JONATHAN TREUSSARD

EDUCATION

- September 2003-Present: Boston University, Ph.D. Candidate in Economics, graduating in January 2008, Master's Degree in Political Economy awarded in May 2006.
    - Fields: Financial Economics, Microeconomic Theory, Econometrics.
    - Research Interests: Life-Cycle Finance Theory, Contingent Claims Analysis (Esp. American-Style Derivatives), Numerical Methods for Finance Modeling.
- June 2003: UCLA, Bachelor's Degree in Economics and International Studies, Summa Cum Laude, College Honors, and Provost's Honor List.

FELLOWSHIPS AND AWARDS

- 2006: Boston University Research Award.
- 2003-2006: Boston University Presidential Fellowship.
- 2004 and 2005: Boston University Summer Research Award.
- 2003: UCLA Department of Economics Certificate of Merit for Outstanding Academic Achievements upon Graduation.

PROFESSIONAL EXPERIENCE

- January 2008 (upcoming): Massachusetts Institute of Technology, Sloan School of Management, 50 Memorial Drive, Cambridge, MA 02142. Instructor for MBA Investments (15.433).
- January 2007 – Present: Boston University School of Management, 595 Commonwealth Avenue, Boston, MA 02215. Instructor for Undergraduate Investments (FE445).
- June – October 2006: Integrated Finance Limited, 630 Fifth Avenue, Suite 2750, NY, NY, 10111. Associate with the quantitative research group supervised by Professor George Chacko and Professor Robert C. Merton.
- January 2005 – Present: Boston University School of Management, 595 Commonwealth Avenue, Boston, MA 02215. Teaching Assistant for MBA Investments (Zvi Bodie, FE823), MBA Advanced Topics in Investments (Zvi Bodie, FE825), Doctoral Seminar in Finance Theory (Zvi Bodie, FE918), and MBA Options and Futures (Zvi Bodie, FE829).
- September 2004 – December 2005: Boston University Department of Economics, 264 Bay State Road, Boston, MA 02215. Teaching Assistant for First-Year Doctoral Microeconomics (Michael Manove, EC701, and Dilip Mookherjee, EC703).
- Winter 2003: UCLA, Reader for Undergraduate Courses in Economics and Teaching Assistant for Ross Star's (UC San Diego) Multi-Campus Course in General Equilibrium

jtreussa@bu.edu, http://people.bu.edu/jtreussa/, (857) 204-8005
BOSTON UNIVERSITY DEPARTMENT OF ECONOMICS, 270 BAY STATE ROAD, BOSTON, MA 02215, U.S.A.

broadcast to UC Berkeley and UCLA from the UC San Diego campus, La Jolla, CA.

GRADUATE WORKS

Publications

1. The Theory of Optimal Life-Cycle Saving and Investing, with Zvi Bodie and Paul Willen (*CFA Future of Life-Cycle Saving and Investing Conference Volume* – Session 1). ***Abstract:*** *How much should a family save for retirement and for the kids' college education? How much insurance should they buy? How should they allocate their portfolio across different assets? What should a company choose as the default asset allocation for a mandatory retirement saving plan? We believe that the life-cycle model developed by economists over the last fifty years provides guidance for making such decisions. The theory teaches us to view financial assets as vehicles for transferring resources across different times and outcomes over the life cycle, and that perspective allows households and planners to think about their decisions in a logical and rigorous way. This paper lays out and illustrates the basic analytical framework from the theory in nonmathematical terms, with the aim of providing guidance to financial service providers, consumers, and policymakers.*

2. Making Investment Choices as Simple as Possible But Not Simpler, with Zvi Bodie (Published, *Financial Analysts Journal*, 63, 3, May-June 2007). ***Abstract:*** *Target-date funds (TDFs) for retirement, also known as life-cycle funds, are being offered as a simple solution to the investment task of participants in self-directed retirement plans. A TDF is a "fund of funds" diversified across stocks, bonds, and cash with the feature that the proportion invested in stocks is automatically reduced as time passes. Empirical evidence suggests that a simple TDF strategy would be an improvement over the choices currently made by many uninformed plan participants. This article explores a way to achieve even greater improvement for people who are very risk averse and have high exposure to market risk through their labor.*

3. Making Investment Choices as Simple as Possible But Not Simpler: Author Response, with Zvi Bodie (Published, *Financial Analysts Journal*, 63, 4, July-August 2007). ***Abstract:*** *In his comment on our article, Jonathan Smith expresses concern about the fact that employers are outsourcing their employee retirement plans to mutual funds and asks what can be done to help financial advisors as they work with people who are planning for their own retirement. We share Mr. Smith's concerns. We think that the investment companies that now hold much of the retirement savings of the next generation of retirees have not done an adequate job of providing safe investment options for these customers. We formulate a list of recommendations.*

4. The Non-Monotonicity of Value-at-Risk and the Validity of Risk Measures over Different Horizons (Published, *ICFAI Journal of Financial Risk Management*, 4, 1, March 2007). ***Abstract:*** *Value-at-Risk and Conditional Tail Expectations are central tools of modern risk management. As risk measures based on the actual probability distribution, these can eventually decrease with the investment horizon. This is not evidence that stock investments are decreasingly risky in the long run. Instead, equity risk increases monotonically at long horizons. This is apparent from economically-motivated risk measures based on risk-neutral probabilities.*

5. Financial Frictions and Risky Corporate Debt, with Doriana Ruffino (Available as *American Economic Association* Online Comment (*http://www.e-aer.org/comments/20060316.pdf*), and Published, *Economic Notes: Review of Banking, Finance and Monetary Economics*, 36, 1, 2007). ***Abstract:*** *We offer clarifications on Cooley and Quadrini (2001) regarding financial frictions and risky corporate-debt pricing. Even in a frictionless world, the promised rate on corporate debt is not identical across firms and across capital structures and it is not equal to the risk-free rate. Frictions are unnecessary for credit spreads to arise. Only with risk neutrality at the macroeconomic level do interest rates on corporate debt reflect default probabilities. To the extent that the firm's entire financial structure is traded, this bias introduces an exploitable arbitrage opportunity. Re-establishing no-arbitrage, firm dynamics move in the opposite direction of Cooley and Quadrini's, weakening their results and challenging their model's ability to replicate the empirical evidence on firm behavior.*

6. Derman and Taleb's The Illusions of Dynamic Replication: A Comment, with Doriana Ruffino (Published, *Quantitative Finance*, 6, 5, October 2006). ***Abstract:*** *While as a matter of pure chance and mathematical manipulations, the Black-Scholes formula could have been accidentally obtained much earlier by making use of put-call parity, a simple thought experiment demonstrates the inconclusiveness of any such derivation as regards the validity of the resulting pricing equation. In particular, the use of a non-stochastic discount rate common to both the call and the put options is inconsistent with modern equilibrium capital asset pricing theory. Additional observations are made.*

Forthcoming

7. Life-Cycle Consumption Plans and Portfolio Policies in a Heath-Jarrow-Morton Economy, *ICFAI Journal of Financial Risk Management*. ***Abstract****: This paper applies the methods of Detemple, Garcia, and Rindisbacher (2003, 2005) and derives explicit optimal lifetime consumption-portfolio plans in an economy whose fixed-income sector is characterized by an N-factor Heath-Jarrow-Morton (1992) model that is Markovian in 3N state variables.*

8. Contingent Claims Analysis and Life-Cycle Finance, with Zvi Bodie and Doriana Ruffino. ***Abstract:*** *This paper explores the application of contingent claims analysis (CCA) to two "hot" issues in life-cycle finance: (1) investing for retirement and (2) deciding when, if ever, to switch careers. Participants in individual retirement accounts do not have the time or the knowledge to make their own investment decisions. Today they are defaulted into life-cycle mutual funds that pass all risk directly through to the participant. We use CCA to demonstrate how financial firms can design and produce guaranteed contingent benefit contracts that improve participant welfare at no additional cost to the system. These contracts combine features of traditional annuities (i.e., lifelong income benefits) and structured investment products (e.g., guaranteed minimum plus "upside" equity participation). In exploring the career-choice issue in the second part of the paper, we use CCA in a somewhat different way. The decision to switch careers is analogous to deciding when to exercise an American-style option to swap one asset for another. By applying the methods used to analyze the option-exercise decision to the career-switching problem, we gain some new insights beyond those derived from the traditional dynamic programming approaches.*

Working Papers

9. Human Capital Risk Management: The Optimal Exercise of Career Options (**Job Market Paper**), with Doriana Ruffino. ***Abstract:*** *Financial economists increasingly view a person's human capital as being analogous to a portfolio of risky stocks and bonds. We demonstrate that, more generally, human capital exhibits the complex structure of a derivatives portfolio. In particular, the ability to permanently change occupations over one's career is isomorphic to an American spread option of the Margrabe type. Studying this career option from the perspective of contingent claims analysis, we consider the optimal choice of one's initial occupation and the decision to change occupations later in life when the individual faces a choice between two occupations -- one relatively safe and the other relatively risky. We show that starting out in the riskier occupation is optimal only if earnings volatility is high and switching costs low. We also find that the option to change occupations is quite valuable, raising human capital wealth by as much as 8 percent.*

10. Repeated Career Options: A Contingent Claims Approach. ***Abstract:*** *This article studies the behavior of an individual who can repeatedly alternate between two occupations. Such a career option is analogous to an exotic derivative security: an American reset option. Despite infinite opportunities to change occupations, an individual faced with mobility costs is shown to always allow time to go by between occupation changes. In addition, for economically motivated calibrations, the average number of occupation changes declines steadily over time. These results mirror the behavior of real-world individuals, who change occupations more often in the early stages of their professional lives. Finally, it is proved analytically that the individual is unambiguously more reluctant to change occupations when she does not have the assurance that she may return to her initial occupation at a later date. The model demonstrates that the flexibility of repeated career options adds much value over their once-in-a-lifetime counterparts.*

11. Automatic for the People? Hedge Funds, Traditional and Clones. ***Abstract:*** *While some herald the development of hedge fund replicators as marking the industry's own ETF revolution, others are expressing concern over the clones' properties since traditional hedge funds are human-capital intensive financial operations and the high concentration of specialized talent is the reason for the industry's remarkably high remuneration structure. Taking much of the human capital out of hedge fund strategies is a pre-requisite for bringing the costs of replicators down, but it is one that many feel comes at a high price in terms of adaptivity, dynamic flexibility, and risk selection. In this article, I study a continuous-time model of arbitrage selection, which sheds light on this trade-off and provides added perspective on the issue. Several important results are obtained. First, a hedge fund's optimal trade selection criterion depends on a risk-reward trade-off that balances the expected gains from the trade and the uncertainty surrounding the trade's speed of convergence. Furthermore, the ability to select potential arbitrage trades generates a value for the fund's net discounted cash flows that resembles prototypical option-pricing formulas. In addition, the value added of human capital to a hedge fund's operations is dramatically enhanced when the fund deals in potential arbitrage trades for which there is a significant amount of uncertainty regarding the speed of convergence or the chances of divergence. Additional observations are made.*

12. Lumps and Clusters in Duopolistic Investment Games: An Early Exercise Premium Approach, with Doriana Ruffino. ***Abstract:*** *This paper investigates strategic investment policies in a duopolistic continuous-time real options game. Our contribution is twofold, economic and methodological. The former is the recognition that, under fixed costs of investment and time-to-build, a firm's exercise of its capital-replacement option leads to a significant temporary reallocation of the firm's revenues to its competitor. The latter is the introduction of the early exercise premium representation as a valuable device for the*

characterization of optimal exercise policies in real options games. Assuming exogenous firm roles, we find that (i) as the leader installs its newly purchased capital, the follower's optimal investment policy displays a markedly convex and monotonically decreasing pattern over time, which finds its justification in the temporary transfer of the leader's consumer demand to its competitor, and (ii) once the leader has completed its investment process, the follower's trigger boundary -- i.e., the level of market demand that renders capital replacement optimal -- is time-independent. Moreover, we demonstrate that the follower's willingness to delay investment is enhanced by a longer time-to-build and a more volatile market demand, while it is weakened by a higher quality improvement upon replacement and by a higher expected growth in market demand. Finally, we study the probability that the follower mimics the leader's decision within the leader's time-to-build window. We conclude that, while a higher quality advancement upon investment and a higher growth rate in market demand make it more likely for the follower to exercise its investment option promptly, a higher market uncertainty and a longer time-to-build alter the probability of an investment cluster non-monotonically.

13. Optimal Age-Based Portfolios with Stochastic Investment Opportunity Sets, with Doriana Ruffino. ***Abstract:*** *In an environment with stocks and short-term debt, random changes in the risk-reward frontier produce hedging demands for equities, implying that portfolio policies supporting optimal life-cycle consumption are rarely mean-variance efficient. Pursuing optimal life-cycle portfolio policies is technologically feasible but it represents a significant burden for individuals and financial firms acting as fiduciaries. As a result, investors often rely on relatively simple investment heuristics, most often age-based portfolio policies that rebalance the investor's portfolio as a function of age alone. We find that (i) the welfare losses associated with optimal age-based policies are often negligible, so that the trade-off between the first-best and these simpler policies likely favors the latter, and that (ii) not only do initial age-based portfolios display the same overall pattern as first-best portfolios but they are also always within the same order of magnitude.*

14. A Study of Inaction in Investment Games via the Early Exercise Premium Representation, with Doriana Ruffino (Submitted to *Economic Modelling*). ***Abstract:*** *This paper examines strategic investment in the context of a duopolistic continuous-time real options game. Our contribution is twofold, economic and methodological. The former is the recognition that, under fixed costs of investment and time-to-build, the firm pays a fraction of the implicit strike price to its competitor in the form of transferred foregone consumer demand. The latter is the introduction of the early exercise premium representation as a valuable device for the characterization of optimal exercise policies in real options games. We find that positive capital depreciation, technology improvement, and harm effects to the low-technology producer are not sufficient to generate equilibria characterized by action.*

SEMINAR PRESENTATIONS AND VIDEO RECORDINGS

- November 8, 2007, Presentation of *Making Investment Choices as Simple as Possible But Not Simpler* at the Association for Public Policy Analysis and Management (*APPAM*) Fall Conference session, "Applying Tools from Modern Finance to Policy Analysis."

- November 7, 2007, Presentation of *Human Capital Risk Management: The Optimal Exercise of Career Options* at the American University Department of Economics.

- July 23, 2007, Presentation of *Human Capital Risk Management: The Optimal Exercise of*

Career Options at the Chicago Federal Reserve Bank's Research Department.

- June 13, 2007, Presentation of *Human Capital Risk Management: The Optimal Exercise of Career Options* at the Boston University Department of Economics.

- March 6, 2007, Presentation of *Lumps and Clusters in Duopolistic Investment Games: An Early Exercise Premium Approach* at the Boston University School of Management.

- November 7, 2006, Presentation of *Making Investment Choices as Simple as Possible But Not Simpler*, and *Optimal Age-Based Portfolios with Stochastic Investment Opportunity Sets* at the Boston University School of Management.

- October 26, 2006: Presentation of *The Theory of Optimal Life-Cycle Saving and Investing* at Future of Life-Cycle Saving and Investing Conference, co-sponsored by Boston University, the CFA Institute and the Boston Federal Reserve Bank. **Webcast available at**: http://www.cfawebcasts.org/cpe/what.cfm?test_id=656

- October 13, 2006, Presentation of *Making Investment Choices as Simple as Possible But Not Simpler* at the Boston University Department of Economics.

- June 27, 2006: Presentation of *Welfare Implications of Age-Based Investment Heuristics* at the Boston Federal Reserve Bank's Research Department.

- February 21, 2006: Presentation of Life-Cycle Consumption Plans and Portfolio Policies in a Heath-Jarrow-Morton Economy at the Boston University School of Management.

DOCTORAL CLASSES

- *First-Year Classes:* Microeconomics (Michael Manove, A), Macroeconomics (Robert G. King, A-), Mathematical Economics (Jorgen Weibull, A), Advanced Statistics for Economists (Jeffrey Miron, B+), Advanced Microeconomic Theory (Dilip Mookerjee, A), Advanced Macroeconomic Theory (Robert G. King, B+), Advanced Econometrics (Jeffrey Miron, A).

- *Second-Year Classes:* Advanced Econometrics II (Victor Aguirregabiria, B+), Time-Series Econometrics (Pierre Perron, A), Game Theory (Bart Lipman, A), Finance Theory (Zvi Bodie, A), Continuous Time Finance, Harvard Business School (Robert C. Merton, NC), Advanced Option-Pricing Theory (Jerome Detemple, A-), Advanced Topics in Econometrics (Victor Aguirregabiria, A-), Advanced Topics in Microeconomics (Hsueh-Ling Huynh, A-), Advanced Topics in Economics of Information (Zvika Neeman, A), Empirical Asset Pricing at Boston College (Wayne Ferson, A-).

- *Cumulative Grade Point Average*: 3.78.

REFEREE FOR JOURNALS

Economic Modelling, Financial Analysts Journal, *Journal of Financial and Quantitative Analysis*, *Journal of Monetary Economics, Journal of Risk and Insurance, Management Science, Quantitative Finance, Quarterly Journal of Economics, Review of Economics and Statistics*.

LANGUAGES

Fluent in English & French, written and spoken.

REFERENCES

- Zvi Bodie, zbodie@bu.edu, (617) 353 4160, Boston University School of Management, 595 Commonwealth Avenue, Room 534, Boston, MA 02215.
- Laurence J. Kotlikoff, kotlikof@bu.edu, (617) 353 4002, Boston University Department of Economics, 270 Bay State Road, Boston, MA 02215.
- Francois Gourio, fgourio@bu.edu, (617) 353 4534, Boston University Department of Economics, 270 Bay State Road, Boston, MA 02215.
- George Chacko, gchacko@ifltd.com, (857) 928 1309, Integrated Finance Limited, Trinsum Group, 245 Park Avenue, 44th floor, New York, NY 10167.

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