Are Economic Uncertainty Expectations Rational?

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This study analyzes whether expectations about uncertainty of the global and U.S. economy emanate from the natural dynamics of the U.S. based rational economic fundamentals, or stem from irrational outlook not attributable to any known risk factors. The findings suggest that both the U.S. and the global economic uncertainty expectations are significantly driven by the U.S. economy and stock market related rational factors namely, economic growth, economic risk premium and excess returns. The three Fama and French factors have significant impact on the U.S. economic uncertainty expectations but insignificant role for global economic uncertainty expectations. Foreign currency movements play a significant role for the global economic uncertainty. The impact of the rational factors is higher for the U.S. economic uncertainty expectations than on the global economic uncertainty expectations. Lastly, there exists a positive feedback effect of the U.S. and global and economic uncertainty expectations. Overall, to a significant extent, the expectations of the U.S. economic uncertainty are well captured by the risk factors suggested in the asset pricing literature.

Keywords: Risk and Uncertainty, Expectations, Behavioral Finance.

INTRODUCTION

The U.S. economy faces an uncertain path under the new administration of President Trump. An upset presidential win promises to radically reshape the global economic order and usher in a period of intense uncertainty for the U.S. economy and its trading partners. According to the *Economic Policy U.S. Uncertainty Index*, the election was the third biggest creator of economic uncertainty in the U.S. The current level of economic uncertainty is higher than the levels observed during the 2008 financial crisis and only the fiscal cliff in 2011 and the 9/11 terrorist attacks caused greater levels of uncertainty. Expectations of radical changes in economic order related to tax cuts, regulations, infrastructure spending, health care reform, looser fiscal policy and more rapid growth are the main sources of heightened economic uncertainty.

However, expectations of an extremely high uncertainty coexist with healthier economic outlook. The GDP growth rate is expected to remain in an ideal range and unemployment forecasted to continue at the natural rate. With the favorable backdrop for the consumers supported by the robust labor market and the ongoing strength of housing and stocks, the fundamentals seem to be in good shape. Moreover, the economic backdrop remains sufficiently healthy for the Federal Reserve to continue moving

incrementally toward its goal of normalizing monetary policy. High economic uncertainty coupled with strong economic performance has created a conundrum in that there exist expectations of decline in investments, output and employment while the economy continues to be resilient with sound fundamentals and diminishing global risks to the growth. The above-mentioned phenomenon raises an important question about the overall expectations of economic uncertainty. Are expectations about economic uncertainty driven by irrational fear or is a natural rational response to turbulent fundamentals, or some combination of both? An investigation to identify the key determinants of global and U.S. economic uncertainty expectations is the main purpose of this research.

The current situation is not unprecedented as there exists several recent puzzling evidences on formation of expectations about economic uncertainty which does seem to be fully rational in nature. In 2010 and 2012, the notion was that the Federal Reserve's massive bond-buying program would cause hyperinflation, soaring commodity prices and a collapse of the dollar. In 2013, the U.S. congressional budget battles which led to sharp spending cuts (sequestration) was perceived to throw the economy back into recession. Economic uncertainty abounded in 2015 that if Greece rejected an international bailout, it could spark a global banking crisis. Last year's policy uncertainty came from China as the country's poorly communicated currency depreciation, accompanied by tumbling commodity prices, generated expectations of a deflationary tide sweeping through global economies. This year, from Brexit to a coup in Turkey and the continuing rise of populist politics, there had been plenty of reasons to be anxious. In each of these cases, the financial markets worldwide reacted negatively to economic uncertainty and suffered large selloffs. However, after initial shocks, markets recovered quickly and in most of the cases went vertical to a new all-time record high suggesting that the economic expectations may not be fully rational (for example, following Brexit, the S&P 500 lost all the year's gains but recovered within two days and has hit 11 fresh highs since then). Similarly, expectations about the timing of the interest rate hike by the Federal Reserve does not seem to be consistent with rational expectations.

This study is motivated by the above mentioned puzzling evidences and theoretical foundation provided by seminal studies that have well documented the role of irrationality in expectations formation. Shleifer and Summers (1990), Hirshleifer (2001) and Brown and Cliff (2005), suggest that investors' expectations are driven by both rational reflection of risk factors as well as irrational enthusiasm/pessimism. It is suggested that a broader psychological paradigm that includes full rationality is a significant special case when it comes to expectations about assets prices. The existing research on the role of irrationality mainly focuses on investors' expectations towards the stock markets while little is done to investigate whether irrationality has a role in the formation of expectations towards the overall economy.

Given the discussion above, this research contributes to the existing literature by analyzing the extent to which expectations about the global and U.S. economic uncertainties emanate from the natural dynamics of the U.S. based economic fundamentals, or stem from irrational outlook not attributable to any known risk factors. It provides an empirical test to examine the impact of fundamentals on the expectations of global and U.S. economic uncertainties consistent with the predictions of rational models.

This study employs the time series data in monthly interval during January 1997 – May 2017 on the global and U.S economic uncertainty indexes developed by Baker, Bloom and Davis. This study employs two separate uncertainty indexes to capture the global and the U.S. economic uncertainties. In addition, it uses data on 12 fundamental factors on the economic conditions that have been shown to carry non-redundant rational information in the literature.

A set of generalized impulse responses obtained from a 14 variable VAR model suggests that both the U.S. and the global economic uncertainty expectations are significantly driven by the U.S. economy and stock market related rational factors namely, economic growth, economic risk premium and excess returns. In addition, the three Fama and French factors have significant impact on the U.S. economic uncertainty but insignificant role in the formation of expectations about the global economic uncertainty. The price of dollar plays a significant role for the global economic uncertainty. The impact of the significant rational factors is higher for the U.S. economic uncertainty expectations than the global economic uncertainty expectations. Lastly, there exists a positive feedback effect of the U.S. and global

and economic uncertainty expectations. However, there is a greater impact of the U.S. economic uncertainty on the global uncertainty than the vice-versa. In summary the findings suggest that as far as rationality is concerned, to a large extent the expectations of the U.S. economic uncertainty are well captured by the risk factors suggested in the asset pricing literature.

This paper is organized as follows: Section two reviews the relevant literature while sections three presents the model. The econometric methodology and data are described in sections four and five respectively. Section six discusses the empirical results and this is followed by the concluding remarks provided in section seven.

LITERATURE REVIEW

In traditional finance literature, the rational expectations about uncertainty is the main building block to assess the economic risk. However, such arguments are just conjecture at this point as there is no empirical test that has studied whether expectations on economic uncertainty are driven by rational factors or irrationality. Our research is motivated by studies from Behavioral Finance such as Shleifer and Summers (1990), Hirshleifer (2001) and Brown and Cliff (2005). Results of these studies suggest that the bullishness or bearishness of investors can be attributed to either a rational reflection of expectations (risks) or irrational enthusiasm (valuation error) or a combination of both. These studies suggest that expectations about economic uncertainty can be both rational and irrational i.e. it can be originating from either the economic fundamentals or not at all related to the economic fundamentals.

The theoretical framework on economic uncertainty is based on Knight (1971) which differentiates between uncertainty and risk. Risk is characterized by randomness that can be measured precisely. An event is uncertain if it has an unknown probability (Ellsberg, 1961). This difference is important since if risk were the only relevant feature of randomness well organized financial institutions should be able to price and market insurance contracts that only depend on risky phenomena. Uncertainty creates frictions that these institutions may not be able to accommodate. Individuals tend to prefer gambles with precise probabilities to ones with unknown odds. Risk and uncertainty are distinct characteristics of random environments but can affect investors' behavior differently. Since uncertainty as distinct from risk can exert a significance influence on individual behavior it can also be a significant determinant of equilibrium outcome.

Uncertainty makes opportunities for mutually satisfactory trade difficult to find in an exchange economy Bewley (2001). A peculiar consequence of uncertainty is that individuals are unwilling to insure each other. This aversion to trade is counterbalanced by the presence of risk aversion, which makes mutual insurance attractive. Rigotti and Shannon (2001) show that equilibrium can be characterized by the interplay between uncertainty and risk. For example, sometimes uncertainty is so large that no trade results; other times desire to insurance prevails and there is trade. This trade-off is not captured by the standard expected utility model where only risk aversion has a role.

It is important to analyze the determinant of economic uncertainty expectations as such expectations have been found to significantly impact several financial and macroeconomic variables. For example, expectations on economic uncertainty is affects employment, output and productivity growth (Bloom, 2009); economic growth (Caglayan, Maioli and Mateut, 2012); firms' investments and cash flows (Baum, Caglayan and Talavera, 2010); economic activity (Bachmann, Elstner and Sims, 2010); output and inflation (Jones and Olson, 2013). Such analysis has implications firms and households who in general consider the role of uncertainty in decision making process. For example, since 2008 recession uncertainty about future tax, spending, regulatory, health-care and monetary policies seems to slow the recovery from the recession by leading businesses and households to postpone investment, hiring and consumption expenditure.

MODEL

The main research question is to investigate the extent to which the expectations on global and U.S. economic uncertainty stem from rational factors. Such expectations may contain information about rational factors, as well as any noise or biases of participants such as excessive optimism/pessimism, fear, greed etc. This study postulates that the economic uncertainty expectations can be driven to a significant degree by rational factors and/or noise and accordingly, the following equations are formulated to model the rational and irrational effects of fundamentals and noise, respectively, on global and U.S. economic uncertainty expectations:

$$Uncertainty_{gt} = \alpha_0 + \alpha_i \sum_{i=1}^{12} Fundamentals_{it} + \varepsilon_t \quad (1)$$

$$Uncertainty_{ust} = \beta_0 + \beta_i \sum_{i=1}^{12} Fundamentals_{it} + \upsilon_t \quad (2)$$

The *variable* $Uncertainty_{gt}$ and $Uncertainty_{ust}$ represents the expectations about the global economic uncertainty and U.S. economic uncertainty at time t while $Fundamentals_{jt}$ is a set of fundamentals representing rational expectations based on risk factors that have been shown to carry non-redundant information in literature. Specifically, the parameters α_i and β_i capture the effects of the 12 rational risk factors on global and U.S. economic uncertainty expectations.

To avoid model misspecification or multicollinearity, this study jointly models the risk factors with the global and U.S. economic uncertainties expectations. Specifically, shocks originating from one risk factor not considered might mistakenly be a disturbance originating from another rational factor included in the analysis. As such in order to investigate the research question, a 14 variable VAR model (2 variables representing expectations on global and U.S. economic uncertainties and 12 fundamental variables) is estimated to analyze the impulse response of the both the global and U.S. economic uncertainties expectations to shocks originating from the 12 rational factors.

This study also jointly models these variables to analyze the lead-lag impact of global and U.S. economic uncertainties expectations on each other. It is quite possible that a major source of global economic uncertainty expectations is due to expectations of uncertainty in the U.S. economy. Specifically, the 12 fundamental factors employed in this study are as follows: (i) Economic growth (Fama, 1970; Schwert, 1990) (ii) Short term interest rates (Campbell, 1991) (iii) Economic risk premium (Ferson and Harvey, 1991; Campbell, 1987) (iv) Term spread (Fama, 1990) (v) Default spread (Fama and French, 1989; Keim and Stambaugh, 1986) (vi) Dividend yield (Hodrick, 1992; Fama and French, 1988; Campbell and Shiller, 1988a, 1988b) (vii) Inflation (Sharpe, 2002; Fama and Schwert, 1977) (viii) Excess returns on the market portfolio (Lintner, 1965; Sharpe, 1964) (ix) Premium on portfolio of small stocks relative to large stocks (Fama and French, 1993). (x) Premium on portfolio of high book/market stocks relative to low book/market stocks (Fama and French, 1993) (xi) Momentum factor (Jegadeesh and Titman, 1993) and, (xii) Currency fluctuation.

DATA

This study employs the time series data in monthly interval during January 1997 – May 2017 on global and U.S economic uncertainty indexes and 12 rational factors. Specifically, the data on economic uncertainties expectations for global and U.S. is obtained from research conducted by Baker (Northwestern University), Bloom (Stanford University) and Davis (University of Chicago). Their research involves constructing global uncertainty index which is a GDP- weighted average of national economic uncertainty expectations indices for 18 countries: Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. The second index, is for the U.S. economic uncertainty which is

developed based on news coverage of policy related economic uncertainty, tax codes expiration dates and economic forecasters disagreements.

In addition, this study employs the following 12 well accepted rational factors in finance and economics research: (i) Economic growth measured as the monthly changes in the industrial production index. (ii) Short term interest rates measured as the yield on one month U.S. Treasury Bills. (iii) Economic risk premium measured as the term structure of interest rates (i.e., the difference in monthly yields between three-month and one-month Treasury bills.) (iv) Future economic expectations variable measured as the term spread (i.e., the yield spread between the 10-year U.S. Treasury bond and three-month Treasury bill.) (v) Business conditions measured as the default spread (i.e., the difference in yields between Baa and Aaa corporate bonds.) (vi) Dividend yield measured as the dividend yield for the value weighted Center for Research in Security Prices (CRSP) index over the past 12 months. (vii) Inflation measured as the monthly changes in the consumer price index. (viii) Excess returns on the market portfolio measured as the value-weighted returns on all NYSE, AMEX, and NASDAQ stocks minus the one-month Treasury bill rate. (ix) Premium on portfolio of small stocks relative to large stocks (Small minus Big or SMB) is the average return on three small portfolios minus the average return on three big portfolios. (x) Premium on portfolio of high book/market stocks relative to low book/market (High minus Low or HML) is the average return on two value portfolios minus the average return on two growth portfolios. (xi) Momentum factor (Up minus Down or UMD) is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios. (xii) Currency fluctuation measured as the changes in the price of dollars against a 15-country trade-weighted basket of currencies.

The data on economic growth, business conditions and inflation are obtained from *DataStream*; short-term interest rates, economic risk premium, future economic variables and currency fluctuations are obtained from the *Federal Reserve Bank of St. Louis*; dividend yield and excess returns on the market portfolio are obtained from *CRSP*; and SMB, HML and UMD from *Kenneth French Data Library at Tuck School of Business, Dartmouth College*. A common sample is identified during this period to match all the variables.

Figure 1 (panels a and b) presents the U.S. and global economic uncertainty expectations during the sample period. Panel (a) presents the data in levels while panel (b) is in the percentage change form capturing the movements in the two indexes. Both the indexes peaks at the end of 2016 and indicates the period of intense uncertainty in both U.S. and global economies due to the presidential election results. Similarly, it peaks at periods during 9/11 terrorist attacks, dot com bubble burst during 2001, 2008 financial crisis and fiscal cliff in 2011. During rest of the periods both the uncertainty indexes are relatively less volatile.

FIGURE 1A
GLOBAL AND U.S. ECONOMIC UNCERTAINTY EXPECTATIONS (INDEX LEVELS)

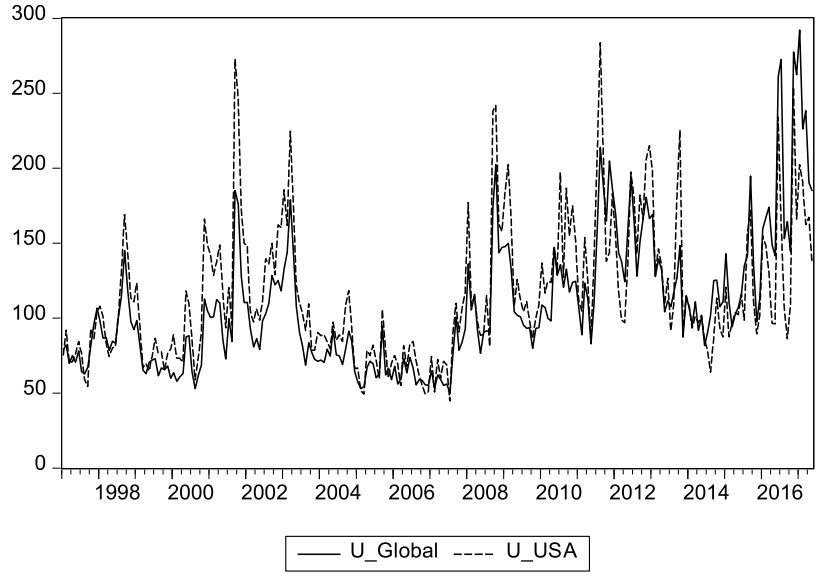


FIGURE 1B
GLOBAL AND U.S. ECONOMIC UNCERTAINTY EXPECTATIONS (% CHANGE)

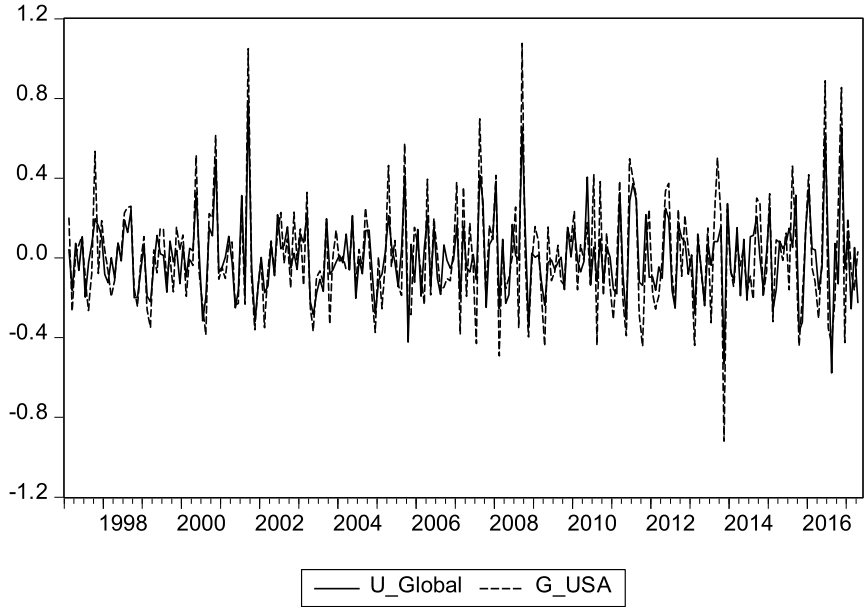


Table 1 reports the descriptive statistics for the 14 variables included in the sample. The average changes in global economic uncertainty expectations is higher than the average changes in U.S. economic uncertainty expectations (0.51% versus 0.31%). The economic growth measured by the changes in the IIP is extremely low at 0.07% during the sample period. The short-term interest rates have moved from a maximum of 5.03% to minimum of 0.01% during this period. The average economic risk premium as measured by the term structure of internet rates is approximately 0.05% while the mean of the future economic expectations as measured by the term spread is healthy at 2.12%. Similarly, the business conditions measured by the average default spread is approximately 1.1% during the sample period.

Among the stock market variables, the average dividend yield is approximately 2% while the excess return is 0.55%. The inflations have been extremely low at an average of 0.17%. Although the average movement in the price of dollar is very low at approximately -0.01%, it has shown a relatively higher variability as demonstrated by the standard deviation of 1.27%. The averages of returns of the three Fama and French factors, SMB, HML and UMD are 0.26%, 0.14% and 0.10% respectively. These three suggests that investors have been rewarded for taking positions in small cap and value stocks and following momentum strategies.

TABLE 1
DESCRIPTIVE STATISTICS

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
U_Gl	0.0051	-0.0030	0.7832	-0.5766	0.2012	0.6021	4.7300
U_US	0.0031	-0.0322	1.0765	-0.9189	0.2822	0.7345	4.9861
IIP	0.0007	0.0012	0.0155	-0.0359	0.0075	-1.6774	9.4811
T30	0.0126	0.0032	0.0503	0.0001	0.0157	1.2146	3.1690
T90-T30	0.0005	0.0003	0.0041	-0.0036	0.0009	0.5058	6.3395
T10-T30	0.0212	0.0225	0.0370	-0.0038	0.0102	-0.6450	2.7602
Baa -Aaa	0.0110	0.0097	0.0338	0.0055	0.0046	2.7923	12.3420
Div	0.0195	0.0194	0.0360	0.0130	0.0035	1.9442	9.0276
Inf	0.0017	0.0019	0.0137	-0.0179	0.0031	-1.3179	11.9371
Rm-Rf	0.0055	0.0109	0.1135	-0.1723	0.0426	-0.6264	4.2953
SMB	0.0026	0.0022	0.0756	-0.0611	0.0249	0.1379	2.8440
HML	0.0014	-0.0010	0.0844	-0.1125	0.0258	-0.2635	5.5305
UMD	0.0010	0.0034	0.1245	-0.3458	0.0488	-2.1297	16.0863
USD	-0.0001	-0.0009	0.0642	-0.0331	0.0127	0.6891	5.6897

The variables are global economic uncertainty expectations (U_Gl), U.S. economic uncertainty expectations (U_US), economic growth(IIP), short term interest rates (T30), economic risk premiums (T90-T30), future economic variables (T10-T30), business conditions (Baa-Aaa), dividend yield (Div), inflation (INF), excess returns on market portfolio ($R_m - R_f$), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML), momentum factors (UMD), and currency fluctuations (USD).

Table 2 reports the cross-correlation between the movements in two economic uncertainty expectations and 12 rational factors. As expected the two uncertainty expectations (global and U.S.) are strongly positively correlated at 0.82. However, both the uncertainty expectations dos not seem to have strong correlations with the rational factors. Also, the correlations among the 12 risk factors is low, suggesting that each variable represents a unique risk independent from the others.

TABLE 2
CROSS CORRELATIONS

	U_Gl	U_US	IIP	T30	T90-T30	T10-T30	Baa -Aaa	Div	Inf	Rm-Rf	SMB	HML	UMD	USD
U_Gl	1.00													
U_US	0.82	1.00												
IIP	-0.02	-0.02	1.00											
T30	0.03	0.03	0.06	1.00										
T90-T30	0.06	0.08	-0.10	0.21	1.00									
T10-T30	-0.03	-0.03	-0.01	-0.72	-0.12	1.00								
Baa -Aaa	-0.06	-0.05	-0.51	-0.21	0.04	0.21	1.00							
Div	-0.01	0.00	-0.43	-0.40	0.08	0.09	0.77	1.00						
Inf	0.09	0.12	0.22	0.17	0.01	-0.10	-0.29	-0.25	1.00					
Rm-Rf	-0.30	-0.27	0.13	-0.09	-0.11	0.01	-0.13	-0.05	0.04	1.00				
SMB	-0.11	-0.10	-0.02	-0.05	-0.03	0.11	0.06	-0.05	0.00	0.33	1.00			
HML	0.06	0.08	0.12	0.06	0.08	0.01	-0.14	-0.16	0.11	0.17	0.07	1.00		
UMD	0.24	0.18	0.06	0.09	0.07	-0.02	-0.22	-0.25	0.07	-0.46	-0.11	-0.20	1.00	
USD	0.21	0.15	-0.10	-0.16	0.17	0.05	0.10	0.18	-0.34	-0.36	-0.05	-0.11	0.25	1.00

The variables are global economic uncertainty expectations (U_Gl), U.S. economic uncertainty expectations (U_US), economic growth(IIP), short term interest rates (T30), economic risk premiums (T90-T30), future economic variables (T10-T30), business conditions (Baa-Aaa), dividend yield (Div), inflation (INF), excess returns on market portfolio ($R_m - R_f$), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML), momentum factors (UMD), and currency fluctuations (USD).

ECONOMETRIC METHODOLOGY

Two separate ordinary least square (OLS) regressions are estimated in order to examine the relationships postulated in equations (1) and (2). In addition, a 14 variable VAR model is estimated to jointly model the 12 rational factors and the two uncertainty expectations variables.
The VAR model is expressed as follows:

$$Z(t) = C + \sum_{s=1}^{m} A(s)Z(t-m) + \varepsilon(t) \tag{3}$$

where $Z(t)$ is a column vector of variables under consideration, C is the deterministic component which is a constant, $A(s)$ is a matrix of coefficients, m is the lag length, and $\varepsilon(t)$ is a vector of random error terms. Accordingly, we use the VAR specification to estimate equations (1) and (2) and rely on generalized impulse response functions for interpretation purposes.

The orthogonalized forecast error variance decomposition results based on the widely used Choleski factorization of VAR innovations may be sensitive to variable ordering (Pesaran and Shin, 1996; Koop, et al., 1996; Pesaran and Shin, 1998). To mitigate such potential problems of misspecification, the *generalized impulses* technique as described by Pesaran and Shin (1998) are employed in which an orthogonal set of innovations does not depend on the VAR ordering.

The VAR specification not only allows researchers to do policy simulations but also integrate Monte Carlo methods to obtain confidence bands around the point estimates (Doan, 1988; Genberg et al. 1987; Hamilton, 1994). The one-time unitary shock of one variable to another variable can be captured by impulse response functions, keeping all other variables constant. These impulse response functions are highly non-linear with the confidence bands around the mean. Responses are considered statistically significant at the 95% confidence level when the upper and lower bands have the same sign.

ESTIMATION RESULTS

The main research question to examine the role of rationality in the formation of expectations about the global and U.S. economic uncertainties. Accordingly, first two separate OLS regressions are estimated in accordance with equations (1) and (2) wherein the 12 risk factors are regressed against the global and U.S. economic uncertainty expectations respectively.

Table 3 reports the regression results for the effect of rational factors on the U.S. economic uncertainty expectations. Consistent with the correlations results, there seems to be a strong significant positive impact of global economic uncertainty expectations. The coefficient for the monthly changes in the IIP is significant and negative suggesting that an improvement in the economic growth causes decrease in economic uncertainty expectations. The difference in monthly yields between three-month and one-month Treasury bills is significant and positive which suggests that uncertainty expectations is higher when there is greater economic risk premium. The coefficient of excess return on the market portfolio is negative and significant which means that an increase market returns causes expectations about uncertainty to decrease. Lastly, the expectations about economic uncertainty is well captured by the risk factors suggested by the Fama and French three factor model (Fama and French, 1993) and Carhart four factor model (Carhart, 1997; Fama and French, 2012). Specifically, the coefficients of SMB, HML and UMD are positive and significant. The R-square of this regression is almost 68% indicating that rational factors play a strong role in the formation of expectations about U.S. economic uncertainty.

TABLE 3
REGRESSION RESULTS FOR EFFECT OF RATIONAL FACTORS ON U.S. ECONOMIC UNCERTAINTY EXPECTATIONS

Dependent Variable : U_US			
Variable	Coefficient	Std. Error	*t*-Statistic
Constant	0.0344	0.1540	0.2233
U_Gl	0.5566***	0.0654	8.5159
IIP	-1.9376**	0.9063	-2.1381
T30	0.8690	1.5904	0.5464
T90-T30	11.3501***	4.3871	2.5872
T10-T30	-0.6762	2.1664	-0.3121
Baa -Aaa	0.4074	5.4613	0.0746
Div	-1.3924	7.7054	-0.1807
Inf	4.6554	4.3928	1.0598
Rm-Rf	-0.3652**	0.1796	-2.0329
SMB	0.0932*	0.0532	1.7540
HML	0.3222***	0.1023	3.1484
UMD	0.1855***	0.0909	2.0421
USD	-0.5974	1.1773	-0.5074
R-squared	0.6785	Mean dependent var	0.0031
Adjusted R-squared	0.6548	S.D. dependent var	0.2822
S.E. of regression	0.1658	Akaike info criterion	-0.6849
Sum squared residual	4.8396	Schwarz criterion	-0.4457
Log likelihood	79.0694	Hannan-Quinn criter.	-0.5880
F-statistic	28.5732	Durbin-Watson stat	2.6952

The variables are global economic uncertainty expectations (U_Gl), U.S. economic uncertainty expectations (U_US), economic growth(IIP), short term interest rates (T30), economic risk premiums (T90-T30), future economic variables (T10-T30), business conditions (Baa-Aaa), dividend yield (Div), inflation (INF), excess returns on market portfolio ($R_m - R_f$), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML), momentum factors (UMD), and currency fluctuations (USD). *, ** and *** represent significance at 10%, 5% and 1% respectively.

Table 4 reports the regression results for the effect of the U.S. based risk factors on the global economic uncertainty expectations. There seems to a strong positive effect of the U.S. economic uncertainty on expectations about global economic uncertainty. Similar, the previous results, the growth in the U.S. economy play a significant role in the global economic uncertainty expectations. The negative coefficient suggests that growth in the U.S. economy causes the global uncertainty to decrease. Similarly, the U.S. economic risk premium has positive and significant coefficient suggesting the dominant role of the U.S. economy in global uncertainty expectations formation. In addition, the U.S. stock market has significant impact as the coefficient of excess return on market portfolio is negative and significant. However, there is no impact of the three Fama and French risk factors, SMB, HML and UMD on the global economic uncertainty expectations. Overall, it seems that the main rational factors of the U.S. economy, namely economic growth, financial market movements and economic risk plays a crucial role in the global economic uncertainty expectations. However, unlike the previous regression result there is a significant positive impact of the price of dollar. An interpretation of this positive significant coefficient is that an appreciation in dollar which means a depreciation in the foreign currencies causes global uncertainty to increase. As expected the R-square of this regression is lower (49%) than the one obtained for the U.S. uncertainty expectations. One reason for lower R-square is that the explanatory variables used

in this regression only pertains to the U.S. economy while the global uncertainty expectations is formed based on the risk factors of several other economies.

TABLE 4
REGRESSION RESULTS FOR EFFECT OF RATIONAL FACTORS ON GLOBAL ECONOMIC UNCERTAINTY EXPECTATIONS

Dependent Variable : U_Gl			
Variable	Coefficient	Std. Error	*t*-Statistic
Constant	0.0735	0.1079	0.6818
U_US	1.1583***	0.0321	36.0527
IIP	-0.0774**	0.0337	-2.2965
T30	0.8205	1.1143	0.7363
T90-T30	9.3272*	5.0803	1.8360
T10-T30	0.6977	1.5184	0.4595
Baa -Aaa	-3.2602	3.8212	-0.8532
Div	4.7249	5.3911	0.8764
Inf	0.2289	3.0896	0.0741
Rm-Rf	-0.1889*	0.0966	-1.9548
SMB	0.0281	0.3727	0.0755
HML	0.2111	0.3522	0.5992
UMD	0.2999	0.2154	1.3925
USD	1.1992*	0.6211	1.9308
R-squared	0.4892	Mean dependent var	0.0051
Adjusted R-squared	0.4662	S.D. dependent var	0.2012
S.E. of regression	0.1163	Akaike info criterion	-1.3951
Sum squared residual	2.3790	Schwarz criterion	-1.1559
Log likelihood	146.5354	Hannan-Quinn criter.	-1.2982
F-statistic	30.0178	Durbin-Watson stat	2.6412

The variables are global economic uncertainty expectations (U_Gl), U.S. economic uncertainty expectations (U_US), economic growth(IIP), short term interest rates (T30), economic risk premiums (T90-T30), future economic variables (T10-T30), business conditions (Baa-Aaa), dividend yield (Div), inflation (INF), excess returns on market portfolio ($R_m - R_f$), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML), momentum factors (UMD), and currency fluctuations (USD). *, ** and *** represent significance at 10%, 5% and 1% respectively.

The next step is to jointly model all the 14 variables to capture the feedback effects and perform simulations to capture the impact of surprises or innovations in the explanatory variables. Accordingly, in accordance with equation (3), a 14 variable VAR model is estimated to examine how U.S. based risk factors impact the expectations about the U.S. and global economic uncertainty. We check for the time series properties of each variable using the Augmented Dickey Fuller (ADF) tests (Dickey and Fuller, 1979, 1981). The number of lags is two based on the consistent and asymptotically efficient *AIC* and *SIC* criteria (Diebold, 2003).

In the case of the ADF test, the null hypothesis of non-stationarity is rejected. The inclusion of drift/trend terms in the ADF test equations (Dolado, et al., 1990) does not change these results.

Figures 2(a) through 2(l) plot the impulse responses of the the U.S. economic uncertainty expectations to one-time standard deviation shocks in the 12 risk factors.[1] Consistent with the regression results, the impulse responses of the uncertainty expectations to six risk factors are statistically significant while the other six rational factors have insignificant impact. Specifically, the impulse response of the

uncertainty expectations to innovations in economic growth (figure 2b), economic risk premium (figure 2c), excess return on the market portfolio (figure 2h), and three Fama and French factors, namely, SML (figure 2i), HML (figure 2j) and UMD (figure 2k) are statistically significant.

The response to economic growth is negative and remains significant for almost two months. An interpretation of this negative impulse response is that an improvement (deterioration) in economic growth leads to decrease (increase) in the U.S. economic uncertainty. Likewise, the response to economic risk premium is positive which suggests that an increase (decrease) in economic risk causes increase (decrease) in economic uncertainty expectations. However, the response to economic risk premium lasts significantly for approximately one month only. The response to excess return on market portfolio is negative and remains significant for almost two months suggesting that positive (negative) returns of the U.S. stock market causes decrease (increase) in the economic uncertainty expectations.

The responses of the three Fama and French factors, SML, HML and UMD are positive are positive and remains significant less than a month. An interpretation of these three impulse responses is that the greater (lesser) the spread between small and high capital stocks; high book/market stocks and low book/market stocks; and up versus down momentum portfolios; higher (lower) is the economic uncertainty expectations. Of these six rational factors, the magnitude of the impact of economic growth is the highest followed by the economic risk premium. Overall, these impulse responses suggest that as far as rationality is concerned, to a large extent the expectations of the U.S. economic uncertainty is well captured by the risk factors suggested in the asset pricing literature.

FIGURE 2
RESPONSE OF U.S. ECONOMIC UNCERTAINTY EXPECTATIONS TO RATIONAL FACTORS

Figure 2a
Response to short term interest rates

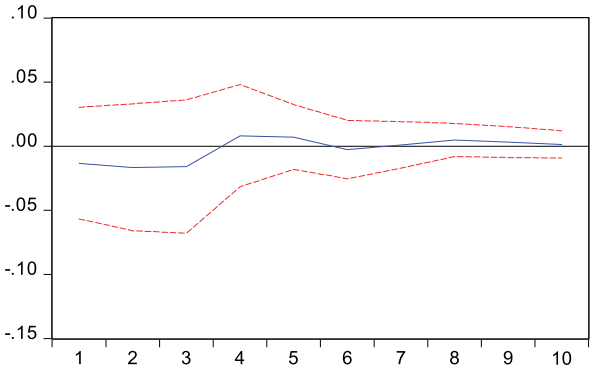


Figure 2b
Response to economic growth

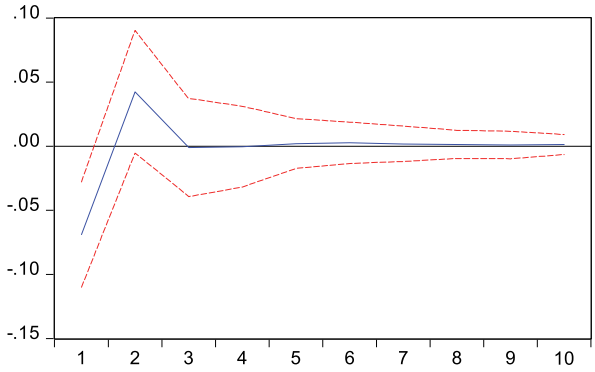


Figure 2c
Response to economic risk premium

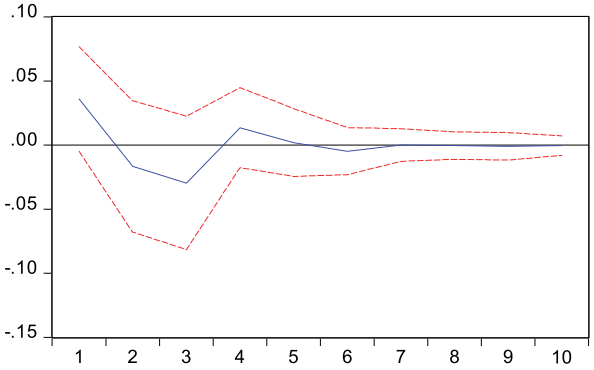


Figure 2d
Response to future economic expecations

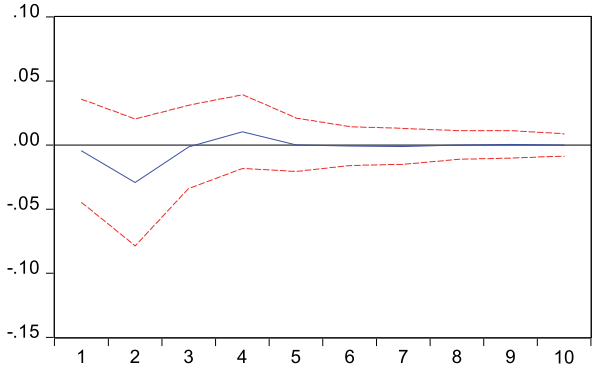


Figure 2e
Response to business conditions

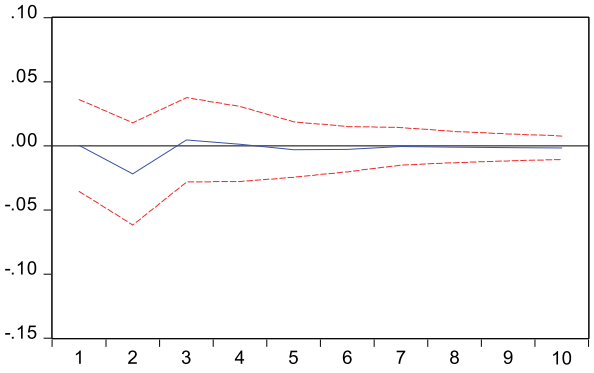


Figure 2f
Response to dividend yield

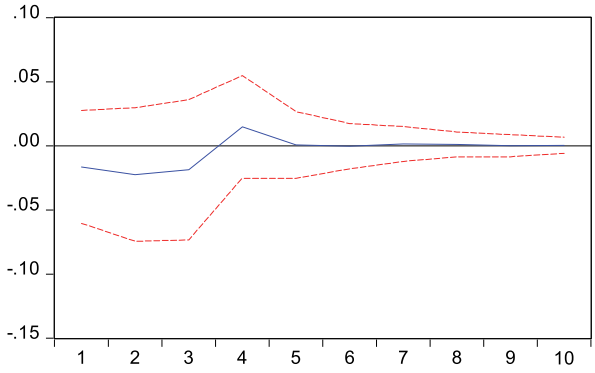


Figure 2g
Response to inflation

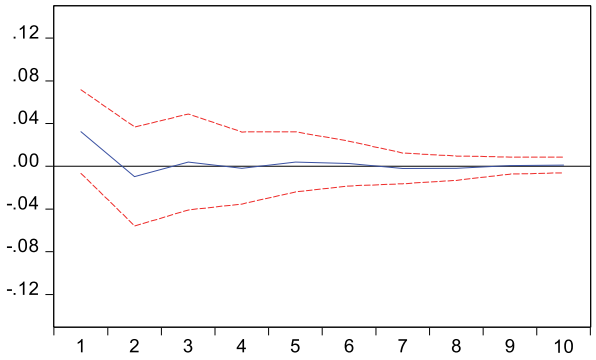


Figure 2h
Response to excess return

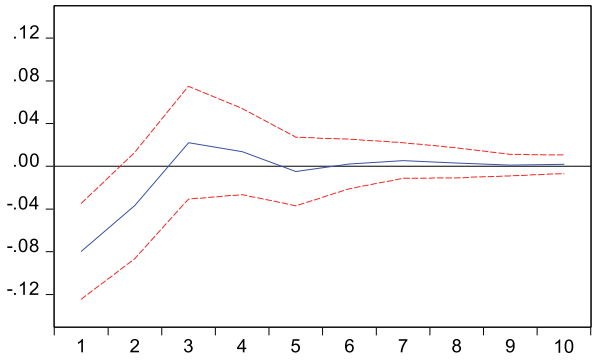


Figure 2i
Response to SMB

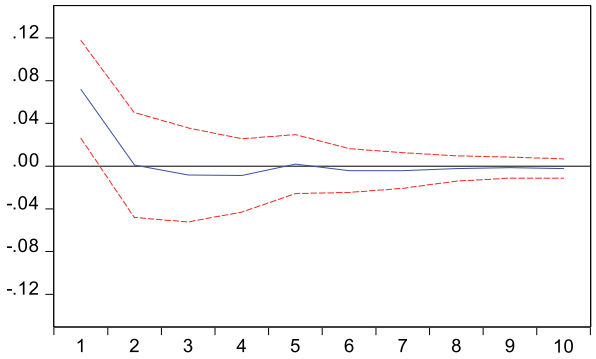


Figure 2j
Response to HML

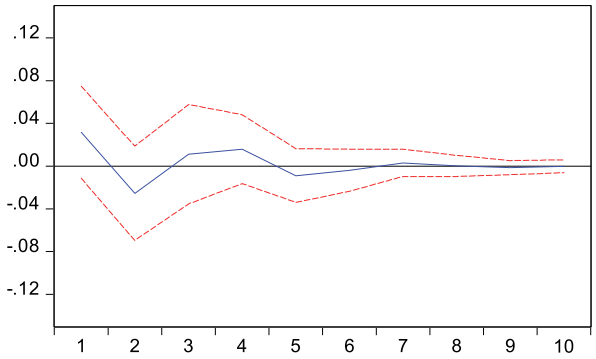


Figure 2k
Response to UMD

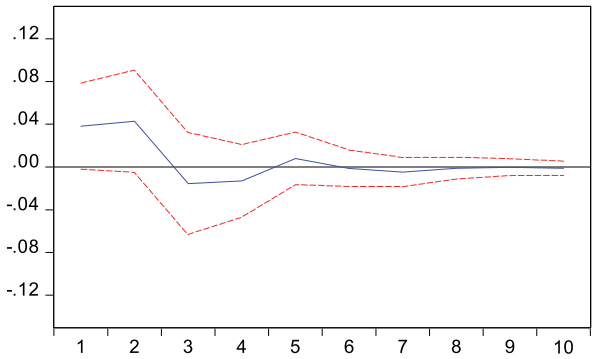
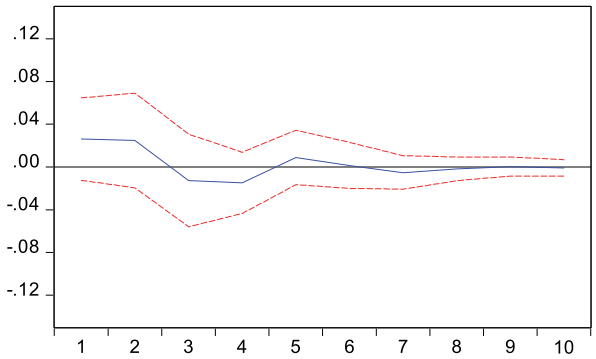


Figure 2l
Response to USD



Figures 3(a) through 3(l) plot the impulse responses of the global economic uncertainty expectations to innovations in the 12 risk factors of the U.S. economy. Consistent with the regression results, the impulse responses of the global uncertainty expectations to four rational factors are statistically significant while the other eight risk factors have insignificant impact. Specifically, the impulse response of the global uncertainty expectations to innovations in economic growth (figure 3b), economic risk premium (figure 3c), excess return on the market portfolio (figure 3h), and price of dollars (figure 3l) are statistically significant.

Similar, to the response of the U.S. economic uncertainty, there are significant negative impact of the U.S. economic growth on the expectations of the global economic uncertainty. However, the impact of economic growth is of lower magnitude as compared to its effect on the U.S. economic uncertainty expectations. Nonetheless, the U.S. economic growth still plays a significant role for the global uncertainty expectations. Likewise, the impact of economic risk premium is positive and significant during the first month. Although this impact is of lesser magnitude than those of the economic growth on the global uncertainty and also lower than the impact of economic growth on the U.S. economic uncertainty expectations. Similar the earlier findings the U.S. stock market movements have significant impact on the expectations of global economic uncertainty as increase (decrease) in returns causes decrease (increase) in such uncertainty expectations.

Unlike the findings of the U.S. economic uncertainty, there are insignificant impact of the Fama and French factors which suggests its limited role as far as global economy is concerned. Interestingly, the impact of the price of dollar which has an insignificant impact on the U.S. economic uncertainty has a positive significant impact on the global economic uncertainty expectations. This suggests that an appreciation in dollar or, depreciation in the foreign currencies causes global uncertainty to increase and a significant role of the currency risk for the global economy.

FIGURE 3
RESPONSE OF GLOBAL ECONOMIC UNCERTAINTY EXPECTATIONS TO RATIONAL FACTORS

Figure 3a
Response to short term interest rates

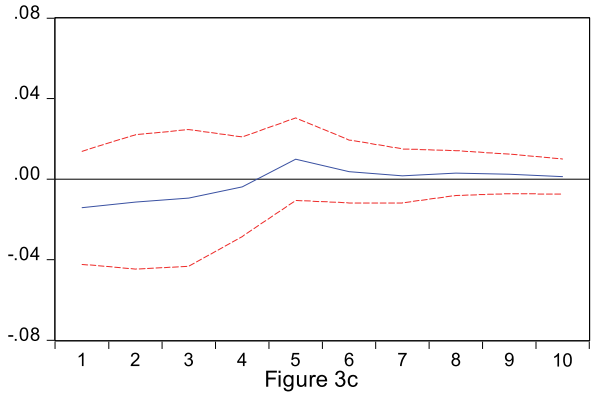


Figure 3b
Response to economic growth

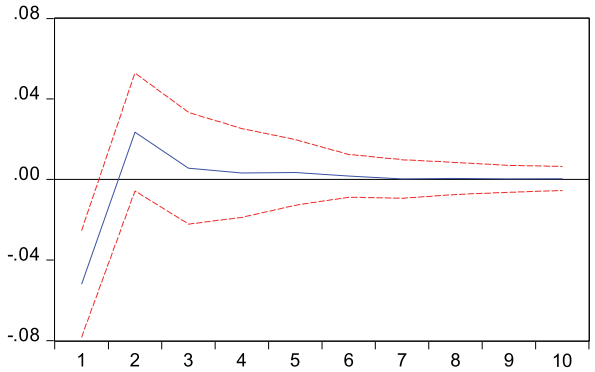


Figure 3c
Response to economic risk premium

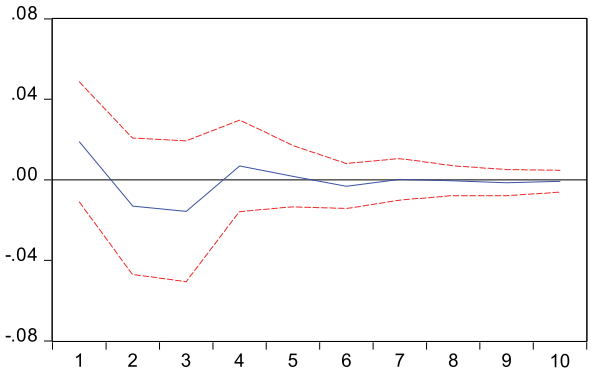


Figure 3d
Response to future economic expectations

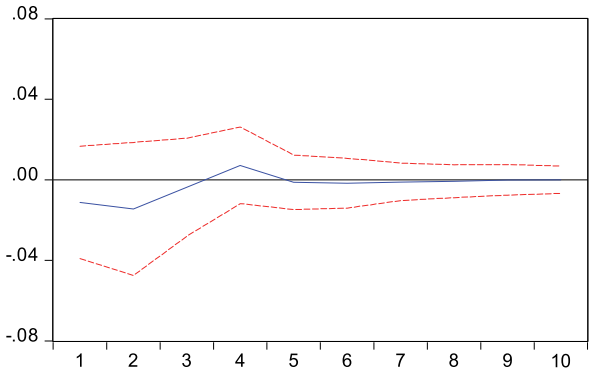


Figure 3e
Response to business conditions

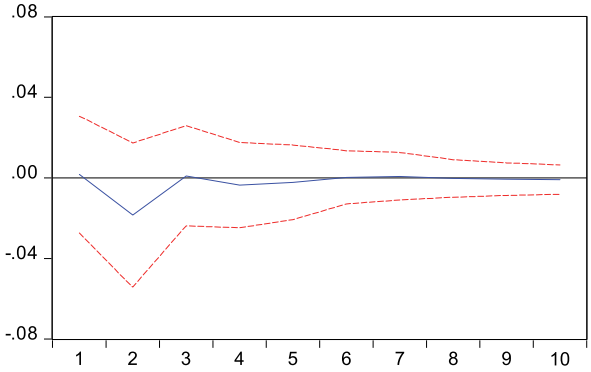


Figure 3f
Response to dividend yield

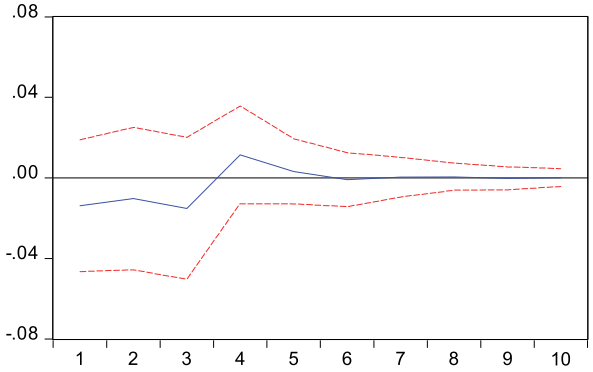


Figure 3g
Response to inflation

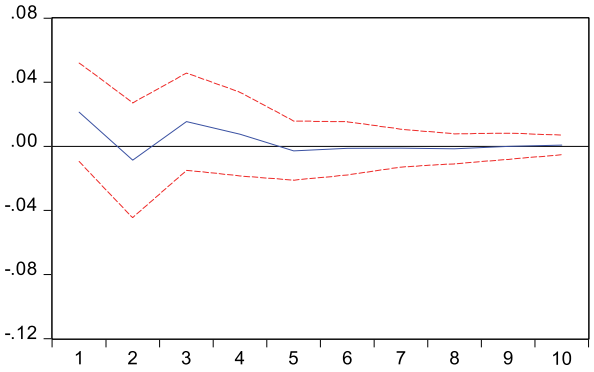


Figure 3h
Response to excess return

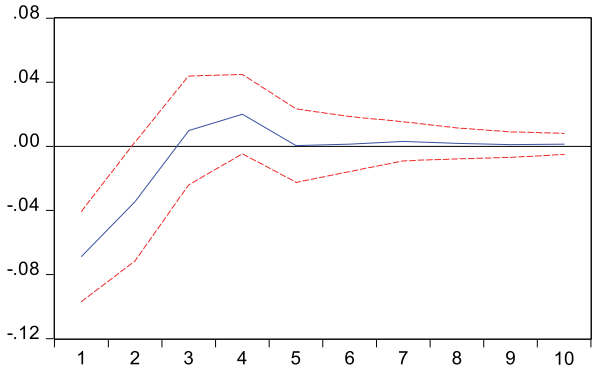


Figure 3i
Response to SMB

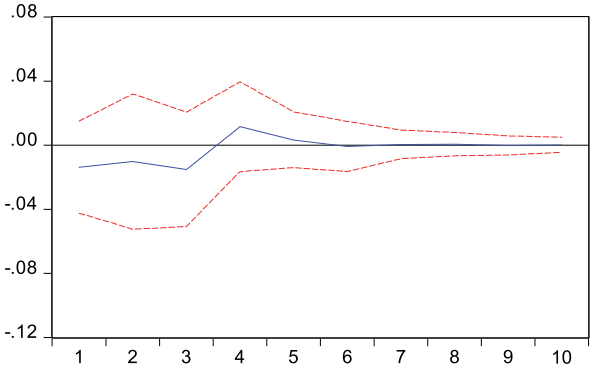


Figure 3j
Response to HML

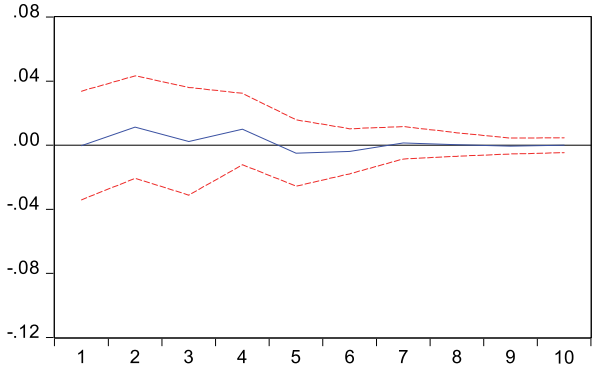


Figure 3k
Response to UMD

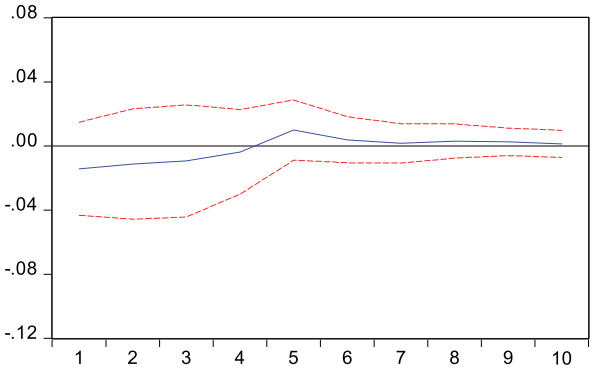


Figure 3l
Response to USD

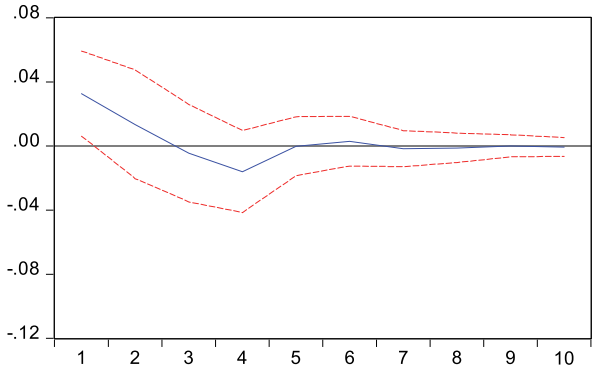


Figure 4 (a) and 4(b) examines the lead-lag effect of the U.S. and the global economic uncertainty expectations. The response of both the U.S. and global economic uncertainty expectations to each other is positive and significant for almost one and a half month. However, the magnitude of the impact of the U.S. economic uncertainty on expectations of the global uncertainty is almost one and half times more than vice-versa. This suggests the dominant role of the U.S. economy for the world economic uncertainty while relatively lesser effect of global economy for the U.S. economic uncertainty expectations.

FIGURE 4
LEAD-LAG IMPACT OF U.S. AND GLOBAL ECONOMIC UNCERTAINTY EXPECTATIONS

Figure 4a
Response of U.S. uncertainty to global uncertainty

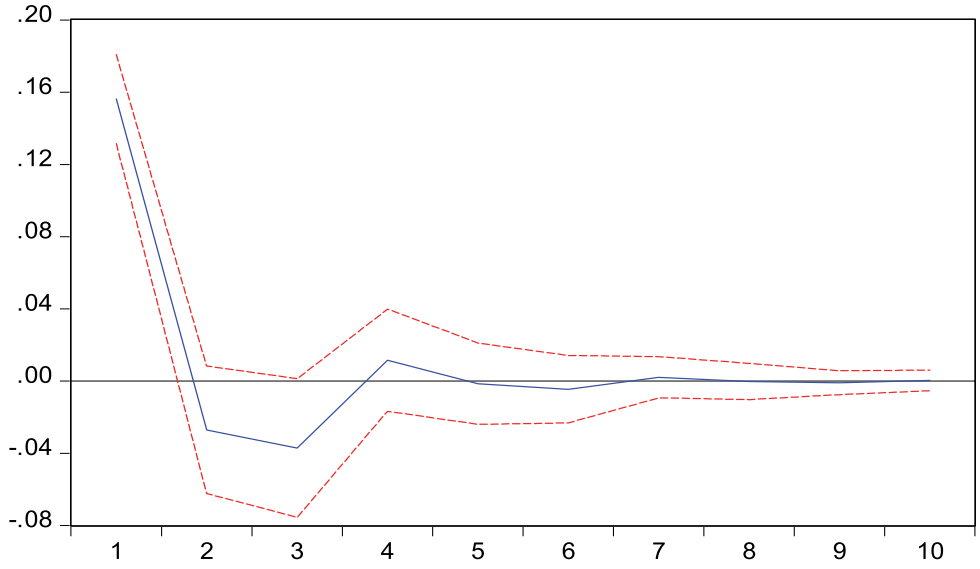
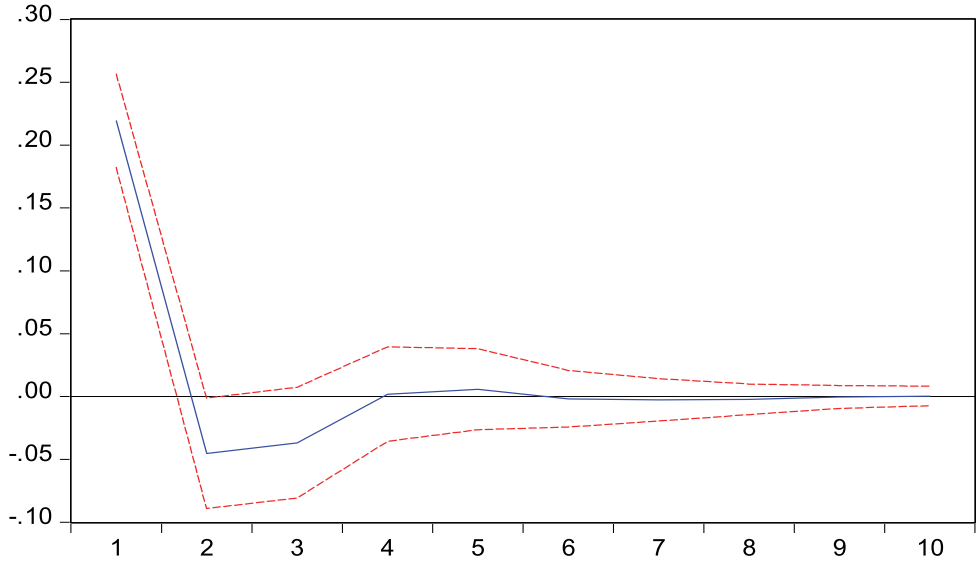


Figure 4b
Response of global uncertainty to U.S. uncertainty



Overall, the impulse responses suggest that both the U.S. and the global economic uncertainty expectations are significantly driven by the U.S. economy and stock market related rational factors namely, economic growth, economic risk premium and excess returns. In addition, the three Fama and French factors have significant impact on the U.S. economic uncertainty but insignificant role in the formation of expectations about the global economic uncertainty. The price of dollar plays a significant role for the global economic uncertainty. The impact of these rational factors (except price of dollar) is higher for the U.S. economic uncertainty expectations than the global economic uncertainty expectations. Lastly, there exists a positive feedback effect of the U.S. and global and economic uncertainty expectations. However, there is a greater impact of the U.S. economic uncertainty on the global uncertainty than the vice-versa. In summary, the U.S. based rational factors play a strong role in the formation of expectations about U.S. and global economic uncertainty.

CONCLUSION

Following seminal studies such as, Shleifer and Summers (1990), Hirshleifer (2001) and Brown and Cliff (2005), this study examines the extent to which the U.S. based rational factors are reflected in the expectations of the U.S. and global economic uncertainties. The analysis of regression coefficients and impulse responses generated from a 14 variable VAR model suggests the following: (i) both the U.S. and the global economic uncertainty expectations are significantly driven by U.S. economic growth, economic risk premium and excess returns of the U.S. stock market; (ii) the three Fama and French factors (SMB, HML and UMD) have significant impact on expectations about U.S. economic uncertainty but insignificant role on the expectations global economic uncertainty; (iii) the movement in foreign currency plays a significant role for the global economic uncertainty expectations but has insignificant impact on the U.S. economic uncertainty expectations; (iv) the impact of all the significant rational factors is higher for the U.S. economic uncertainty expectations than the global economic uncertainty expectations (v) there exists a positive feedback effect of the U.S. and global and economic uncertainty expectations with greater impact of the former on later than vice-versa.

In summary the findings suggest that as far as rationality is concerned, to a large extent the expectations of the U.S. economic uncertainty are well captured by the risk factors suggested in the asset pricing literature. A limitation of this research is that it only employs the U.S. based rational factors as determinant of economic uncertainty expectations. Future research can examine the response of global economic uncertainty expectations to international risk factors.

These results have important practical implications for both investors and policymakers. Analytically, these results indicate that expectations about economic uncertainty are mainly a manifestation of the rational risk factors. Investors could therefore improve their portfolio performance by considering both the stability and volatility in those rational factors as determinants of asset prices. Policy makers should concentrate their efforts to attain stability in sentiments induced by rational factors in order to reduce volatility and minimize economic uncertainty. The aim of this study is not to argue irrational beliefs or other behavioral factors are not important. The contribution of this study is rather to clarify to a large extent the features of economic uncertainty expectations are consistent with the rational models.

ACKNOWLEDGEMENT

This research was supported by the ORCA award fund from the University of Houston, Downtown.

ENDNOTE

1. The dashed lines on each graph represent the upper and lower 95% confidence bands. When the upper and lower bounds carry the same sign the response becomes statistically significant. On each graph, “percentage returns” are on the vertical and “horizon” is on the horizontal axis.

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