiting information about counterparty risk in credit default swaps (CDS). A CDS contract written by a bank to insure against the default of another bank is exposed to the risk that both banks default. From CDS spreads we can then learn about the joint default risk of pairs of banks. From bond prices we can learn the individual default probabilities. Since knowing individual and pairwise probabilities is not sufficient to fully characterize multiple default risk, I derive the tightest bounds on the probability that many banks fail simultaneously.

“An Intertemporal CAPM with Stochastic Volatility”, with John Campbell, Christopher Polk and Bob Turley, June 2013

This paper extends the approximate closed-form intertemporal capital asset pricing model of Campbell (1993) to allow for stochastic volatility. The return on the aggregate stock market is modeled as one element of a vector autoregressive (VAR) system, and the volatility of all shocks to the VAR is another element of the system. The paper presents evidence that growth stocks underperform value stocks because they hedge two types of deterioration in investment opportunities: declining expected stock returns, and increasing volatility. Volatility hedging is also relevant for pricing risk-sorted portfolios and non-equity assets such as equity index options and corporate bonds.

AWARDS AND SCHOLARSHIPS

Jacob Gold & Associates Best Paper Prize, ASU Sonoran Winter Finance Conference	2014
Jane and Basil Vasiliou Faculty Scholar	2013 – 2014
UBS Global Asset Management Award for Research in Investments (FRA)	2012

Roger L. Martin Cornerstone Grant, Harvard University	2010 – 2011
Graduate Society Dissertation Completion Fellowship, Harvard University	2010 – 2011
Real Estate Academic Initiative, Harvard University	2009 – 2010
American Finance Association Travel Grant	2008
Harvard University Graduate Fellowship, Harvard University	2007 – 2008
Douglas Dillon Fellowship, Harvard University	2006 – 2007

PRESENTATIONS AND DISCUSSIONS

2014: American Finance Association Meetings

2013: Jackson Hole Finance Conference, Utah Winter Finance Conference, Norwegian School of Economics, Midwest Finance Association, Adam Smith Workshop in Asset Pricing, Columbia (GSB), University of Maryland (Smith), University of Wisconsin Madison (School of Business), Institutional Investor Conference at Georgia State, SFS Cavalcade, Kellogg Junior Finance Conference, Macro Finance Society, McGill-RFS Global Asset Management Conference, WFA, Oxford-Man Annual Asset Pricing Retreat, NBER Forecasting and Empirical Methods, CEPR European Summer Symposium on Financial Markets, HULM (Atlanta Fed), Helsinki Finance Summit, New York Fed, Northwestern (Kellogg), Notre Dame (Mendoza)

2012: HULM (Boston Fed), Richmond Fed, Minneapolis Fed, Bank of Canada, CITE, NBER Behavioral Finance, Financial Research Association, Tel Aviv University Finance Conference, CEPR European Summer Symposium on Financial Markets, Macro Financial Modeling Group.

2011: Stanford, Graduate School of Business; Northwestern University, Kellogg Graduate School of Management; Princeton, MIT, Sloan School of Business; University of Chicago, Booth School of Business; UC Berkeley, Haas School of Business; Yale University, School of Management; Carnegie Mellon University, Tepper School of Business; University of Pennsylvania, the Wharton School; EIEF; CEPR European Summer Symposium on Financial Markets; Chicago Fed Bank Structure Conference; XIII Workshop in International Economics and Finance; North American Meetings of the Econometric Society; Western Finance Association; European Economic Association; Duke University, Fuqua School of Business; Bank of Finland; CREDIT; Tilburg University; Rotterdam School of Management; Maastricht University; Federal Reserve Board of Governors; FSA; Stockholm School of Economics.

2010: Stanford Institute for Theoretical Economics (SITE); Program for Evolutionary Dynamics, Harvard University; Chicago Fed, Rookie Conference; London Business School; NYU, Stern School of Business; Dartmouth, Tuck School of Business.

2009: Brown University; CEPR European Summer Symposium on Financial Markets.

TEACHING EXPERIENCE

Topics in Asset Pricing (PhD), Chicago Booth, co-teach with Lars Hansen	2013
Investments (MBA), Chicago Booth	2012-present

Asset Pricing (Ph.D.), Harvard University, teaching fellow for Prof. John Y. Campbell	2009
Intermediate Macroeconomics (undergraduate), Harvard University, head teaching fellow for Prof. Philippe Aghion and Prof. David Laibson	2009
Corporate Finance (undergraduate), Harvard University, head teaching fellow for Prof. Borja Larrain	2008

RESEARCH AND PROFESSIONAL EXPERIENCE

Harvard University, Research Assistant for Prof. John Y. Campbell	2007 – 2009
Bocconi University, Research Assistant for Prof. Carlo Favero	2005 – 2006
WRDS, the Wharton School, University of Pennsylvania, Intern, Financial Data	2004

PROFESSIONAL SERVICE

Referee: *Journal of Political Economy*, *Quarterly Journal of Economics*, *American Economic Review*, *Econometrica*, *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies*, *Journal of Monetary Economics*, *Journal of Financial and Quantitative Analysis*, *European Financial Management*, *the Review of Economics and Statistics*, *Transition Economics*, *Review of Finance*, *Management Science*, *Journal of Empirical Finance*, *Journal of Economic Surveys*, *Economic Letters*, *Journal of Financial Intermediation*, *Journal of Urban Economics*, *Regional Science and Urban Economics*, *International Journal of Central Banking*.

Conference committees: *Utah Winter Finance Conference*, *Midwest Finance Association*

OTHER INTERESTS AND ACTIVITIES

Diploma in Classical Music Composition Candidate, Conservatory of Torino, Italy	
<ul style="list-style-type: none"> • Middle-Course Degree in Composition (7th year) • Lower-Course Degree in Composition (4th year) 	2006 2002
Middle-Course Degree in Viola, Conservatory of Torino, Italy	1998
Exchange program at Wharton, University of Pennsylvania	2004

REFERENCES

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 Department of Economics
 Harvard University
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Professor Emmanuel Farhi
 Department of Economics
 Harvard University
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Professor Effi Benmelech
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 Harvard University
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New York University
Stern School of Business
Department of Finance,
44 West 4th Street
New York, NY, 10012, USA

Employment

New York University, USA, 2012-present
Stern School of Business, Assistant Professor of Finance
Department of Economics, affiliation as Assistant Professor of Economics

Princeton University, USA, 2012-2013
Department of Economics, 2012-13 Fellow at the International Economics Section

Affiliations:

National Bureau of Economic Research, USA, 2013-present
Faculty Research Fellow,
International Macroeconomics and Finance Program 2013-present,
Asset Pricing Program 2014-present

Center for Economic Policy Research, UK, 2013-present
Research Affiliate, Financial Economics Program

Education

University of California Berkeley, USA, 2007-12
Haas School of Business, PhD in Finance
MS in Finance, Dec 2009

Thesis: Essays in International Finance and Macroeconomics

Advisory Committee: Nicolae Gârleanu, Pierre-Olivier Gourinchas, Martin Lettau, Maurice Obstfeld,
and Andrew Rose

Warwick University, UK, 2004-05
Department of Economics and Business School
MSc in Economics and Finance

Luiss Guido Carli University, Italy, 2001-04
Department of Economics
Laurea triennale (BSc) in Economics

Research and Teaching Fields

International finance and macroeconomics, finance, macroeconomics

Prizes, Honors and Awards:

- Review of Economic Studies May Meetings (European tour) (2012)
- SAC Capital PhD Candidate Award for Outstanding Research, Western Finance Association (2012)
- Outstanding Graduate Student Instructor, teaching award (2012)
- Final Year Gold Medalist (Luiss, 2004)
- Special mention and publication honors by the Graduation Committee (Luiss, 2004)
- Best Student of the Year (Luiss, 2002)
- Mention for High School Academic Excellence (Mayor of Rome, 2001)

Awards for individual papers:

- Jacob Gold & Associates Best Paper Prize, ASU Sonoram Winter Finance Conference (2014), for “*Very Long-Run Discount Rates*”
- NYU Glucksman Institute Faculty Research Prize for the Best Paper in Finance (2014), for “*Financial Intermediation, International Risk Sharing, and Reserve Currencies*”
- AQR Insight Award (2013), for “*Conditional Risk Premia in Currency Markets and Other Asset Classes*”
- Finance Theory Group Prizes for Best Theory Papers on the Job Market, second prize (2012), for “*Financial Intermediation, International Risk Sharing, and Reserve Currencies*”

Fellowships, Research Grants:

- Dauphine-Amundi Chair, research grant (2013-14), joint with Xavier Gabaix
- Princeton University, International Economics Section and Department of Economics, postdoctoral fellowship (2012-13)
- NYU Stern Center for the Global Economy and Business, research grant (summer 2012, spring 2013 and fall 2013 joint with Johannes Stroebe, fall 2013 joint with Xavier Gabaix)
- UC Berkeley Coleman Fung Risk Management Research Center, research grant (2012-13), joint with Martin Lettau and Michael Weber
- UC Berkeley Clausen Center for International Business and Policy, research grant (2012-13), joint with Martin Lettau and Michael Weber
- UC Berkeley Institute for Business and Economic Research (IBER), research grant (2010, 2012)
- White Foundation Scholarship, research fellowship (2010-11), dissertation fellowship (2011-12)
- UC Berkeley Clausen Center for International Business and Policy, research grant (2011)
- American Finance Association (Denver), student travel grant (2011)
- Fondazione Marco Fanno, PhD fellowship (2008-09-10)
- Fondazione Luigi Einaudi, PhD fellowship (2007-08)

Publications:

Conditional Risk Premia in Currency Markets and Other Asset Classes, with Martin Lettau and Michael Weber

Forthcoming Journal of Financial Economics

Winner of the AQR Insight Award (2013)

Working papers:

Financial Intermediation, International Risk Sharing, and Reserve Currencies, 2013

Revise & Resubmit at the American Economic Review

Awarded the Finance Theory Group Prize for Best Theory Papers on the Job Market, second prize (2012)

Awarded the NYU Glucksman Institute Faculty Research Prize for the Best Paper in Finance (2014)

International Liquidity and Exchange Rate Dynamics, 2013, with Xavier Gabaix

Very Long-Run Discount Rates, 2013, with Stefano Giglio and Johannes Stroebe

Awarded the Jacob Gold & Associates Best Paper Prize, ASU Sonoram Winter Finance Conference(2014)

No-Bubble Condition: Model-free Tests in Housing Markets, (2014) with Stefano Giglio and Johannes Stroebe

The U.S. Dollar Safety Premium, 2011

Work in progress:

A Note on New Estimates of Currency Returns

Teaching Experience

-Global Financial Markets, New York University Stern, Spring 2014, MBA and Undergraduate

Guest lectures:

-13/11/2012, Princeton University, PhD-Econ553 International Monetary Theory and Policy I. *Lecture on Financial Intermediation, International Risk Sharing, and Reserve Currencies*

Teaching Assistant: Winner of the 2012 Outstanding Graduate Student Instructor teaching award

-Full Time MBA, Options and Futures, spring 2011, Prof. Nicolae Gârleanu. Evaluation: 6.6/7

-Evening and Weekend MBA, Options and Futures, spring 2011, Prof. Nicolae Gârleanu. Evaluation: 6.56/7

Other Research Activities:

Presentations:

2014 (scheduled):

Seminars: Princeton (Economics), Harvard (Economics), MIT (macro/international), UPenn Wharton (finance), Federal Reserve Board (international finance), IMF, Bank of Japan.

Conferences: NBER Spring Meetings (Monetary Economics, International Macroeconomics and Finance, Asset Pricing, Macroeconomics Across Time and Space), NBER Summer Institute (Impulse and Propagation Mechanisms, Real Estate), Northwestern Center for International Macroeconomics, Yale Cowles Conference on General Equilibrium, Barcelona GSE Summer Forum (International Capital Flows Workshop), Macro Financial Modeling Group, Einaudi Institute Pizzanomics, NYC Junior Macro-Finance Group, AQR, American Economic Association, Society of Economic Dynamics, UBC Winter Finance Conference.

2013:

Seminars: Yale (Macroeconomics), Columbia Department of Economics & GSB (Macroeconomics), Northwestern (Macroeconomics), Harvard Department of Economics and HBS (Finance), University of Michigan (International macro), Minneapolis Fed (Macro/International), INSEAD (Finance), Duke Fuqua (Finance), University of Minnesota Carlson (Finance), World Bank (Macroeconomics), New York University Stern (Finance), Princeton University (Macro/International lunch), University of Southern California Marshall (Finance), University of Texas Austin McCombs (Finance), Imperial College Tanaka (Finance), City University Cass (Finance)

Conferences: NBER Asset Pricing Spring Meeting, NBER Summer Institute International Finance and Macroeconomics Meeting and International Asset Pricing Meeting, AQR Insight Award, CEPR conference on "Capital Flows and Safe Assets", CEPR workshop on "Bottom-up Macro Finance", Stanford Institute for Theoretical Economics "New Models of Financial Markets", Chicago Booth Junior Faculty International Macro-Finance Conference, New York University Volatility Institute Annual Conference, American Economic Association, American Finance Association, Society of Economic Dynamics.

2012:

Seminars: Review of Economics Studies European Tour (University of Mannheim, University of Leicester, IGIER-Bocconi University), Harvard University (International macro), University of Chicago Booth (Finance), Massachusetts Institute of Technology Sloan (Finance), Stanford University Graduate School of Business (Finance), New York University (Economics), New York University Stern (Finance), Northwestern Kellogg (Finance), London Business School (Finance), London School of Economics

(Economics), London School of Economics (Finance), Yale School of Management (Finance), University of California Los Angeles Anderson (Finance), Boston College Carroll (Finance), Princeton University (macro/international lunch), Washington University in St. Louis Olin (Finance), University of Illinois at Urbana-Champaign (Finance).

Conferences: NBER International Finance and Macroeconomics Spring meeting, Swiss National Bank and CEPR conference on “Exchange Rates and External Adjustment”, Chicago Booth Junior Finance Symposium, Society of Economic Dynamics, Western Finance Association, UNC CIBER Junior Faculty Meeting.

2011:

Seminars: London Business School (Economics), Joint Berkeley-Stanford PhD Seminar (Stanford GSB), UC Berkeley (International Trade and Finance Seminar, Macroeconomics Seminar, Financial Economics lunch seminar), UC Berkeley Haas (Finance Job Market Seminar).

Conferences: London Business School Transatlantic PhD Conference.

Discussions:

2014:

-Krishnamurthy, A. and Z. He, *A Macroeconomic Framework for Quantifying Systemic Risk*, AEA
-Filipe, Suominen, *Currency Carry Trades and Funding Risk*, AFA

2013:

-Hale, G. and M. Obstfeld, *The Euro and the Geography of International Debt Flows*, NBER Sovereign Debt and Financial Crisis Conference
-Lewis, K. and E. Liu, *International Consumption Risk Is Shared After All: An Asset Return View*, AEA
-Verdelhan, A., *The Share of Systematic Variation in Bilateral Exchange Rates*, Econometric Society
-Wenxin, D., Schreger, J., *Local Currency Sovereign Risk*, NBER IFM Spring Meeting

Referee

American Economic Review, Journal of Political Economy, Review of Economic Studies, American Economic Journal: Macroeconomics, Journal of Finance, Review of Financial Studies, Journal of International Economics, Journal of the European Economic Association, Review of Economic Dynamics, European Financial Management Journal, Journal of Financial Intermediation, Journal of International Money and Finance, Journal of Empirical Finance.

Reviewer

National Science Foundation, Swiss National Science Foundation, Canadian SSHRC.

Conference Program Committees

Society of Economic Dynamics 2014, International Macroeconomics and Finance Conference (organizer)
U Chicago Booth Dec 2013, Western Finance Association 2013.

Professional Experience

JP Morgan, London (UK) and New York (USA), 2005- 2007

Trader, London

Trading foreign exchange and interest rates.

Fundamental Markets training program, New York, Aug-Nov 2005

JP Morgan, London, Jun-Sep 2003

Summer Intern, Debt and Capital Markets, International bond and loan pricing and origination

Selected Media Mentions

-“Very Long-Run Discount Rates”: The Economist (Free Exchange)

-“Conditional Risk Premia in Currency Markets and Other Asset Classes” (Forthcoming JFE) and related AQR Award: WSJ, Reuters.

Other

Personal: Italian Citizen. Born 01-11-1982, Rome, Italy

Languages: Italian, English, French (basic)

Other Affiliations: Finance Theory Group (2012-present), Macro Finance Society (2012-present), Aspen Institute Italia (Junior Fellow, 2010-present)

References

Prof. Nicolae Gârleanu

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Leonard N. Stern School of Business
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EMPLOYMENT

- 2013 - **New York University**, Leonard N. Stern School of Business
Assistant Professor of Finance
- 2012 - 2013 **University of Chicago**, Booth School of Business
Neubauer Family Assistant Professor of Economics

EDUCATION

- 2007 – 2012 Ph.D. Economics, **Stanford University**,
Advisors: John B. Taylor, Caroline Hoxby, Monika Piazzesi, Martin Schneider
- 2003 – 2006 B.A. Philosophy, Politics and Economics, **Merton College, Oxford University**,
First Class Honors

RESEARCH AND TEACHING FIELDS

Macroeconomics, Financial Economics, Real Estate Economics

TEACHING EXPERIENCE

- 2013 Foundations of Finance (MBA Course at NYU Stern)
- 2013 Housing and the Economy (MBA Course at Chicago Booth) - *Newly designed course to highlight the feedback between macroeconomic activity and residential real estate markets.* (Rating 4.8/5.00)
- 2010 Teaching Assistant for Martin Schneider and Michèle Tertilt, Econ 211 (Graduate Macro)
(Rating 4.74/5.00 – Detailed evaluation available on request)

PUBLICATIONS

Resource Extraction Contracts Under Threat of Expropriation: Theory and Evidence”, with Arthur van Benthem, *Review of Economics and Statistics* 95(5), December 2013

We use fiscal data on 2,468 oil extraction agreements in 38 countries to study tax contracts between resource-rich countries and independent oil companies. We analyze why expropriations occur and what determines the degree of oil price exposure of host countries. With asymmetric information about a country's expropriation cost even optimal contracts feature expropriations. Near-linearity in the oil price of real-world hydrocarbon contracts also helps to explain expropriations. We show theoretically and verify empirically that oil price insurance provided by tax contracts is increasing in a country's cost of expropriation, and decreasing in its production expertise. The timing of actual expropriations is consistent with our model.

“Estimated Impact of the Fed's Mortgage-Backed Securities Purchase Program, with John B. Taylor, *International Journal of Central Banking*, 8(2), June 2012

The largest credit or liquidity program created by the Federal Reserve during the financial crisis was the mortgage-backed securities (MBS) purchase program. In this paper, we examine the quantitative impact of this program on mortgage interest rate spreads. This is more difficult than frequently perceived because of simultaneous changes in prepayment risk and default risk. Our empirical results attribute a sizable portion of the decline in mortgage rates to such risks and a relatively small and uncertain portion to the program. For specifications where the existence or announcement of the program appears to have lowered spreads, we find no separate effect of the stock of MBS purchased by the Federal Reserve.

RESEARCH PAPERS

Very Long-Run Discount Rates (*With Stefano Giglio and Matteo Maggiori*)

We provide direct estimates of how agents trade off immediate costs and uncertain future benefits that occur in the very long run, 100 or more years away. We exploit a unique feature of housing markets in the U.K. and Singapore, where residential property ownership takes the form of either leaseholds or freeholds. Leaseholds are temporary, pre-paid, and tradable ownership contracts with maturities between 99 and 999 years, while freeholds are perpetual ownership contracts. The difference between leasehold and freehold prices reflects the present value of perpetual rental income starting at leasehold expiry, and is thus informative about very long-run discount rates. We estimate the price discounts for varying leasehold maturities compared to freeholds and extremely long-run leaseholds via hedonic regressions using proprietary datasets of the universe of transactions in each country. Agents discount very long-run cash flows at low rates, assigning high present values to cash flows hundreds of years in the future. For example, 100-year leaseholds are valued at more than 10% less than otherwise identical freeholds, implying discount rates below 2.6% for 100-year claims. Given the riskiness of rents, this suggests that both long-run risk-free discount rates and long-run risk premia are low. We show how the estimated very long-run discount rates are informative for climate change policy.

Testing for Information Asymmetries in Real Estate Markets (*With Pablo Kurlat*)

We study equilibrium outcomes in markets with asymmetric information about asset values among both buyers and sellers. In residential real estate markets hard-to-observe neighborhood characteristics are a key source of information heterogeneity: sellers are usually better informed about neighborhood values than buyers, but there are some sellers and some buyers that are better informed than their peers. We propose a new theoretical framework for analyzing such markets with many heterogeneous assets and differentially informed agents. Consistent with the predictions from this framework, we find that changes in the seller composition towards (i) more informed sellers and (ii) sellers with a larger supply elasticity predict subsequent house-price declines and demographic changes in that neighborhood. This effect is larger for houses whose value depends more on neighborhood characteristics, and smaller for houses bought by more informed buyers. Our findings suggest that home owners have superior information about important neighborhood characteristics, and exploit this information to time local market movements.

Regulating Consumer Financial Products: Evidence from Credit Cards *(With Sumit Agarwal, Souphala Chomsisengphet and Neale Mahoney)*

We analyze the effectiveness of consumer financial regulation by considering the 2009 Credit Card Accountability Responsibility and Disclosure (CARD) Act in the United States. Using a difference-in-differences research design and a unique panel data set covering over 160 million credit card accounts, we find that regulatory limits on credit card fees reduced overall borrowing costs to consumers by an annualized 1.7% of average daily balances, with a decline of more than 5.5% for consumers with FICO scores below 660. Consistent with a model of low fee salience and limited market competition, we find no evidence of an offsetting increase in interest charges or a reduction in volume of credit, although we are unable to analyze longer-run effects on investments or industry structure. Taken together, we estimate that the CARD Act fee reductions have saved U.S. consumers \$12.6 billion per year. We also analyze the CARD Act requirement to disclose the interest savings from paying off balances in 36 months rather than only making minimum payments. We find that this "nudge" increased the number of account holders making the 36-month payment value by 0.5 percentage points on a base of 5.7%.

Asymmetric Information about Collateral Values, *Revise and Resubmit at the Journal of Finance*

I empirically analyze the sources and magnitude of asymmetric information between competing lenders in residential mortgage lending. I exploit that property developers often cooperate with vertically integrated mortgage lenders to provide financing to buyers of their newly constructed homes. These integrated lenders might have superior information about both mortgage collateral quality and borrower characteristics. I construct a dataset of all housing transactions and associated mortgages in Arizona between 2000 and 2010. This allows me to test for asymmetric information by comparing the return of initially similar houses in the same development financed by different lenders. I find that houses financed by an integrated lender outperform similar houses financed by non-integrated competitors by 50 basis points annually. They are also less likely to enter into foreclosure. These differences persist during the ownership period of the second owner of the house. The outperformance of houses financed by an integrated lender is over twice as large amongst houses built on expansive soil, which makes housing return more sensitive to construction quality. Non-integrated lenders charge 10 basis points higher interest rates when competing against an integrated lender. This interest rate increase is larger for mortgages with a high loan-to-value ratio, for which repayment is more sensitive to subsequent changes in collateral value. These results are highly consistent with the presence of significant asymmetric information about collateral quality in mortgage lending.

Government Intervention in the Housing Market – Who Wins, Who Loses? *(With Max Floetotto and Michael Kirker)*

We study the effects of government intervention in the housing market on prices, quantities and welfare in a general equilibrium model with heterogeneous agents. We consider (i) the introduction of temporary home purchase tax credits and (ii) a removal of the asymmetric tax treatment of owner-occupied and rental housing. Home buyer tax credits temporarily raise house prices and transaction volumes, but have negative welfare effects. Removing the asymmetric tax treatment of owner-occupied and rental housing would generate welfare gains for a majority of agents in a comparison of stationary equilibria. Welfare impacts are more varied, though still positive, along the transition between steady states.

Foreclosure and Bankruptcy – Policy Conclusions from the Current Crisis *(With Theresa Kuchler) - SIEPR Discussion Paper No. 08-37*

The recent episode of rising consumer bankruptcies and increasing foreclosure rates has sparked a lively debate about how to best tackle the crisis in the U.S. housing market. We contribute to this debate by providing an explicit model of a household's joint decision to declare Chapter 7 bankruptcy and to enter into foreclosure. This model demonstrates how bankruptcy exemption limits and mortgage regulation interact to influence consumer bankruptcy and foreclosure rates. We use state-level data to show that our model predictions are empirically plausible. We suggest that policy proposals need to focus on reducing both foreclosures and bankruptcies jointly. In particular, we argue that in the short-run a switch from non-recourse mortgages to recourse mortgages may have little effect on the number of foreclosures, but could dramatically increase the number of bankruptcies.

The Power of the Church - The Role of Roman Catholic Teaching in the Transmission of HIV (*With Arthur van Benthem*)

We use the appointment of a Kenyan Roman Catholic archbishop as a natural experiment to analyze the impact of church authorities' teaching on sexual behavior. Using a triple-difference approach, we find that following the archbishop's counter-doctrinal assertion that condom use within a marriage can be acceptable to reduce HIV infections, Catholic married couples within the archdiocese who had access to condoms were 7.0 percentage points more likely to use condoms than unmarried Catholics in the diocese, non-Catholics within the diocese, or Catholics in other dioceses. These results are quantitatively large and robust to a number of econometric specifications. The evidence for whether advocating condom use leads to an increase in infidelity or a decrease in respect for women is not conclusive. Our results suggest an important role for the Catholic church in the fight against HIV. This is especially relevant in light of Pope Benedict XVI's recent reconciliatory statement about condom use.

OTHER PUBLICATIONS

“Investment Treaties and Hydrocarbon Taxation in Developing Countries”, with Arthur van Benthem, *CESifo Conference Volume “Taxation in Developing Countries”*, Clemens Fuest and George Zodrow (eds.), The MIT Press, 2013

Ending Government Bailouts as We Know Them, “Summary of the Commentary,” Kenneth Scott, George P. Shultz and John B. Taylor (eds.), Hoover Press

“The role of banking portfolios in the transmission from the currency crises to banking crises - potential effects of Basel II,” with Tobias Knedlik, *Journal of Money, Investment and Banking*, vol. 13, 2010 (Previous: IWH Discussion Papers 21/2006)

“Credit ratings anticipate currency crises insufficiently,” with Tobias Knedlik (Article in German), *Economy in Change* 10/2007, p. 380-384

“Will a new IMF-Instrument prevent currency crises?” with Tobias Knedlik (Article in German), *Economy in Change* 7/2007, p. 269-274

RESEARCH IN PROGRESS

- *“Infinitely-lived Bubbles: Model-free Tests in Housing Markets”* with Stefano Giglio and Matteo Maggiori
- *“Segmented Housing Search”* with Monika Piazzesi and Martin Schneider.
- *“Asymmetric Information in Used Vehicle Markets”* with Arthur van Benthem

SCHOLARSHIPS AND AWARDS

2014 **Jacob Gold & Associates Best Paper Prize** for “Very Long-Run Discount Rates”, ASU Sonoran Winter Finance Conference 2014

2012 **Neubauer Family Assistant Professorship**, University of Chicago

2011-12 **Bradley Fellowship**, Stanford University

- 2011 **USAEE/IAEE 2010 Best Working Paper Award** for “Resource Extraction Contracts Under Threat of Expropriation: Theory and Evidence”
- 2010-11 **Kohlhagen Fellowship**, Stanford University
- 2007-09 **Dr. Carl M. and Carolyn C. Franklin Fellowship**, Stanford University
- 2006 **Hicks and Webb Medley Prize** for the best overall performances in economics, Oxford University

RESEARCH GRANTS

Center for the Global Economy and Business, NYU Stern (2013 - with Matteo Maggiori and Stefano Giglio, \$40,000)

Initiative on Global Markets, University of Chicago, Booth School of Business: (2013 – with Matteo Maggiori and Stefano Giglio, \$15,000 | 2012 - with Arthur van Benthem, \$13,150 | 2013, with Neale Mahoney, \$10,000 | 2013, with Joe Vavra, \$5,000)

Fama-Miller Center, University of Chicago, Booth School of Business: (2013 – with Matteo Maggiori and Stefano Giglio, \$15,000)

Institute for Global Environmental Leadership, The Wharton School (2012, with Arthur van Benthem, \$10,000)

Dean’s Research Fund, The Wharton School (2012, with Arthur van Benthem, \$5,000)

PROFESSIONAL ACTIVITIES

Organizing Committee/Program Committee: SED (2014), Christmas Meetings of German Economists Abroad

Referee for *American Economic Review*, *International Economic Review*, *National Tax Journal*, *Journal of Finance*, *Journal of Money, Credit and Banking*, *Journal of Political Economy*, *Regional Science and Urban Economics*, *Review of Economic Dynamics*, *Review of Economic Studies*, *Review of Financial Studies*

Member of the Working Group on Economic Policy, Hoover Institution (Stanford University)

Graduate Student Flyout Coordinator, 2010, 2011, Stanford University

PRESENTATIONS (including scheduled)

2010 CESifo (Venice), IWH (Halle), Stanford University

2011 Federal Reserve Bank of Chicago, Goethe University (Frankfurt), San Francisco State University, Stanford University

2012 Northwestern University (Kellogg), University of Pennsylvania (Wharton), Princeton University, Harvard University (HBS), University of California, Los Angeles (Anderson), University of Chicago (Booth), Massachusetts Institute of Technology (Economics and Sloan), London School of Economics, London Business School, University of Michigan, University of California, Berkeley (Haas), New York University (Stern), Stanford University (Economics and GSB), NBER Summer Institute, Cornell

- University; Wisconsin HULM conference, Federal Reserve Bank of Philadelphia (Consumer Credit Conference), Bonn University, Cologne University
- 2013 University of Chicago, Oxford University, European University Institute (Florence), KOF Zurich, Real Estate Summer Symposium/WFA, NBER Summer Institute, Minnesota Workshop in Macroeconomic Theory, European Economic Association Meetings, Junior Macro Meeting in New Orleans, Benefit-Cost Analysis Conference Chicago Law School, New York University, Christmas Meeting of German Economists Abroad (Konstanz)
- 2014 American Economic Association Meetings, New York Junior Macro Group, NBER Law & Economics Program Meeting, Princeton University (JRC Conference), ASU Sonoran Winter Conference, Harvard University (HBS), NYU Stern Research Day, Baruch College, London Business School / Adam Smith Conference, HULM Conference, Arizona State University, NBER Public Economics Meeting, NBER Corporate Finance Meeting, NBER Meeting on “Financing Housing Capital”, Barcelona GSE Summer Forum, University of Regensburg, CEPR/Bonn Conference “Regulating Financial Intermediaries”, IEA Triennial World Congress, Society for Economic Dynamics, Federal Reserve Board

Disussions

Alex Chinco and Chris Mayer: “Misinformed Speculators and Mispricing in the Housing Market,” 2014 (AEA)

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