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Do Stock Market Risk Premium Respond to Consumer Confidence?

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Abstract.

During the 2007-9 Great Recession, the risk premium associated with U.S. stocks sharply increased and has since remained significantly higher compared to its range during the last 40 years. The increase in the equity risk premium has led many analysts to believe that risk aversion among stock investors has moved to a permanently higher range in recent years. Our empirical findings show that the recent increase in the equity risk premium primarily reflects a temporary collapse in consumer confidence. As long as the consumer confidence in the sustainability of economic recovery remains low, today's elevated risk premium would persist. Once the confidence level starts to recover - as it has done after every recession since the 1960s - the required return among stock market investors should also diminish.

JEL Classification C22, G11, G14

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Introduction

During the 2007-9 Great Recession, the risk premium associated with U.S. stocks (i.e., the difference between the stock market's earnings yield and the 10-year Treasury yield) sharply increased and has since remained significantly higher compared to its range during the last 40 years. Some financial analysts have suggested that the crises during the last decade have led to a permanent reassessment of risk or an increase in the return required by investors from the stock market relative to safer assets. On the other hand, Paulson (2011), among others, have argued that the recent rise in the stock market risk premium represents a cyclical phenomena rather than a secular shift.

Whether the recent jump in the equity risk premium proves enduring or temporary has important implication for stock investors. If it has been permanently boosted, the stock market may already be nearing a full valuation. On the other hand, any temporary elevation in the risk premium suggests that the stock market probably offers compelling prospects since future returns can be enhanced simply by a slow but steady revitalization in confidence in the economy.

In order to understand the nature of the jump in risk premium, it is essential to determine what caused the sudden upward drift. This paper tries to empirically determine the factors that have affected the risk premium. The paper is organized as follows. Section II discusses the history of the U.S. stock market risk premium while Section III introduces the consumer confidence index. Section IV shows the relationship between risk premium and consumer confidence highlighting the change in the relationship over time. Section V introduces the methodology and discusses the data used in this paper. The estimation results are presented in Section VI while the paper concludes with a summary and policy implications in Section VII.

I. A History of the U.S. Stock Market Risk Premium

Until the late 1960s, the risk premium associated with the stock market was persistently higher than it has been in the last four decades. Figure 1 shows the trend in equity risk premium during the 1870-2011 period. Between 1871 and 1965, the average stock market risk premium was 4.1 percent. In the late 1960s, however, the risk premium dropped below its range of the previous 100 years and established a new trading range whereby bond yields typically exceeded the earnings yield by 1.5 percent. Only since the beginning of the Great Recession in December 2007, and especially 2008, did the equity risk premium again undergo a shift in its trading range, returning to the much higher range experienced before the late 1960s.

Why has the equity risk premium undergone such radical changes in its trading range? A number of factors, put forward in the financial media, have probably been important in establishing and sometimes altering the range of the equity risk premium. First, the frequency and length of U.S. recessions have dropped since the 1960s. Second, beginning in the late 1960s, the Consumer Price Index advanced uninterrupted for at least three decades. Third, bond yields rose to all-time U.S. highs in the 1970s and remained elevated above historic norms for most of the next three decades. Finally, post World War II economic policy-making has been much more supportive of economic expansions and much more aggressive in fighting recessions. Paulson (2011) suggests that together, however, what they really represent is "confidence." Contemporary concerns about the potential for more frequent recessions, about the increased likelihood of deflationary pressures, about the implications of a return to a near zero interest rate world, and fears about increasing impotency of economic policy making is reflected in the current low readings of most economic confidence measures (Paulson, 2011).

II. Equity Risk Premium and the Consumer Confidence

Is the equity risk premium mainly about confidence? Figure 2 compares the Consumer Confidence Index published by the Conference Board with the U.S. equity risk premium since 1970. The equity risk premium has moved closely with changes in the consumer confidence index. Between 1970 and 2007, the equity risk premium remained in a broad range between -5 percent and +2 percent similar to the broad range of the Consumer Confidence Index between about 50 and 150. Moreover, the equity risk premium has tended to rise and fall within its range in close approximation to changes in confidence.

With the onset of the Great Recession, as the equity risk premium started to surge to a level not seen since the early 1960s, the level of consumer confidence dropped to an all-time record low. In fact, the consumer confidence index dropped to its lowest recorded level of 25.3 in February 2009, much below its previous record low of 43 in December 1974. Is it really surprising, therefore, that the required return from the stock market jumped to its highest level in decades as consumer confidence suffered its biggest collapse of the post-war era?

As Figure 2 shows, since 2009, both confidence and the risk premium have recovered to levels associated with recessionary bottoms during the last 40 years. The current level of the Consumer Confidence Index is very similar to the lows reached at the bottom of the 1980, 1982, early-1990s, and early-2000s recessions. Similarly, despite remaining in a much wider range since 2007, the equity risk premium has also recently contracted to a level not much different than it reached twice during the 1970s and again early in the last decade (Paulson 2011).

This paper seeks to contribute to the understanding of the above-mentioned issue by using an innovative econometric methodology. This methodology studies the direction of causality between the equity risk premium and consumer confidence. Existing empirical work on the causality between two variables usually uses standard Granger-causality-type tests to detect the direction of causality. This paper adopts a different methodological approach, namely the Toda-Yamamoto test for causality (Toda and Yamamoto 1995), which helps to derive much more robust conclusions.

III. Methodology and data issues

The use of Granger causality tests to trace the direction of causality between two economic variables is quite common in empirical work. The direction of causality has generally been tested using either the Granger or Sims tests (see Granger 1969 and Sims 1972). However, as econometric research has shown, such tests focus on time precedence rather than causality in the usual sense. Therefore, they are particularly weak for establishing the relation between forward-looking variables. Having said that, Granger tests can still provide some valuable information in terms of time patterns, and can be particularly interesting in a cross-country comparative framework. These tests are based on null hypotheses formulated as zero restrictions on the coefficients of the lags of a subset of the variables. However, such tests are grounded in asymptotic theory; yet, it must be borne in mind that asymptotic theory is only valid for stationary variables, thus if a series is known to be non-stationary, I(1), then such inferences can only be made if the VAR is estimated in first differences, and therefore stationary. This causes problems because the unit root tests to test the null hypothesis of stationarity have low power against the alternative hypothesis of trend stationarity.

Similarly, the tests for cointegrating rank in Johansen's tests are sensitive to the values of trend and constant terms in finite samples and thus not very reliable for typical time series sample sizes. In other words, it is possible that incorrect inferences could be made about causality simply due to the sensitivity of stationarity or cointegration tests.

In this paper we use the methodology of Toda and Yamamoto (1995) for testing for causality in the risk premium-consumer confidence relalationship. Toda and Yamamoto avoid the problems outlined above by ignoring any possible non-stationarity or cointegration between series when testing for causality, and fitting a standard VAR in the *levels* of the variables (rather than first differences, as is the case with the Granger and Sims causality tests), thereby minimizing the risks associated with possibly wrongly identifying the orders of integration of the series, or the presence of cointegration, and minimizes the distortion of the tests' sizes as a result of pre-testing (Giles 1997; Mavrotas and Kelly 2001, Chowdhury and Mavrotas (2006).

We use the Augmented Dickey Fuller (ADF) test (Dickey and Fuller 1981) to test for unit roots. In order to model the variable in a manner that captures the inherent characteristics of its time-series, we use the Akaike's Final Prediction Error (Akaike, 1973) criterion to determine the lag structure of the series. Blough (1992) discusses the trade-off between the size and power of unit root tests, namely that they must have either a high probability of falsely rejecting the null of non-stationarity when the DGP is a nearly stationary process, or low power against a stationary alternative. This is because in finite samples it has been found that some unit root processes display behavior closer to stationary white noise than to a non-stationary random walk, while some trend stationary processes behave more like random walks (Harris 1995). Thus, as pointed out by Blough (1992), unit root tests with high power against any stationary alternative will have a high probability of a false rejection of the unit root when applied to near stationary processes. These problems, occurring when there is near equivalence of nonstationary and stationary processes in finite samples, are partly due to using critical values based on the DF asymptotic distribution. Bearing in mind all these potential problems in testing for unit roots, we also employ the KPSS test described in Kwiatkowski *et al.* (1992) in order to confirm the validity of the ADF test results.

IV. Estimation results

The sample period runs from January 1970 to March 2011. Monthly data on consumer confidence index is collected from the Conference Board while data on equity risk premium is collected from the database of the Capital Market Consultants, a wealth management firm based in Milwaukee. The risk premium is represented by the S&P 500 Earnings Yield (based on the average trailing 60-month reported earnings per share) less 10-year Treasury Bond Yield. The empirical results are reported in four steps. First, we test for the order of integration for both Equity Risk Premium (ERP) and Consumer Confidence (CC). In the second step, we find out the optimum lag structure using the Akaike's final prediction error (FPE) criterion. Third, we conduct diagnostic tests to determine the presence of any misspecification in the results. Finally, we conduct a bootstrap simulation to investigate the performance of the Toda-Yamamoto test.

To set the stage for the Toda-Yamamoto test, the order of integration of the variables is initially determined using the ADF test with eight lagged differences. The results are given in Table 1. The variables, ERP and CC, are shown in column 1. The unit root tests are performed sequentially. The results of the ADF tests for one and two unit roots are given in columns 2 and 3 respectively. The results show that the ERP and the CC series are I(1) series. The null hypothesis of a unit root is not rejected. However, similar tests for the presence of two unit roots reject the hypothesis at least at the 5 per cent significance level. To check for the robustness of the ADF test results, the KPSS test described in Kwiatkowski *et al.* (1992) is also reported. Here the null hypothesis of stationarity around a level and around a deterministic linear trend is tested. The results, shown in the last two columns in Table 1, indicate that the null hypothesis of both level stationarity and trend stationarity can be rejected for all variables. Given the results of the ADF and the KPSS tests, it is concluded that the ERP and CC variables are integrated of order one.

Next, we specify the model for each variable by determining the optimal lag length of the levels of own and other variables in the model. Akaike's Minimum Final Prediction Error criterion is used to select the optimum lag. The results are presented in Table 2. The optimal lag length of ERP in the CC equation is zero, suggesting that ERP does not influence CC. On the other hand, the optimal lag length of CC in ERP equation is two. This indicates the presence of a unidirectional causality running from CC to ERP.

The next step involves the test to see if the data support the model assumptions. Following Giles (1997), Mavrotas and Kelly (2001) and Chowdhury and Mavrotas (2006), a battery of misspecification tests are performed. In particular, the Ramsey RESET (RR, Ramsey 1969) test is used to see if the coefficients of higher order terms added to the regression are zero. The Lagrange multiplier test (LM1-LM3) is also used to test whether the error terms are serially uncorrelated. Finally, the Jarque-Bera (JB, Bera and Jarque 1981) test is performed. The results are reported in Table 3. In general, the tests show that the model specification used in estimation is appropriate without any of the assumptions of the econometric model being rejected. The Toda-Yamamoto test involves the addition of one extra lag of each of the variables to each equation and the use of a standard *Wald* test to see if the coefficients of the lagged 'other' variables (excluding the additional one) are jointly zero in the equation. The results of the *Wald* test are given in column one in Table 3. The assumption of non-causality from CC to ERP is rejected at least at the 5 per cent level; however, we cannot reject the non-causality assumption from ERP to CC.

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It is notable that, given the small sample size employed in this paper, the Toda-Yamamoto test may suffer from size distortion and low power (Mavrotas and Kelly 2001). In view of this, we check for the robustness of the causality test results by recalculating the p-values obtained in the initial *Wald* test using a bootstrap test with 1000 replications. The idea behind a bootstrap test is to use the estimation residuals to artificially generate additional observations, which have the same distribution as the original observations, via a Monte-Carlo type process. Using the additional observations, a more robust estimation can be undertaken (see Greene 1997, for more details). The results are reported in Table 4. Given the nature of the test, both the *Wald* test statistics and the *p* values would be different from those obtained and reported in Table 3. The p-values in Table 4 show the probability that the independent variable in regression is equal to zero. The results confirm the findings reported in Table 3, i.e. CC causes ERP but ERP does not cause CC. This confirms the robustness of the tests performed in this paper.

V. Summary and Policy Implications

The increase in the equity risk premium since the beginning of the 2007-9 Great Recession has led many analysts to believe that risk aversion among stock investors has moved to a permanently higher range in recent years. Whether the equity risk premium stays within its new wider range – seen in the pre-1960s period - or returns to its range exhibited during the last four decades will prove critically important for stock investors.

Our empirical findings support Paulsen's (2011) view that the recent increase in the equity risk premium primarily reflects a temporary collapse in consumer confidence. Empirical estimates show that the changes in consumer confidence causes changes in the equity risk premium over the 1970-2011 sample period.
As long as the consumer confidence in the sustainability of economic recovery remains low, today's elevated risk premium would persist. In fact, this has significantly improved the risk-reward profile of the stock market since lower confidence has introduced a bigger buffer relative to competitive interest rates.

The higher risk premium seen in the last few years has significantly enhanced the risk-return profile of the stock market. Even if the risk premium remains in its newly elevated range for an extended period, the stock market could still provide investors satisfactory returns with a relatively low downside risk.

Will the equity risk premium remain in a much higher range for several years? Our empirical analysis indicates that this is only likely if consumer confidence remains abnormally low. Once the confidence level starts to recover - as it has done after every recession since the 1960s - the required return among stock market investors should also diminish. Indeed, our analysis provides support to Paulsen's (2011) contention that if, during this economic recovery, consumer confidence eventually reaches the upper end of its range since 1970, the equity risk premium should return to the range which was common during much of the last four decades.

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Table 1: Stationarity Test Results

Variable	Augmented Dickey-Fuller Test H_0:I(1)	H_0:I(2)	Kwiatkowski test H_0:I(0) level	Trend
ERP	-0.46	-5.10	0.462	0.298
CC	-1.02	-6.48	0.378	0.155

ERP and CC are the equity risk premium and consumer confidence, respectively.
Following Kwiatkowski et al (1992), the null hypothesis of stationarity around a level and around a deterministic linear trend is tested.
The 5% critical value for the ADF statistic is -3.45 (Fuller 1976)
The 5% critical value for stationarity around a level and around a deterministic linear trend are 0.463 and 0.146, respectively.

Table 2 : Optimum Lag Structure using Akaike's Final Prediction Error Criterion

	Dependent Variable	
Own Lags	ERP	CC
0	0.0085	0.0422
1	0.0087	0.0451
2	0.0080	0.0530
3	0.0083	0.0622
4	0.0089	0.0594
5	0.0086	0.0528
6	0.0090	0.0590
7	0.0092	0.0566
8	0.0096	0.0569

ERP and CC are the equity risk premium and consumer confidence, respectively.

Table 3: Toda-Yamamoto Test Results and Misspecification Diagnostics

	Wald	JB	LM1	LM2	LM3	RR
ERP	0.629 (0.448)	0.556 (0.722)	0.790 (0.684)	0.962 (0.560)	1.098 (0.492)	0.015
CC	18.930 (0.014)	0.649 (0.538)	0.512 (0.337)	0.873 (0.274)	0.810 (0.158)	0.046

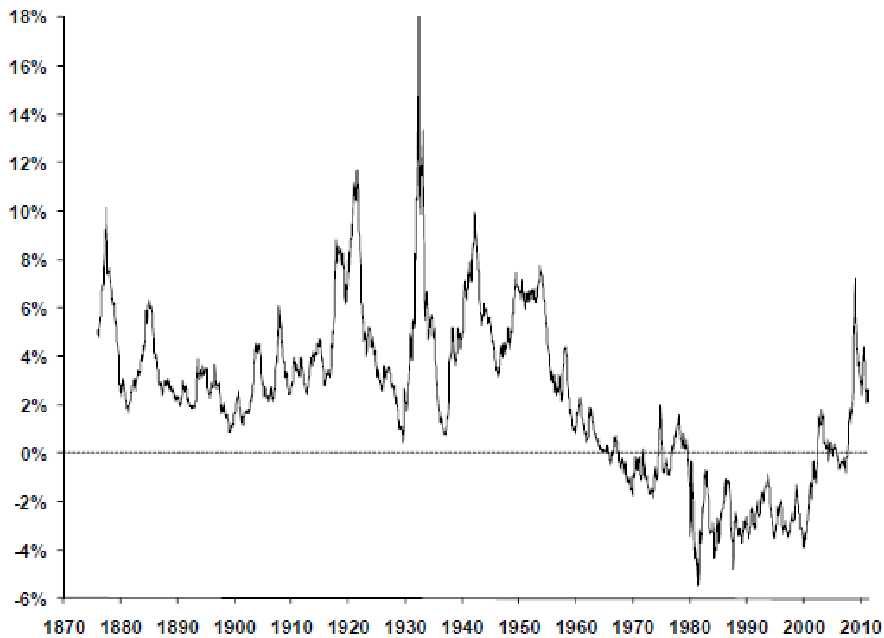
The figures in parentheses are p-values.

Table 4: Bootstrap Test Results

	Wald Statistic
ERP causes CC	0.0832 (0.424)
CC causes ERP	0.0676 (0.018)

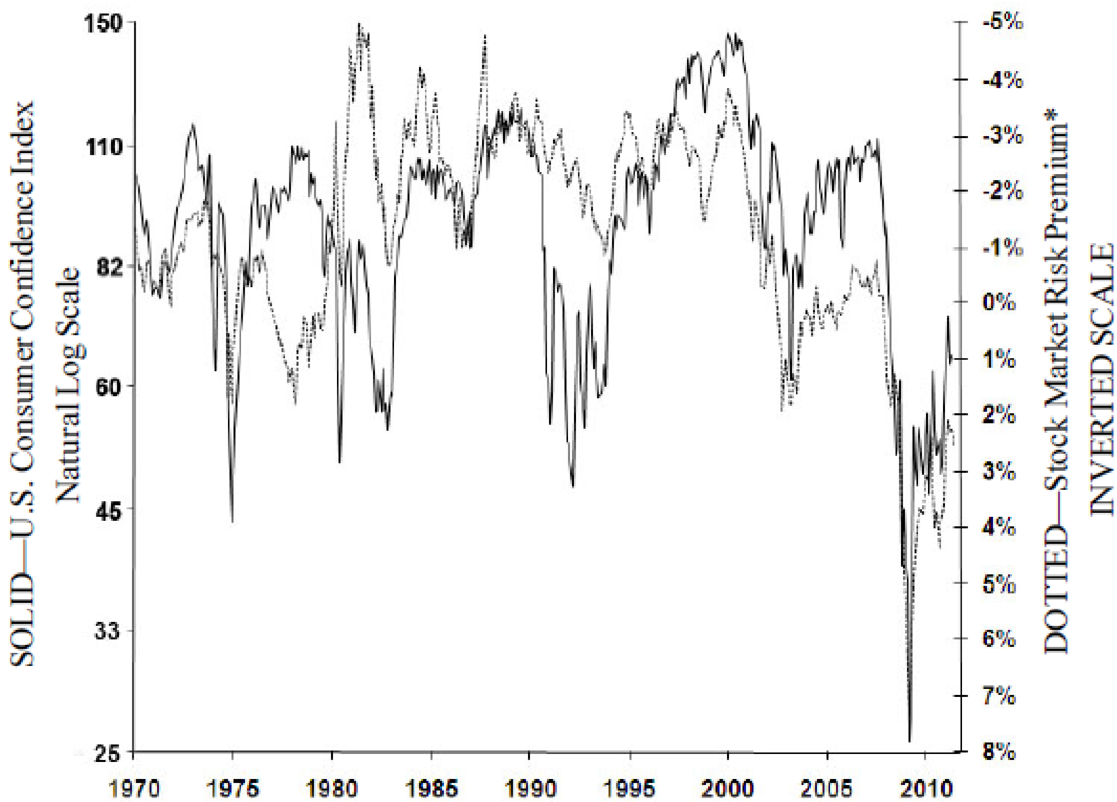
The figures in parentheses are the p-values.

Figure 1: US Stock Market Risk Premium* (1870-2011)



Note: S&P 500 Earnings Yield (based on the average trailing 60-month reported earnings per share) less 10-year Treasury Bond Yield

Figure 2: Consumer Confidence Index vs. Stock Market Risk Premium



Note: S&P 500 Earnings Yield (based on the average trailing 60-month reported earnings per share) less 10-year Treasury Bond Yield.