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BIRTH DATE: September 3, 1951, Buffalo, NY.

CITIZENSHIP: United States.

MARITAL STATUS: Married.

EDUCATION:

B.S. -- State University of New York at Buffalo, in Mathematics and Economics (cum laude), May 1974

M.A. -- State University of New York at Buffalo, in Economics, September 1977 Ph.D. -- State University of New York at Buffalo, in Economics, August 1979

PRIMARY FIELD: Financial Economics, Monetary Theory and Policy, Computational Finance.

PUBLICATIONS - ARTICLES:

"On Formulating and Solving Portfolio Decision and Asset Pricing Problems," **Chapter 4 of Handbook of Computational Economics** edited by Kenneth Judd and Karl Schmedders, Elsevier Science Publishers B.V. Volume 3, 2015, 161-223. Co-Authors Yu Chen and Alex Himonas.

"An Analytic Approach for Stochastic Differential Utility for Endowment and Production Economies," **Computational Economics** 44, 2014, 397-443. Co-Authors Yu Chen, Alex Himonas and Peter Kelly.

"Monetary Policy with a Touch of Basel," Co-Author Ralph Chami. Lead article, **Journal of Economics and Business**, 62, 2010, 161-175. Co-Author Ralph Chami.

"Continuous Time One-Dimensional Asset Pricing Models with Analytic Price-Dividend Functions." Lead article, **Economic Theory**, 42, 2010, 461-503. Co-Authors Yu Chen and Alex Himonas.

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"Solving An Asset Pricing Model with Hybrid Internal and External Habits, and Autocorrelated Gaussian Shocks." **Annals of Finance,** 4, 2008, 305-344. Co-Authors Yu Chen and Alex Himonas.

"Solving Asset Pricing Models when the Price-Dividend Function is Analytic." **Econometrica**, 73, 2005, 961-982. Co-Authors Ovidiu Calin, Yu Chen and Alex Himonas.

"Solving Ramsey Problems with Nonlinear Projection Methods," **Studies in Nonlinear Dynamics & Econometrics** May 2005 9 1-36. Co-Author Michael T. Gapen.

"Did the Basel Accord cause a Credit Slowdown in Latin America?" **Economia** Fall 2004 5 135-175. Co-Authors Adolfo Barajas and Ralph Chami.

"Financial Institutions and Trustworthy Behavior in Business Transactions," **Journal** of Business Ethics, 52(2), (2004) 179-188.

"Capital Trading, Stock Trading, and the Inflation Tax on Equity: A Note," **Review** of Economic Dynamics, 6, (2003) 987-990. Co-Authors Scott Baier, Charles T. Carlstrom, Ralph Chami Timothy S. Fuerst, and Connel Fullenkamp

"Introduction to Managing Ethical Risk: How Investing in Ethics Adds Value",26, (2002) 1697-1718 **Journal of Banking and Finance**. Co-Authors Ralph Chami and Connel Fullenkamp.

"Capital Trading, Stock Trading, and the Inflation Tax on Equity," **Review of Economic Dynamics**, 4, (2001) 575-606. Co-Authors Ralph Chami and Connel Fullenkamp.

"What's Different Among Banks?" **Journal of Monetary Economics**, 41(1998) 57-70. Co-Author Bill McDonald.

"Risk Averse Behavior and Normal Employment," **Perspectives on Money**, Sanjeev Joshi Editor, Reserve Bank of India Endowment Unit. Co-Author G. Subrahmanyam.

"Intermediation," **Economica**, 63 (1996) 131-143.

"Is the Conventional View of Discount Window Borrowing Consistent with the Behavior of Weekly Reporting Banks?" **Review of Economics and Statistics**, 76 (1994) 761-770. Co-Author Richard G. Sheehan.

"Inflation Variability and Gradualist Monetary Policy." **Review of Economic Studies**, 61 (1994) 721-738. Co-Author Ronald J. Balvers.

"Federal Reserve Operating Procedure 1984-1991: An Empirical Analysis." **Journal** of Macroeconomics, 16 (1994) 573-588. Co-Author Richard G. Sheehan.

"Central Bank Secrecy, Interest Rates and Monetary Control." **Economic Inquiry** 31 (July 1993) 370-382. Co-Author John B. Van Huyck.

"Periodic Learning with A Hidden State Variable." **Journal of Economic Dynamics** & Control 17 (1993) no. 5-6 805-828. Co-Author Ronald J. Balvers.

"DIDMCA and Bank Market Risk: Theory and Evidence." **Journal of Banking and Finance** 16 (November 1992) 1179-1193. Co-Authors Thomas P. Bundt and John A. Halloran.

"Actively Learning About Demand and the Dynamics of Price Adjustment." **Economic Journal** 100 (September 1990) 882-898. Co-Author Ronald J. Balvers.

"Predicting Stock Returns in an Efficient Market." **Journal of Finance** 45 (September 1990) 1109-1128. Co-Authors Ronald J. Balvers and Bill McDonald.

"Choosing Sides in Matching Games: Nash Equilibria and Comparative Statics." **Economica** 57 (August 1990) 283-294. Co-Author Michael R. Baye.

"Dynamic Monetary Control and Interest Rate Stabilization." **Journal of Monetary Economics** 23 (January 1989) 53-63. Co-Author John B. Van Huyck.

"Spatial Competition with Free Entry, Chamberlinian Tangencies, and Social Efficiency: A Reevaluation." **Journal of Urban Economics** 26 (July 1989) 84-89. Co-Author Bruce L. Benson.

"Estimates of the Variance of U.S. Inflation Based Upon the ARCH Model: a comment." **Journal of Money, Credit, and Banking** 20 (August 1988) 409-421. Co-Author Dennis W. Jansen.

"The Banking Industry under Uncertain Monetary Policy." Journal of Banking and Finance 12 (March 1988) 117-139.

"Federal Reserve Policy 1975 - 1985: An Empirical Analysis." **Journal of Macroeconomics** 10 (Winter 1988) 27-47. Co-Author Dennis W. Jansen.

"The Relation Between Money Growth Variability and the Variability of Money About Target." **Economics Letters** 25 (1987) 355-358. Co-Author Dennis W. Jansen.

"The Federal Funds Market under Bank Deregulation." Journal of Money, Credit, and Banking 19 (August 1987) 326-339.

"Reserve Accounting and Variability in the Federal Funds Market." Journal of

Money, Credit, and Banking 19 (May 1987) 199-209.

"Erratic Monetary Policy and the Dispersion of Commodity Prices." **Journal of Macroeconomics** 8 (Spring 1986) 201-212. Co-Author Michael R. Baye.

"Erratic Monetary Policy and Price Variability." Journal of Macroeconomics 7 (Summer 1985) 313-331.

"The Incentive to Adopt Cost Reducing Innovation in the Presence of a Non-Linear Demand Curve." **Southern Economic Journal** 47 (July 1981) 97-104.

"Money and Biased Technical Progress." Journal of Monetary Economics 5 (October 1979) 497-504. Co-Author G. Subrahmanyam.

PUBLICATIONS - BOOK:

The Changing Distribution of Income in an Open US Economy, Edited by Jeffery H. Bergstrand, Thomas F. Cosimano, John W. Houck and Richard G. Sheehan, published in the series **Contributions to Economic Analysis**, Edited by D. W. Jorgenson and J. J. Laffont by Elsevier Science Punlishers B.V. 1994.

Guest Editor, **Journal of Banking and Finance**, 26 (2002) for the conference volume from "Measuring and Managing Ethical Risk: How Investing in Ethics Adds Value." Co-Authors Ralph Chami and Connel Fullenkamp.

"Macroeconomic Consequences of Remittances," IMF Occassional Paper 259, IMF 2008. Co-Authors Ralph Chami, Adolfo Barajas, Connel Fullenkamp, Michael Gapen, and Peter Montiel.

PUBLICATIONS - BOOK REVIEWS:

Money and Financial Markets edited by Mark P. Taylor Cambridge, MA: Blackwell Publishers, 1991. Journal of Money, Credit and Banking, November 1993 864-867.

Asset Pricing for Dynamic Economies by Sumru Altug and Pamela Labadie, Cambridge University Press, 2008. Forthcoming International Review of Economics and Finance.

DOCTORAL DISSERTATION:

"Expectations and Dynamic Economic Theory in Continuous Time"

Director: Professor James M. Holmes

<u>Committee</u>: Professor Murray C. Kemp, Professor James P. Quirk, and Professor Yieh-Hei Wan

PAPERS PRESENTED:

"The Intertemporal Holding of Commodity Inventories and Money Under Uncertainty and Transactions Cost (An Argument for Price Stability)." Presented at Econometric Society Meetings in New York City, December 28, 1982.

"Risk Averse Behavior and Normal Employment," Presented at Southern Economic Meetings in Washington, D.C. November 21, 1983.

"The Dynamics of a One-Commodity Market with Habit Persistence: An Apology for Marshallian Dynamics," Co-Author James M. Holmes. Presented at Southern Economic Meetings in Washington, D.C. November 21, 1983.

"The Banking Firm and Industry under Uncertain Monetary Policy." NBER conference on Money and Financial Markets, April 27, 1985.

"Federal Reserve Policy Under Bank Deregulation," 5th World Congress of Econometric Society, August 22, 1985, Federal Reserve Bank of Richmond, October 1985, Board of Governors of the Federal Reserve, January 1986, and Federal Reserve Bank of Kansas City, July 1986.

"Search and Matching Equilibria When the Side of the Match is Endogenous." Presented at Southern Economic Association Meeting in New Orleans, November 1986 and Econometric Society Meeting in New Orleans, December 1986.

"Dynamic Monetary Control and Interest Rate Stabilization." Presented at Econometric Summer Meetings in San Francisco, June 1987.

"Predicting Stock Returns in an Efficient Market: Theory and Evidence." Co-Authors Ronald J. Balvers and Bill McDonald. Presented at Texas A&M University, November 1988, Michigan State University, October 1989, Federal Reserve Bank of New York, October 1989 and State University of New York at Buffalo, May 1990.

"Central Bank Secrecy, Interest Rates and Monetary Control." Co-Author John B. Van Huyck. Presented at Southern Economic Association Meeting in San Antonio, TX, November 1988, Indiana University, October 1988, and American Economic Association Meeting in Atlanta, GA, December 1989.

"Is the Conventional View of Discount Window Borrowing Consistent with the Behavior of Weekly Reporting Banks?" Presented at Southern Economic Association Meeting in New Orleans, LA, November 1990. Southern Methodist University, December 1990, and The Federal Reserve Bank of Dallas, December 1990.

"Periodic Learning with A Hidden State Variable." Co-Author Ronald J. Balvers. Presented at The Pennsylvania State University, October 1991, and Indiana University, December 1991.

"A Pure Theory of Intermediation." Presented at Midwest Mathematical Economic Association meeting Pittsburgh, October 1992.

"Deaton's Paradox and the Predictability of Asset Returns in an Efficient Market." Co-Author Ralph Chami. Presented at University of Kentucky, May 1993, and The Econometric Society meeting in Boston, January 1994.

"A Unified Theory of Consumption Smoothing and Asset Returns in an Efficient Market." Co-Author Ralph Chami. Present at The Ohio State University, March 1994, and State University of New York at Buffalo, November 1994.

"To Give or Not to Give? An Exploration into the Causes and Consequences of Short Investment Horizons." Co-Author Ralph Chami. Presented at Midwest Mathematical Economic Association meeting The Pennsylvania State University, October 1994.

"Liquidity Effects and Asset Pricing in a General Equilibrium Model with Production," Co-Authors Ralph Chami and James D. Peterson. Presented at The Econometrica Society meeting in Washington, D. C., January 1995.

"Persistent Liquidity Effects and Asset Pricing in a General Equilibrium Model with Production," Co-Authors Ralph Chami and James D. Peterson. Presented at Federal Reserve Bank of Chicago March 1996, Midwest Macroeconomic Meetings at The Pennsylvania State University, April 1997, Texas A&M University May, 1997 and Federal Reserve Bank of Dallas May, 1997.

"On Consumption Growth in Stochastic Growth Models with Correlated Productivity Shocks," Co-Author Ralph Chami. Presented at Midwest Macroeconomic Meetings at The Ohio State University October, 1996

"On Consumption Growth in Stochastic Growth Models," Co-Author Ralph Chami. Presented at Midwest Economic Theory Meetings at Northwestern University June, 1997.

"An Examination of Retail Deposit Rate Setting by Large Finanical Institutions," Co-Authors Connel Fullenkamp and Richard G. Sheehan, Midwest Macroeconomic Meetings at The University of Notre Dame October, 1997. Presented at the St.Louis Federal Reserve Bank, October 1998.

"Empirical Implementation of a Wang Style Model of Stock Trading Volumne," Co-Authors Connel Fullenkamp and Paula Tkac. Presented at Econometric Society meetings in New Orleans, January 1997. "Ownership of Capital in Monetary Economies and the Inflation Tax on Equity," Co-Authors Ralph Chami and Connel Fullenkamp. Presented at Western Michigan University, February 1998. Presented at Midwest Macroeconomic Meeting at St. Louis Federal Reserve Bank,Western Economic Association Meeting in Lake Tahoe, Purdue University and Indiana University April 1999. Federal Reserve Bank of Cleveland May 1999.

"Can an Equity Market Account for the Predictability of Asset Returns?" Co-Author Ralph Chami. Presented at Midwestern Macroeconomic Association Meeting at Indiana University, October 1998.

"On the Conduct of Monetary Policy under the Basel Accord," Co-Author Ralph Chami. Presented at Summer Econometric Society at University of Maryland, Summer 2001, IMF Institute in Washington, D.C. July 18,2001, Federal Reserve Board, October 2001,Atlantic Economic Society Meeting/ASSA in Atlanta, January 2002,and Midwest Macro-economic Meetings at Vanderbilt University, April 2002.

"Optimal Experimentation and the Perturbation Method," Presented at 9th Annual Conference for the Society of Computational Economics, University of Washington, Seatle WA, July 2003.

"Solving Asset Pricing Models when the Price-Dividend Function is Analytic."Coauthor Stefano G. Athanasoulis, Ovidiu Calin, and Alex Himonas. Presented at Summer Econometric Society at Northwestern University, June 2003, Stanford Institute for Theoretical Economics workshop on Computational Methods and Applications in Economics, July 2003.

"Did the Basel Accord cause a Credit Slowdown in Latin America?" Co-Author Adolfo Barajas and Ralph Chami. Presented at the 9th Economia panel meeting at Harvard University.

"By Force of Habit: An Exploration of Asset Pricing Models using Analytic Methods," Co-Authors Y Chen and Alex Himonas. Presenting at the 3rd World Congress of the Bachelier Finance Society in Chicago July 2004. Johns Hopkins University March 2005.

"Recursive Models of Dynamic Linear Economics and Optimal Experimentation using the Perturbation Method," Co-Author Michael Gapen, Society of Computational Economics and Finance, June 2005 Washington, DC

"Beware of Emigrants Bearing Gifts: Optimal Fiscal and Monetary Policy in the Presence of Remittances," Middle East Economic Association, Boston, MA and IMF Institute January 2006.Midwest Macroeconomic Meeting, Washington University in St. Louis May 2006.

"Internal versus External Habits: Why does the Distribution of Stock Returns have ARCH Properties?" Co-Authors Y Chen and Alex Himonas. Econometric Society Meetings, Boston MA January 2006.

"An Algorithm for Approximating Optimal Experimentation Problems using the

Perturbation Method." C0-Author Michael Gapen, Federal Reserve Board of Governors, Washington D.C. March 2007.

"Solving One-Dimensonal Asset Pricing Models when the Price-Dividend function is analytic: the Continuous Time Case," Co-Authors Y Chen and Alex Himonas Society of Computational Economes, Montreal Canada June 2007, Econometric Society Summer Meetings, Duke University June 2007, and The Institute for Computational Economics University of Chicago August 2007 and August 2008, Texas A&M University March 2008, Georgia State University May 2008, Erasmus University June 2008, IMF Institute July 2008.

"Using the Perturbation Method to Approximate Large Scale Economic Problems with Optimal Experimentation," CO-Author Michael Gapen Society of Computational Economics, Paris, France June 2008, ECB-CFS-Bundesbank July 2008.

"Beware of Emigrants Bearing Gifts: Optimal Fiscal and Monetary Policy in the Presence of Remittances," Co-Authors Ralph Chami and Michael Gapen. University of Frankfurt, July 2008, University of Munich July 2008.

"Commercial Bank Behavior in the Wake of the 2007-2009 Financial Crisis," Co-Authors Adolfo Barajas, Ralph Chami, and Dalia Hakura. International Monetary Fund Institute, December 2009.

"Bank Behavior in Response to Basel III: A Cross-Country Analysis," Co-Author Dalia Hakura. International Monetary Fund Institute, March 2011.

"Optimal Incentive Contracts in a Changing Environment," Co-Author Adam Speight and Hayong Yun, University of Zurich June 2012, University of Siena June 2012, Society of Computational Economics, Prague, Czech Republic June 2012, Frankfurt Seminar in Macroeconomics at Goethe University, July 2012.

"What's Different about Bank Holding Companies?," Co_Author Ralph Chami, Jun Ma, and Celine Rochon, 2016 Annual Meeting of SNDE, University of Alabama, 2016 Summer Econometric Society at University of Pennsylvania, 2016 Joint IMF and Federal Reserve Board Workshop, Interaction of Monetary Policy and Financial Stability.

ACTIVITIES:

Certified Financial Analysis Institute Chapter for Level II exam: "Economics and Investment Markets," Co-Author Andrew Clare.

Concurrent Professor of Economics, University of Notre Dame (Fall 2004-Present).

Concurrent Professor of Mathematics, University of Notre Dame (July 2007-

Present).

Banc One Fellow at University of Notre Dame (Fall 1999 - 2004).

Member Board of Editors, Economic Inquiry (April 1997-2008).

Member Board of Associate Editors **Journal of Economics and Business** (January 1999 to 2014).

Referee, Journal of Macroeconomics (Fall 1978 to present), Southern Economic Journal (Spring 1982 to present), Journal of Money, Credit, and Banking (Fall 1985 to present), Journal of Banking and Finance (Fall 1987 to present), National Science Foundation (1990. 1991 and 1992), Economic Inquiry (1991 to present), Journal of Economic Dynamics & Control (1991 to present), Journal of Business and Economic Statistics (1991 to present), Journal of Finance (1994 to present), and Review of Financial Studies (1996 to present).

Co-Sponsor and Chair of a session for conference, "The Changing Distribution of Income in an Open U. S. Economy," at University of Notre Dame September 17-18, 1992.

Organized, The Midwest Macroeconomic Conference at University of Notre Dame, October, 1997.

Organized, Conference on "Measuring and Managing Ethical Risk: How Investing in Ethics Adds Value," at University of Notre Dame September 23-24, 1999.

Visiting Scholar, International Monetary Fund Institute 2000-2014.

Organized Conference with Alex Himonas sponsored by the Center for Applied Mathematics, University of Notre Dame, "Advances in Portfolio Decision Making." June 8-10, 2007.

TEACHING AND EMPLOYMENT HISTORY:

Instructor for the Department of Economics, The Pennsylvania State University (Fall 1978 - Spring 1979). Macroeconomic Principles, Monetary Theory and Policy, Mathematical Economics, and Intermediate Microeconomics.

Assistant Professor for the Department of Economics, The Pennsylvania State University (Fall 1979 - 1981). Money and Banking, Mathematical Microeconomics (Graduate), and Stochastic Control Theory (Graduate).

Assistant Professor at Texas A&M University (Fall 1981 - Spring 1987). Macroeconomic principles, Money and Banking, Intermediate Macroeconomics, and Economic Theory (Ph.D.).

Associate Professor of Finance at University of Notre Dame (Fall 1987 - Spring 1990). Money and Banking, and Intermediate Macroeconomics.

Tenured Associate Professor of Finance at University of Notre Dame (Fall 1990 - Spring 1995). Money and Banking, Intermediate Macroeconomics and Banking and The Money Market (MBA).

Professor of Finance at University of Notre Dame (Fall 1995 - Present). Intermediate Macroeconomics and Macroeconomics in a Global Economy (MBA). Commercial Bank Management, Money and Banking, Banking and the Money Market (MBA). Mathematical Methods in Financial Economics. Mathematics for Economist II (Ph.D. in Economics and Econometrics).

References available upon request.