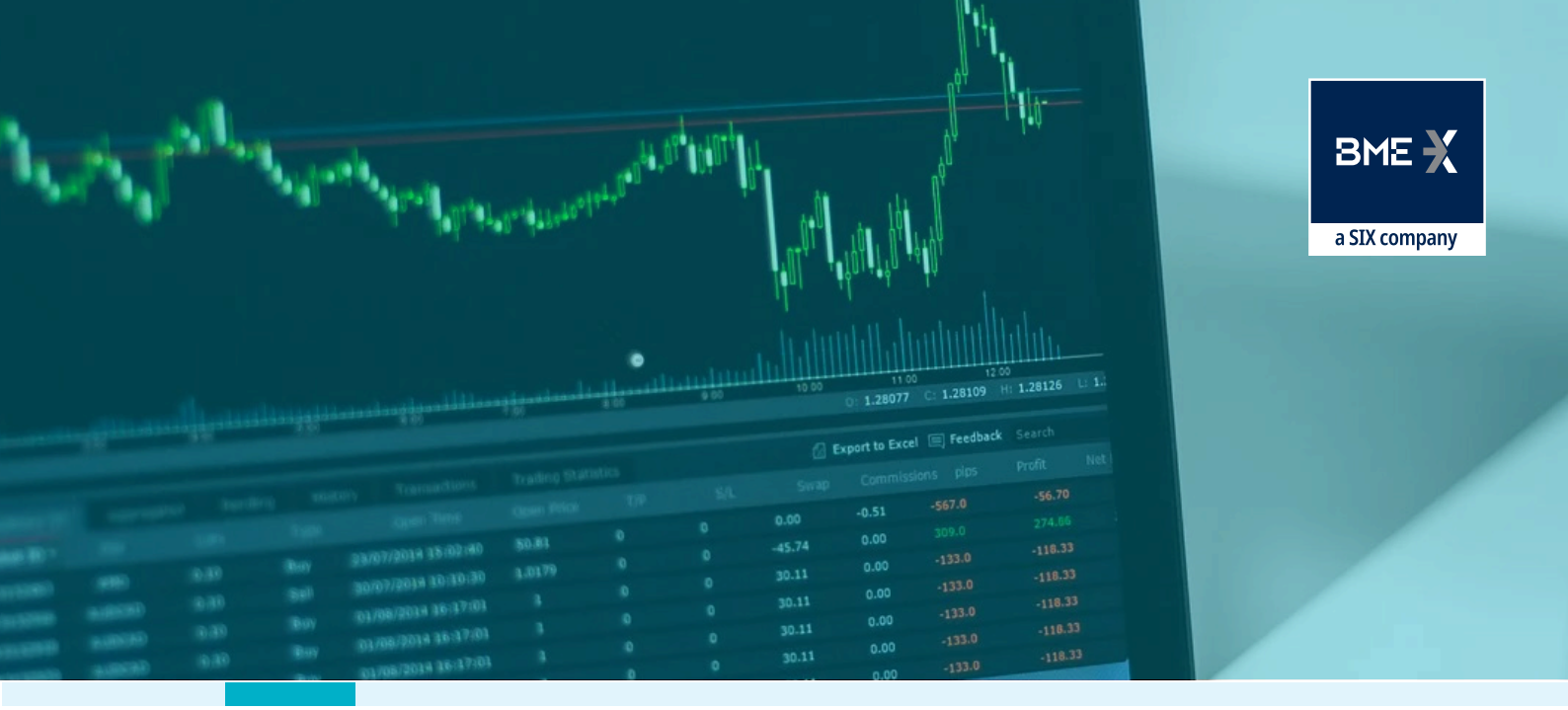

TIME-VARYING RISK AVERSION AND THE **EXPECTED MARKET RISK PREMIUM** IN THE SPANISH STOCK EXCHANGE

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ABSTRACT

The relevance of risk aversion as the key factor explaining the fluctuations of the economy is receiving increasing attention since the Great Recession. The role of financial shocks in the economic fluctuations and their associated amplifying effects are crucial aspects in the monetary policies followed by central banks around the world. The underlying mechanism behind these effects is directly linked to the time-varying behavior of risk aversion, especially during recessions. The reason is that risk aversion is strongly related to the behavior of the expected market risk premium, which is a fundamental input in the cost of capital and investment decisions of firms through the business cycle. In this research, we present an analysis of the interplay between the expected market risk premium, time-varying risk aversion, and economic uncertainty for the Spanish economy. We estimate risk aversion from aggregate consumption of Spanish households, while the expected market risk premium is extracted from options traded on the IBEX-35 index. Note that we put together variables from the real economy and financial markets. We show that both variables are positive and significantly related, clarifying the important connection between the real and financial sectors of the Spanish economy. More precisely, we show that both risk aversion and the expected market risk premia at alternative horizons are counter-cyclical, and that the slope of the term structure of the expected market risk premium is steeply downward sloping during recessions. Moreover, we find that risk aversion significantly amplifies the effects of adverse economic uncertainty shocks on the expected market risk premium. Therefore, it should not be surprising the collapse of financial prices when there is shock in uncertainty amplified by the increase in risk aversion. The corresponding rise in the expected market risk premium explains the drop in equity prices during bad economic times. The persistence of these effects depends on the nature of the economic crisis. In this framework, we understand both the initial dramatic drop in asset prices provoked by the exogenous COVID-19 crises, and the subsequent recuperation. To conclude, the positive association between uncertainty shocks, risk aversion and the expected market risk premium has extremely important consequences for the investment and output growth fluctuations of the Spanish economy.

AVERSIÓN AL RIESGO VARIABLE EN EL TIEMPO Y PRIMA DE RIESGO ESPERADA DEL MERCADO EN LA BOLSA ESPAÑOLA

RESUMEN

La relevancia de la aversión al riesgo como el factor explicativo clave de las fluctuaciones económicas está recibiendo una atención creciente desde la Gran Recesión. El papel de las perturbaciones financieras y sus asociados efectos amplificadores son aspectos cruciales en las políticas monetarias seguidas por los bancos centrales de todo el mundo. El mecanismo subyacente detrás de estos efectos está directamente ligado al comportamiento cambiante de la aversión al riesgo a lo largo de los ciclos económicos, especialmente durante recesiones. La razón es que la aversión al riesgo está fuertemente relacionada con la prima de riesgo esperada del mercado que es un input fundamental del coste de capital y de las decisiones de inversión empresariales a lo largo del ciclo económico. En este trabajo, presentamos un análisis para la economía española sobre la interacción entre la prima de riesgo esperada del mercado, la aversión al riesgo variable en el tiempo y la incertidumbre económica. Estimamos la aversión al riesgo utilizando datos agregados de consumo de los hogares, mientras que la prima de riesgo esperada del mercado se extrae de los precios de las opciones sobre el IBEX-35. Así, ponemos en común dos variables procedentes de la economía real y de los mercados financieros. Mostramos que ambas variables están positiva y significativamente relacionadas, lo que clarifica la importante conexión entre los sectores financieros y reales de la economía española. De forma más precisa, mostramos que tanto la aversión al riesgo como la prima de riesgo esperada del mercado a diferentes horizontes son contra cíclicas y que la pendiente de la estructura temporal de las primas del mercado presenta una fuerte pendiente negativa durante recesiones. Además, encontramos que la aversión al riesgo amplifica de forma significativa los efectos adversos que las perturbaciones asociadas a la incertidumbre económica tienen sobre la prima de riesgo esperada del mercado. Por tanto, no debería resultar sorprendente el colapso de los precios de activos financieros cuando se produce una perturbación de incertidumbre amplificada por la aversión al riesgo. La correspondiente subida en la prima de riesgo explica la caída de los precios durante tiempos económicos malos. La persistencia de estos efectos depende de la naturaleza de las crisis económicas. Bajo este contexto, entendemos tanto la dramática caída inicial en los precios de los activos provocada por la crisis exógena del COVID-19, como su posterior recuperación. A modo de conclusión, la asociación positiva entre los shocks de incertidumbre, la aversión al riesgo y la prima de riesgo esperada del mercado tiene consecuencias extremadamente importantes para las fluctuaciones de la inversión y la producción de la economía española.

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1. INTRODUCTION

Macro-finance is the area of Economics that relates the time-varying behavior of expected risk premia with economic fluctuations. It deals with the back-and-forth interactions between financial markets and the real economy. Under this overall framework, we initially estimate the time-varying risk aversion in the Spanish economy from private consumption data and habit-based preferences. We show that both the level and the annual growth of risk aversion are highly counter-cyclical over the business cycle. Then, we estimate the expected market risk premia at different horizons using option prices on the IBEX-35 index. The expected market risk premium is a key variable for the cost of capital of any firm. We show that, on average, the slope of the term structure of expected market risk premia is downward sloping, and that becomes steeply downward sloping during bad economic times. Furthermore, we obtain a positive and significant relation between the expected market risk premium and risk aversion independently of the horizon. Finally, we find that risk aversion significantly amplifies adverse shocks from economic policy uncertainty establishing an important connection between the real and financial sectors in the Spanish economy.

The rest of the paper proceeds as follows. In Section 2, we estimate time-varying risk aversion, and in Section 3 we present the option-implied expected market risk premium. In Section 4, we study the effects of shocks of uncertainty and risk aversion on the expected market risk premium and on the slope of the term structure of equities. Finally, Section 5 concludes.

2. ESTIMATING RISK AVERSION IN THE SPANISH ECONOMY

We estimate time-varying risk aversion for the Spanish economy using the theoretical framework of Campbell and Cochrane (1999), where economic agents obtain utility from consumption relative to their level of habit associated with their past consumption. This very rigorous and well-sounded approach allows us to connect naturally Macroeconomics and Finance, which is the underlying topic of this paper. More specifically, we relate risk aversion, estimated form consumption data, and the expected market risk premium obtained from options traded on the IBEX-35 stock market index. To the best of our knowledge, this is the first empirical exercise carried out with Spanish data along these simultaneous dimensions.

As the main consumption data, we employ the private final seasonal adjusted real consumption expenditure denominated in euros obtained from https://fred.stlouisfed.org. Data are quarterly frequency and go from the first quarter of 1995 to the third quarter of 2020. For robustness, we also employ the quarterly private consumption expenditure of Spanish households done both in Spain and abroad, and also the quarterly nondurable consumption expenditure of Spanish households done in Spain. Both series are obtained from https://ine.es.

This procedure generates the quarterly series of the aggregate time-varying risk aversion for the Spanish economy from the first quarter of 1996 to the first quarter of 2020. Figure 1 shows the time-series of risk aversion. Bars represent official recession dates of the Spanish economy[1]. The average risk aversion level is 5.29. As expected, the level of risk aversion follows closely the business cycle of the Spanish economy. It shows a continuous increasing pattern from the fall of 2007 to reach its highest level of 7.84 in the third quarter of 2013. Then, risk aversion declines until the shock produced by the COVID-19. There is a very rapid and striking increase during the first quarter of 2020 going from 6.05, at the end of 2019, to 7.76 during the initial months of the pandemic. Figure 2 displays the surplus consumption ratio of the Spanish economy, which the inverse of the level of risk aversion and is defined as difference between the level of consumption and habit as a percentage of consumption. Of course, it follows just the opposite pattern reflecting that the surplus consumption is a strongly related recession variable. During bad times, the level of consumption falls to get close to the previous level of habit of the representative Spanish economic agent.

1 The official recession dates of the Spanish economy are published by the Spanish Business Cycle Dating Committee at http://www.asesec.org/CFCweb/index.php/en/.Warwick (2000).

As a robustness check, in Figure 3 we show the risk aversion estimated with the three measures of consumption data: the private final seasonal adjusted real consumption expenditure (Risk Aversion FRED), the private consumption expenditure of Spanish households done both in Spain and abroad (Interior-Abroad), and the nondurable consumption expenditure of Spanish households done in Spain (Non-durable). The average levels of risk aversion are 5.29, 4.02, and 3.94, respectively. More importantly, the pattern over the business cycle is very similar across the three measures, although risk aversion estimated with nondurable consumption increases more rapidly during the Eurozone crisis.

FIGURE 1. TIME-VARYING RISK AVERSION OF THE SPANISH ECONOMY: I:1996-I:2020

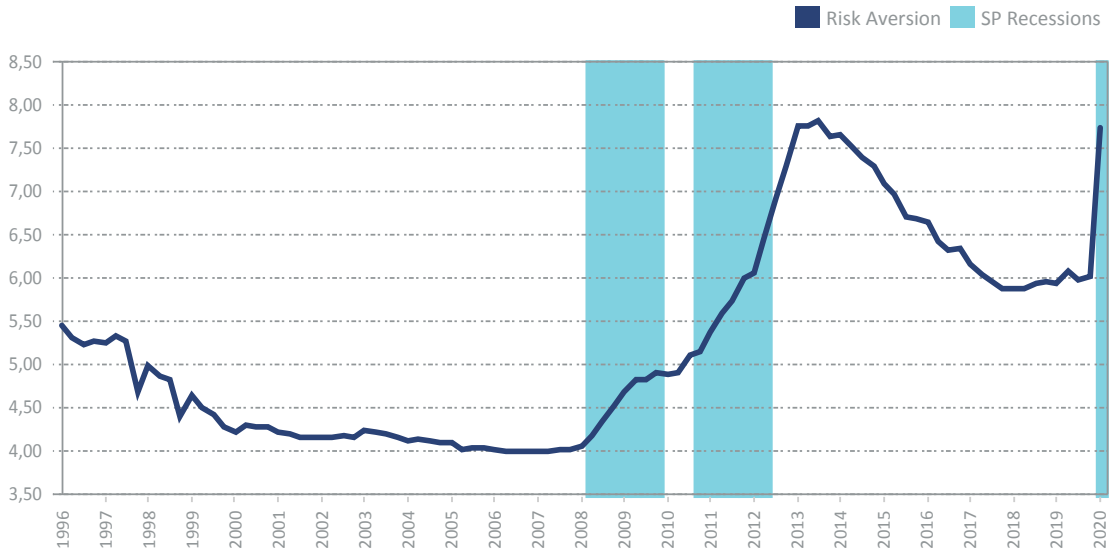


FIGURE 2. THE SURPLUS CONSUMPTION RATIO OF THE SPANISH ECONOMY: I:1996-I:2020

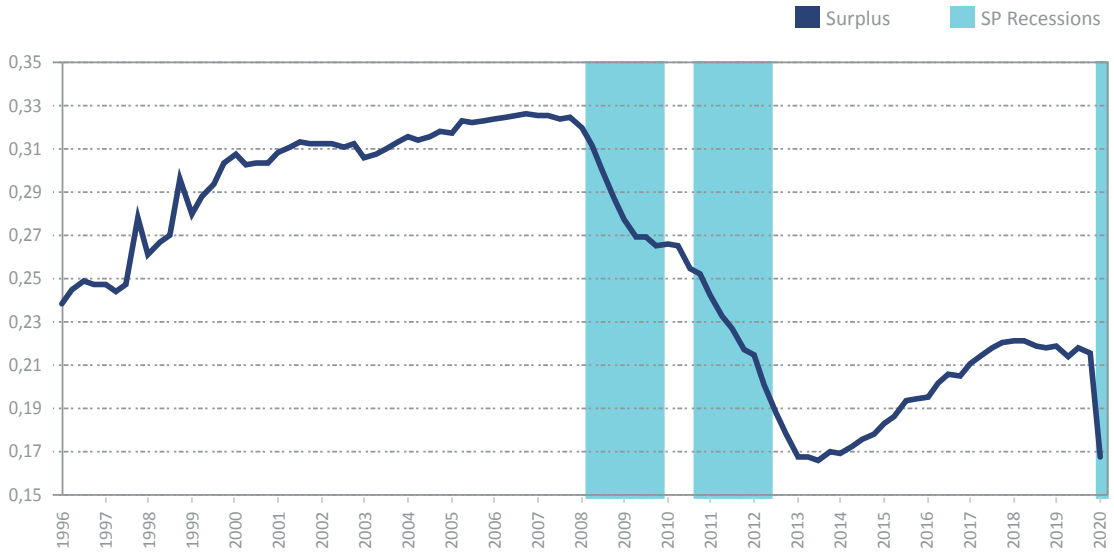
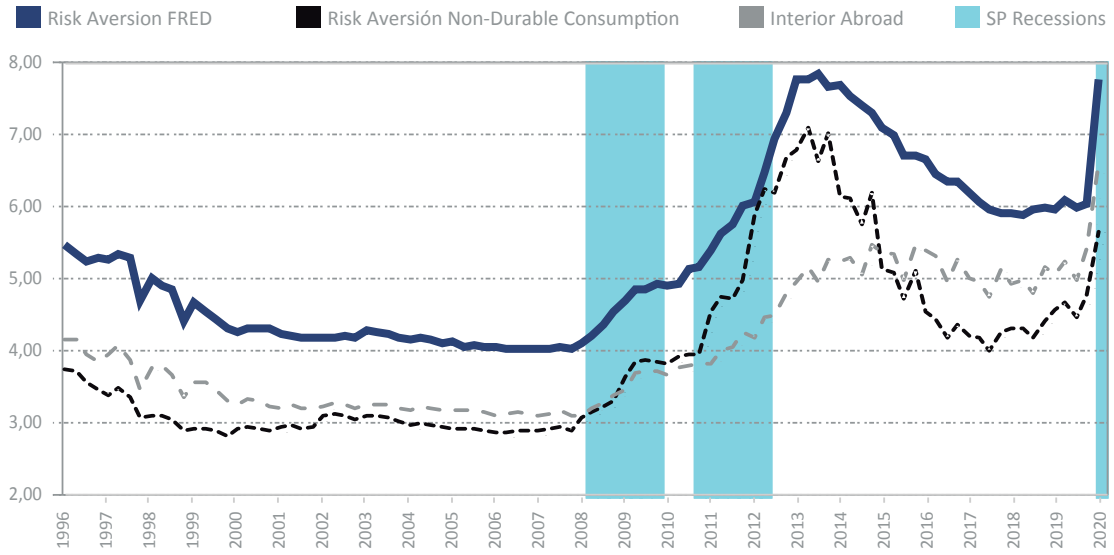
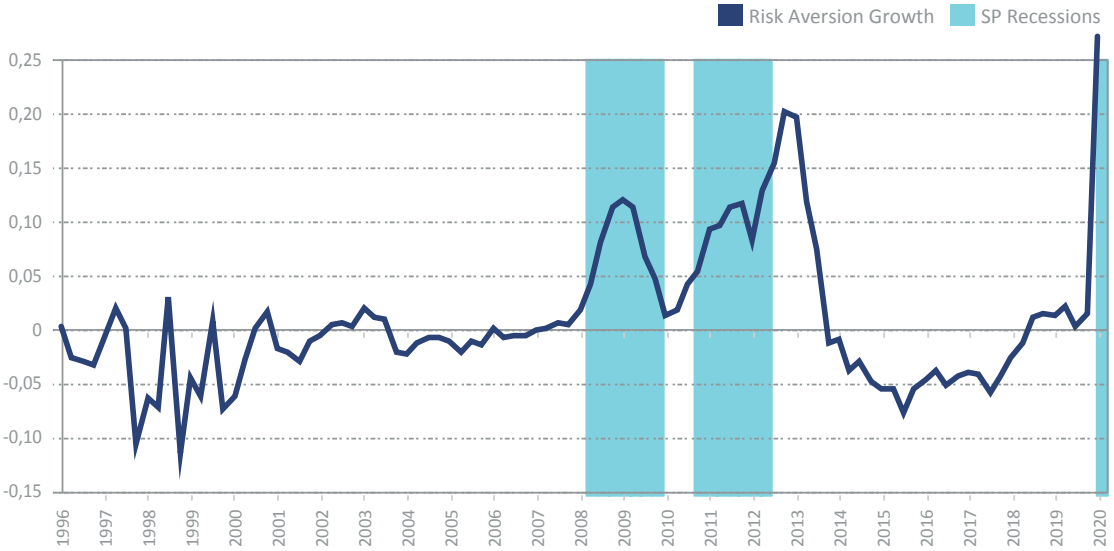


FIGURE 3. TIME-VARYING RISK AVERSION OF THE SPANISH ECONOMY FOR ALTERNATIVE CONSUMPTION MEASURES: I:1996-I:2020



Finally, in Figure 4 we show the annual growth of risk aversion at quarterly frequency[2]. The average annual growth during the full sample period is 0.77%. The growth rate of risk aversion rises at the beginning of recessions. It shows a rather volatile behavior at the beginning of the sample period associated with the international Asian currency crises, the debt Russian default, and the turn of the century with the dot.com bubble crash. After the international period of risk appetite, we see the increasing risk aversion growth related to the Great Recession, and especially to the Eurozone debt and credibility crisis. Finally, there is a striking jump in the growth rate associated with the exogeneous shock of the COVID-19.

FIGURE 4. ANNUAL GROWTH RATE OF TIME-VARYING RISK AVERSION OF THE SPANISH ECONOMY: I:1996-I:2020



2 From now on, all the results employ the risk aversion measure from the consumption FRED data.

This is the first available evidence of the time-varying behavior of risk aversion for the Spanish economy. For a useful comparison, in Figure 5 we show the annual growth rates of risk aversion for Spain and the U.S. economies. Although, the patterns of both growth rates follow the business cycle performance of both economies, relevant differences are noticeable. The average and volatilities of the growth rates are higher for the U.S. market. These are 0.77% and 6.61%, and 1.28% and 12.7% for Spain and the U.S., respectively. The correlation coefficient is 0.61. The U.S. market shows the expected increasing pattern during the official recession experienced in 2001, and the historical big jump of risk aversion associated with the financial crisis of 2008. It is interesting to note that the risk aversion in Spain experienced a much lower impact than in the U.S. during this period. Indeed, the risk aversion growth in Spain is much larger during the Eurozone crisis than during the Great recession, contrary to the rates shown for the U.S. Finally, there is an additional increase in the U.S. growth rate of risk aversion around the Presidential election at the end of 2016.

FIGURE 5. ANNUAL GROWTH RATES OF TIME-VARYING RISK AVERSION OF THE SPANISH AND THE U.S. ECONOMIES: I:1996-I:2020

3. ESTIMATING THE EXPECTED MARKET RISK PREMIUM IN THE SPANISH STOCK MARKET

A fundamental idea behind asset pricing models is the positive relation between expected risk premia of financial assets and risk aversion. In addition, this relation is especially important to understand economic fluctuations due to the impact that these variables have on the real economy[3]. Both key variables are accepted to be time-varying and counter-cyclical, and expected returns are probably the most important input into investment decisions. Note, of course, that expected returns represent the cost of equity capital for corporations. The predictability of the expected market risk premium is extremely difficult and even controversial. Recent literature on the estimation of the expected market risk premium has experienced great methodological advances. We take advantage of these new approaches.

We could think about the expected return that a financial asset has between today and a given date on the future. Hence, from this point of view, dividends strips would be appropriate assets if there were markets from which we could extract expected returns. It turns out that dividend futures for the S&P500 and other stock market indices are traded since 2003. The payoff depends exclusively on the dividend payments at expiration, so they play the same role zero-coupon bonds play on the zero-coupon yield curve. Dividend futures expired at the end of the year, and there are maturities up to seven years. Therefore, the availability of public data on dividend futures became very useful to empirically estimate expected returns. The recent paper by Gormsen (2021) is an excellent example of this literature.

In this section, we estimate the expected market risk premium in the Spanish stock market using a very different approach. More precisely, we use the option-implied approach developed by Martin (2017) rather than the more common approach based on dividend strips. From our point of view, this is reasonable since we want to estimate the total expected market risk premium, and not only the component of the expected return related to the expected dividend yield. As pointed out by Cochrane (2011, 2017), most of the variation in prices is due to changes in expected returns. Therefore, by using expected market returns we learn about changes in discount rates driven by risk aversion or uncertainty. For example, Gormsen and Koijen (2020) employ data from the dividend futures market to estimate growth expectations by maturity and find that the information of dividends is insufficient to explain the big drop in the stock market during the COVID-19 crisis. The intuition behind Martin's approach is easily explained by noting that we can extract the implied variance of market returns from option prices traded on the stock market index under a model-free framework. Then, the idea is just to impose the classic relation between the expected return and the variance of the asset.

Data are obtained from OptionMetrics IvyDB Global Indices database, which provides daily information of liquid options written on the main international stock market indices as the IBEX-35 index. Data frequency is daily and spans from October 11, 2006 to April 30, 2020 (3444 observations). The dataset includes the Great Recession, the Eurozone crisis, and the early stages of the recent COVID19 pandemic. From the model-free implied variance procedure, we obtain the expected market risk premium of the Spanish stock market index for 10 alternative horizons. Therefore, we can analyze not only the relation between the expected market risk premium and risk aversion at a given horizon, but also to explore the term structure of expected market risk premia in Spain.

Panel A of Table 1 contains the average expected risk premia for alternative horizons. On average, the expected risk premia are characterized by reasonable magnitudes from 6.3% at the shortest horizon and 4.6% at the longest. It is important to note that the expected market risk premium declines monotonically with the horizon. The same pattern is observed for the volatility of expected excess returns. This is consistent with the evidence reported by Rubio, Serrano, and Vaello-Sebastiá (2021) for the S&P 500, EURO STOXX 50, NIKKEI 225, and FTSE 100 stock market indices. However, the average expected risk premia at all

3 See Cochrane (2017) and the evidence reported by Bretscher, Hsu, and Tamoni (2021).

horizons are higher for the IBEX-35 than for these four markets. The magnitudes resemble more to the risk premia of EURO STOXX 50 and NIKKEI 225 than to the S&P 500 and FTSE 100. The volatility of the expected risk premia is comparable across the five stock markets, with slightly higher volatility for Japan across all horizons. This evidence implies that, on average, the term structure of expected market risk premia in Spain is downward sloping. Indeed, Panel B of Table 1 shows that, on average, this is the case for all horizons. The negative slope increases with the horizons. Again, a similar finding is reported by Rubio et al. (2021) for the four stock market indices mentioned above, although the average slope is higher for the IBEX-35, especially at longer horizons.

TABLE 1. AVERAGE EXPECTED MARKET RISK PREMIA FOR ALTERNATIVE HORIZONS AND THE TERM STRUCTURE OF THE EXPECTED MARKET RISK PREMIA

We use daily estimations of the lower bound of expected risk premia estimated from option prices following Martin (2017) for the IBEX-35 index from October 2006 to April 2020. In Panel A, we report the average expected market risk premium for a given horizon, and in parentheses the standard deviation of the expected risk premia. In Panel B we report the unconditional term structure of the expected market risk premium, and in parentheses the t-statistics for the mean adjusted for autocorrelation for the differentials between each horizon and one-month.

PANEL A	1 MONTH	2 MONTHS	3 MONTHS	4 MONTHS	5 MONTHS	6 MONTHS	9 MONTHS	12 MONTHS	18 MONTHS	24 MONTHS
IBEX 35	0.0626	0.0595	0.0579	0.0562	0.0550	0.0540	0.0518	0.0503	0.0480	0.0458
	(0.057)	(0.047)	(0.041)	(0.037)	(0.034)	(0.032)	(0.027)	(0.025)	(0.022)	(0.020)

PANEL B	2 - 1	3 - 1	4 - 1	5 - 1	6 - 1	9 - 1	12 - 1	18 - 1	24 - 1
IBEX 35	-0.0030	-0.0047	-0.0064	-0.0076	-0.0085	-0.0108	-0.0123	-0.0145	-0.0168
	(-4.36)	(-4.48)	(-4.64)	(-4.86)	(-5.04)	(-5.49)	(-5.83)	(-6.49)	(-7.14)

Figure 6 displays the time-varying and counter-cyclical behavior of the expected market risk premia at the one- and 12-month horizons for the IBEX-35. Data are at quarterly frequency, and the risk premia displayed are the average magnitudes of the daily expected market risk premia within each quarter. The highest peak occurs during the Great Recession, with similar magnitudes for the Eurozone sovereign crises and the COVID-19. In Figure 7, we show the differential pattern between the expected risk premia at the two horizons (i.e. 3- and 1-month differential, and 12- and 1-month differential). The slope becomes steeply downward during bad economic times. The sensitivity of the expected risk premia to economic or financial crises at the shortest horizon is very large. Not only the expected market risk premium is time-varying over the business cycle, but also the slope of the term structure of the expected market risk premium of the IBEX-35 is time-varying. However, although the expected market risk premium is counter-cyclical, the slope of the term structure is highly pro-cyclical.

FIGURE 6. OPTION-IMPLIED EXPECTED MARKET RISK PREMIA (EMRP) AT ONE- AND 12-MONTH HORIZONS (H) OF THE IBEX-35: IV:2006-I:2020

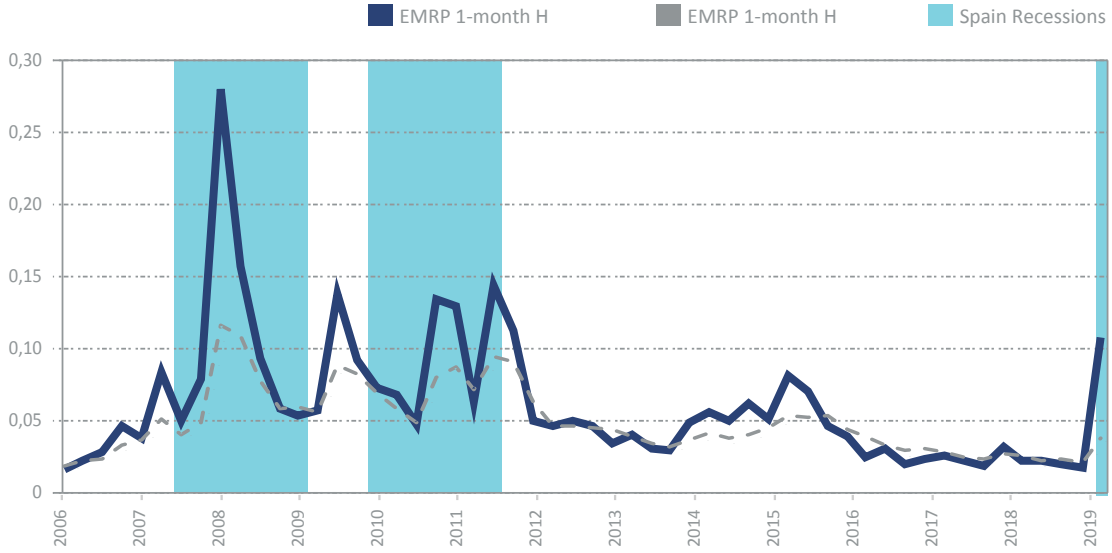


FIGURE 7. THE SLOPE OF THE TERM STRUCTURE (TERM) OF THE EXPECTED MARKET RISK PREMIUM DIFFERENTIALS BETWEEN THE 3- AND 1-MONTH HORIZONS, AND BETWEEN THE 12- AND 1-MONTH HORIZONS OF THE IBEX-35: IV:2006-I:2020

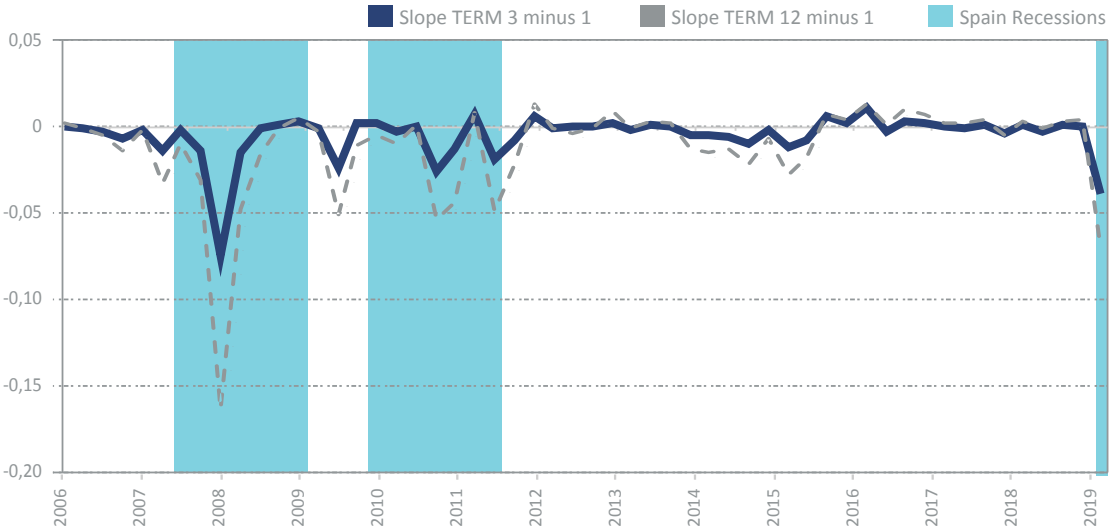
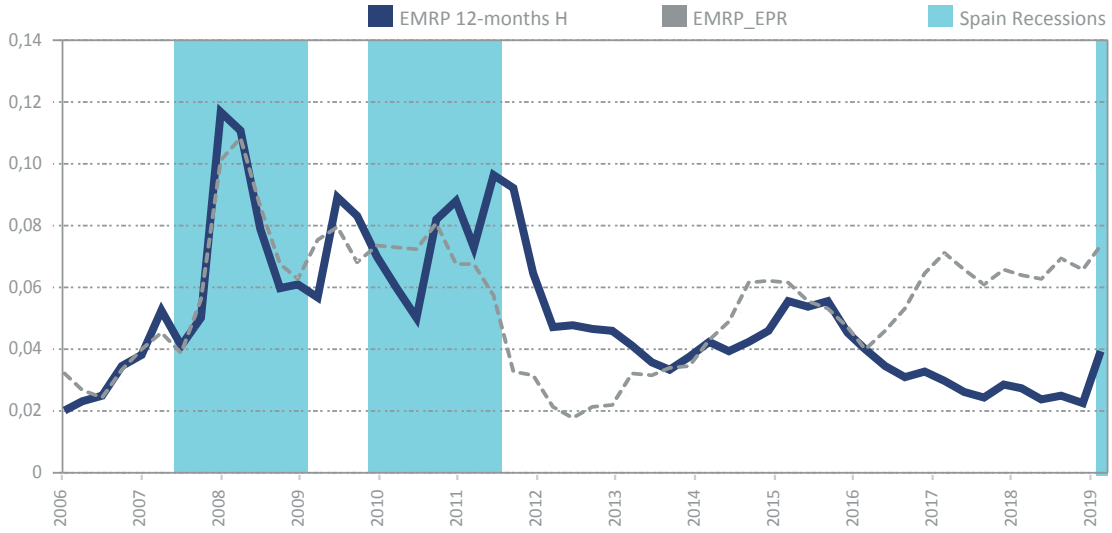


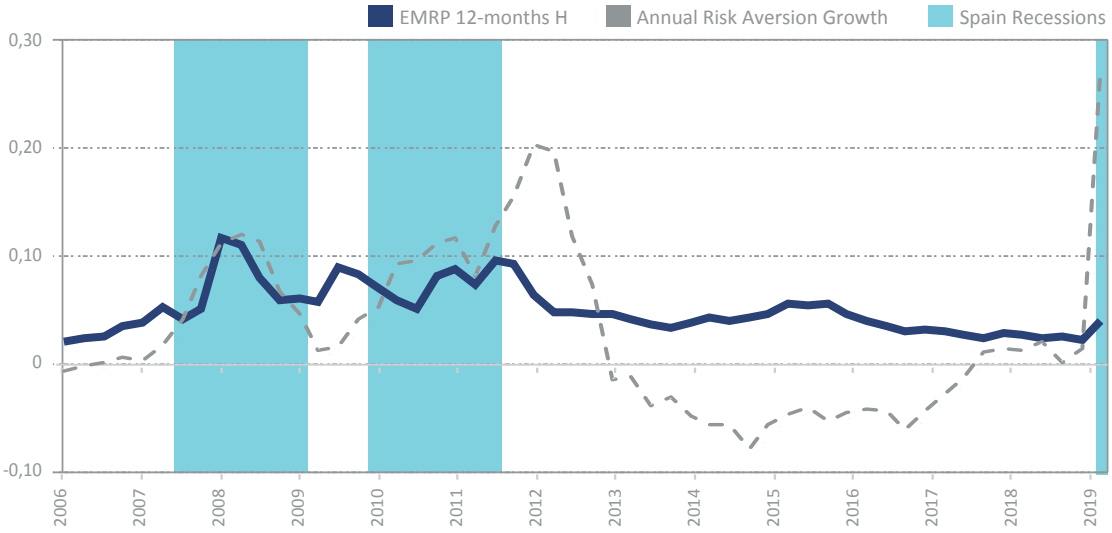
Figure 8 shows a comparison between the option-implied expected market risk premium at the one-year horizon and the earnings price ratio (EPR) over the risk-free rate. The earnings price ratio is simply the inverse of the PER for the IBEX-35. The average expected market risk premia are 5.01% and 5.44% with volatilities of 2.34% and 2.04% for the option-implied expectation and EPR, respectively. The option-implied risk premium tends to be higher during bad times relative to the EPR proxy. It is surprising how different is the level of these two proxies since December 2016. This finding reflects the historical low volatility experienced by the IBEX-35 during these years. Although this low volatility is translated into option prices and risk-neutral volatility, this is not the case for proxies based on earning yields. In addition, the difference may also be explained by the increase in the earnings per share obtained by Spanish firms during the last part of the sample.

FIGURE 8. OPTION-IMPLIED EXPECTED MARKET RISK PREMIUM (EMRP) AT THE 12-MONTH HORIZON (H) AND THE EARNINGS PRICE RATIO (EPR) OVER THE RISK-FREE RATE AS AN ALTERNATIVE PROXY OF THE EXPECTED MARKET RISK PREMIUM OF THE IBEX-35: IV:2006-I:2020



In Figure 9, we show the counter-cyclical expected market risk premium at the 12-month horizon together with the strong counter-cyclical annual growth rate of risk aversion. The expected market risk premium and the growth rate of risk aversion rise in every recession, but greater growth is attained by risk aversion during the summer and fall of 2012. Contrary to the expected market risk premium, it is interesting to observe that risk aversion does not start declining until the first semester of 2013, once the Euro crisis was controlled by European authorities. The relevant message implied in Figure 9 is the close relation between the expected market risk premium and risk aversion.

FIGURE 9. OPTION-IMPLIED EXPECTED MARKET RISK PREMIUM (EMRP) AT THE 12-MONTH HORIZON (H) OF THE IBEX-35 AND THE ANNUAL GROWTH OF RISK AVERSION OF THE SPANISH ECONOMY: IV:2006-I:2020



4. UNCERTAINTY AND THE AMPLIFYING EFFECTS OF RISK AVERSION ON THE EXPECTED MARKET RISK PREMIUM IN THE SPANISH STOCK MARKET

The price of risk, which is the compensation for supporting market risk, embeds risk aversion and economic uncertainty. Our next empirical analysis estimates not only the relation between risk aversion and economic uncertainty with the expected market risk premium, but also the potential amplified impact that risk aversion could have on the expected market risk premium over and above uncertainty shocks. Several recent papers, using data from the U.S. market, justify the interest on this issue. Nieto and Rubio (2021) show that risk aversion amplifies the effects of adverse shocks of economic policy uncertainty on the expected market risk premium extracted not only from option prices, but also from an out-of-sample prediction using the dividend yield, the slope of the term structure of interest rates, and the default premium as predictors. Bretscher, Hsu, and Tamoni (2021) show that risk aversion amplifies the output growth responses to financial and economic policy uncertainty shocks. Finally, Rubio et al. (2021), using local projection econometric techniques, estimate impulse-response functions to show that macroeconomic uncertainty shocks have significant effects on the expected market risk premium.

In this paper, as a proxy for uncertainty, we use the economic policy uncertainty indicator (EPU) for Spain proposed by Baker, Bloom, and Davis (2016), which quantifies the newspaper coverage of policy-related economic uncertainty. It counts the frequency of articles containing the words *uncertain* or *uncertainty*, *economy* or *economics*, and the following six policy words: *Congress, deficit, central bank, legislation, regulation, and government*. There is an increasingly popular literature on the relation and transmission mechanism between uncertainty and economic growth. Overall, there is a consensus that greater uncertainty leads to lower growth[4].

We first study the relation between the expected market risk premium at the one, 3-, 6-, 12-, and 24-month horizons, and the annual growth rate of risk aversion. In Table 2, we present the results that robustly show a positive and significant relation between expected risk premia and risk aversion in the Spanish market. The statistically significant slope coefficients, denoted as $\hat{\beta}_1$, show a monotonically declining pattern with the horizon, and the R-squared values range from 17.6% for the longest horizon to 24.9% for the 6-months and one-year horizons. This is slightly higher than the statistic for the shortest horizon. The results are convincing showing that approximately 25% of the variability of the expected market risk premia is explained by the time-varying behavior of risk aversion. It is important to point out that the real and financial economies seem to be significantly connected in Spain. While risk aversion is estimated from household consumption data, and expected returns from the option market, both variables show a positive and consistent relation.

4 See Bloom (2014) for a review article on uncertainty and real activity growth.

TABLE 2. THE RELATION BETWEEN THE EXPECTED MARKET RISK PREMIUM AND RISK AVERSION

This table provides the results of the following regression with quarterly data:
$E_t(R^e_{mT}) = \beta_0 + \beta_1 \Delta Raversion + \varepsilon_t$, where $\Delta\ Raversion$ refers to annual changes in risk aversion, estimated under the Campbell and Cochrane (1999) habit model, and $E_t(R^e_{mT})$ is the option-implied expected market risk premium (EMRP) at the one-, 3-, 6-, 12-, and 24-month horizons (H). The expected market risk premium is the lower bound estimated from option prices following Martin (2017). The sample period is from the fourth quarter of 2006 and the first quarter of 2020. The t-statistics, for heteroskedasticity and autocorrelation consistent HAC-based standard errors, are in parentheses.

	EMRP 1-MONTH H	EMRP 3-MONTHS H	EMRP 6-MONTHS H	EMRP 12-MONTHS H	EMRP 24-MONTHS H
β_0	0.0530	0.0503	0.0479	0.0454	0.0424
	(9.04)	(10.22)	(11.57)	(13.18)	(13.25)
$\hat{\beta}_1$	0.2981	0.2376	0.1938	0.1559	0.1086
	(2.86)	(2.84)	(2.82)	(2.77)	(2.42)
Adj. R^2	0.2284	0.2396	0.2491	0.2491	0.1757

As argued at the beginning of this section, the price of risk not only reflects risk aversion, but also integrates economic uncertainty. Our final analysis wants to capture not only the effect of economic uncertainty, but also the potential amplified impact that risk aversion could have on the expected market risk premium. We employ the log of economic policy uncertainty, which is obtained as the average for each quarter of the monthly uncertainty index for Spain provided at www.policyuncertainty.com (Baker et al., 2016).

The results are presented in Table 3. While the effect of uncertainty on the expected market risk premia disappears with the horizon, as shown by $\hat{\beta}_1$, the slope coefficient associated with the interaction term between risk aversion and uncertainty, given by $\hat{\beta}_2$, remains positive and statistically different from zero at all horizons. Even, when the uncertainty shock is relevant at the shortest horizons, the amplifying effect of risk aversion continue to be positive and statistically significant. We conclude that in Spain, the role of risk aversion in the stock market is extremely important because shocks in risk aversion amplify positive and significantly the effects of economic uncertainty on the expected market risk premia. In other words, risk aversion is a key driver of the expected market risk premium in the Spanish economy. This has relevant economic consequences because these effects are incorporated into the cost of capital of Spanish firms with the corresponding impact on investment and output growth.

TABLE 3. THE RELATION BETWEEN THE EXPECTED MARKET RISK PREMIUM, RISK AVERSION, AND ECONOMIC UNCERTAINTY

This table provides the results of the following regression with quarterly data:
$E_t(R^e_{mT}) = \beta_0 + \beta_1 LnUnc_t + \beta_2 (LnUnc_t \times \Delta Raversion_t) + \varepsilon_t$, where $\Delta Raversion$ refers to annual changes in risk aversion, estimated under the Campbell and Cochrane (1999) habit model, and $E_t(R^e_{mT})$ is the option-implied expected market risk premium (EMRP) at the one-, 3-, 6-, 12-, and 24-month horizons (H). The expected market risk premium is the lower bound estimated from option prices following Martin (2017). The sample period is from the fourth quarter of 2006 and the first quarter of 2020. The t-statistics, for heteroskedasticity and autocorrelation consistent HAC-based standard errors, are in parentheses.

	EMRP 1-MONTH H	EMRP 3-MONTHS H	EMRP 6-MONTHS H	EMRP 12-MONTHS H	EMRP 24-MONTHS H
$\hat{\beta}_0$	-0.0499	-0.0314	-0.0220	-0.0117	0.0011
	(-1.16)	(-0.77)	(-0.57)	(-0.35)	(0.04)
$\hat{\beta}_1$	0.0220	0.0175	0.0150	0.0122	0.0089
	(2.98)	(1.95)	(1.79)	(1.69)	(1.39)
$\hat{\beta}_2$	0.0594	0.0470	0.0382	0.0306	0.0210
	(2.74)	(2.70)	(2.67)	(2.61)	(2.25)
Adj. R^2	0.2433	0.2523	0.2652	0.2653	0.1788

5. CONCLUSIONS

This paper contributes to the overall knowledge of the Spanish economy by estimating time-varying aggregate risk aversion and the option-implied expected market risk premium. This is the first empirical evidence available for these two key variables estimated with Spanish data. Importantly, risk aversion is generated from consumption data and the expected market risk premium from option prices. On average, the slope of the term structure of expected market risk premia is downward sloping. More importantly, the slope becomes steeply downward sloping during bad economic times. When we analyze whether risk aversion is a significant driver of the expected market risk premium, we obtain a robust, significant, and positive relation between both variables. This is consistent with macro-finance asset pricing models. Moreover, our results suggest relevant connections between the Spanish financial and real sectors. Finally, we incorporate economic policy uncertainty of the Spanish economy into the analysis. Although, uncertainty is a significant driver of the expected market risk premium at the shortest horizon, the amplifying effects of risk aversion dominates the relation with the expected market risk premium. Time-varying risk aversion is an extremely important driver of the expected market risk premium in Spain. The precise consequences of this result for both output growth and optimal corporate financial decisions are important topics of future research.

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