Behavioural, Financial, and Health & Medical Economics:

A Connection*

Chia-Lin Chang
Department of Applied Economics
Department of Finance
National Chung Hsing University
Taichung, Taiwan

Michael McAleer
Department of Quantitative Finance
National Tsing Hua University
Hsinchu, Taiwan
and
Econometric Institute
Erasmus School of Economics
Erasmus University Rotterdam
and
Tinbergen Institute, The Netherlands
and
Department of Quantitative Economics
Complutense University of Madrid
Spain

Wing-Keung Wong
Department of Economics
Hong Kong Baptist University
Hong Kong, China

EI2015-27

September 2015

Abstract

This Opinion article briefly reviews some of the literature in behavioural and financial economics that are related to health & medical economics. We then discuss some of the research on behavioural and financial economics that could be extended to health & medical economics beyond the existing areas in theory, statistics and econometrics.

1. Introduction

There are many studies that link behavioural and financial economics to health & medical economics. For example, there is research that links unemployment and health. Jahoda (1979) conducts unemployment research during the Depression years of the 1930s, and finds that unemployment is the most important cause of mental and physical problems.

Analyzing the relationships between measures of household income and resources, subjectively appraised financial strain and psychological distress, Whelan (1992) demonstrates that objectively assessed exclusion from customary lifestyles, involving deprivation of socially defined necessities, is associated with increased psychological distress.

Rantakeisu et al. (1999) interview young unemployed people in Sweden, and find that variations in the health effects of unemployment are functions of financial hardship and of experiences of shame.

In this short communication, we discuss some of the available research on behavioural and financial economic that could be closely related to health & medical economics, and discuss the possible extensions of these areas. We first discuss the theoretical models that have been developed that could be related to closely health & medical economics in the next section.

The plan of the remainder of the short communication is as follows. In Section 2, some theoretical models are discussed. Alternative statistical and econometrics models are analysed succinctly in Section 3. A brief discussion of empirical models is presented in Section 4. Some concluding remarks are given in Section 5.

2. Theoretical Models

Our first suggestion to authors is to develop theoretical models to link behavioural and financial economics to health & medical economics. There are many theoretical studies in behavioural and financial economics. For example, Wong and Li (1999), Wong (2007) and others develop some properties for the stochastic dominance (SD) theory for both risk averters and risk seekers, while Wong and Chan (2008), Egozcue et al. (2011) and others develop some properties for the SD theory for investors with S-shaped and S-shaped utility functions.

On the other hand, Wong and Ma (2008) generalize the theory on location-scale (LS) family to multivariate setting for both risk averters and risk seekers. They study some general non-expected utility functions defined over the LS family, and develop some properties for the partial orders and dominance relations defined over the LS family. These theories could be used to explain many important economic and financial issues and anomalies.

Alternatively, Lam et al. (2010, 2012) develop a model of weight assignments using a pseudo-Bayesian approach to study the behaviour of investors with conservatism and/or representativeness heuristics. Their model can be used to explain excess volatility, short-term under-reaction, long-term overreaction, and their magnitude effects during a normal financial situation, as well as during a financial crisis and subsequent recovery.

Guo et al. (2015b) extend the theory by developing some properties on the expected earnings shock and its volatility, and establish some properties of investors' behavior on the stock price, as well as its volatility during a financial crisis and subsequent recovery. They also develop properties to explain excess volatility, short-term under-reaction, long-term over-reaction, and their magnitude effects during a normal financial situation, as well as during a financial crisis and subsequent recovery.

In addition, Guo et al. (2015a) develop a theory to investigate the production and hedging behaviors of managers with risk-averse and regret-averse attitudes. They prove that the separation theorem is still alive under regret aversion because regret aversion is independent of the level of optimal production. On the other hand, they find that the full-hedging theorem does not always hold under regret aversion as the regret-averse firms take hedged positions different from those of

risk-averse firms in some situations. They also show that with, more regret aversion, regret-averse firms will hold smaller optimal hedging positions in an unbiased futures market and document that, contrary to conventional expectations, banning firms from forward trading affects their production level in both directions.

To date, there have not been many theoretical models to link behavioural and financial economics to health & medical economics. Therefore, we suggest that researchers might develop appropriate and relevant theories to link behavioural and financial economics to health & medical economics. For example, it is well known that one's financial situation could affect one's health (Jahoda, 1979; Whelan, 1992; Rantakeisu et al., 1999). Moreover, individuals with different attitudes toward risk could lead them to different financial situations. Thus, it could be interesting to develop theories to examine whether different attitudes such as, for example, risk aversion, risk seeking, and regret aversion, could lead to different health and medical situations.

3. Statistical and Econometric Models

A second suggestion to researchers is to develop statistical and econometric models to link behavioural and financial economics to health & medical economics. After developing mathematical models, one might consider developing some related statistical and econometric models. The SD theory for both risk averters and risk seekers was developed by Wong and Li (1999), Wong (2007), among others, and the SD theory for investors with S-shaped and S-shaped utility functions was developed by Wong and Chan (2008), Egozcue et al. (2011), among others, as discussed in Section 2 above.

Subsequently, Bai et al. (2015) extend the work of the SD test for risk averters developed by Davidson and Duclos (2000) to the SD test for risk seekers, Bai et al. (2011) also extend the previous research by developing the SD tests for investors with S-shaped and S-shaped utility functions.

Similarly, after developing some theoretical models to link behavioural and financial economics to health & medical economics, as suggested in Section 2, researchers could consider developing some statistical and econometric models to render the theoretical models applicable to real data. For example, researchers could develop some statistical and econometric models to study whether different behavior such as, for example, risk aversion, risk seeking, and regret aversion, could lead to different health & medical situations.

4. Empirical Studies

A third suggestion to researchers is to apply statistical and econometric models to examine the relationship between variables in behavioural and financial economics with variables in health & medical economics. After developing statistical and econometric models, theoretical researchers and practitioners might consider applying the models to analyze real data in order to reveal whether the assertions of the theoretical theories hold in practice.

For example, after Davidson and Duclos (2000) developed the SD test for risk averters, Bai et al. (2015) extended the ideas to obtain the SD test for risk seekers. Subsequently, Bai et al. (2011) developed the SD tests for investors with S-shaped and S-shaped utility functions.

Researchers might consider applying these tests to analyse some exciting empirical data. For instance, Lean et al. (2015) examine risk-averse and risk-seeking investor preferences for oil spot and futures prices, while Hoang et al. (2015) study the preferences of risk averters and risk seekers on gold, stocks, and bonds. These ideas could be extended to stock markets where health & medical companies might be listed to link financial economics and behavioural finance directly to health & medical economics.

An area of considerable interest is the study by Fong et al. (2008) of the preferences for investors with S-shaped and reverse S-shaped utility functions for internet versus "old economy" stocks. Gasbarro et al. (2012) examine the preferences for investors with S-shaped and reverse S-shaped utility functions on iShares. Furthermore, Clark et al. (2015) evaluate the preferences of risk

averters, risk seekers, and investors with S-shaped and reverse S-shaped utility functions to the Taiwan spot and futures markets.

Similarly, after developing statistical and econometric models to study the relationship between the interesting and available variables in behavioural and financial economics with variables in health & medical economics, as suggested in Section 3 above, theoretical researchers and practitioners could consider applying the models to real data. Of course, the difficult issues in obtaining access to the crucial data for health & medical analysis may nevertheless be encountered as serious obstacles.

Our suggestion is that empirical researchers might consider approaching hospitals, clinics, or local, regional and national governments and other organizations in order to obtain the relevant and accurate data. For example, Chow et al. (2015b) apply the SD tests developed by Davidson and Duclos (2000) and Bai et al. (2015) in order to analyze census data obtained from Governments to analyze relative welfare levels of income distributions for the poor and the rich of different groups of individuals.

Another way of obtaining data is to conduct surveys. For example, to test whether the theory developed by Lam et al. (2010, 2012) and Guo et al. (2015b) could be applied to real data, Chow et al. (2015a) conduct a survey to examine whether the theory holds empirically by studying the behaviour of different types of Hong Kong small investors in their financial investments, especially during times of financial crisis.

Another topic to examine the relationship between variables in behavioural and financial economics with variables in health & medical economics is to examine how cycles and crisis could be related to health & medical economics. For example, Wong and McAleer (2009) study the effect of the Presidential Election Cycle on U.S. stock markets, while McAleer et al. (2015) explore whether there are any opportunities to profiteer from the dot-com bubble, sub-prime crisis and Asian financial crisis. Such ideas could easily be extended to data considerations in health & medical economics.

If individuals could follow their approaches to use cycle and crisis to improve ones' financial situations, this could improve their health. Thus, it could be interesting in studying how the relationship between exploring opportunities from cycles and crises and health situations of investors.

5. Concluding Remarks

In this paper, we mainly discuss our work on behavioural and financial economics that could link to health economics and suggest extension of our work to link behavioural and financial economics to health economics. In literature, there are many other theoretical work and econometrics work in behavioural and financial economics. Authors could also extend their work to link behavioural and financial economics to health economics.

References

Bai, Z.D., Li, H., Liu, H.X., Wong, W.K. (2011), Test Statistics for Prospect and Markowitz Stochastic Dominances with Applications, *Econometrics Journal*, 14(2), 278-303.

Bai, Z.D., Li, H., McAleer, M., Wong, W.K. (2015), Stochastic Dominance Statistics for Risk Averters and Risk Seekers: An Analysis of Stock Preferences for USA and China, *Quantitative Finance*, 15(5), 889-900.

Chow, S.-C., Hon, T.-Y., Wong, W.K., Woo, K.-Y. (2015a), Empirical Study on the Behaviours of Different Types of Hong Kong Small Investors in Their Investment, Social Science Research Network Working Paper Series 2565780.

Chow, S.-C., Lui, F.T., Ma, V.R., Wong, W.K. (2015b), Tests for Richness and Poorness: A Stochastic Dominance Analysis of Income Distributions, Social Science Research Network Working Paper Series 2604045.

Clark, E., Qiao, Z., Wong, W.K. (2015), Theories of Risk: Testing Investor Behaviour on the Taiwan Stock and Stock Index Futures Markets, *Economic Inquiry*, forthcoming.

Davidson, R., Duclos. J.Y. (2000), Statistical Inference for Stochastic Dominance and for the Measurement of Poverty and Inequality, *Econometrica*, 68, 1435-1464.

Egozcue, M., Fuentes García, L., Wong, W.K., Zitikis, R. (2011), Do Investors Like to Diversify? A Study of Markowitz Preferences, *European Journal of Operational Research*, 215(1), 188-193.

Ezzy, D. (1993), Unemployment and Mental Health: A Critical Review, *Social Science & Medicine*, 37(1), 41-52.

Fong, W.M., Lean, H.H., Wong, W.K. (2008), Stochastic Dominance and Behavior towards Risk: The Market for Internet Stocks, *Journal of Economic Behavior and Organization*, 68(1), 194-208.

Gasbarro, D., Wong, W.K., Zumwalt, J.K. (2012), Stochastic Dominance and Behavior towards Risk: The Market for iShares, *Annals of Financial Economics*, 7(1), 1250005-1-20.

Guo, X., Wong, W.K., Xu, Q., Zhu, X. (2015a), Production and Hedging Decisions under Regret Aversion, *Economic Modelling*, forthcoming.

Guo, X., Wong, W.K., Zhu, X.H. (2015b), A Bayesian approach to explain excess volatility, short-term underreaction, and long-term overreaction during normal 16 situations and financial crises, Social Science Research Network Working Paper Series 2574005.

Van Hoang, T.H., Wong, W.K., Zhu, Z.Z. (2015), Is Gold Different for Risk-Averse and Risk-Seeking Investors? An Empirical Analysis of the Shanghai Gold Exchange, *Economic Modelling*, 50, 200-211.

Jahoda, M. (1979), The Impact of Unemployment in the 1930s and 1970s, *Bulletin of the British Psychological Society,* 32, 309-14.

Lam, K., Liu, T., Wong, W.K. (2010), A Pseudo-Bayesian Model in Financial Decision Making with Implications to Market Volatility, Under- and Overreaction, *European Journal of Operational Research*, 203(1), 166-175.

Lam, K., Liu, T., Wong, W.K. (2012), A New Pseudo-Bayesian Model with Implications to Financial Anomalies and Investors' Behaviors, *Journal of Behavioral Finance*, 13(2), 93-107.

Lean, H., McAleer, M., Wong, W.K. **(**2015**),** Preferences of Risk-averse and Risk-seeking Investors for Oil Spot and Futures Before, During and After the Global Financial Crisis, *International Review of Financial Analysis*, forthcoming.

McAleer, M., Suen, J., Wong, W.K. (2015), Profiteering from the Dot-Com Bubble, Sub-Prime Crisis and Asian Financial Crisis, *Japanese Economic Review*, forthcoming.

Rantakeisu, U., Starrin, B., Hagquist, C. (1999), Financial Hardship and Shame: A Tentative Model to Understand the Social and Health Effects of Unemployment, *British Journal of Social Work*, 29, 877-901.

Whelan, C.T. (1992), The Role of Income, Life-Style Deprivation and Financial Strain in Mediating the Impact of Unemployment on Psychological Distress: Evidence from the Republic of Ireland, *Journal of Occupational and Organizational Psychology*, 65, 331-344.

Wong, W.K. (2007), Stochastic Dominance and Mean-Variance Measures of Profit and Loss for Business Planning and Investment, *European Journal of Operational Research*, 182, 829-843.

Wong, W.K., Chan, R. (2008), Markowitz and Prospect Stochastic Dominances, *Annals of Finance*, 4(1), 105-129.

Wong, W.K., Li, C.K. (1999), A Note on Convex Stochastic Dominance, *Economics Letters*, 62, 293-300.

Wong, W.K., Ma, C. (2008), Preferences over Location-Scale Family, *Economic Theory*, 37(1), 119-146.

Wong, W.K., McAleer, M. (2009), Mapping the Presidential Election Cycle in US Stock Markets, *Mathematics and Computers in Simulation*, 79(11), 3267-3277.