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Stock performance when facing the unexpected

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A New World Post COVID-19
Lessons for Business, the Finance Industry and Policy Makers
edited by Monica Billio and Simone Varotto

Stock Performance When Facing the Unexpected

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Abstract The COVID-19 crisis has had enormous costs. The effects on financial markets were exacerbated by panic, fear of the unknown, fear of the end of the world as we knew it. This panic obfuscated our ability to make rational predictions on future cash flows and asset values. Overall though, our economic system is bouncing back. We can learn from this experience and build more flexible models which can help us to better manage severe systemic risks.

Keywords COVID-19. Equity market performance. CAPM. Beta. Volatility.

Summary 1 Introduction. – 2 The Perfect Storm: Panic and Uncertainty. – 3 The Timeline of the COVID-19 Pandemic. – 4 The Effects of the COVID-19 Crisis on Equity Markets. – 5 Industry Groups. – 6 The Prediction of Financial Models (CAPM Beta). – 7Conclusions.

1 Introduction

This crisis has had huge costs in terms of human lives lost, great physical and psychological suffering caused either directly by the disease or indirectly by the drastic measures adopted to contain the spread of the virus. This pandemic will have enduring consequences on the world population, the economy, our societies, the environment, and the financial systems. Notwithstanding the enormity of the physical and psychological pain caused by the virus, in this chapter 1 only reflect on the effects of the COVID-19 pandemic on the equity markets. Financial markets, more generally, provide an essential price discovery function. They aggregate demand and supply for assets and prod-

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ucts and help us discover the value of these assets and products so that we can properly allocate resources to particular projects, sectors/industries and enterprises.

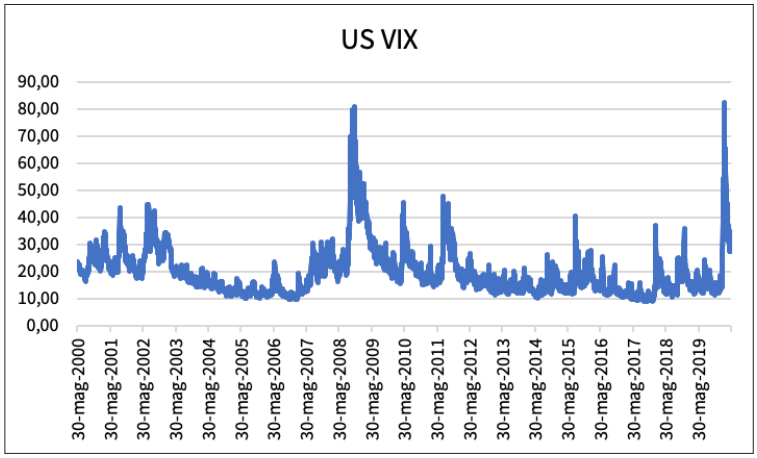
2 The Perfect Storm: Panic and Uncertainty

To assess the level of panic in the equity markets due to the COVID-19 pandemic we can refer to two major volatility indices: the VIX (CBOE Volatilty Index) in the US and the Vstoxx (Euro Stoxx 50 Volatility Index) in Europe. These are the indices for the level of volatility implied from option contracts on major equity indices, the S&P 500 and the Euro Stoxx 50 in the US and Europe, respectively. The VIX and the Vstoxx are often referred to as fear gauges capturing the level of uncertainty in financial markets. Over the last 20 years, these indices had two major peaks which reflect episodes of extremely high levels of uncertainty in the financial markets. The first peak was in October 2008 during the credit crisis, and the second was in March 2020 when the Western world went into lockdown.

In mid-March 2020, the announcement of drastic restrictive measures by US authorities precipitated the crisis. Market participants realised that the COVID-19 pandemic was not going to be confined to Asia. It had already started showing the first signs of potentially devastating effects on Western economies and the lockdown increased the likelihood of the most catastrophic scenarios. As the graphs in figure 1 show, the US markets became even more fearful of the effects of the pandemic on equity values than what they were at the time of the credit crisis **[fig. 1]**. Perhaps this is because the pandemic severely affected New York, the main US financial centre. In Europe instead, financial markets reflected a relatively greater level of uncertainty during the financial crises. The pandemic created havoc in Italy and Spain sparing, at first, Europe's main financial centres such as London, Frankfurt, and Paris. With so much fear and uncertainty markets do not function well in discovering asset prices.

3 The Timeline of the COVID-19 Pandemic

So, how and when did it all begin? A new mysterious virus was first reported by Chinese authorities to the World Health Organisation (WHO) on December 31, 2019, although now scientists believe the virus was already circulating in China since November 2019. Despite the drastic containment measures taken by the Chinese authorities to try to limit the contagion, unfortunately the virus spread to other countries in South East Asia. The virus was showing unexpected strength and high infection rates which could yield high mortality rates. By the end



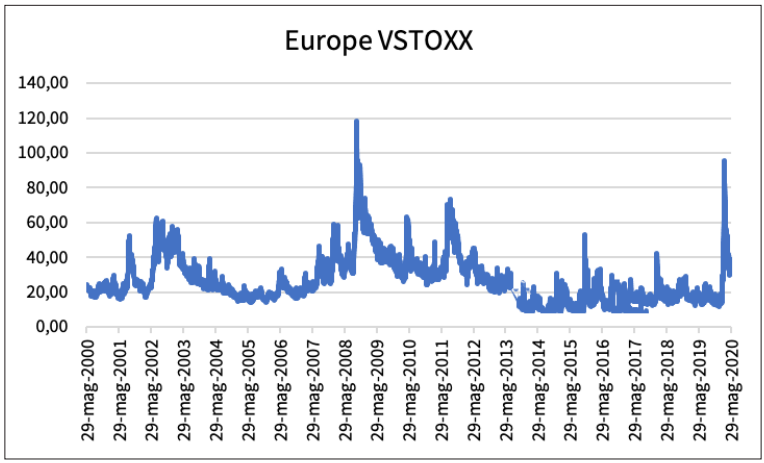


Figure 1 The volatility indices. This figure presents the time series for the daily values of the VIX and the VSTOXX indices from 29 May 2000 to 30 May 2020. The data were downloaded from the Thompson Reuters Eikon platform

of January, the virus had spread to 18 countries outside China. On January 30, 2020, the WHO officially declared the status of International Health Emergency. This declaration triggered a series of health procedures and travel restrictions across the world. On February 11, 2020, the WHO named the new coronavirus as COVID-19. On March 11, 2020, the WHO declared the outbreak of a global pandemic.[1]

The first western country to enter into a national lockdown was Italy on March 10, 2020. On March 13, 2020, President Trump declared a national emergency initiating a series of government response procedures.[2] In the following days, a number of other European countries adopted restrictive measures and on March 23, 2020 the UK also entered into a national lockdown.[3] In the US, the first "stay at home" order was issued by California on March 19, 2020.[4] Although a US-wide lockdown was never implemented, most states adopted restrictive measures.[5]

4 The Effects of the COVID-19 Crisis on Equity Markets

The Italian, UK and US stock markets started a rapid decline on February 20, 2020 when the new virus was rapidly spreading across Europe and the US **[fig. 2]**. The Italian equity market suffered the steepest fall and reached the lowest level on March 12, 2020 **[fig. 3]**. In less than a month, the Italian equity market fell by more than 41%. It took a bit longer for the US and the UK markets to reach their lowest level. This came on the March 23 when the FTSE 100 Index closed down by almost 200 points for the day.

1 The timeline of the pandemic is based on a report by the World Health Organisation detailing its response to the COVID-19 crisis. The report is available at https://www.who.int/news-room/detail/29-06-2020-covidtimeline.

2 See for example, https://edition.cnn.com/2020/03/13/politics/states-coronavirus-fema/index.html.

3 On March 9, 2020, the Italian prime minister Giuseppe Conte signed a decree for the implementation of a national lockdown starting from March 10, 2020. Detailed information on the measures implemented by governments in response to the pandemic is provided by Oxford University's COVID-19 Government Response Tracker, which is available at https://www.bsg.ox.ac.uk/covidtracker.

4 See the Executive Order N-33-20 issued by California at https://www.gov.ca.gov/wp-content/uploads/2020/03/3.19.20-attested-EO-N-33-20-COVID-19-HEALTH-ORDER.pdf.

5 A list of the states implementing 'stay at home' orders is available at https://www.nbcnews.com/health/health-news/here-are-stay-home-orders-across-country-n1168736.

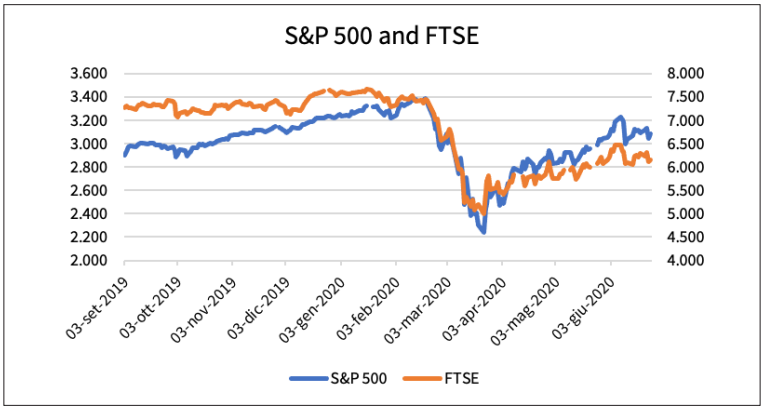


Figure 2 The scale for the S&P 500 Index is indicated on the left-hand side and the scale for the FTSE 100 index is indicated on the right-hand side. The sample covers the period from September 3, 2019 to June 25, 2020. The data was downloaded from the Thompson Reuters Eikon platform

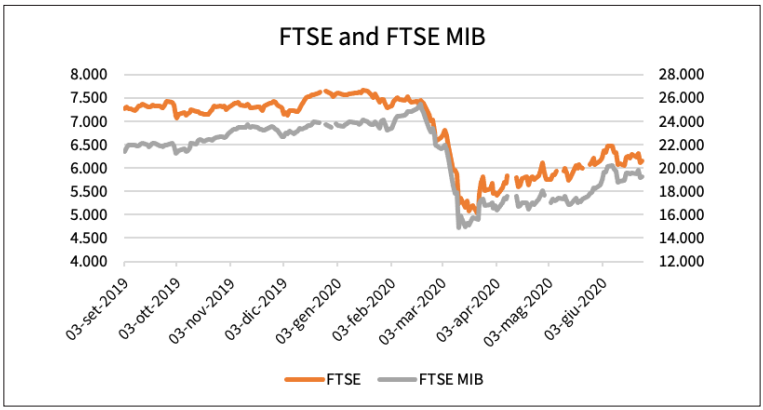


Figure 3 The scale for the FTSE 100 Index is indicated on the left-hand side and the scale for the FTSE MIB index is indicated on the right-hand side. The sample covers the period from September 3, 2019 to June 25, 2020. The data was downloaded from the Thompson Reuters Eikon platform

Over the period from February 19 to March 23, 2020, the UK FTSE 100 index lost about 33% and the S&P 500 index about 34% of their values, respectively. The worst daily price change for the UK equity market was recorded on March 12 when the FTSE 100 Index lost 10.87% in a single day. This is the largest single-day drop recorded over the last 20 years (since May 30, 2000). Table 1 shows the distinct phases of the COVID-19 crisis so far and summarises the changes in the values of the benchmark Italian, UK and US equity indices.

Table 1 Equity price changes during the COVID-19 crisis

Country	Decline phase	Index change (%)	Recovery phase	Index change (%)	COVID-19 crisis and recovery period	Index change (%)
Italy	Feb 19 - Mar 12, 2020	-41.54	Mar 12 - Jun 8, 2020	30.02	Feb 19 - Jun 8, 2020	-20.59
UK	Feb 19 - Mar 23, 2020	-33.03	Mar 23 - Jun 8, 2020	29.61	Feb 19 - Jun 8, 2020	-13.20
USA	Feb 19 - Mar 23, 2020	-33.92	Mar 23 - Jun 8, 2020	44.47	Feb 19 - Jun 8, 2020	-4.54

The equity indices used for Italy, UK and USA are FTSE MIB, FTSE 100 and S&P 500, respectively. Returns were computed using daily data which was downloaded from the Thompson Reuters Eikon platform.

5 Industry Groups

The performance of the various industry groups during the decline and recovery phases of the crisis is summarised in tables 2 and 3 below. The industry returns are value-weighted and thus they will be driven by the performance of the largest companies in each sector. In the UK, the transportation industry was the most affected (-63%). With the lockdown in place, aeroplanes were grounded, international travel stopped almost completely, and most people were housebound. More surprisingly, the media and entertainment industry (WPP, Pearson, etc.) was the second worst performing industry during the decline phase. With many businesses halted by health and safety restrictions, advertising budgets froze, and fairs and exhibitions were cancelled; this hit the UK media industry, which relies almost exclusively on ad revenue. However, in the US the increased demand for news and home entertainment helped online American media companies (Google, Facebook, Walt Disney, etc.) to recover more rapidly than other industries.

Industries providing core and essential services or those that were able to adapt quickly to flexible/distance working conditions suffered lower declines and recovered very quickly (for example, e-commerce, technology, software services). In the US, the retailing (Amazon, Ebay, Dollar General) and technology industries managed to weather the COVID-19 storm better than other industries posting double digit increases in aggregate industry values.

Table 2 The performance of the FTSE 100 index components by industry groups over the COVID-19 crisis from December 2019 to June 2020

	Decline		Recovery		Overall	
FTSE 100 - Industry Groups	**1 Jan -27 Mar 20 (%)**	**Rank**	**27 Mar -26 Jun 20 (%)**	**Rank**	**27 Dec 19 -26 Jun 20 (%)**	**Rank**
Banks (5)	-28.11%	16	-16.74%	22	-40.86%	20
Capital Goods (9)	-24.95%	14	9.81%	9	-19.16%	12
Commercial & Professional Services (5)	-8.05%	4	10.89%	8	0.72%	5
Consumer Durables & Apparel (5)	-30.55%	18	9.11%	10	-24.02%	17
Consumer Services (5)	-30.87%	19	5.08%	15	-28.00%	18
Diversified Financials (8)	-20.28%	10	11.65%	7	-11.47%	10
Energy (3)	-35.76%	20	-7.16%	21	-41.59%	21
Food & Staples Retailing (3)	-8.83%	5	-1.60%	19	-10.23%	9
Food, Beverage & Tobacco (5)	-18.77%	7	6.59%	13	-14.05%	11
Health Care Equipment & Services (1)	-23.47%	12	6.13%	14	-20.82%	13
Household & Personal Products (2)	-6.15%	2	13.56%	6	5.63%	2
Insurance (6)	-24.54%	13	3.07%	16	-22.50%	15
Materials (14)	-25.54%	15	23.04%	2	-8.78%	8
Media & Entertainment (6)	-38.76%	21	6.75%	12	-35.42%	19
Pharmaceuticals, Biotechnology & Life Sciences (3)	-12.26%	6	16.83%	4	0.74%	4
Real Estate (3)	-28.81%	17	7.35%	11	-22.27%	14
Retailing (5)	-19.49%	8	31.95%	1	7.00%	1
Software & Services (3)	-19.53%	9	17.07%	3	-7.06%	7
Technology Hardware & Equipment (1)	-6.76%	3	14.65%	5	5.50%	3
Telecommunication Services (2)	-21.00%	11	-0.92%	18	-23.47%	16
Transportation (1)	-62.96%	22	-1.90%	20	-63.72%	22
Utilities (5)	-1.92%	1	2.46%	17	-0.78%	6

The table presents cumulative returns for the various industry groups. These are percentage changes in the aggregate value (market capitalisation) of each industry group. The lowest rank is given to the best performing industry group during each phase. The best 5 performing industries are coloured in green and the worst 5 in red. The data was downloaded from the Thompson Reuters Eikon platform.

Table 4 The performance of the S&P 500 index components by industry groups over the COVID-19 crisis from December 2019 to June 2020

	Decline		Recovery		Overall	
S&P 500 - Industry Groups	**1 Jan 20 -27 Mar 20 (%)**	**Rank**	**27 Mar -26 Jun 20 (%)**	**Rank**	**27 Dec 19 -26 Jun 20 (%)**	**Rank**
Automobiles & Components (4)	-40.92%	23	19.74%	8	-29.66%	22
Banks (18)	-36.59%	22	4.43%	23	-34.05%	23
Capital Goods (48)	-25.28%	18	8.63%	18	-19.33%	20
Commercial & Professional Services (10)	-16.69%	12	16.55%	10	-2.54%	7
Consumer Durables & Apparel (18)	-27.58%	19	17.97%	9	-14.38%	17
Consumer Services (15)	-31.48%	21	8.29%	19	-26.14%	21
Diversified Financials (26)	-21.56%	15	10.47%	15	-13.64%	16
Energy (26)	-48.69%	24	22.92%	5	-37.03%	24
Food & Staples Retailing (5)	-9.27%	3	6.07%	21	-4.19%	9
Food, Beverage & Tobacco (21)	-17.37%	13	7.96%	20	-10.68%	14
Health Care Equipment & Services (38)	-16.68%	11	13.76%	12	-5.39%	10
Household & Personal Products (7)	-12.57%	6	10.81%	14	-3.19%	8
Insurance (22)	-28.04%	20	12.01%	13	-19.09%	19
Materials (28)	-25.13%	17	20.32%	7	-9.83%	12
Media & Entertainment (22)	-15.69%	10	24.63%	3	3.64%	5
Pharmaceuticals, Biotechnology & Life Sciences (24)	-12.36%	5	14.57%	11	0.04%	6
Real Estate (31)	-19.15%	14	9.89%	17	-10.38%	13
Retailing (24)	-7.63%	2	34.48%	1	23.31%	1
Semiconductors & Semiconductor Equipment (16)	-12.03%	4	22.04%	6	6.62%	4
Software & Services (35)	-7.08%	1	23.14%	4	13.73%	3
Technology Hardware & Equipment (20)	-14.27%	9	32.43%	2	14.56%	2
Telecommunication Services (4)	-13.90%	7	5.28%	22	-9.18%	11
Transportation (15)	-23.11%	16	10.26%	16	-15.92%	18
Utilities (28)	-14.25%	8	0.64%	24	-13.07%	15

The table presents cumulative returns for the various industry groups. These are percentage changes in the aggregate value (market capitalisation) of each industry group. The lowest rank is given to the best performing industry group during each phase. The best 5 performing industries are coloured in green and the worst 5 in red. The data was downloaded from the Thompson Reuters Eikon platform.

The share prices of US and European banks have been falling significantly since the beginning of the COVID-19 crisis as investors have been fearing that the disruption to business caused by the lockdown may increase default rates on bank loans, while continuing monetary stimulus may keep interest rates low, thus hurting banks' margins and profitability. In addition, regulators have urged banks to freeze dividend payments to shareholders and strengthen their core capital so that they would be able to absorb larger than expected losses in their loan portfolios.

Another industry hit hard by the pandemic has been the energy industry. The travel restrictions and the lockdown created a sharp fall in the demand for oil. Such a deep and sudden negative demand shock combined with a relatively sticky supply created the perfect storm with devastating effects on oil prices. The negative pressure on oil prices was amplified by the delays in finding an agreement among oil-producing countries on the appropriate, joint response to dwindling energy demand. Thus, the excess oil supply led to increases in oil inventories and a sharp fall in oil prices. All available storage was full and sellers had to pay buyers to take oil off their hands. Oil was cheap but the cost of storage had surged. On Monday April 20, 2020, the light crude oil contract trading on the New York Mercantile exchange reached a minimum of about *negative* $40 per barrel. This created a problem. Traditionally, financial models assume that asset prices do not go below the zero level. Thus, how do we price an asset with negative prices? Financial markets had to scramble and implement ad-hoc models to allow commodity prices to reach negative values.[6]

6 The Prediction of Financial Models (CAPM Beta)

Usually, our financial models would suggest taking refuge in defensive stocks during downturns and then shifting to more aggressive stocks during the rebound. Stocks would be classified using the beta coefficient of the Capital Asset Pricing Model (CAPM) which indicates how correlated and sensitive a particular stock is to movements in the whole financial market. Low beta stocks (with beta less than 1) are often called defensive stocks. They have more stable performance and relatively lower volatility. Whereas, high beta stocks (with beta greater than 1) are called aggressive stocks. These are riskier but can potentially deliver higher returns. How did so-called

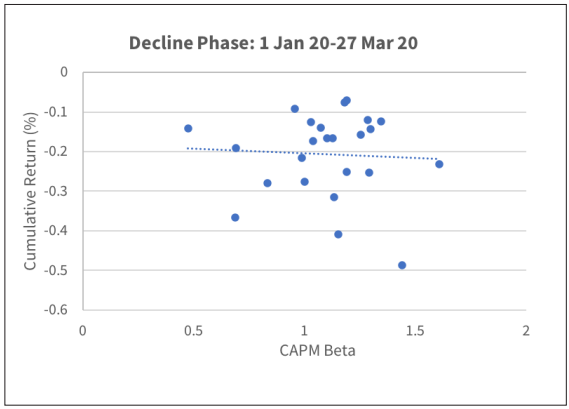
6 See the note released by the CME on April 8, 2020 at `https://www.cmegroup.com/content/dam/cmegroup/notices/clearing/2020/04/Chadv20-152.pdf`. Eventually, on 22 April 2020, CME Clearing adopted the Bachelier Option Pricing Model (`https://www.cmegroup.com/notices/clearing/2020/04/Chadv20-171.html`).

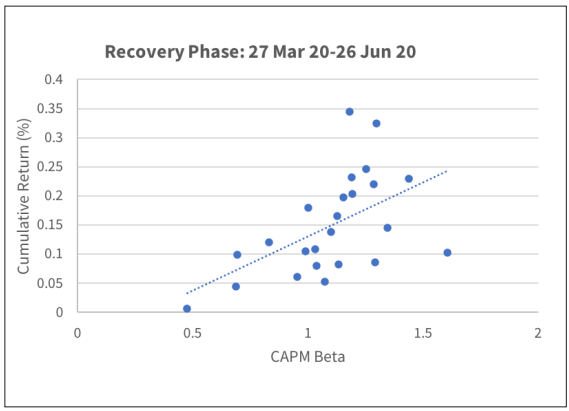
defensive stocks perform during the declining phase of the pandemic? Did the market behave as expected supporting financial theories or instead provided further evidence of the limitations of existing financial models and thus calling for new theories to be developed?

I used industry CAPM beta coefficients computed by Aswath Damodaran in January 2020 for US stocks and related them to cumulative stock returns during the two main phases of the COVID-19 pandemic.[7] Figure 4 shows scatter plots relating cumulative returns for the stocks included in the S&P 500 index with their industry beta during the decline and recovery phases of the COVID-19 pandemic **[fig. 4]**. The scatter plots also show the trend line which summarises the relationships between cumulative returns and CAPM betas.

The CAPM model worked very well during the recovery phase when high beta stocks clearly bounced back more rapidly than low beta stocks posting high cumulative returns. This evidence seems consistent with the more rigorous work conducted by Savor and Wilson (2014) which shows how on days with macroeconomic announcements there is a strong positive relation between average returns and stock betas as predicted by the CAPM model. On other days though, the same relationship does not hold. Hence, our financial models seem to work well during the recovery phase of the crisis as well as on announcement days because, as Savor and Wilson (2014) note, in these days there is "a clear link between macroeconomic risk and asset returns". When traders are driven by panic and fear instead, our traditional models based on long-term expectations and rational behaviour break down. The return-risk relationship observed during the decline phase is almost flat. Thus, the intuition of investing in defensive stocks might have just marginally limited investment losses. This preliminary evidence seems to support Lopez de Prado (2019)'s call for the development of more flexible models which are optimal under different regimes and market conditions.

7 The CAPM beta data is available at `http://people.stern.nyu.edu/adamodar/New_Home_Page/datacurrent.html`. The cumulative returns were computed using data downloaded from the Thompson Reuters Eikon platform.





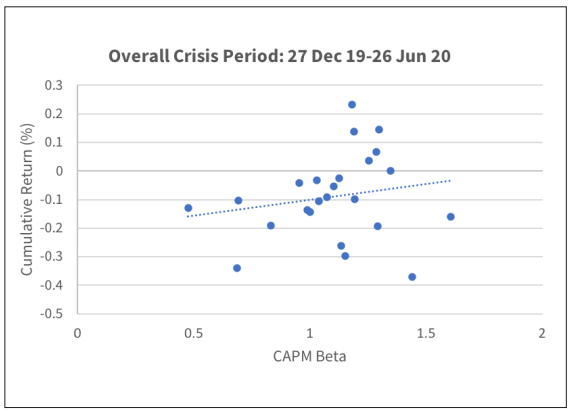


Figure 4 Cumulative stock returns (%) versus CAPM industry beta coefficients for the S&P 500 Index stock components. A dotted trend line is shown. Cumulative returns were computed using stock data downloaded from the Thompson Reuters Eikon platform. The CAPM industry beta coefficients were estimated by Aswath Damodaran for January 2020

7 Conclusions

This pandemic has destabilised our financial markets and severely affected our economies. Governments have now committed enormous resources to help the economy recover. Financial markets and financial infrastructures will have to play their part. It is time to start reflecting on the lessons from the pandemic. We are now in a world with potentially negative prices and with negative interest rates. We are very interconnected and therefore vulnerable to factors which may lead to systemic crises (credit and liquidity shortages, pandemics, cybersecurity attacks, etc.). Given the extreme scenarios created by the pandemic, it is important to gather relevant data and reflect on whether our models are still fit for purpose. If not, we should use the evidence to guide the development of new theories and models. These theories and models should help us better rationalise the effects of these crises on asset values and prevent reaching extreme levels of uncertainty which may have contributed to escalating the crisis. At the outburst of the pandemic, the priority of governments and regulators correctly focused on adopting all measures necessary to save human lives. Perhaps for future pandemic scenarios we should more promptly implement measures to mitigate the impact of the pandemic on our businesses and financial markets hence preventing reaching such an extreme level of uncertainty about firm and asset values.

Clearly, we are not out of the woods yet with respect to COVID-19. The disease is still spreading around the world and a second wave is still likely if a vaccine is not developed before the next flu season. The economic engine of the Western world was temporarily switched off to "stop the virus and save the NHS" as we were saying in the UK. It is now the time to switch on the economic accelerator and take the opportunity to learn from the crisis and set the foundations for creating an even stronger, more resilient, and more equitable financial system.

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