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The Impact of the COVID-19 Pandemic on the U.S. Economy: Evidence from the Stock Market¹

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Abstract

The coronavirus crisis has damaged the U.S. economy. This paper uses stock returns on 125 sectors to investigate its impact. It decomposes returns into components driven by sector-specific factors and by macroeconomic factors. Idiosyncratic factors harmed industries such as airlines, aerospace, real estate, tourism, oil, brewers, retail apparel, and funerals. There are thus large swaths of the economy whose recovery depends not on the macroeconomic environment but on controlling the pandemic. Macroeconomic factors generated losses in industries such as production equipment, machinery, and electronic & electrical equipment. Thus reviving capital goods spending requires not just an end to the pandemic but a macroeconomic recovery.

Keywords: COVID-19, U.S. economy, Stock returns

JEL classification: G10, I10

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1. Introduction

The COVID-19 pandemic has walloped the U.S. economy. Between January and July 2020, the unemployment rate rose from 3.6 percent to 10.1 percent, industrial production fell by 9 percent, and nonfarm employment fell by more than 12.5 million people.

The Federal Reserve and federal and state governments have fought the downturn and the pandemic. Beginning in March the Fed lowered the federal funds rate target by 150 basis points, provided forward guidance that interest rates would remain low, engaged in quantitative easing by buying Treasury and mortgage-backed securities, loaned to Treasury security primary dealers, backstopped money market funds, encouraged bank lending, and took other steps to maintain the flow of credit.² Congress passed several pieces of legislation in March, including the Coronavirus Aid, Relief, and Economic Security Act (CARES). CARES provides loans for small businesses to continue paying wages (Paycheck Protection Program), expands unemployment benefits, pays \$1,200 per adult and \$500 per child for individuals earning up to \$75,000 (or \$150,000 for taxpayers filing jointly), and channels funds to the health care system and to state and local governments. Several states and localities issued shelter-in-place (S-I-P) orders mandating that non-essential businesses close and that non-essential employees work from home. What are the channels driving the economy's response to the pandemic and to the policy interventions?

Chetty et al. (2020) employed daily data to examine how spending, revenues, employment, and other variables responded at the county and industry level. Since the fall in GDP between 2019Q4 and 2020Q1 was driven by a drop in personal consumption expenditures, they investigated consumer spending. They reported that more than half of the drop in spending

² Cheng, Skidmore, and Wessel (2020) provided a valuable discussion of the steps that the Fed has taken.

in June 2020 relative to June 2019 came from the top income quartile and only five percent of the drop came from the bottom quartile. They found that three-fourths of the drop in spending between the pre-coronavirus period and the middle of April came from goods and services requiring close contact such as hotels, transportation, and restaurant meals. They also found that high-income households reduced spending at businesses producing non-tradables, causing these businesses to lay off low-income employees. CARES payments then stimulated spending by low-income individuals but did little to increase employment among the many laid off from jobs requiring close contact. The Paycheck Protection Program also did little to increase employment among these service workers. Chetty et al. concluded that stimulating aggregate demand and providing liquidity to businesses may not increase employment much when spending is constrained by health concerns.

Goolsbee and Syverson (2020) investigated whether the U.S. coronavirus-related downturn arose from S-I-P policies or from people choosing to refrain from activities to avoid infections. They employed cell phone data on customer visits to 2.25 million businesses in 110 industries. Comparing visits to contiguous locations with different S-I-P policies, they reported that legal shutdown orders explained only 7 percentage points (ppt) of the 60 ppt drop in customer visits during the pandemic. They concluded that consumer actions to avoid infection rather than the lockdown policies were responsible for the lion's share of the drop in spending across exposed businesses.

Eichenbaum et al. (2020a, 2020b, 2020c) calibrated how pandemics affect aggregate demand and aggregate supply. They modeled the interactions between agents' economic decisions and the spread of the infection. They found that people avoiding infection risk caused labor supply and thus aggregate supply to fall and consumption and thus aggregate demand to

drop. The simultaneous reduction in aggregate supply and aggregate demand in their model leads to a deep, persistent recession.

To investigate how the pandemic and the policy actions have affected the U.S. economy, this paper examines the response of sectoral stock prices. Finance theory indicates that stock prices equal the expected present value of future cash flows. They thus contain information about how investors expect firms and industries to be affected.

Previous research has investigated how the coronavirus crisis has affected asset prices. Ramelli and Wagner (2020) examined how COVID-19 affected U.S. stock returns. They used the capital asset pricing model and the Fama-French (1993, 2015) factors to adjust returns. They found that as news of the outbreak emerged between 20 January and 21 February 2020, adjusted returns on stocks of U.S. firms that traded with China fell more. Then as concern about the crisis exploded over the 24 February to 20 March 2020 period, they reported that adjusted returns on firms with less cash and higher leverage fell more.

Pagano, Wagner, and Zechner (2020) found that stocks of firms that are resilient to social distancing perform better than non-resilient stocks. They employed Koren and Pető's (2020) affected share variable that measures the extent to which jobs can be done without close human contact. They classified firms as resilient if their affected share values are below the median and as not resilience if their affected share values are above the median. Over the 24 February – 20 March 2020 period, they reported that capital asset pricing model-adjusted returns were 10 percent for the high resilience portfolio and -15 percent for the low resilience portfolio. The high resilience portfolio thus outperformed the low resilience portfolio by 25%. For returns adjusted using the Fama and French (1993, 2015) factors, they reported that the high resilience portfolio outperformed the low resilience portfolio by between 15% and 20%.

Chan and Marsh (2020) compared the drop in the Dow Jones Industrial Average (DJIA) from 21 February 2020 to the end of March 2020 with drops during other market crashes and pandemics. They reported that the DJIA fell about as much over their sample as it did at a comparable point during the 1929 Great Depressions and much more than during previous pandemics such as the 1918 Spanish Flu epidemic. They attributed the large drop in 2020 to uncertainty about the technical characteristics of COVID-19, the effects of S-I-P policies on the economy, and the impact of the pandemic on global value chains.

Gormsen and Koijen (2020) employed dividend futures to measure the economic impact of the crisis. As of 9 June 2020, their model predicted a 2 ppt fall in U.S. GDP growth forecasted over the next year relative to forecasts on 1 January 2020, a 9 ppt fall in U.S. dividends, a 3.1 ppt over the next year relative to forecasts on 1 January 2020, a 3.1 ppt drop in European GDP growth, and a 14 ppt drop in European dividends. They stated that their approach might understate the falls because the macroeconomic changes in 2020 are large relative to historical experience.

This paper investigates how stock returns in 125 sectors have been affected during the pandemic. Black (1987, p. 113) observed that, “The sector-by-sector behavior of stocks is useful in predicting sector-by-sector changes in output, profits, or investment. When stocks in a given sector go up, more often than not that sector will show a rise in sales, earnings, and outlays for plant and equipment.” This paper also decomposes cumulative returns into those portions driven by macroeconomic factors and by idiosyncratic factors. The results present evidence at a disaggregated level concerning how investors expect different parts of the U.S. economy to fare.

The next section presents the data and methodology. Section 3 contains the results. Section 4 concludes.

2. Data and Methodology

This paper investigates stock returns for 125 sectors during the COVID-19 crisis. It focuses on the period beginning on 19 February 2020, when stock prices began falling, until 10 July 2020. The sectors investigated are listed in column (1) of Table 1 and the values on July 10th of 1 dollar invested on February 19th are presented in column (2). This paper investigates how both sector-specific factors and the macroeconomic environment affect returns. Over the sample period, the coronavirus pandemic was a key event driving these responses.

To capture how aggregate economic environment affects returns, several macroeconomic variables are used. The first is the return on the overall U.S. stock market, following a long tradition in finance of using the return on the market to control for economy-wide influences (see, e.g., Brown and Warner, 1980, 1985). The second is the return on the world stock market, capturing how changes in the world economy influence sectoral returns. The third is the nominal effective exchange rate, following a body of research that investigates sectors' exchange rate exposures (see, e.g., Dominguez and Tesar, 2006). The fourth is the price of oil, reflecting the large impact of oil prices across U.S. sectors (see, e.g., Thorbecke, 2019). The fifth is inflation, drawing on evidence that inflation is a state variable that matters for stock returns (see, e.g., Chen, Roll, and Ross, 1985). The other three variables are interest rates or interest rate spreads, building on the large literature indicating that these affect equity risk premia (see, e.g., Aït-Sahalia, Karaman, and Mancini, 2020). These last three variables are the change in the interest rate on three-month Treasury securities, the change in the spread between interest rates on ten-year and three-month Treasury security, and the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities.

Data on sectoral stock returns, the return on the U.S. aggregate stock market and the world stock market, and changes in the price of West Texas Intermediate crude oil come from the Datastream database. Data on changes in interest rates and interest rate spreads, changes in the breakeven inflation rate calculated from U.S. Treasury inflation-protected securities (TIPS), and changes in the Federal Reserve broad trade-weighted exchange rate index come from the Federal Reserve Bank of St. Louis FRED database. The exchange rate data are available beginning in 2006, so the sample period extends from 4 January 2006 to 10 July 2020.³

Augmented Dickey-Fuller (ADF) tests on the 125 sectoral returns and the eight macro factors permit rejection in every case of the null hypothesis that the series have unit roots. Sectoral returns are thus regressed on the eight factors.

The estimated equations take the form:

$$\begin{aligned}\Delta R_{i,t} = & \alpha_0 + \alpha_1 \Delta R_{m,US,t} + \alpha_2 \Delta R_{m,World,t} + \alpha_3 \Delta er_t + \alpha_4 \Delta P_{oil,t} + \alpha_5 \Delta Inf_t \\ & + \alpha_6 \Delta i_{three,t} + \alpha_7 \Delta i_{ten-three,t} \\ & + \alpha_8 \Delta i_{baa-ten,t},\end{aligned}\tag{1}$$

where the data are daily and $\Delta R_{i,t}$ is the change in the log of the stock price index for sector i , $\Delta R_{m,US,t}$ is the change in the log of the price index for the U.S. aggregate stock market, $\Delta R_{m,World,t}$ is the change in the log of the price index for the world stock market, Δer_t is the change in the Federal Reserve broad trade-weighted exchange rate index, $\Delta P_{oil,t}$ is the change in the log of the spot price for West Texas Intermediate crude oil, ΔInf_t is the change in the five-

³ In some cases, the stock return data are not available until after 4 January 2006. In these cases, the data are employed from the first date they become available.

year breakeven inflation rate calculated from TIPS, $\Delta i_{\text{three},t}$ is the change in the interest rate on three-month Treasury securities, $\Delta i_{\text{ten-three},t}$ is the change in the spread between interest rates on ten-year and three-month Treasury security, and $\Delta i_{\text{baa-ten},t}$ is the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities.

Equation (1) can be employed to divide returns into the part driven by macroeconomic variables and the part driven by sector-specific factors. The COVID-19 pandemic and the stimulus in response to it have affected the macroeconomic environment and also impacted sectors in various ways. The decomposition sheds light on when economy-wide and when sector-specific influences are driving performance.

As a robustness test the right-hand-side variables in equation (1) are replaced by the five Fama-French factors. Fama and French (1993, 2015) reported that five common factors are useful for explaining the cross section of stock returns. These factors are: 1) the return on the aggregate U.S. stock market index minus the return on one-month U.S. Treasury securities, 2) the average return on nine small capitalization stock portfolios minus the average return on nine large capitalization stock portfolios, 3) the average return on two high book value to market value portfolios minus the average return on two low book value to market value portfolios, 4) the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and 5) the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Regressing sectoral returns on these five factors provides an alternative way of decomposing returns into systematic and idiosyncratic portions.⁴

⁴ As of the writing of this paper, data on the Fama-French factors are available on the homepage of Professor Kenneth French until 30 June 2020. The sample period for the regressions using these factors extends from 1/03/2003 to 6/30/2020.

Figure 1 plots aggregate U.S. stock prices from 1 January 2020 to 10 July 2020. After increasing between January 1st and February 19th, prices fell logarithmically by 42 percent between February 19th and March 23rd. They then increased by 37 percent between March 23rd and July 10th.

Smith and Badkar (2020), Wells (2020), and others discussed how concerns about coronavirus starting on February 19th caused investors to sell U.S. stocks and move into safe-haven assets such as long-term Treasury securities and gold. The Fed then announced aggressive actions on March 23rd to promote recovery (see Federal Reserve, 2020). Hartley and Rebucci (2020), employing an event study methodology, found that the announcement caused a statistically significant decline of -0.16% in 10-year Treasury yields. Ramelli and Wagner (2020), finding a deleterious impact of low liquidity and high leverage on firm performance during the pandemic, reported that the Fed announcement weakened this effect. Chen et al. (2020), examining the mortgage-backed security (MBS) market, found that the relationship between MBS prices in the specified pool market and the to-be-announced market returned to normal only after the Fed's announcement on March 23rd. Ablan et al. (2020), considering the effect of news on asset prices, reported that news of the CARES stimulus package and the Fed's aggressive actions led to the stock market rally that began after March 23rd. Despite bad news in terms of infections, stock prices trended upwards between March 23rd and July 10th. Fed actions, the CARES stimulus, and the possibility of future expansionary policies contributed to this rebound.

The focus in the next section is on sectoral performance over the 19 February 2020 – 10 July 2020 sample period. The sample period is also divided into the 19 February – 23 March

sub-sample when news about the virus itself impacted markets and the 23 March – 10 July sub-sample when news of government stimulus helped to revive markets.

3. Results

Table 1 presents the findings across sectors explained by the eight macroeconomic variables. The average adjusted R-squared in column (11) is 0.578. This is good for regressions explaining daily stock returns. The numbers in columns (2) through (10) indicate how much one dollar invested at the beginning of the period would be worth at the end of the period. Numbers below one indicate that one dollar invested at the beginning of the period would have lost value and numbers above one indicate that it would have gained value. Columns (2) - (4) concern investments over the 19 February – 10 July period, columns (5) – (7) investments over the 19 February – 23 March period, and columns (8) – (10) investments over the 23 March – 10 July period. For all three periods the leftmost column presents results for the overall stock return in a sector, the middle column for the portion of the return driven by macroeconomic factors, and the rightmost column for the portion driven by idiosyncratic factors.

According to column (2), the worst performing sector in terms of overall stock returns over the 19 February – 10 July period is airlines. One dollar invested on 19 February would be worth only 38 cents on 10 July. The closely related aerospace sector that provides planes to the airline sector has also suffered, with a dollar investment falling to 50 cents by the end of the period. Columns (3) and (4) indicate that the lion's share of this fall has been driven by idiosyncratic rather than macroeconomic factors. The pandemic grounded flights and decimated these industries.

The next worse performing sectors in terms of overall returns are hotel & lodging real estate investment trusts (REITs) and real estate holding and development. One dollar invested on 19 February in hotel & lodging REITs would be worth only 39 cents on 10 July and one dollar invested in real estate holding and development would be worth only 41 cents. Columns (3) and (4) indicate that two-thirds of the drop was due to idiosyncratic factors and one-third to the macro environment. Investments in two related sectors, retail REITs and mortgage REITs, also lost more than half of their value over this period. The crisis restricted visits to hotels and retail stores and jeopardized agents' ability to pay rents and mortgages.

The oil sector has also performed poorly. One dollar invested in oil equipment and services on 19 February fell to 42 cents, one dollar in crude oil production fell to 45 cents, and one dollar in oil refining and marketing and in pipelines fell to 55 cents. Columns (3) and (4) indicate that both macroeconomic factors (e.g., low oil prices) and idiosyncratic factors (e.g., S-I-P policies) roiled the industry. Brower (2020) reported that oil production in the U.S. fell by 30 percent during the crisis.

Tourism has been decimated. One dollar invested in casinos & gambling fell to 55 cents, one dollar in travel & tourism to 57 cents, and one dollar in hotels & motels to 58 cents. Macroeconomic factors contributed to these losses but idiosyncratic factors contributed more. Concern about infections and lockdowns have reduced cruise ship voyages, trips to crowded locations, and visits to hotels.

Recreational services such as fitness centers and also banks and consumer lending have suffered. One dollar invested in recreational services fell to 51 cents and one dollar invested in banks and consumer lending to 58 cents. Customers avoided fitness centers. Banks and consumer lending faced the danger that borrowers may be unable to repay loans. Noonan and

Armstrong (2020) reported that U.S. banks set aside much more than expected for loan loss provisions in 2020Q2 and that Fed interest rate cuts also reduced interest rate margins and bank profitability. In addition credit card balances, a major profit source for banks, tumbled in 2020Q2 (Smith, 2020).

Other sectors that performed badly are brewers, apparel retailers, radio & TV broadcasting, and funerals. The returns on July 10th to one dollar invested in these sectors on February 19th are, respectively, 59 cents, 65 cents, 66 cents, and 58 cents. For all of these sectors except radio & TV broadcasting, idiosyncratic factors mattered much more than macroeconomic factors. For broadcasting, both factors mattered equally. Brewers have been harmed because people stopped frequenting restaurants and bars, apparel retailers because people avoided stores, broadcasters because advertising spending has dropped to the extent that broadcasters are giving away advertising time for free (Promnitz, 2020), and funerals because people have avoided gatherings.

It is also informative to compare returns in a sector with returns in upstream sectors that provide it with equipment. For instance, one dollar invested in railroads on 19 February would be worth 81 cents on 10 July while one dollar invested in railroad equipment would be worth only 64 cents. Similarly, one dollar invested in oil equipment and services would be worth less than one dollar invested in oil production, oil refining and marketing, or international oil companies. McCormick (2020) reported that drastic cutbacks by oil producers caused revenues at oil equipment and services companies to collapse. Companies faring badly during the pandemic have slashed investment spending. This helps explain why real gross private domestic investment in 2020Q2 was 20 percent less than its value on 2019Q2.⁵

⁵ These data come from the Federal Reserve Bank of St. Louis FRED database.

To further understand business investment it is helpful to examine sectors such as production equipment, machinery, and electronic & electrical equipment. For production technology & equipment, electronic & electrical equipment, and construction, agricultural, and engine machinery, the losses were driven overwhelmingly by macroeconomic rather than idiosyncratic factors. This suggests that a revival of the macroeconomy and not just a defeat of the pandemic is necessary to raise spending on capital goods.

Of the 125 sectors listed in Table 1, 15 have yielded positive returns between 19 February and 10 July. In every case macroeconomic factors harmed these sectors and idiosyncratic responses drove the gains.

The best performing sector is electronic entertainment. One dollar invested in this sector on 19 February would have grown to \$1.37 by 10 July. Macroeconomic factors would have shrunk the investment to 91 cents. Idiosyncratic factors counteracted these losses. As people have huddled at home, their spending on video games and other forms of electronic entertainment has soared.

The next best performing sector is diversified retailers. Prominent among these is Amazon. One dollar invested in this sector on 19 February would have grown to \$1.37 by 10 July. As people have avoided going out, they have turned to companies such as Amazon to deliver products.

Leisure goods have also performed well. A one dollar investment on 19 February would be worth \$1.23 on 10 July. Macroeconomic factors would have reduced this investment to 89 cents. Idiosyncratic factors such as peoples' demand for leisure goods when homebound have caused this sector to gain nevertheless.

A dollar investment in nondurable household products would have grown to \$1.21 by the end of the period. The dominant company in this sector is Clorox. Demand for products such as Clorox disinfectant wipes has soared during the pandemic (Tyco, 2020).

Some other sectors that have gained over this period are gold mining, biotechnology, trucking, computer hardware, computer software, recreational products, and consumer digital services. Gold mining has gained because the price of gold, a safe-haven asset, has risen during the crisis. Biotechnology stocks have attracted investors hoping these companies will develop a vaccine for COVID-19. Trucking includes delivery services that have served as a lifeline for individuals stuck at home. Time spent on computers has increased by 75 percent in 2020, and with this computer sales have risen (Novet, 2020). Computer software has also done well as platforms such as Zoom have become essential to people transitioning from in-person to virtual meetings. The recreational products sector has benefitted as demand for personal swimming pools and other home-based activities has increased. Consumer digital services such as messaging apps and digital communication have gained from the restrictions on face-to-face communication.

Some sectors have stayed the same or posted losses of 2 percent or less. For these sectors the macroeconomic environment led to losses of 10 percent or more that were offset by gains driven by idiosyncratic factors. For instance, sectoral returns on delivery service companies such as United Parcel Service and Federal Express were unchanged on 10 July relative to 19 February. Delivery services became essential as individuals could not leave home. Health care services and financial data providers fell only 1 percent over this period. Health care services offered care for those exposed to the virus and financial data providers offered information for investors confronting pervasive uncertainty. Entertainment and miscellaneous consumer services both

lost only 2 percent. Entertainment companies such as Netflix and consumer services firms such as eBay filled a niche for homebound individuals.

Columns (5) – (7) present results for the period from 19 February to 23 March. All sectors did badly. For the 11 worst performers, 1 dollar invested on February 19th was worth less than 40 cents on March 23rd. The worst performing sectors were related to the oil industry. For crude oil production and oil equipment and services, a one dollar investment fell to 31 cents, for oil refining and marketing it fell to 36 cents, and for pipelines it fell to 39.8 cents. Sectors related to air travel also suffered. One dollar invested in commercial vehicle leasing, including aircrafts, fell to 33 cents. One dollar invested in aerospace and in airlines fell to 38 cents. Real estate investments also soured. One dollar invested in real estate holdings & development fell to 32 cents and one dollar invested in hotel & lodging, mortgage, and retail REITs fell below 40 cents. In all of these cases macroeconomic factors were the primary driver of the losses, supported by idiosyncratic factors.

In columns (5) through (7), there are only five sectors where a one dollar investment on February 19th was worth at least 85 cents on March 23rd. These are nondurable household producers (e.g., Clorox), luxury items (e.g., gold watch makers), diversified retailers (e.g., Amazon), gold mining, and electronic entertainment (e.g., video game producers). In every case the macroeconomic environment led to losses and idiosyncratic factors offset some of these.

Columns (8) – (10) indicate that almost all sectors gained between March 23rd and July 10th. One of the few exceptions was brewers. As traffic to bars and restaurants fell, beer sales also tumbled. Funerals showed no gains and real estate sectors, banks, and airlines posted smaller gains than other sectors. In all of these cases the macroeconomic environment led to gains and idiosyncratic factors reduced these.

Columns (8) – (10) also indicate that, of the 13 best performing sectors over the March 23rd - July 10th period, more than half relate to the home and to home improvement. One dollar invested on March 23rd would be worth \$2.16 in the household furnishing sector, \$1.86 in the renewable energy (including solar panel) sector, \$1.76 in the recreational products (including home swimming pool) sector, \$1.70 in the home improvement store sector, \$1.69 in the electronic entertainment sector, \$1.66 in the household appliance sector, and \$1.63 in the home construction sector. These gains were driven first of all by the macroeconomic environment but also by idiosyncratic factors. As people sheltered at home, they invested in making their homes more comfortable and energy-efficient.

Other large gainers over the March 23 – July 10 period include transport services, recreational vehicles, and specialty retail. Transport services including logistics staged a partial comeback after being one of the deepest losers during the earlier sub-sample period. Recreational vehicle demand rose since tourist activities involving close contact posed health risks. Specialty retail businesses such as Amazon continued to thrive as consumers sheltered at home.

As a robustness test, returns are regressed on the Fama-French (1993, 2015) factors instead of the eight macroeconomic factors. Interestingly, as Figure 2 shows, the adjusted R-squareds across sectors for the regressions with the Fama-French factors are closely related to the adjusted R-squareds from the regressions with the eight macroeconomic factors. In addition, as Figures 3 and 4 demonstrate, the influence of systematic and idiosyncratic effects across sectors are similar using these two approaches. The findings in Figures 2-4 thus indicate that the results presented in Table 1 are robust to a very different choice of common factors.⁶

⁶ Results for all 125 sectors from the Fama-French regressions are available upon request.

The important implication of the findings in this section is that there are large swaths of the U.S. economy whose recovery depends not on the macroeconomic environment but instead on bringing the pandemic under control. These sectors include airlines, aerospace, real estate investment trusts, recreational services, brewers, apparel retailers, and funerals. On the other hand, many sectors that are important for capital investment such as production equipment, machinery, and electronic and electric equipment are dependent on the macroeconomy. A robust recovery is thus necessary to revive business investment.

4. Conclusion

The coronavirus pandemic is an exogenous shock. This paper uses sectoral stock price responses to trace out its effects on the U.S. economy. Stock prices are useful because they provide a measure of how investors expect shocks to impact future cash flows across sectors. The paper also decomposes stock return changes into portions driven by sector-specific factors and portions driven by macroeconomic factors. Regressing returns on eight macroeconomic variables and on Fama and French's (1993, 2015) five factors yield similar decompositions into idiosyncratic and macroeconomic responses.

During the 19 February – 10 July 2020 sample period, the coronavirus crisis loomed large as an event driving idiosyncratic responses. Sectors roiled by idiosyncratic factors include airlines, aerospace, real estate, tourism, oil, brewers, retail apparel, and funerals. Until the pandemic is contained, these sectors are likely to suffer. Sectors profiting from idiosyncratic responses include electronic entertainment, diversified retailers such as Amazon, nondurable household goods such as Clorox, biotechnology, computer hardware, and software.

Macroeconomic factors caused large losses in the production equipment, machinery, and electronic & electrical equipment sectors. This suggests that a macroeconomic recovery and not just a defeat of the pandemic is necessary to revive capital goods spending.

News of the crisis contributed to a 43 percent drop in the aggregate U.S. stock market between 19 February and 23 March 2020. Expansionary policies by the Federal Reserve and the federal government then contributed to a 37 percent increase in stock prices between 23 March and 10 July 2020. During the recovery period, seven of the 13 best performing sectors were related to the home and home improvement. As people sheltered at home, they spent on their homes. While this will make their homes more comfortable, the evidence reported here that the real estate sector has done so badly indicates that this spending might not yield a high return on investment (ROI).

Stimulus that raises spending but does not lead to a high ROI will produce short run gains. Chetty et al. (2020) reported that stimulating aggregate demand and providing liquidity to businesses may not increase employment much when spending is constrained by health concerns. Policymakers need to develop a new approach to promote sustainable recovery from the COVID-19-induced downturn. One step in this direction, as Barrero, Bloom, and Davis (2020) argued, is to speed the reallocation of labor and capital from sectors that are unlikely to recover to newly productive sectors.

Table 1. Value of 1 Dollar Invested on 19 February 2020 Across U.S. Sectors Explained by Eight Macroeconomic Factors

	19 Feb. 2020 – 10 July 2020 Period			19 Feb. 2020 – 23 March 2020 Period			23 March 2020 – 10 July 2020 Period			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sector	Value on 10 July of 1 Dollar Invested on 19 Feb.	Value on 10 July of 1 Dollar Invested on 19 Feb. Driven by Macroeconomic Factors	Value on 10 July of 1 Dollar Invested on 19 Feb. Driven by Other Factors	Value on 23 March of 1 Dollar Invested on 19 Feb.	Value on 23 March of 1 Dollar Invested on 19 Feb. Driven by Macroeconomic Factors	Value on 23 March of 1 Dollar Invested on 19 Feb. Driven by Other Factors	Value on 10 July of 1 Dollar Invested on 23 March	Value on 10 July of 1 Dollar Invested on 23 March Driven by Macroeconomic Factors	Value on 10 July of 1 Dollar Invested on 23 March Driven by Other Factors	Adjusted -R ²
Aerospace	0.500	0.834	0.604	0.377	0.546	0.703	1.32	1.472	0.885	0.674
Airlines	0.381	0.812	0.442	0.381	0.539	0.704	1.039	1.452	0.676	0.349
Apparel Retailer	0.652	0.862	0.766	0.49 2	0.59 2	0.83 3	1.28 4	1.41 9	0.91 3	0.652
Automobiles	1.225	0.801	1.253	0.468	0.524	0.882	2.601	1.468	1.469	0.487
Banks	0.577	0.759	0.72	0.489	0.509	0.942	1.078	1.426	0.732	0.671
Basic Materials	0.897	0.812	1.06	0.595	0.538	1.088	1.43	1.444	0.967	0.782
Basic Resources	0.925	0.751	1.124	0.609	0.483	1.211	1.456	1.475	0.936	0.649
Beverages	0.816	0.951	0.888	0.649	0.749	0.875	1.236	1.246	1.015	0.567
Biotechnology	1.125	0.958	1.195	0.795	0.728	1.092	1.396	1.292	1.101	0.482
Brewers	0.587	0.899	0.695	0.615	0.708	0.874	0.891	1.24	0.761	0.277
Cable TV Services	0.876	0.892	0.947	0.682	0.624	1.083	1.308	1.388	0.916	0.590
Casinos/Gambling	0.554	0.738	0.715	0.472	0.471	0.989	1.201	1.486	0.777	0.505
Chemicals	0.881	0.85	1.019	0.589	0.576	1.015	1.415	1.418	0.988	0.784
Clothing, Accessories	0.747	0.858	0.846	0.531	0.592	0.894	1.342	1.399	0.935	0.618
Commercial Vehicle Leasing	0.575	0.726	0.774	0.331	0.421	0.777	1.668	1.623	1.017	0.498
Computer Hardware	1.099	0.912	1.165	0.668	0.637	1.054	1.614	1.391	1.115	0.579
Computer Services	0.884	0.894	0.994	0.641	0.661	0.973	1.366	1.316	1.039	0.691
Consumer Digital Services	1.009	0.914	1.074	0.664	0.664	0.996	1.503	1.341	1.095	0.517
Construction & Materials	0.805	0.836	0.913	0.59	0.561	1.029	1.307	1.433	0.884	0.799
Construction	0.617	0.761	0.761	0.553	0.489	1.095	1.149	1.48	0.75	0.640
Consumer Electronics	0.946	0.879	1.026	0.637	0.632	0.998	1.43	1.347	1.023	0.276
Consumer Lending	0.58	0.8	0.713	0.426	0.507	0.826	1.296	1.515	0.854	0.704
Consumer Staples	0.88	0.946	0.94	0.706	0.749	0.949	1.202	1.239	0.974	0.741
Consumer Services	0.945	0.903	1.009	0.589	0.651	0.902	1.601	1.351	1.145	0.612

Containers & Packaging	0.87	0.886	0.954	0.635	0.637	0.992	1.266	1.347	0.918	0.739
Copper	0.969	0.695	1.193	0.524	0.41	1.226	1.738	1.584	0.977	0.551
Cosmetics	0.757	0.927	0.797	0.621	0.664	0.942	1.188	1.355	0.849	0.401
Defense	0.707	0.914	0.77	0.597	0.679	0.885	1.119	1.314	0.843	0.581
Delivery Service	0.998	0.891	1.078	0.78	0.672	1.153	1.27	1.289	0.956	0.609
Distillers & Vintners	0.852	0.912	0.989	0.561	0.665	0.846	1.38	1.335	1.092	0.469
Diversified Retailers	1.296	0.972	1.218	0.873	0.758	1.148	1.511	1.261	1.098	0.555
Drug Retailers	0.816	0.918	0.877	0.748	0.72	1.044	1.039	1.246	0.819	0.512
Education Services	0.669	0.889	0.751	0.522	0.631	0.841	1.301	1.379	0.926	0.221
Electronic & Electrical Equipment	0.843	0.857	0.954	0.606	0.588	1.023	1.319	1.403	0.92	0.865
Electronic Entertainment	1.365	0.909	1.475	0.851	0.657	1.279	1.692	1.35	1.244	0.400
Electronic Equipment: Controls	0.846	0.829	0.968	0.582	0.552	1.038	1.37	1.44	0.918	0.787
Electronic Equipment: Gauges	0.868	0.889	0.963	0.638	0.627	1.014	1.306	1.369	0.944	0.818
Electronic Equipment: Pollution Control	0.733	0.869	0.802	0.581	0.606	0.955	1.196	1.381	0.827	0.592
Electricity	0.757	0.914	0.879	0.607	0.695	0.882	1.178	1.289	0.96	0.536
Electronic Components	0.822	0.834	0.942	0.595	0.562	1.046	1.35	1.425	0.916	0.819
Entertainment	0.98	0.886	1.034	0.694	0.626	1.101	1.461	1.374	1	0.753
Farming & Fishing	0.741	0.895	0.832	0.668	0.67	1.007	1.091	1.295	0.838	0.280
Fertilizers	0.754	0.763	1	0.535	0.477	1	1.351	1.515	1	0.401
Financial Data Providers	0.986	0.873	1.147	0.601	0.58	1.031	1.526	1.454	1.07	0.682
Food Products	0.927	0.939	0.988	0.728	0.748	0.976	1.21	1.233	0.981	0.623
Footwear	0.89	0.929	0.948	0.592	0.675	0.874	1.406	1.339	1.045	0.471
Forestry	0.627	0.885	0.721	0.453	0.643	0.726	1.125	1.34	0.832	0.298
Fruit & Grain	0.799	0.843	0.926	0.635	0.605	1.046	1.233	1.344	0.899	0.499
Funerals	0.684	0.905	0.76	0.679	0.633	1.066	1.002	1.383	0.732	0.409
Gas Distribution	0.719	0.879	0.844	0.592	0.635	0.942	1.153	1.345	0.876	0.658
General Industrials	0.788	0.848	0.899	0.58	0.604	0.953	1.259	1.357	0.905	0.799
Gold Mining	1.241	0.927	1.332	0.854	0.707	1.186	1.5	1.281	1.184	0.141
Health Care	0.955	0.945	1.019	0.703	0.721	0.978	1.293	1.284	1.013	0.751
Household Appliance	0.782	0.834	0.924	0.402	0.562	0.721	1.66	1.428	1.14	0.666

Household Equipment Producers	0.689	0.826	0.843	0.496	0.6	0.824	1.279	1.322	0.982	0.366
Household Furnishing	0.895	0.822	1.082	0.421	0.533	0.79	2.164	1.487	1.444	0.566
Home Construction	0.743	0.82	0.904	0.414	0.531	0.766	1.625	1.49	1.11	0.466
Home Improvement Retail	0.953	0.892	1.093	0.592	0.624	0.966	1.698	1.391	1.223	0.590
Hotel & Lodging REIT	0.393	0.731	0.498	0.386	0.456	0.821	1.029	1.53	0.64	0.607
Hotels & Motels	0.581	0.816	0.67	0.477	0.539	0.848	1.178	1.449	0.797	0.604
Industrial Engineering	0.843	0.824	1	0.592	0.542	1	1.359	1.454	1	0.798
Industrial Materials	0.659	0.798	0.775	0.497	0.519	0.952	1.146	1.471	0.738	0.550
Industrial Suppliers	0.832	0.886	0.92	0.547	0.622	0.888	1.407	1.38	0.992	0.593
Industrial Support Services	0.854	0.902	0.966	0.584	0.639	0.921	1.398	1.371	1.033	0.874
Industrial Transport	0.879	0.878	0.966	0.633	0.618	1.02	1.355	1.376	0.954	0.730
Investment Services	0.811	0.755	1.003	0.567	0.5	1.104	1.324	1.443	0.882	0.757
Iron & Steel	0.771	0.724	0.966	0.58	0.455	1.216	1.249	1.505	0.789	0.604
Leisure Goods	1.231	0.894	1.347	0.764	0.65	1.164	1.677	1.338	1.236	0.599
Life Insurance	0.583	0.735	0.73	0.415	0.455	0.897	1.355	1.538	0.824	0.686
Luxury Items	0.881	0.911	0.883	0.893	0.667	1.28	0.957	1.327	0.689	0.353
Machinery: Agricultural	0.852	0.837	0.976	0.633	0.548	1.136	1.329	1.458	0.887	0.570
Machinery: Construction	0.868	0.825	1.064	0.65	0.55	1.151	1.284	1.435	0.929	0.565
Machinery: Engines	0.973	0.803	1.049	0.601	0.505	1.118	1.417	1.514	0.865	0.509
Machinery: Industrial	0.72	0.833	0.844	0.471	0.55	0.852	1.463	1.454	0.987	0.798
Machinery: Specialty	0.803	0.876	0.912	0.675	0.616	1.083	1.139	1.371	0.836	0.559
Machinery: Tools	0.756	0.843	0.894	0.477	0.556	0.855	1.458	1.459	1.001	0.706
Media Agencies	0.824	0.825	0.985	0.549	0.583	0.943	1.476	1.367	1.063	0.647
Medical Equipment	0.947	0.93	1.025	0.66	0.68	0.969	1.361	1.332	1.03	0.693
Medical Services	0.84	0.93	0.952	0.529	0.693	0.778	1.51	1.314	1.191	0.450
Medical Supplies	0.912	0.956	0.973	0.666	0.722	0.924	1.287	1.298	1.011	0.617
Metal Fabric.	0.99	0.901	1.086	0.663	0.628	1.045	1.46	1.388	1.05	0.523
Mortgage REITs	0.478	0.844	0.551	0.387	0.588	0.669	1.111	1.398	0.762	0.178
Nondurable Household Products	1.213	0.994	1.23	0.903	0.831	1.086	1.267	1.18	1.085	0.389
Nonlife Insurance	0.746	0.879	0.841	0.628	0.65	0.967	1.127	1.317	0.848	0.783
Office REITs	0.62	0.82	0.719	0.525	0.533	0.966	1.135	1.478	0.743	0.633
Oil Equipment & Services	0.418	0.694	0.595	0.311	0.431	0.749	1.259	1.523	0.788	0.592

Oil Refining & Marketing	0.55	0.748	0.723	0.361	0.467	0.773	1.294	1.529	0.837	0.515
Oil: Crude Prod.	0.45	0.732	0.647	0.31	0.461	0.709	1.381	1.514	0.912	0.577
Oil & Gas (International)	0.656	0.817	0.797	0.477	0.567	0.851	1.288	1.393	0.909	0.662
Paint & Coating	0.891	0.924	0.949	0.615	0.654	0.938	1.364	1.375	0.98	0.675
Paper	0.721	0.797	0.817	0.578	0.53	1.077	1.112	1.438	0.71	0.514
Personal Goods	0.825	0.919	0.89	0.593	0.688	0.867	1.324	1.303	1.001	0.720
Personal Product	0.949	0.957	0.992	0.759	0.767	0.997	1.195	1.226	0.969	0.514
Pharmaceuticals	0.961	0.953	1.014	0.75	0.751	0.999	1.215	1.245	0.981	0.648
Pipelines	0.55	0.821	0.694	0.398	0.591	0.701	1.258	1.347	0.932	0.482
Production Technology & Equipment	0.932	0.878	1.023	0.598	0.582	1.034	1.61	1.456	1.057	0.575
Professional Business Support	0.889	0.897	1.006	0.617	0.643	0.962	1.391	1.354	1.041	0.796
Publishing	0.918	0.87	0.974	0.64	0.643	0.99	1.381	1.315	0.976	0.698
Radio TV Broadcasting	0.657	0.779	0.81	0.47	0.503	0.916	1.387	1.482	0.916	0.543
Railroad Equipment	0.64	0.832	0.738	0.486	0.546	0.872	1.33	1.462	0.888	0.468
Railroads	0.806	0.877	0.888	0.576	0.59	0.978	1.342	1.439	0.902	0.599
Real Estate Holdings & Development	0.413	0.758	0.516	0.319	0.468	0.686	1.115	1.539	0.683	0.560
Real Estate	0.742	0.843	0.868	0.556	0.567	0.967	1.26	1.438	0.877	0.678
Recreation Products	1.013	0.891	1.131	0.578	0.584	0.977	1.758	1.472	1.202	0.480
Recreational Vehicles	0.829	0.825	1.008	0.402	0.515	0.795	1.755	1.534	1.132	0.439
Recreational Services	0.507	0.793	0.649	0.41	0.53	0.784	1.265	1.437	0.88	0.559
Renewable Energy Equipment	1.102	0.793	1.219	0.585	0.496	1.129	1.864	1.525	1.12	0.226
Restaurants & Bars	0.82	0.949	0.873	0.606	0.709	0.863	1.305	1.313	0.996	0.617
Retail REITs	0.469	0.786	0.588	0.399	0.506	0.796	1.109	1.492	0.727	0.588
Retailers	1.184	0.947	1.165	0.786	0.718	1.092	1.536	1.292	1.109	0.783
Security Services	0.753	0.854	0.86	0.53	0.594	0.887	1.338	1.393	0.945	0.562
Semiconductors	0.963	0.88	1.058	0.67	0.605	1.113	1.494	1.406	1.019	0.684
Soft Drinks	0.814	0.954	0.879	0.66	0.756	0.882	1.223	1.24	1.005	0.528
Software	1.065	0.917	1.154	0.698	0.648	1.082	1.519	1.377	1.091	0.729
Specialty Retail	0.906	0.897	0.995	0.564	0.631	0.897	1.617	1.385	1.145	0.678
Technology Hardware	1.029	0.888	1.12	0.663	0.617	1.081	1.562	1.395	1.075	0.767
Telecommunications	0.901	0.904	0.984	0.732	0.698	1.05	1.213	1.266	0.945	0.705
Tobacco	0.81	0.923	0.885	0.666	0.726	0.929	1.162	1.247	0.928	0.408
Toys	0.691	0.868	0.746	0.508	0.612	0.833	1.466	1.379	0.99	0.514

Training, Employment	0.746	0.803	0.882	0.521	0.538	0.939	1.382	1.434	0.943	0.498
Transport Services	0.655	0.804	0.809	0.404	0.51	0.799	1.761	1.514	1.14	0.503
Travel & Tourism	0.567	0.804	0.672	0.407	0.512	0.792	1.404	1.503	0.892	0.536
Trucking	1.103	0.92	1.161	0.761	0.674	1.114	1.434	1.329	1.059	0.525
Utilities	0.759	0.914	0.876	0.611	0.692	0.892	1.168	1.294	0.944	0.572
Waste & Disposal Services	0.77	0.921	0.846	0.646	0.696	0.934	1.075	1.291	0.84	0.604

Note: Column (2) presents the stock market return as of 10 July 2020 from investing 1 dollar in the sector listed in column (1) on 19 February 2020. Column (3) presents the portion of returns in column (2) that can be attributed to the effect of eight macroeconomic factors on returns. These factors are 1) the return on the aggregate U.S. stock market index, 2) the return on the world stock market index, 3) the change in the Federal Reserve broad trade-weighted exchange rate index, 4) the change in the log of the spot price from West Texas Intermediate crude oil, 5) the change in the breakeven inflation rate calculated from U.S. Treasury inflation-protected securities, 6) the change in the interest rate on three-month Treasury securities, 7) the change in the spread between interest rates on ten-year and three-month Treasury security, and 8) the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities. Column (4) presents the portion of returns in column (2) not explained by these eight factors. Column (4) thus includes the effects of other factors such as the coronavirus pandemic on returns. Column (5) – (7) and (8) – (10) are analogous to columns (2) – (4) except the returns on a one dollar investment are calculated over the 19 February 2020 – 23 March 2020 and 23 March 2020 – 10 July 2020 periods, respectively. Column (11) presents the adjusted R-squared coefficient from a regression of the sector's return on the eight macroeconomic factors. The sample period extends from 2 January 2006 to 10 July 2020. In cases where return data are not available on 2 January 2006, the sample begins on the first date when return data become available.

Source: Datastream database, Federal Reserve Bank of St. Louis FRED database, and calculations by the author.

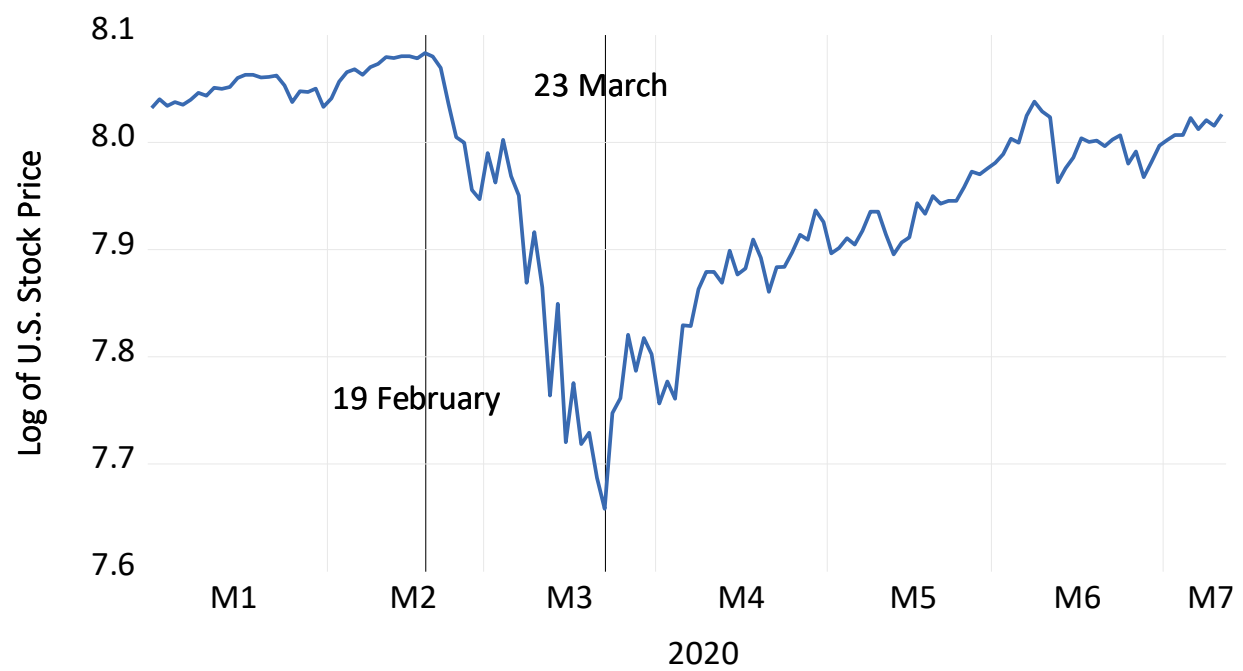


Figure 1. U.S. Aggregate Stock Prices.
Source: Datastream database.

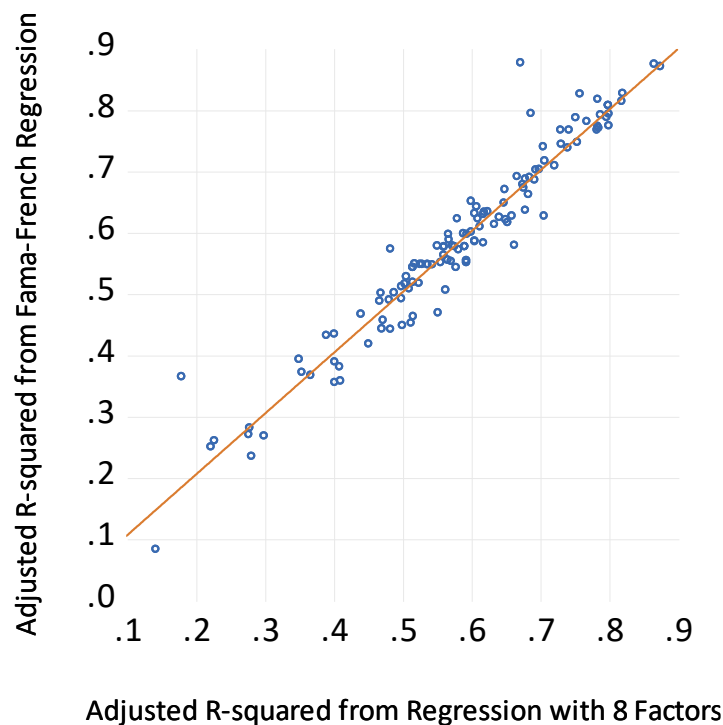
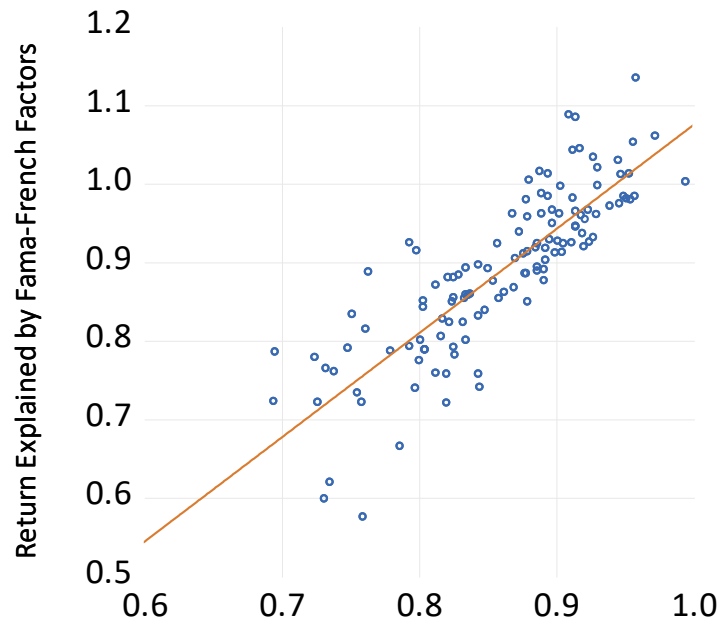


Figure 2. Adjusted R-squared Coefficients from Regressions with Eight Macroeconomic Factors versus Adjusted R-squared from Regressions with Five Fama-French Factors

Note: The horizontal axis plots the adjusted R-squared coefficients from regressing daily returns on 125 sectors on the return on the aggregate U.S. stock market index, the return on the world stock market index, the change in the Federal Reserve broad trade-weighted dollar exchange rate index, the change in the log of the spot price for West Texas Intermediate crude oil, the change in the breakeven inflation rate calculated from U.S. Treasury inflation-protected securities, the change in the interest rate on three-month Treasury securities, the change in the spread between interest rates on ten-year and three-month Treasury security, and the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities. The vertical axis plots the corresponding adjusted R-squared coefficients from regressing daily returns on 125 sectors on the five Fama-French (2015) factors. These factors are 1) the return on the aggregate U.S. stock market index minus the return on one-month Treasury securities, 2) the average return on nine small capitalization stock portfolios minus the average return on the nine large capitalization stock portfolios, 3) the average return on two high book value to market value portfolios minus the average return on the two low book value to market value portfolios, 4) the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and 5) the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios.

Source: Datastream database, Federal Reserve Bank of St. Louis FRED database, homepage of Professor Kenneth French, and calculations by the author.



Return Explained by 8 Macroeconomic Factors

Figure 3. Values on 10 July 2020 of One Dollar Invested on 19 February 2020 Explained by Eight Macroeconomic Factors versus Corresponding Values Explained by Fama-French Factors

Note: The horizontal axis measures the values on 10 July 2020 across 125 sectors of a dollar invested on 19 February 2020 explained by 8 macroeconomic factors. These factors are 1) the return on the aggregate U.S. stock market index, 2) the return on the world stock market index, 3) the change in the Federal Reserve broad trade-weighted exchange rate index, 4) the change in the log of the spot price from West Texas Intermediate crude oil, 5) the change in the breakeven inflation rate calculated from U.S. Treasury inflation-protected securities, 6) the change in the interest rate on three-month Treasury securities, 7) the change in the spread between interest rates on ten-year and three-month Treasury security, and 8) the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities. The vertical axis plots the corresponding values explained by the five Fama-French (2015) factors. These factors are 1) the return on the aggregate U.S. stock market index minus the return on one-month Treasury securities, 2) the average return on nine small capitalization stock portfolios minus the average return on the nine large capitalization stock portfolios, 3) the average return on two high book value to market value portfolios minus the average return on the two low book value to market value portfolios, 4) the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and 5) the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios.

Source: Datastream database, Federal Reserve Bank of St. Louis FRED database, homepage of Professor Kenneth French, and calculations by the author.

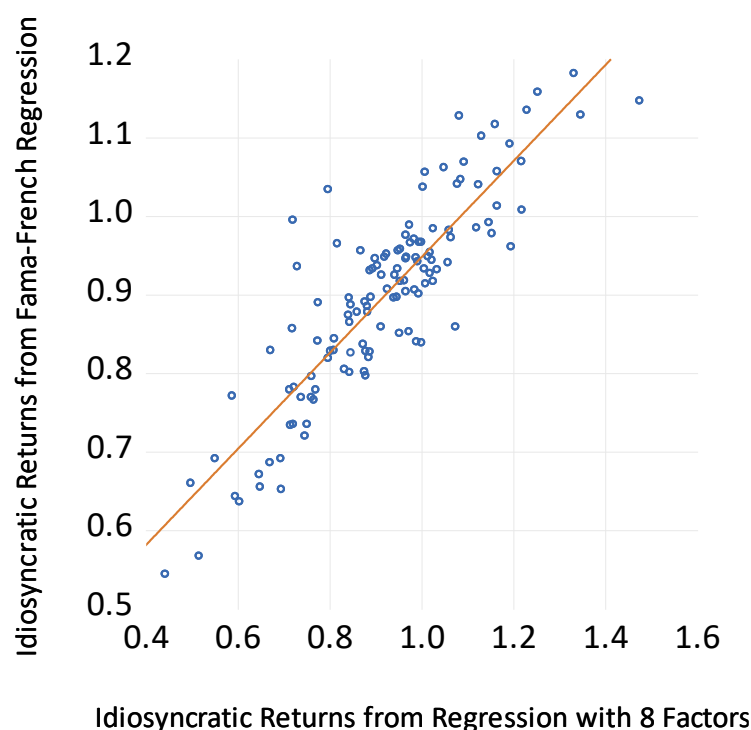


Figure 4. Values on 10 July 2020 of One Dollar Invested on 19 February 2020 Not Explained by Eight Macroeconomic Factors versus Corresponding Values Not Explained by Fama-French Factors

Note: The horizontal axis measures the values on 10 July 2020 across 125 sectors of a dollar invested on 19 February 2020 not explained by 8 macroeconomic factors. These factors are 1) the return on the aggregate U.S. stock market index, 2) the return on the world stock market index, 3) the change in the Federal Reserve broad trade-weighted exchange rate index, 4) the change in the log of the spot price from West Texas Intermediate crude oil, 5) the change in the breakeven inflation rate calculated from U.S. Treasury inflation-protected securities, 6) the change in the interest rate on three-month Treasury securities, 7) the change in the spread between interest rates on ten-year and three-month Treasury security, and 8) the change in the spread between interest rates on Moody's seasoned Baa corporate bonds and ten-year Treasury securities. The vertical axis plots the corresponding values not explained by the five Fama-French (2015) factors. These factors are 1) the return on the aggregate U.S. stock market index minus the return on one-month Treasury securities, 2) the average return on nine small capitalization stock portfolios minus the average return on the nine large capitalization stock portfolios, 3) the average return on two high book value to market value portfolios minus the average return on the two low book value to market value portfolios, 4) the average return on two robust operating profitability portfolios minus the average return on two weak operating profitability portfolios, and 5) the average return on two conservative investment portfolios minus the average return on two aggressive investment portfolios. Changes in value not explained by macroeconomic factors over the 19 February – 10 July 2020 period include sector-specific responses to the COVID-19 pandemic.

Source: Datastream database, Federal Reserve Bank of St. Louis FRED database, homepage of Professor Kenneth French, and calculations by the author.

References

- Ablan, J., Georgiadis, P., Lockett, H., and Lewis, L. (2020). Wall Street Rallies for Third Day as Stimulus Cheers Investors. *Financial Times*, 27 March
- Aït-Sahalia, Y., Karaman, M., and Mancini, L. (2020). The Term Structure of Equity and Variance Risk Premia. *Journal of Econometrics*, forthcoming.
- Barrero, J.M., Bloom, N., and Davis, S. (2020). COVID-19 Is Also a Reallocation Shock. NBER Working Paper No. 27137.
- Black, F. (1987). *Business Cycles and Equilibrium*, Basil Blackwell, New York.
- Brower, D. (2020). US Oil's Slow Grind Higher. *Financial Times*, 28 July.
- Brown, S.J. and Warner, J.B. (1985). Using Daily Stock Returns: The Case of Event Studies. *Journal of Financial Economics* 14, 3-31.
- Brown, S.J. and Warner, J.B. (1980). Measuring Security Price Performance. *Journal of Financial Economics* 8, 205-258.
- Chan, K. and Marsh, T. (2020). The Asset Markets and the Coronavirus Pandemic. VoxEU Weblog, 3 April (available at: www.voxeu.org).
- Chen, J., Liu, H., Rubio, D., Sarkar, A., and Song, Z. (2020). MBS Market Dysfunction in the Time of COVID-19. Liberty Street Economics Weblog, 17 July (available at: <https://libertystreeteconomics.newyorkfed.org/>).
- Chen, N., Roll, R., and Ross, S. (1986). Economic Forces and the Stock Market. *The Journal of Business* 59, 383-403.
- Cheng, J., Skidmore, D., and Wessel, D. (2020). What's the Fed Doing in Response to the COVID-19 Crisis? What More Could it Do? Brookings Weblog, 17 July (available at: www.brookings.edu).
- Chetty, R., Friedman, J., Hendren, N., Stepner, M., and the Opportunity Insights Team. (2020). How Did Covid-19 and Stabilization Policies Affect Spending and Employment? A New Real Time Economic Tracker Based on Private Sector Data. Opportunity Insights Working Paper (available at: https://opportunityinsights.org/wp-content/uploads/2020/05/tracker_paper.pdf)
- Dominguez, K. M. E., and Tesar, L.L. (2006). Exchange Rate Exposure. *Journal of International Economics* 68, 188-218.
- Eichenbaum, M., Rebelo, S., and Trabandt, M. (2020a). Epidemics in the Neoclassical and New Keynesian Models. NBER Working Paper No. 27430.

- Eichenbaum, M., Rebelo, S., and Trabandt, M. (2020b). The Macroeconomics of Testing and Quarantining. NBER Working Paper No. 27104.
- Eichenbaum, M., Rebelo, S., and Trabandt, M. (2020c). The Macroeconomics of Epidemics. NBER Working Paper No. 26882.
- Fama, E. F., and French, K.R. (2015). A Five-Factor Asset Pricing Model. *Journal of Financial Economics* 116, 1–22.
- Fama, E.F., and French, K.R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics*, 33, 3-56.
- Federal Reserve. (2020). Federal Reserve Announces Extensive New Measures to Support the Economy. 23 March (available at: <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm>)
- Goolsbee, A., and Syverson, C. (2020). Fear, Lockdown, and Diversion: Comparing Drivers of Pandemic Economic Decline 2020. NBER Working Paper No. 27432.
- Gormsen, N. J., and Koijen, R.S.J. (2020). Coronavirus: Impact on Stock Prices and Growth Expectations. University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2020-22.
- Hartley, A. and Rebucci, J. (2020). An Event Study of COVID-19 Central Bank Quantitative Easing in Advanced and Emerging Economies. CEPR Discussion Paper 14841.
- Koren, M. and Pető, R. (2020). Business Disruptions from Social Distancing. *Covid Economics: Vetted and Real-Time Papers 2*, CEPR Press. (available at: <https://cepr.org/content/covid-economics-vetted-and-real-time-papers-0#block-block-10>)
- McCormick, M. (2020). Schlumberger to Slash 21,000 jobs as Revenues Plunge. *Financial Times*, 25 July.
- Noonan, L., and Armstrong, R. (2020). Three US Banks Set Aside Record \$28bn for Loan Losses. 15 July.
- Novet, J. (2020). The PC is suddenly cool again ... for now. CNBC, 4 May (available at: www.cnbc.com).
- Pagano, M, Wagner, C., and Zechner, J. (2020). Disaster Resilience and Asset Prices. *Covid Economics: Vetted and Real-Time Papers 2*, CEPR Press. (available at: <https://cepr.org/content/covid-economics-vetted-and-real-time-papers-0#block-block-10>)
- Promnitz, D. (2020). Broadcasters Use Free Advertising During Pandemic. *The Business Journal*, 19 June.

- Ramelli, S., and Wagner, A.F. (2020). Feverish Stock Price Reactions to COVID-19. *Review of Corporate Finance Studies*, forthcoming.
- Smith, C. (2020). US Consumers Cut Debt as Lockdowns Curbed Spending. *Financial Times*, 7 August.
- Smith, C. and Badkar, M. (2020). US Stocks Post Weekly Drop as Investors Reach for Safety. *Financial Times*, 22 February.
- Thorbecke, W. (2019). Oil Prices and the U.S. Economy: Evidence from the Stock Market. *Journal of Macroeconomics*, 61, Article 103137.
- Tyco, K. (2020). Need Clorox Wipes? Disinfecting Wipes Shortage Could Last into 2021 Amid Coronavirus Pandemic. USA Today, 6 August.
- Wells, P. (2020). US Stocks Retreat from Record Highs. *Financial Times*, 27 March.