The Coronavirus Impact on Stock Returns in Spain

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ABSTRACT

Asset price changes capture current aggregate expectations. Hence, the behavior of asset prices is a formidable tool regarding future expected outcomes of industry sectors and risk factors. In this paper, we analyze the significant differences on the impact of Covid-19 on prices across sectors and risk factors in the Spanish stock market. The empirical findings have important implications both, for policy and for investment strategies using traded stocks in the Spanish market. The financial and consumption service sectors present the worst relative performance during the first four months of 2020. On the other hand, the energy and consumption goods sectors, including pharmaceutical products and biotechnology, have positive market adjusted returns. Similarly, from an investment strategy point of view, and using data from both the Spanish and the U.S. market, risk factors related to momentum and quality stocks have an outstanding dynamic behavior between January 2 and March 31, 2020. Finally, growth stocks outperformed value stocks, although this result is stronger in the U.S. market than in the Spanish stock market.

RESUMEN

Los cambios en los precios de los activos financieros capturan expectativas agregadas actuales. En definitiva, el comportamiento de los precios de los activos es una formidable herramienta para señalizar los resultados esperados futuros de los sectores industriales y de los factores agregados de riesgo que cotizan en Bolsa. En este trabajo, analizamos las diferencias significativas del impacto del Covid-19 en los precios de los sectores que conforman los índices bursátiles en España, así como en los rendimientos de los factores de riesgo de la Bolsa española. Nuestros resultados contienen importantes consecuencias para decisiones de política económica e industrial y también aportan conocimiento más preciso sobre estrategias de inversión alternativas. Los sectores asociados a los servicios financieros y a los servicios de consumo presentan los peores resultados durante los primeros cuatro meses del 2020. Por otra parte, los sectores energéticos y, bienes de consumo, incluidos productos farmacéuticos y biotecnológicos, muestran resultados positivos une vez ajustados por el comportamiento del mercado. De forma similar, pero desde un punto de vista de inversión estratégica, los factores asociados al “momentum” y a los activos de “calidad” tienen un comportamiento dinámico excelente durante los peores momentos vividos por la Bolsa española entre enero y marzo de 2020. Finalmente, los activos “crecimiento” superan en resultados a los activos “valor”, aunque este resultado es más evidente en el mercado de Estados Unidos que en el mercado bursátil español.

1. Introduction

The outbreak of the new coronavirus and the associated pandemic has caused not only a dramatic impact on public health, but also an increasing concern about the short- and long-run economic consequences around the world.

This paper focuses on the short-run impact of the pandemic on the behavior of the Spanish Stock Exchange along two lines of analysis. We first briefly describe the consequences for the Spanish stock market indices, both the IBEX 35 and the Madrid Stock Exchange General Index (IGBM), and for the publicly available associated sector indices. Then, our analysis moves on to consider the impact of the crisis on risk factors for both Spain and the U.S. markets. Given the scarce empirical evidence regarding the new available risk factors for the Spanish Stock Exchange, we carry out the analysis relative to the performance of the same risk factors for the U.S. Moreover, it is important to analyze the sectors and the risk factors in the Spanish Stock Exchange because, as our evidence shows, the pandemic-associated drop in prices is very different across sectors and risk factors. This finding has important implications both, for policy and for investment strategies using traded stocks in the Spanish Stock Market.[1]

2. The behavior of the Spanish Stock Exchanges Indices

In a similar fashion to all stock exchanges around the world, the levels of the IBEX 35 and the Madrid Stock Exchange General Index (IGBM), comprise of 127 stocks, have fallen sharply and the volatility has spiked to levels last seen during the Great Recession. The impact of global and local uncertainty amplified by an abrupt increase in risk aversion has characterized the behavior of financial markets during the past two

[1] See the recent evidence provided by Ding, Levine, Lin, and Xie (2020) who analyze a sample of more than 6.000 firms across 56 countries to find a relation between corporate characteristics and stock prices reactions to the pandemic. Firms with healthier financial statements before the crisis, less exposure due to global supply chains, corporate social responsibility activities, and less entrenched executives suffer milder drops in prices.

months.[2] Panels A and B of Table 1 show a full period return from January 3 to April 29 of -26.9% and -27.4% for the IBEX 35 and the IGBM, respectively. The realized (annualized) volatility during the same period is 46.3% and 45.6% for the IBEX 35 and the IGBM, respectively. All sector indices for both the IBEX 35 and the IGBM have also been negatively affected, but, as expected given the nature of the crisis, not all sectors have been affected with the same intensity. These return differentials among sectors are an important signal for policy decisions regarding both, the near- and long-term future. The three available sector indices associated with the IBEX 35 show that the large Spanish banks suffer an enormous price decline with an overall return during the period of -42.3% and a volatility of 61.4%. Although the energy and construction sectors also present highly negative returns during the period with high volatility levels, the negative impact has not been as large as in the Spanish banks. Even though banks have more capital and liquidity than before the Great Recession, the resilience of the banks is once again tested. These strong declines in market capitalization suggest that investors across the world are concerned about the profitability and prospects for the banking sector in Spain.

[2] See Rubio and García (2020) for an analysis of the effects of risk aversion on the stock market during financial and economic crises.

Table 1. Descriptive Statistics of Spanish Stock Exchange Market Indices: January 3, 2020 to April 29, 2020.

PANEL A: IBEX 35				
	IBEX 35	IBEX Banks	IBEX Energy	IBEX Construction
Return	-0.2686	-0.4225	-0.1492	-0.1932
Annualized Volatility	0.4631	0.6143	0.4438	0.4560

PANEL B: MADRID STOCK EXCHANGE GENERAL INDEX (IGBM)							
	IGBM	Energy & Oil	Manufac & Industry	Consump. Goods	Consump. Servicies	Finance	Tech. & Communi.
Return	-0.2738	-0.1123	-0.2380	-0.1717	-0.4581	-0.4112	-0.2860
Annualized Volatility	0.4561	0.4631	0.5024	0.3838	0.6688	0.5934	0.4950

Figures 1.A and 1.B show the cumulative returns of the IBEX 35 and the three sector indices from January 2 to April 29, and the cumulative market adjusted returns for the sector indices. Cumulative returns started declining rapidly from the 24th of February onwards with the largest drop on the 12th of March. From March 20th onward the cumulative returns of all sectors remain rather stable until April 29th.

Figure 1.A. Cumulative Raw Returns for IBEX and Sector Indices

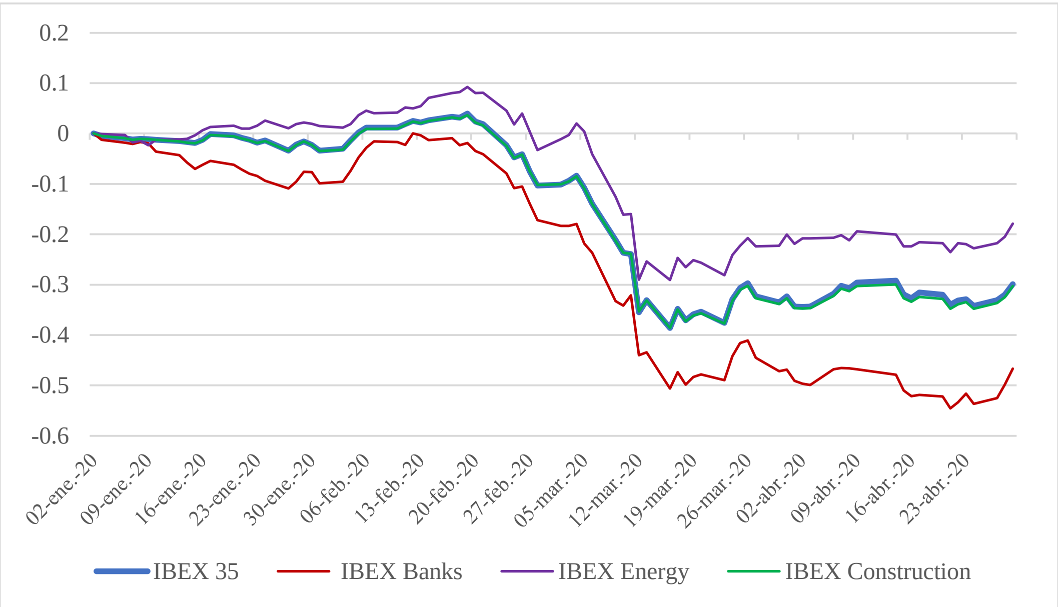
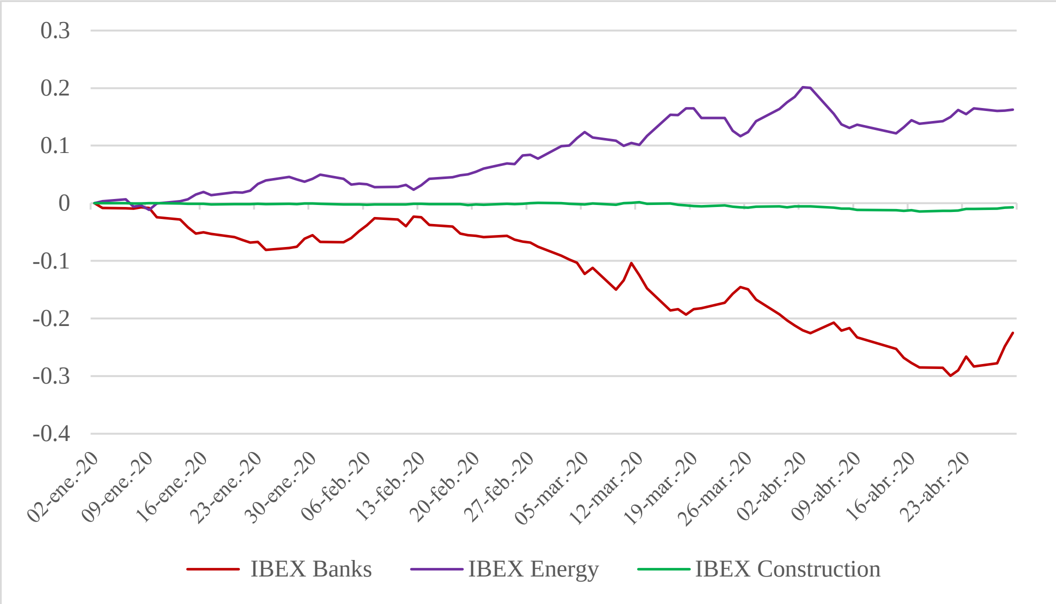


Figure 1.B. Cumulative Market (IBEX 35) Adjusted Returns for Sector Indices



All sectors suffer the same negative pattern, but as already mentioned, large Spanish banks display the worst behavior, while the Energy sector, comprised of utilities, oil and gas, and renewables, presents the relatively best performance. It is interesting to point out how closely the performance of the Construction and Infrastructures index follows the global IBEX 35 index. This distinctive cumulative behavior between the three sectors is even better appreciated in Figure 1.B, where we show the cumulative returns adjusted by the overall market. Again, the relative performance of the large Spanish banks is disturbing.

Fortunately, to preserve financial stability around the world, central banks have reacted quickly, and they have eased monetary policy by cutting policy rates and reactivated the programs already employed during the previous global financial recession. More precisely, they have announced plans to expand their provision of liquidity. In any case, there is a global agreement that monetary and liquidity provisions are not enough because this is a crisis about solvency and not simply about liquidity.

For this reason, fiscal policy becomes a crucial additional step in policy actions. These coordinated economic actions and the confinement policies followed by most countries in the world reduced the big initial shock in risk aversion. Approximately from March 20^{th} onwards, the cumulative returns have remained at stable levels, although the market adjusted behavior of the large Spanish banks shown in Figure 1.B present a continuous deterioration until April 20^{th}, 2020 when we observe a rebound in the market adjusted cumulative return.

The performance of six sector indices associated with the IGBM show obvious similarities, although it is convenient to discuss their performance given that the indices contain a more detailed compositions than in the case of the IBEX 35. Panel B of Table 1 show that the Finance sector, and the Consumption Services present the worst average performance among all sectors associated with the IGBM index. The Finance sector index includes banks, insurance, and financial and investment services. On the other hand, the Consumption Services index is comprised of leisure, tourism and catering, commerce, media and advertising, and transport and retail. The dynamic behavior of cumulative and market adjusted cumulative returns is shown in Figures 2.A and 2.B. The relative bad performance of these two sectors is very consistent throughout the sample period. On the other hand, Energy & Oil, and Consumption Goods have the best relative performance. The first index is comprised on oil, power and gas, and renewables, while the second index includes food and beverages, textile, clothing and shoes, paper and graphic design, and pharmaceutical products and biotechnology.

Figure 2.A. Cumulative Raw Returns for IGBM and Sector Indices

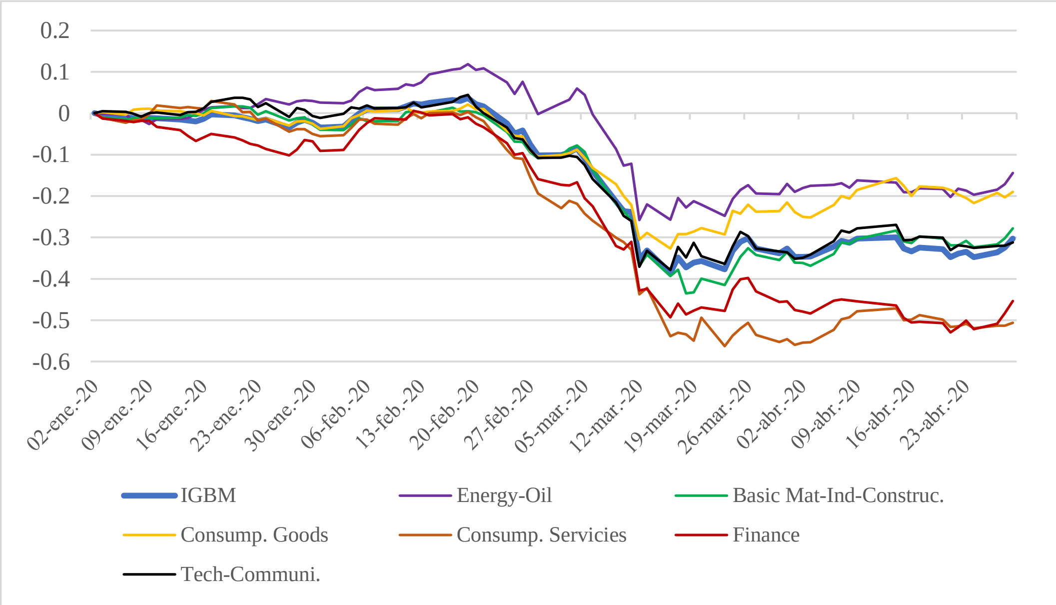
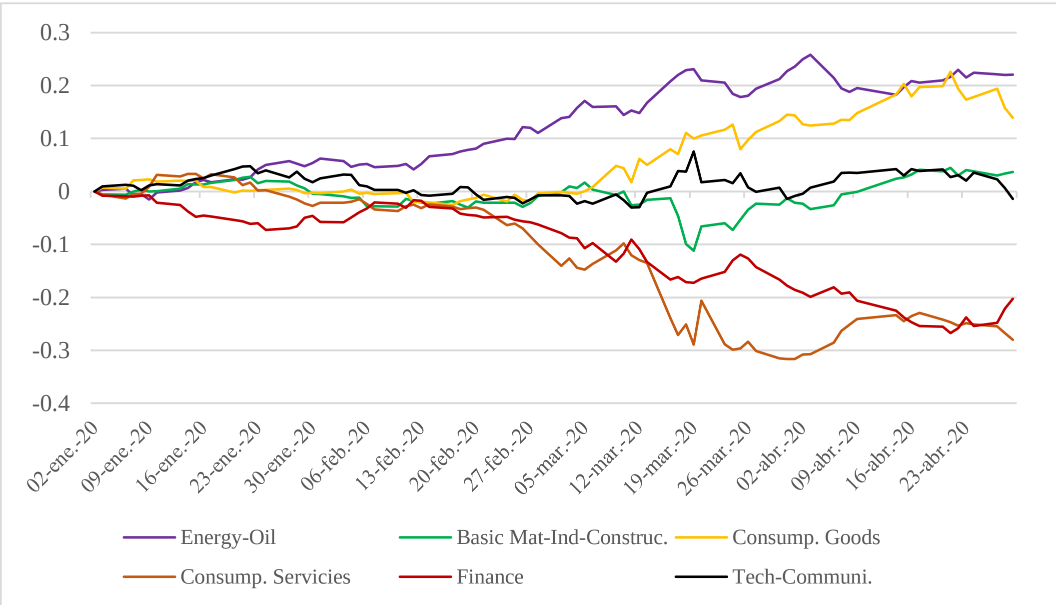


Figure 2.B. Cumulative Market (IGBM) Adjusted Returns for Sector Indices



Given these results, our exercise points out those sectors strongly negatively affected by the health crisis, but also signals the high uncertainty surrounding the impact of the future developments confronting these industries. Precisely the opposite conclusion applies directly to the Consumption Goods index. Policy actions should be aware of the strong signals provided by the stock markets both locally and around the world regarding the future of alternative industries and how new and unknown global risks affect them now, but also in the future.

3. The Volatility of the IBEX 35 (The VIBEX)

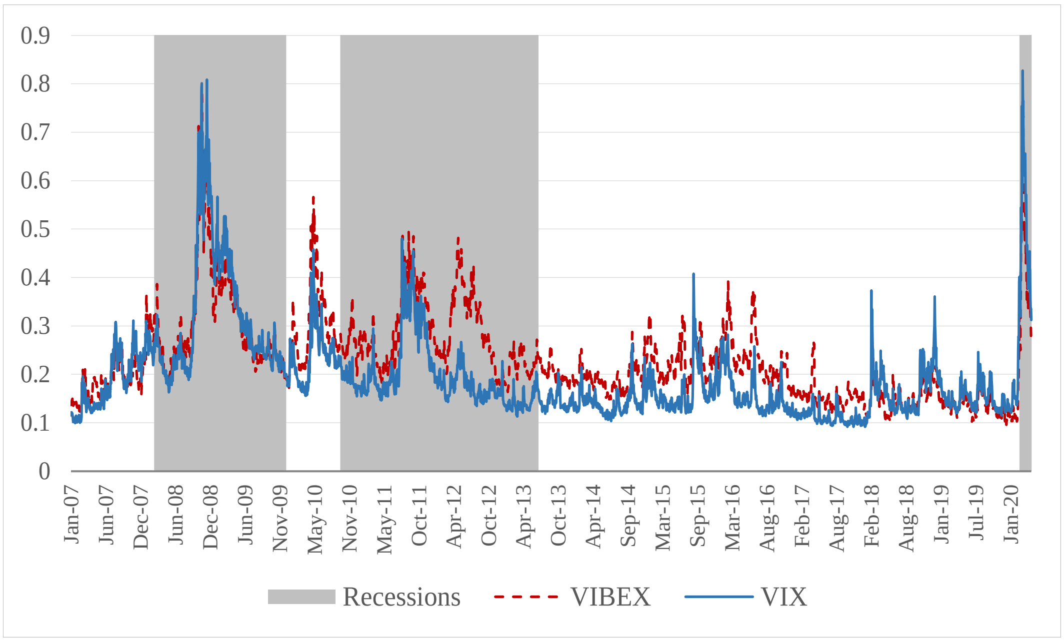
To describe the time-varying behavior of the volatility of the IBEX 35 throughout this crisis, we employ the risk-neutral volatility rather than the realized physical volatility. The Spanish risk-neutral equity volatility is known as VIBEX and it is available on daily basis since January 2, 2007. As for the VIX, which is the risk-neutral volatility of the U.S. market, it is computed by averaging the weighted prices of puts and calls on the IBEX 35. In the case of VIX, options on the S&P 500 Index are weighted by the inverse of the squared of strikes over a wide range of exercise prices. Hence, puts out-of-the-money are especially relevant in VIX, which explains why this volatility index is associated with expected fears embedded in the U.S. market. On the contrary, the VIBEX is estimated by weighting mainly at-the-money options. In any case, risk-neutral volatilities reflect a forward-looking measure or the expectation of volatility over the options expiration period. They have become an extremely popular and useful measures of future near-term market volatilities.

Figure 3 shows the daily behavior of the annualized VIBEX from January 2, 2007 to April 29, 2020, together with the VIX for comparative purposes. They follow a similar pattern, even though the level of the VIBEX remains above the level of the VIX from January 2010 to the end of 2017. It shows how strong the Eurozone sovereign debt crisis affected the Spanish economy. Recession bars for the Spanish economy are also displayed in Figure 3.[3] As expected, risk-neutral volatility is countercyclical, and spikes during recessions and economic crises. On daily basis, the minimum (9.6%) and

[3] These dates are obtained from the web page of the Spanish Economic Association at www.asesec.org/CFCweb/en/.

maximum (79.2%) levels for the VIBEX were reached on December 20, 2019 and October 27, 2008, respectively. The second (76.67%) and third (76.66%) highest levels of the VIBEX were reached on October 28, 2008 and March 16, 2020, respectively. Regarding the VIX the minimum (9.1%) and maximum (82.7%) levels were observed on November 3, 2017 and March 16, 2020, respectively. The maximum level during the Great Recession (80.1%) was reached on October 27, 2008. The highest peaks for Spain and the U.S. are quite similar both during the Great Recession and the current global health crisis. These similarities reflect the global uncertainty shocks in both episodes and the amplifying risk aversion effects in investors all over the world.

Figure 3. Annualized Risk Neutral Volatilities of the IBEX 35 (VIBEX) and the S&P 500 (VIX)

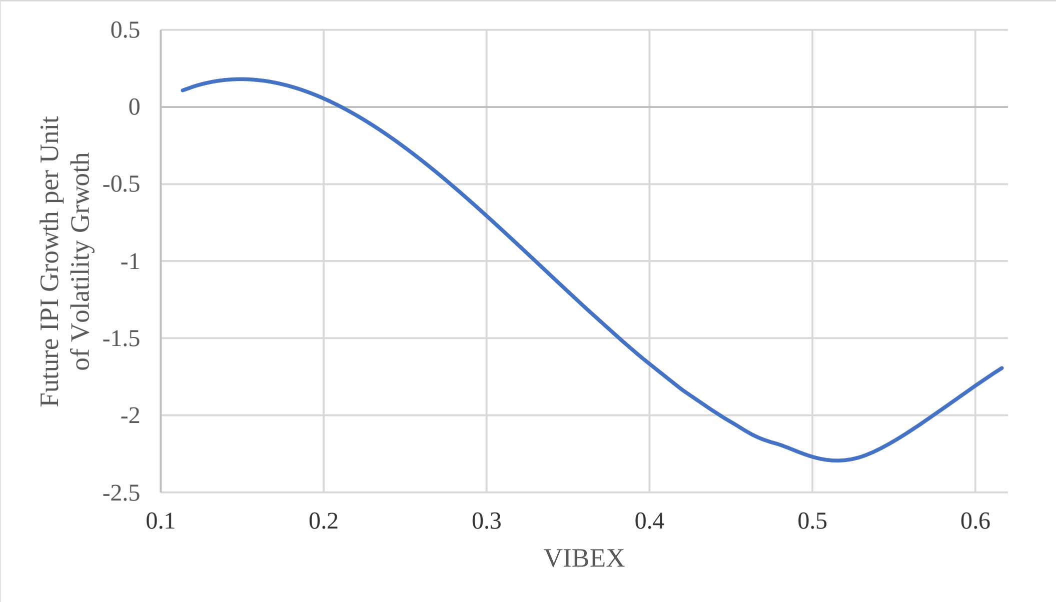


Given that these risk-neutral volatilities extracted from option prices are forward-looking volatilities, a very important application for the VIX has been its use as a predictor of future stock market returns or even future real activity.[4] Overall, these papers show the significant information content that the VIX has for a future near-term behavior of financial markets and the real economy. All these papers employ a linear relation between future market returns and current risk-neutral volatility. In a recent paper, Adrian, Crump, and Vogt (2019) show that the information content provided by the VIX for the future performance of the stock market is much stronger than previously reported, as long as we employ a nonlinear relation between future market returns and current risk-neutral volatility. If the VIX is below its median, future market returns are insensitive to the VIX. However, once the VIX is above its historical median, the expected market return (future realized returns) rises (drop) significantly. This finding is consistent with the flight-to-safety from stocks to bonds during bad economic times.

In Figure 4, we show the results of a similar analysis using the VIBEX as a predictor of future industrial production growth in Spain. We specify a nonlinear forecasting relation between future industrial production and the VIBEX using a 6-month horizon into the future. The estimated nonlinear forecasting relation generates the nonlinear pattern shown in Figure 4.

[4] Among other authors, Bollerslev, Tauchen, and Zhou (2009), Bekaert and Hoerova (2014), Nieto and Rubio (2014), and González-Urteaga, Nieto, and Rubio (2019) employ the VIX as a predictor of future market returns and real activity for the U.S. economy.

Figure 4. Six-Month Future Cumulative Industrial Production Growth and the VIBEX



The median of the VIBEX from January 2 to April 29, 2020 is 21.6%. Note that above its median, the VIBEX significantly forecast a reduction in the growth of industrial production during the following 6 months per unit of average volatility of production growth. When we move from the 21%-26% volatility range to the 26%-32% range, the higher the VIBEX, the more pronounced is the fall in future industrial production growth. Over the 32% volatility, the proportional drop in future industrial production is slightly less dramatic. The forecasting regression implies that, on average, if the VIBEX is around 30%, the growth of industrial production will fall around 2.7% during the following 6 months. But, if the VIBEX remains around 45%, then the fall in future industrial production may reach a 7.4% fall in the following 6 months.[5] By accounting for the nonlinear relation, the level of the VIBEX is a relevant indicator of future real activity. Note that the median of the VIBEX from April 6 to April 29, 2020 remained around 35%, although, since then, the VIBEX has been reduced to levels

[5] These numbers are obtained under the average volatility of the 6-month cumulative future industrial production growth from January 2007 to April 2020.

slightly above 29%. Volatility levels close to its historical median are important signals to be confident on the future of the economic recovery.

4. Risk Factors in the Spanish Stock Exchange

Risk averse investors are particularly concerned with investments that perform poorly in bad economic times. Factor asset pricing models like the popular CAPM or the Fama and French (1993, 2015) multi-factor models replace the macro-finance or consumption-based expression for aggregate marginal utility growth by a linear function of portfolio-based risk factors. These risk factors capture times of high marginal utility of consumption or, more simply, bad economic times, where each of them reflects a distinct flavor of a bad economic state. The multi-factor asset pricing literature has become the key reference argument for the so called "factor investing". The idea is that managed portfolios are not a combination of asset classes (stocks, corporate bonds, Treasury bonds, etc.). They are bundles of risk factors. As Ang (2014) points out, "asset management is not really about the management of assets, it is all about risk factors". Factor investing is an investment style that delivers relatively high returns over a long period of time. The earned risk premium is a consequence of supporting risk during the flavor of bad times characterizing each risk factor. The achieved risk premium associated with factor investing is not for free. On the contrary, risk factor can underperform, even very strongly, during their related bad economic times. Therefore, risky assets earn returns over the risk-free rate because they are exposed to underlying risk factors. This is the fundamental message of asset pricing and investment theory.

Financial theory and long investment experience have identified stocks that have consistently higher (or lower) average returns than the market portfolio. These are known as risk factors or dynamic factors because investors take a long position in stocks, which perform better than the market on average and offsetting with short positions in stocks with the opposite behavior. Therefore, the key insight of multi-factor asset pricing models is that a portfolio X earns, on average, more than other type of portfolio Y, not because the stocks in portfolio X have a particular characteristic, but because those stocks in portfolio X move together with an unobservable risk factor. And, therefore, they are compensated for their exposure to the bad time economic risk associated with that underlying factor. It is important to note that the market portfolio, by definition, has no exposure to dynamic risk factors.

The first multi-factor model is due to Fama and French (1993), who propose their well-known three-factor model with excess market returns, small minus big (SMB) returns, and high-value minus low-growth (HML) returns. On average, small companies tend to earn a higher return than big companies, so the factor SMB is the return differential between small and big firms controlling for value and growth characteristics.[6] Similarly, value firms tend to earn on average higher returns than growth firms. The factor HML is the return differential between value and growth companies controlling for size. Note that value are firms with relatively high book-to-market ratio, while growth stocks are characterized by relatively low book-to-market ratios. Therefore, value stocks have lower market valuations relative to the value of their equity in books, and the opposite occurs for growth stocks.[7] Fama and French (1993) classified all traded company each June by the ratio of book equity value divided by market value. They update both the numerator and the denominator at the end of each June, with the idea that the market knows by June the book equity value of all companies. Of course, the market value of the companies is known every day, so they could update the denominator of the ratio more often. However, they keep the yearly

[6] See Alquist, Israel, and Moskowitz (2018), for a discussion on the size effect.
[7] See Asness, Frazzini, Israel, and Moskowitz (2015) for a discussion on value investing.

updating for both the book equity and the market value of each company. Following Asness and Frazzini (2013), we also use the HML factor with monthly price updates in the book-to-market ratio rather than the original Fama-French (1993) HML factor. This is known as the HML Devil.[8]

Another popular risk factor is known as "momentum" and is due to Carhart (1997), who show that companies with high returns during the previous 12 months earn higher returns on average over relatively long sample periods than firms with low returns during the same previous year. Following the idea of Fama and French (1993), Carhart (1997) proposes the UMD (up minus down) factor to capture momentum. This factor is the return differential between companies with high returns and firms with low returns during the recent past controlling for size.[9]

We also employ the Betting against Beta (BAB) factor of Frazzini and Pedersen (2014). The BAB factor is the return differential between leveraged low-beta stocks and de-leveraged high-beta stocks. They show that by leveraging and delivering low- and high- beta stocks, the BAB factor turns out to be neutral with respect to the market portfolio, so the factor by construction is neutral to market risk. Therefore, the return differential provided by the BAB factor reflects the difference between low and high risky stocks. These authors show that leverage constraints in the economy are strong and significantly reflected in the return provided by this factor. Indeed, Frazzini and Pedersen (2014) argue that the positive and highly significant risk-adjusted returns relative to traditional asset pricing models shown by portfolios sorted by the level of market beta are explained by shadow cost-of-borrowing constraints. More recently, Asness, Frazzini, Gormsen, and Pedersen (2019) test whether the low-risk effect is

[8] Fama and French (2015) extended their 3-factor model to the 5-factor model with the profitability and investment aggressiveness factors.
[9] See Asness, Frazzini, Israel, and Moskowitz (2014) for a discussion on momentum investing.

driven either by borrowing constraints or behavioral effects. To this end, these authors propose the Betting against Correlation factor and show that U.S. and international data support borrowing constraints theories. This finding is consistent with the idea of the BAB factor is a robust proxy for funding liquidity.

Quality pricing and the associated investment strategies are receiving increasing attention among practitioners and academics. A recent line of research undertaken by Asness, Frazzini and Pedersen (2019, AFP hereafter) identifies a quality stock as an asset for which investors would be willing to pay a high price, which means that these stocks are simultaneously safe (low beta), profitable (high return on equity), growing (high cash flow growth), and well managed (high dividend payout ratio). The authors' quality minus junk (QMJ) factor, which buys high-quality stocks and shorts low-quality (junk) stocks, earns significant risk-adjusted returns not only in the U.S. market, but also in 24 other countries. In addition, the striking finding of AFP is that the QMJ factor displays large realized returns during downturns, which suggests that the quality-based factor does not exhibit bad-times risk. To summarize, the QMJ factor is the return differential between high- and low-quality stocks controlling for size.

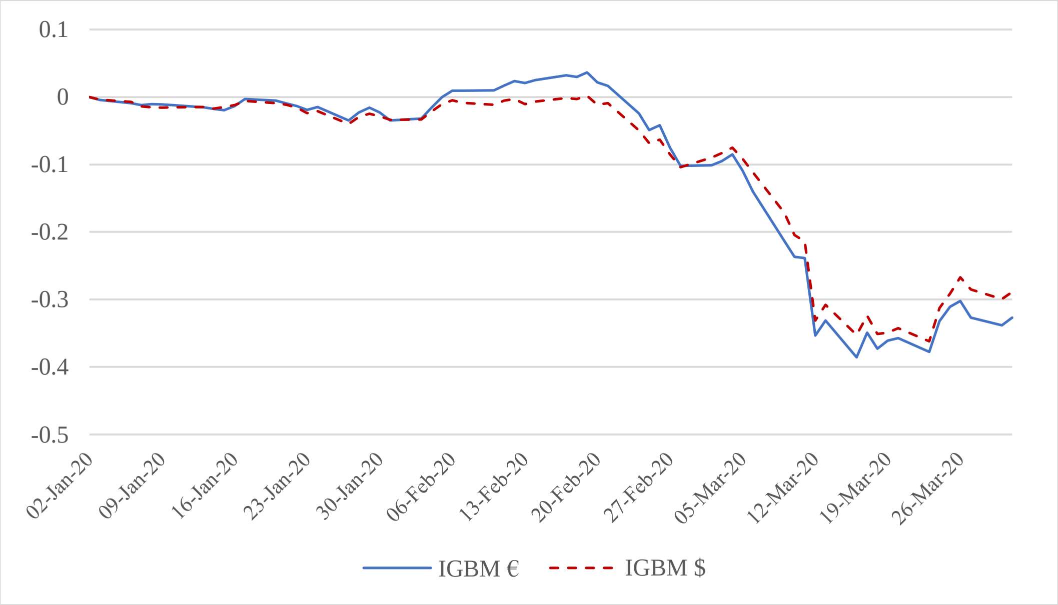
The QMJ factor is an important idea to better understand the popular value investing strategy. Imagine that you are a value investor, so you buy stocks with high book-to-market, which suggests that you like buying stocks relatively cheap. However, a reasonable question would be the following: does the stock looks cheap because it is cheap or because it deserves to be cheap.[10] If the investor goes ahead with the strategy of buying a low-price company, she may end up owing a flawed firm, which is known as the value trap. The key idea is that the value trap may be mitigated by focusing on the

[10] See Pedersen (2015) for a detailed discussion on these issues.

stocks with low price but quality characteristics at the same time. This is the concept of buying quality at a reasonable price or QARP strategy; the strategy of buying high quality at a discounted price. Therefore, as pointed out by AFP, value investing is buying based on prices irrespective of quality, while quality investing is buying and selling based on quality characteristics irrespective of price.

The data for the excess market return, SMB, HML, HML Devil, UMD, QMJ, and BAB factors are downloaded from the AQR Capital Management's database (www.aqr.com). They provide daily and monthly returns for these 7 factors for both the U.S and the Spanish market from July 1996 to March 2020. These returns are calculated with stock prices in U.S. dollars, so all returns are comparable with each other. In order to appreciate the difference between the returns in euros and dollars, Figure 5 shows the cumulative excess market returns (over the risk-free rate) for the IGBM provided in U.S. dollars by AQR Capital Management and the cumulative excess returns for the IGBM in euros. The sample period employs cumulative daily returns from January 2, 2020 to March 31, 2020. The results suggest that we can proceed with the data provided by AQR Capital Management without significant distortions due to the exchange rate.

Figure 5. Cumulative Returns for IGBM in € and $



We next perform a comparative analysis between the Spanish and the U.S. stock markets using the 7 risk factors described above. Using monthly data from July 1996 to March 2020, we first perform a long-period analysis to have an overall perspective of the behavior of the risk factors in both countries. Then, we focus our analysis on the short period that involves the Covid-19 crisis and analyze the behavior of the risk factors with daily data from January 2, 2020 to March 31, 2020.

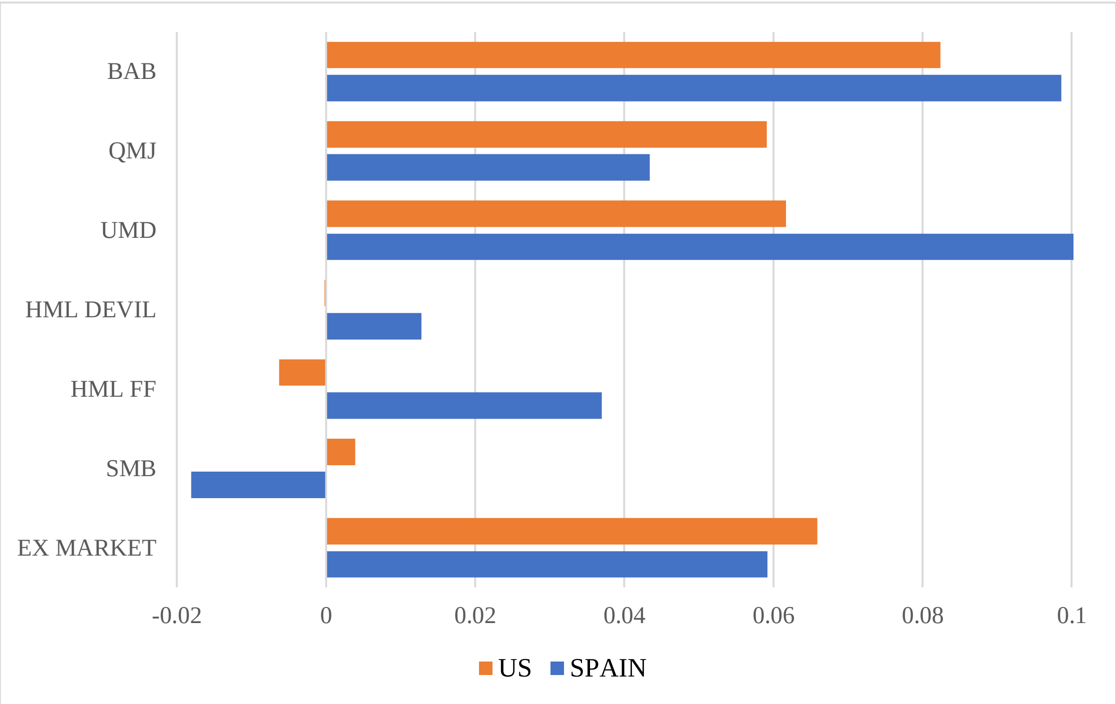
Using the long sample period, Panels A and B of Table 2 report descriptive annualized statistics for Spain and the U.S., respectively. The Sharpe ratio for the market risk premium is much higher for U.S. than for Spain. Even though, the average realized market risk premium is relatively similar in both markets, the volatility is clearly lower for the U.S. market. There are also differences in the average behavior of the other risk factors. The SMB factor performs better in the U.S. than in Spain, while the two HML factors show positive averages in Spain and negative in the U.S. The UMD, QMJ, and BAB factors present the best performance in both markets. The UMD and BAB factors show an impressive average performance in Spain, while the QMJ and

BAB factors are the best performer factors in the U.S. The QMJ factor performs better in the U.S. than in Spain. This comparison is illustrated in Figure 6.

Table 2. Descriptive Annualized Statistics for Factor Risks in Spain and in the U.S.: June 1996 to March 2020 (Data in U.S. dollars)

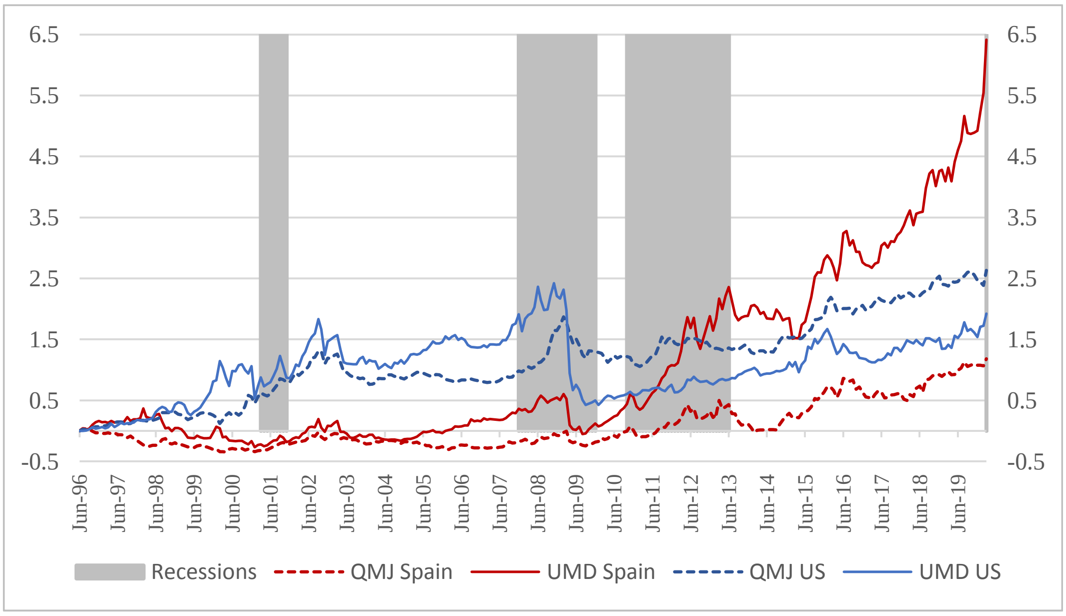
PANEL A: SPAIN	EXCESS MARKET	SMB	HML FF	HML DEVIL	UMD	QMJ	BAB
Mean	0.0592	-0.0181	0.0370	0.0128	0.1014	0.0434	0.0986
Volatility	0.2251	0.1245	0.1313	0.1428	0.1809	0.1450	0.1741
Sharpe Ratio	0.2630	-0.1454	0.2778	0.0896	0.5605	0.2991	0.5664
PANEL B: U.S.	**EXCESS MARKET**	**SMB**	**HML FF**	**HML DEVIL**	**UMD**	**QMJ**	**BAB**
Mean	0.0659	0.0039	-0.0063	-0.0002	0.0617	0.0591	0.0824
Volatility	0.1595	0.0967	0.1012	0.1404	0.1755	0.0969	0.1419
Sharpe Ratio	0.4134	0.0408	-0.0625	-0.0013	0.3514	0.6092	0.5805

Figure 6. Risk Factors in Spain and the U.S. Average Returns: June 1996 to March 2020



To compare the time-varying behavior of the UMD and QMJ factors between the two markets, Figure 7 displays their cumulative returns. Grey bars represents months of simultaneous recessions in Spain and the U.S. The behavior of the UMD factor in Spain is striking. It clearly dominates the other risk factors, but even more interesting is that the success of the UMD factor started during the Euro zone debt crisis. Moreover, the extraordinary performance of this factor during the last years of the sample period is accompanied the economic recovery of the Spanish economy. In fact, before the Great Recession, the two factors in the U.S. perform better than the same factors in Spain. It is important to point the large drop in returns experienced by the UMD factor in the U.S. market during the financial crisis.

Figure 7. The QMJ and UMD Factors in Spain and the U.S. June 1996 to March 2020



Panela A and B of Table 3 show the correlation coefficients among the risk factors for Spain and the U.S., respectively. The results for the U.S. market are consistent with the previous evidence reported by Fama and French (2015) and Asness (2014). The market risk premium is negatively (positively) correlated with SMB for Spain (the

U.S.), and negatively correlated with momentum, quality, and defensive stocks for both countries. The sign of the correlation between the market risk premium and the value-growth factor is positive for Spain, but it depends on how we define the factor for the U.S. With monthly updating of the price, the correlation becomes positive, while it is negative with respect to the traditional Fama and French (1993) HML factor. In fact, the main differences in factors' correlations between Spain and U.S. are due to the value-growth factors. They are negatively correlated with the UMD factors for Spain and the U.S., which is consistent with the popular investing strategies combining value and momentum, but the signs tend to change in both countries with respect to the QMJ and BAB factors. The two alternative proxies for the value-growth factor show consistent negative correlations with the QMJ and BAB in Spain. Finally, the UMD, QMJ, and BAB factors are positively correlated with each other in both countries, which is consistent with their good performance as shown in Table 2. These three factors have negative correlations with the SMB factor suggesting that the good performer factors tend to load positively on big rather than small stocks.

Table 3. Correlation Coefficients for Factor Risks in Spain and in the U.S.: July 1996 to March 2020 (Data in U.S. dollars)

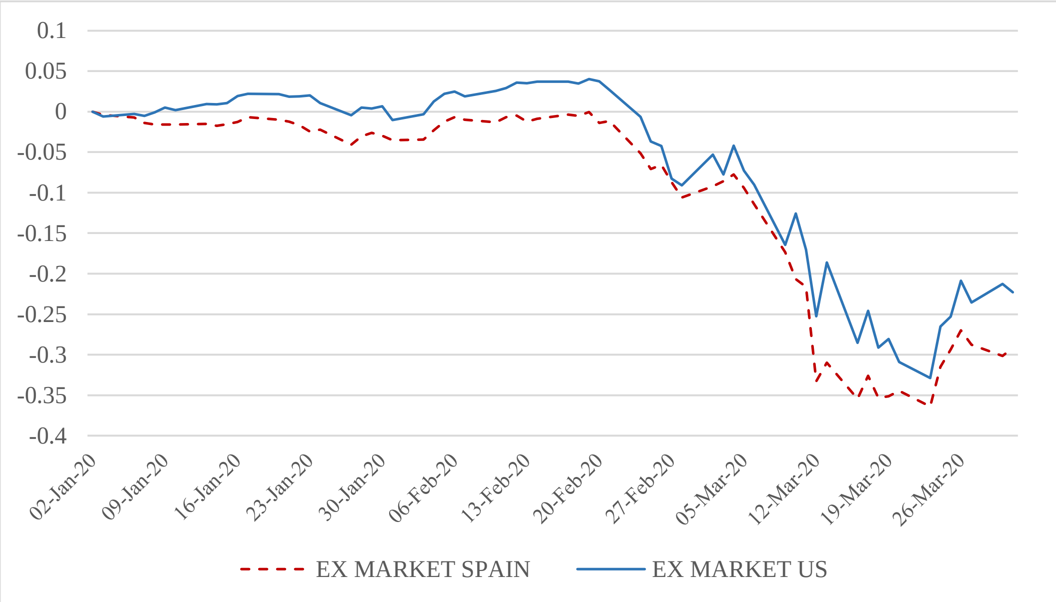
PANEL A: SPAIN	SMB	HML FF	HML DEVIL	UMD	QMJ	BAB
EX MARKET	-0.0964	0.1242	0.1890	-0.3512	-0.6167	-0.2390
SMB	1	0.0357	0.0859	-0.1365	-0.1276	0.0853
HML FF		1	0.7551	-0.1636	-0.3574	-0.1210
HML DEVIL			1	-0.4598	-0.4371	-0.1981
UMD				1	0.5299	0.3700
QMJ					1	0.4243
PANEL B: U.S.	**SMB**	**HML FF**	**HML DEVIL**	**UMD**	**QMJ**	**BAB**
EX MARKET	0.2992	-0.1269	0.1518	-0.3221	-0.6688	-0.3000
SMB	1	-0.0989	0.0219	-0.1176	-0.5347	-0.2175
HML FF		1	0.7140	-0.1536	0.0566	0.4808
HML DEVIL			1	-0.7331	-0.2252	0.1077
UMD				1	0.3688	0.2916
QMJ					1	0.3916

We next discuss the performance of the market risk premium and the six selected risk factors using daily data from January 2, 2020 to March 31, 2020 to analyze the comparative behavior of these factors during the global health crisis. Panels A and B of Table 4 shows the descriptive annualized statistics for Spain and the U.S., respectively. The overall market performance in both countries is dramatic. However, the average results for the U.S. market are not as bad as for the Spanish case. It suggests that the international investors are relatively more confident about the global competing capabilities of the U.S. relative to the Spanish economy. This result is also displayed in Figure 8, in which we present the cumulative daily market excess returns for both markets. The cumulative returns for the U.S. market have been consistently above the returns of the Spanish market. The strong bias in favor of technological sectors of the U.S. market relative to the Spanish economy could easily explain this relative performance.

Table 4. Descriptive Annualized Statistics for Factor Risks in Spain and in the U.S.: January 3, 2020 to March 31, 2020 (Data in U.S. dollars)

PANEL A: SPAIN	EXCESS MARKET	SMB	HML FF	HML DEVIL	UMD	QMJ	BAB
Mean	-1.2370	-0.0761	0.1968	-0.1589	0.9249	0.3057	0.3870
Volatility	0.4528	0.1534	0.1550	0.1394	0.1386	0.1806	0.2716
Sharpe Ratio	-2.7316	-0.4961	1.2700	-1.1397	6.6745	1.6930	1.4248
PANEL B: U.S.	**EXCESS MARKET**	**SMB**	**HML FF**	**HML DEVIL**	**UMD**	**QMJ**	**BAB**
Mean	-0.8269	-0.3737	-0.8968	-1.0400	0.5331	0.1696	-0.2524
Volatility	0.5579	0.1400	0.1289	0.1112	0.1225	0.1040	0.2719
Sharpe Ratio	-1.4822	-2.6696	-6.9554	-6.6622	4.3521	1.6311	-0.9281

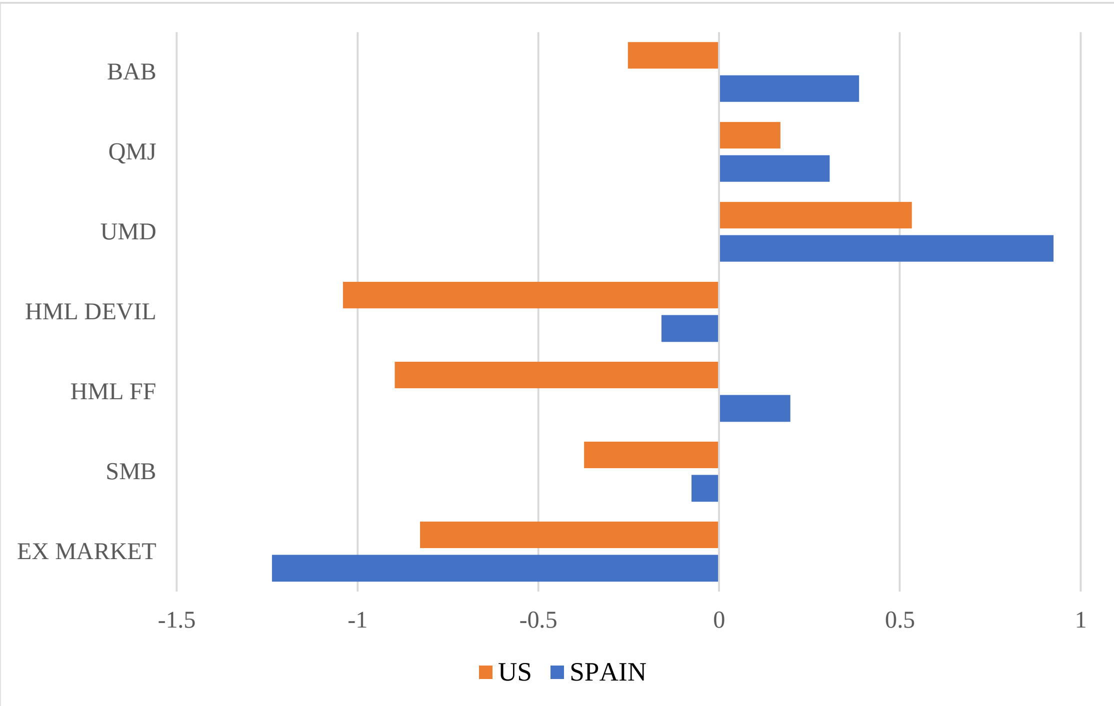
Figure 8. Cumulative Excess Market Returns for Spain and the U.S.: January 2, 2020 to March 31, 2020



As before, it is even more relevant to analyze the behavior of the alternative risk factors. Figure 9 displays the average annualized returns for all the risk factors and the two countries. Once again, we also find important differences. SMB and HML Devil show negative average return in both countries but their performance is much worse in the U.S. In fact, the Fama-French HML factor produces positive average returns in

Spain. This is consistent with the results during the full sample period. On the other hand, QMJ and UMD are the only two factors that show positive returns in both markets, highlighting the extremely good performance of the second one. Momentum and quality investing seem to be successful not only during our long sample period, but they are also surprisingly strong performers during the more adverse days of the global pandemic. The strong negative impact suffered for the U.S. UMD factor during the Great Recession, as shown in Figure 7, does not seem be present in this crisis, at least until the end of March. Finally, the BAB defensive factor presents a positive performance in Spain, but an average negative return for the U.S.

Figure 9. Risk Factors in Spain and the U.S. Average Returns: January 2, 2020 to March 31, 2020



In addition to the average statistics reported in Table 4, Figures 10.A and 10.B display the cumulative daily returns from January 2, 2020 to March 31, 2020 for the excess market returns and the risk factors in Spain and the U.S., respectively.

Figure 10.A. Risk Factors Cumulative Raw Returns in Spain

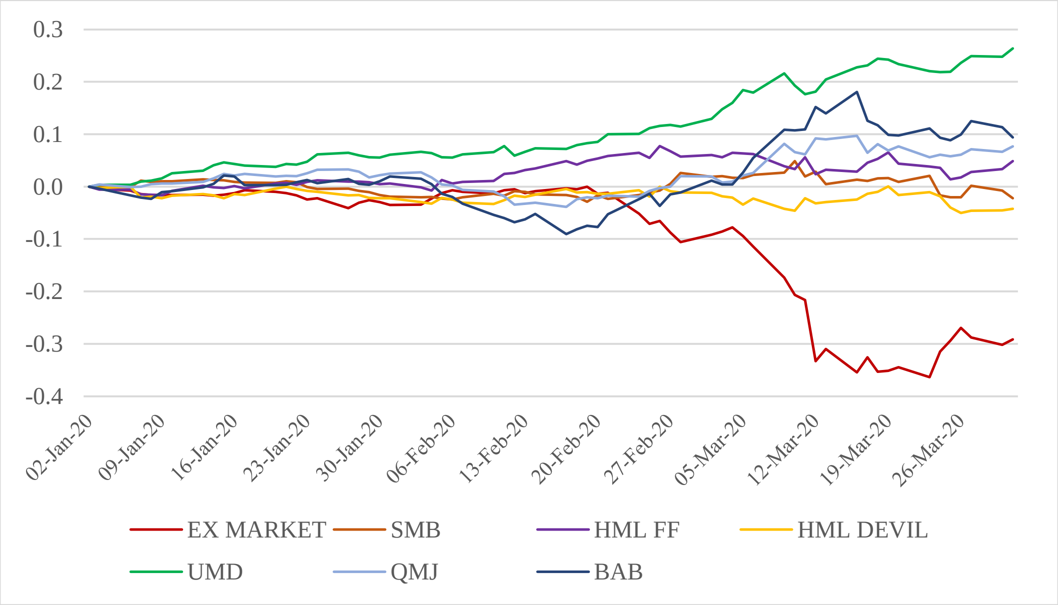
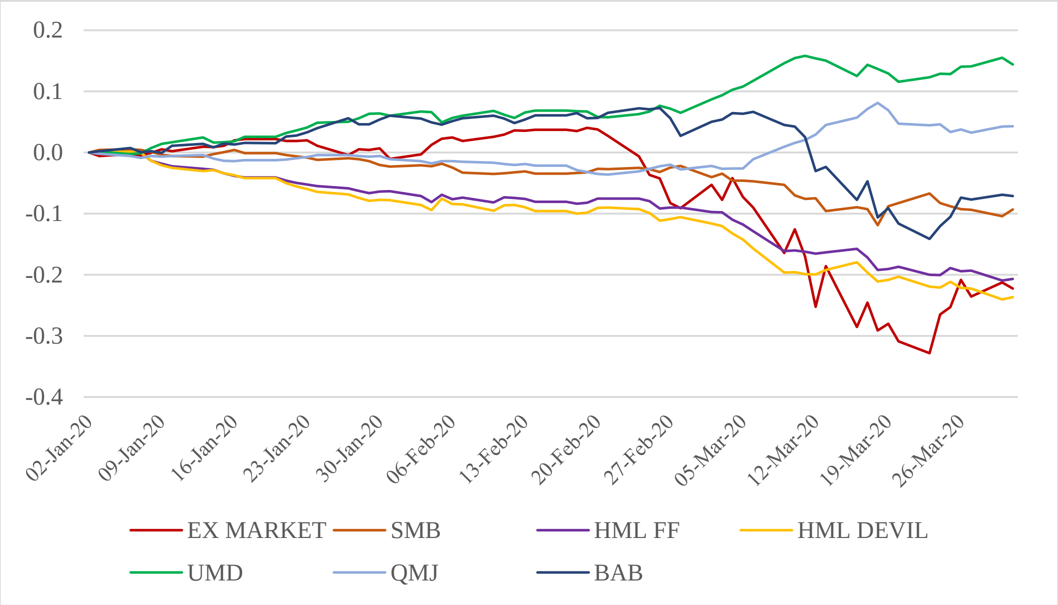


Figure 10.B. Risk Factors Cumulative Raw Returns in the U.S.



In the Spanish Stock Exchange, the UMD, QMJ, and BAB factors present the best cumulative returns. It is rather surprising the good performance of the BAB factor during March. The best performing risk factor is the UMD factor, which systematically have cumulative returns above all other factors. The HML and SMB factors have cumulative returns around zero. On the other hand, the UMD and QMJ are the best performers in the U.S. market. The BAB factor shows the opposite behavior during March than its equivalent factor in Spain. It should be noted that the BAB factor has been shown to be, at least in the U.S. market, related to funding liquidity. In other words, in times of tighter borrowing restrictions, the BAB factor presents a bad performance. This is exactly what we detect in Figure 10.B. Surprisingly, there is no evidence of such behavior in the Spanish market during the peak of the health crisis. The SMB factor presents a neutral behavior in the U.S. market as in Spain, and the HML factors show a poor performance. U.S. value companies are presenting not only a relatively poor performance in the stock market since the Great Recession, but also during the pandemic crisis.

Overall, we find that only two risk factors have consistently positive cumulative daily returns between January and March 2020 in both markets: The momentum (UMD) and the quality (QMJ) factors. Figures 11.A and 11.B display, for both countries, the time performance of the UMD and QMJ factors, respectively. Figure 11.A shows that the UMD factor presents an increasingly good performance over the full quarter in both markets with a small decline in the second week of March. On the other hand, Figure 11.B shows the extraordinary hedging performance of the quality factors during the worse moments of the crisis. The QMJ factors start increasing in both markets precisely on February 24th and the cumulative returns are continuously climbing until March 18th.[11] Therefore, the UMD factors may be understood as an investment strategy showing an excellent performance, while the QMJ factor is a tremendously powerful hedging investment tool.

[11] On Sunday 23th of February, the Italian authorities placed thousands of people in strict lockdown in the North of Italy, the most productive region of the country.

Figure 11.A. Momentum Risk Factor (UMD)

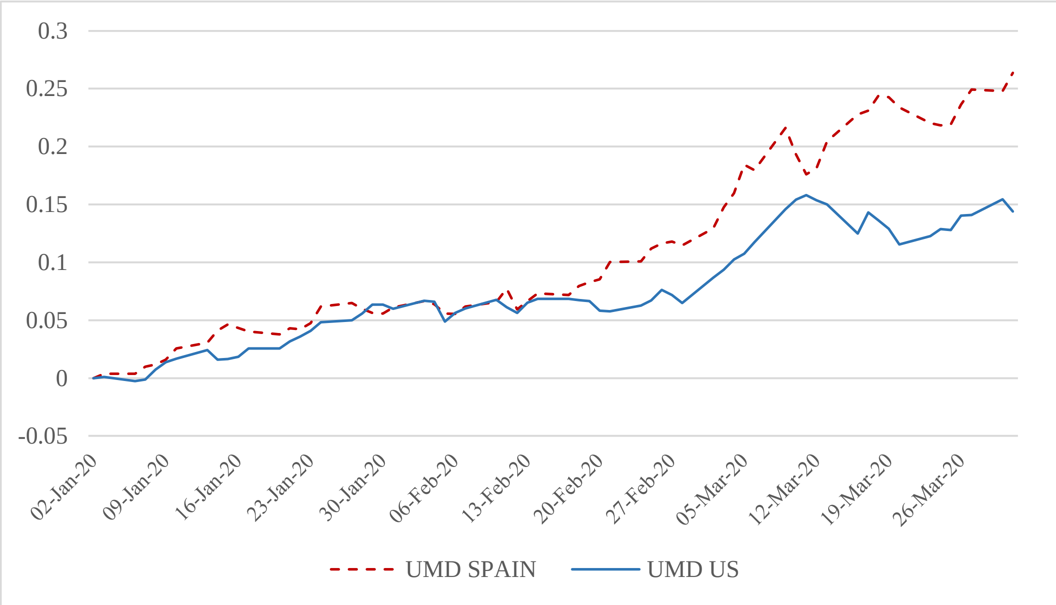
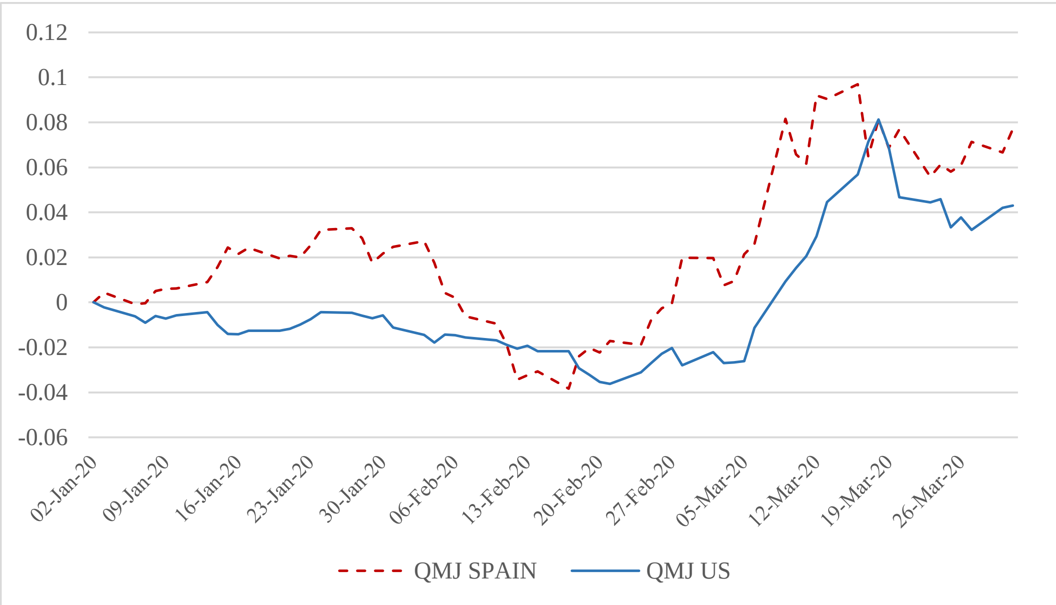


Figure 11.B. Quality Risk Factor (QMJ)



5. Conclusions

The empirical evidence reported in this paper shows the following:

- Even though the stock market in Spain has suffered enormous losses since the beginning of January up to the end of April, it is important to note how informative is the behavior of the alternative sectors of the market to have a powerful idea of the sectors with good prospects in the future, as well as the sectors that the marker signals as future losers. Note that the stock market always has a forward-looking perspective.
- It is important to pay attention to the volatility of the Spanish Stock Market as a powerful predictor of future production industrial growth. Volatility levels above the median volatility ranging from 21 to 22%, especially if these higher levels remain around 30% or more, seem to forecast a bad future perspective for the Spanish real economy.
- Risk factors are another way of distinguishing how crisis affect differently alternative investment strategies. The momentum (UMD) and quality (QMJ), together with the defensive (BAB) factor in Spain are risk factors than present a clear better performance during the recent health crisis. These three factors are, in fact, the three investment vehicles with the best performance records in both the U.S and Spanish markets during our longest sample period from June 1996 to March 2020.

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