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How the Coronavirus Crisis is Affecting the Korean Economy: Evidence from the Stock Market*

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Abstract

South Korea has proven resilient through crises. During the COVID-19 pandemic, Korea has used testing and contact tracing to keep the number of cases per capita far below those in the U.S. and Europe. This paper uses sectoral stock returns to gauge the impact of the pandemic on the Korean economy. The results indicate that industrial machinery stocks have doubled in value in the eight months since the crisis hit. Other sectors that benefit individuals hunkered at home such as consumer digital services, software and computer services, leisure goods, and electronic entertainment have also done well. On the other hand, sectors providing services such as travel & leisure, casinos & gambling, and convenience stores have languished. The crisis has benefited sectors producing goods and employing higher-skilled workers and harmed sectors providing services and employing lower-skilled workers. This risks perpetuating disparities that existed in Korea before the pandemic.

Keywords: Korea, Coronavirus, Stock returns, Dual labor market

JEL classification: G10, I10

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1. Introduction

The first case of COVID-19 was reported in Wuhan, China in December 2019. The first case in South Korea was announced on 19 January 2020. Korea contained the first two waves of the virus in March and August 2020 and is fighting a third wave that began in November 2020. It is also mitigating the economic fallout. This paper uses detailed stock price data to investigate how individual sectors of the Korean economy are faring during the crisis.

After the pandemic hit the world economy, Korea suffered capital outflows. As Figure 1 shows, between 17 February and 19 March 2020 the won depreciated by 8 percent and the Korean stock market fell by 42 percent. Both the won and the stock market increased markedly beginning on 19 March. This was the day when the Bank of Korea (BOK) and the Federal Reserve agreed to a 60 billion U.S. dollar swap arrangement. This agreement reassured investors that, as occurred following the 2008 BOK/Fed swap agreement, dollar liquidity would be available in the Korean economy (Lee, 2020).

Korea also slowed the spread of the virus without strict lockdowns. The government, having learned from the SARS epidemic in 2004 and the MERS-COV outbreak in 2015, responded quickly (Ji, 2020). It employed extensive testing and used artificial intelligence and other advanced technologies to trace the contacts of infected individuals. It quarantined these contacts and tested them for COVID-19. As Huang, Sun, and Sui (2020) discussed, private developers also fashioned an app called Corona 100m that employs government data and notifies users of infected individuals within 100 meters, along with their nationalities, ages, and gender. It was downloaded over a million times within a few weeks. Schools moved to distance learning and the government also provided information about how to avoid the disease. Huang, Sun, and Sui noted that Koreans are civic-minded and inclined to follow government instructions. In the

meantime, stores remained open. This strategy succeeded, and Korea averaged less than 100 new cases per day in October 2020. Although this number increased in November and December, on a per capita basis Korea's total cases remain two orders of magnitude below those in the U.S.

In spite of this success, the OECD (2020) noted that the pandemic damaged the Korean economy. The travel and leisure sectors suffered from travel restrictions and precautionary behavior. Manufacturing, especially petrochemicals and cars, fell during the global slowdown. Employment, especially for non-regular and service workers, also fell.

There were also silver linings. Government stimulus programs and partial recoveries abroad stimulated demand for Korean exports. Consumers staying at home rechanneled spending from services to goods. Korea's manufacturing economy benefited from this switch. Korea's exports began recovering in June 2020.

The government also implemented four supplementary budgets. These provided support for businesses and households, funds for controlling the virus, and aid to local governments. In addition, President Moon is pursuing a "Green New Deal" program to promote green and digital technologies and to strengthen social safety nets. The OECD (2020) forecasted that Korea's budget balance will move from a surplus in 2019 to a deficit of about 3 percent of GDP in 2020 and its government debt to GDP ratio will exceed 40 percent of GDP.

The IMF (2020) reported that Korea took several other steps to ease financial conditions and strengthen the financial system. The BOK lowered the Base Rate from 1.25 percent to 0.5 percent and used open market operations and lending support to provide funds to banks, non-bank financial institutions, and small and medium-sized enterprises (SMEs). President Moon dedicated 100 trillion Korean won to promote bank lending to smaller firms, purchase corporate

bonds and commercial paper, and help to stabilize the financial system. He also allocated 40 trillion Korean won to support the following industries: airlines, shipping, shipbuilding, autos, general machinery, electric power, and communications.

The steps Korea has taken to fight the pandemic and support the economy have proved successful. The December 2020 *Asian Development Outlook Supplement* (ADB, 2020) forecasts that GDP will contract by only 0.9 percent in 2020 and grow by 3.3 percent in 2021. Its forecasted growth in 2021 is the highest among all 37 OECD members (Jung-a, 2020)

Korea has a history of resilience in the face of crises. After the devastation of the Korean War its GDP per capita was lower than Haiti's and Zimbabwe's. The lion's share of output came from the agricultural sector, and only 15 percent came from manufacturing. U.S. aid supported the economy.

General Chung-Hee Park took power in 1961. Korea lacked natural resources, and needed to export in order to import commodities and military equipment. Park directed Korea to follow Japan's post-War export-oriented approach. He nationalized banks and provided subsidized loans to large conglomerates (*chaebols*). He only continued lending to successful exporters, and many chaebols stopped receiving credit (Yoshitomi, 2003, Hausmann and Rodrik, 2003).

Korea also invested heavily in education. Hayami (2008) found that in 1960 the average years of schooling of the working age population in Korea was at 25 percent of the frontier country (the U.S.) and by 2000 this had increased to 75 percent.

Park's government promoted consumer electronics. Korean firms in the 1960s produced black and white televisions and stereos using imported inputs. Kim (1980) found that labor only contributed 5 percent to the value added. However by 1975 domestic research and development

(R&D) grew and on average consumer electronics firms reported making 5 improvements per year.

Samsung in the 1970s engaged in R&D. It could not make color televisions. There was also no domestic market to subsidize color TV manufacturing since Korean networks did not broadcast in color. Nevertheless Samsung reverse engineered foreign color televisions and persuaded Matsushita to sell it color picture tubes. It then exported color TVs into highly competitive world markets. Sato (1997) noted that Samsung's extreme effort to export color TVs exhibited its commitment to follow the government's export mandate. Pecht et al (1997) observed that Korean workers were hard working and patriotic and determined to help Korea grow.

As the oil crisis unfolded in the 1970s, Samsung could no longer purchase foreign semiconductors. It began manufacturing poor quality chips. In the 1980s, Samsung focused on Dynamic Random Access Memory (DRAM) semiconductors. Its engineers diligently absorbed technology from America and Japan. By the early 1990s it was the leading producer of DRAMs. It also manufactured other parts and components such as liquid crystal displays.

Capital then flooded into Korea to invest in Samsung and other chaebols.¹ Much of this capital was in the form of short-term dollar denominated bank loans that financed long-term won denominated assets such as factories. Korean banks had overlooked high debt when lending to the chaebols because they viewed lending to the conglomerates as a part of Korea's industrial policy and not subject to normal commercial risks. On the other hand foreign investors, observing the high debt/equity ratios of Korean firms, withdrew their capital in 1997. The reversal of capital between 1996 and 1997 exceeded 10 percent of GDP. The BOK lacked

¹ This paragraph draws on Yoshitomi (2003).

sufficient reserves to defend the peg, the won tumbled, U.S. dollar-denominated debts became onerous, and the stock market crashed. Korea faced a severe crisis, with the percentage of people in poverty increasing by 10 percentage points.

The crisis atmosphere gave Korean firms an opportunity to reinvent themselves. Samsung and other corporations realized that competing on price in producing low-end goods would fail. As Ward (2004) noted, they slashed their debts and focused on improving technology and design. Samsung became a leader not only in semiconductors and LCDs but also in phones, flat screen TVs, and other sophisticated consumer electronics.

Before the 2008 Global Financial Crisis, Korean banks borrowed short-term in foreign currencies.² Then as the crisis hit, foreign investors grew concerned about the exposure of the Korean economy. Capital flowed out of the economy and both the won and stock prices fell by more than 25 percent between September and November 2008. On 30 October 2008 the BOK established a \$30 billion swap arrangement with the Federal Reserve and used this to provide foreign currency liquidity to the domestic economy.

As the won depreciated and the Japanese yen appreciated, Korean conglomerates gained comparative advantage relative to Japanese firms in producing electronic parts and components (Thorbecke, 2019a). As their exports increased, they channeled the revenues into capital formation and R&D. Korean companies such as Samsung and SK Hynix solidified their positions at the world's leading producers of memory chips.

However, as the OECD (2020) discussed, a dual labor market has developed in Korea. Wages and working conditions are much better for workers at large firms and in industry than for

² This paragraph draws on Kim (2009).

workers at SMEs and in services. The Gini coefficient in Korea exceeds 0.3, placing Korea as the 30th most unequal economy out of the 36 OECD members.

This paper investigates how individual sectors of the Korean economy have fared during the pandemic. To do this it traces the response of Korean stock prices in 59 sectors from 17 February to 19 March 2020 and from 19 March to 4 December 2020. Black (1987, p. 113) noted 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.” Stock prices thus summarize the forecasts of many investors on the prospects for individual sectors.

The results indicate that stocks in sectors such as cosmetics, travel and leisure, and convenience stores have fared badly during the pandemic. On the other hand industrial machinery stocks, after losing more than half of their value between 17 February and 19 March, has since soared and more than doubled in value between 17 February and 4 December. The demand for Korean capital goods has thus increased after March 2020.

Several papers have investigated the relationship between the COVID-19 pandemic and asset prices for countries other than Korea. Ramelli and Wagner (2020), using the capital asset pricing model and the Fama and French (1993, 2015) factor model to control for risk, reported that coronavirus news caused risk-adjusted returns on stocks of U.S. companies that trade with China and that had less cash and more leverage to fall more. Pagano et al. (2020), employing Koren and Petó’s (2020) approach to measure tasks that can be done without close contact, found that stocks of firms that are resilient to social distancing performed better than non-resilient stocks. Gormsen and Koijen (2020), using dividend futures to calibrate the impact of the pandemic, forecasted a 9 percentage point (ppt) drop in U.S. dividends and a 14 ppt drop in

European dividends. Sharif et al. (2020), employing wavelet-based methods, found that the U.S. stock market, economic uncertainty, and geopolitical risk are impacted both by the COVID-19 pandemic and by oil price shocks. This paper adds to the literature by using stock returns to investigate how Korean industries fared during the pandemic.

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

2. Data and Methodology

Figure 1 indicates that the aggregate Korean stock market tumbled between 17 February and 19 March 2020 and then staged an impressive recovery afterwards. This paper thus examines the behavior of sectoral stock returns not only over the 17 February to 4 December 2020 sample period but also over the 17 February to 19 March and 19 March to 4 December subsample periods.

Changes in returns are also divided into the portion driven by macroeconomic factors and the portion driven by idiosyncratic influences. This can shed light on whether sectors are being harmed by changes in the macroeconomic environment in Korea and the world or by sector-specific vulnerabilities during the pandemic.

To capture the effects of macroeconomic variables on returns five factors are employed. Following the literature on the market model (e.g., Brown and Warner 1980, 1985), returns on the aggregate Korean stock market are included as an explanatory variable to capture the effects of changes in the overall Korean economy on individual sectors. Following the exchange rate exposure literature (e.g., Dominguez and Tesar, 2006), the change in the nominal Korean won/U.S. dollar exchange rate is included as an explanatory variable. Following evidence that oil prices matter for the Korean economy (e.g., Thorbecke, 2019b), the change in the spot price

of Dubai crude oil is also included as an explanatory variable. In addition, returns on the world economy and changes in the BOK Base Rate are included to capture the effects of changes in the world economy and in Korean monetary policy on individual sectors.

Data on sectoral returns for 59 sectors, the returns on the overall Korean and world stock markets, the change in the won/dollar exchange rate, the change in the price of Dubai crude oil, and the change in the BOK base rate are obtained from the Datastream database. The data extend from 4 December 2000 to 4 December 2020.³ There are 5218 observations.

Augmented Dickey–Fuller (ADF) tests allow the null hypothesis that the first difference of the series have unit roots to be rejected. The following regressions are thus estimated:

$$\Delta R_{i,t} = \alpha_0 + \alpha_1 \Delta R_{m,Korea,t} + \alpha_2 \Delta er_t + \alpha_3 \Delta P_{oil,t} + \alpha_4 \Delta R_{m,World,t} + \alpha_5 \Delta BR_t + \varepsilon_t, \quad (1)$$

where $\Delta R_{i,t}$ is the change in the log of the stock price index for sector i , $\Delta R_{m,Korea,t}$ is the change in the log of the price index for the Korean aggregate stock market, Δer_t is the change in the Korean won/U.S. dollar nominal exchange rate, $\Delta P_{oil,t}$ is the change in the log of the spot price for Dubai crude oil, $\Delta R_{m,World,t}$ is the change in the log of the price index for the world stock market, ΔBR_t is the change in the BOK Base Rate, ε_t is a mean zero error term, and the data are daily.

Equation (1) is a standard regression in finance of sectoral returns on macroeconomic variables. Following previous researchers (e.g., Chen, Roll, and Ross, 1986), the causality is assumed to flow from the macroeconomic variables on the right-hand side of equation (1) to the sectoral returns on the left-hand side and any causality flowing the other way is assumed to be second order.

Sectoral returns are compounded to find the value on 4 December 2020 of one won invested on 17 February 2020. Equation (1) is then used to decompose compounded returns into

³ In cases where sectoral stock return data are unavailable starting 4 December 2000, the data are used from the first date that they are available.

the portions driven by the macroeconomic factors and by sector-specific factors. Compounded returns are also calculated over the 17 February to 19 March subsample when the effect of the crisis was most severe and the 19 March to 4 December subsample when the Korean economy showed signs of recovery.

3. Results

Table 1 presents the results from estimating equation (1). The adjusted R-squareds in column (12) average 0.301. This is good for regressions using daily stock price data.

The betas to the Korean stock market in column (2) indicate that manufactured items such as industrial machinery have betas greater than 1.0, indicating that these sectors are sensitive to the overall Korean economy. Sectors such as food, tobacco, distillers & vintners, health care, and pharmaceuticals have low market betas. Many of the goods produced in these sectors continue to be purchased even when the Korean economy turns down.

The exchange rate betas in column (4) indicate that automobiles and automobile parts, consumer electronics, computer hardware, and other sectors gain when the won depreciates. These are fiercely competitive sectors, and exchange rate depreciations allow exporters to either increase their profit margins (if they keep foreign currency export prices constant) or increase the volume of exports (if they pass through depreciations into lower foreign currency prices). Industries employing imported inputs such as sophisticated machinery sectors benefit from appreciations.

The oil price betas in column (6) indicate that oil price increases harm airlines, electricity, and automobiles (the coefficient on automobile stocks is significant at the 10 percent level). Oil price increases benefit oil refining & marketing and marine transport. Marine transport is

composed of shipbuilding companies, and an increase in oil prices increases the demand for oil tankers.

The betas to the world stock market in column (8) and the Bank of Korea base rate in column (10) indicate that many sectors are also exposed to these variables. For the world stock market these include industrial machinery, commercial vehicle parts, iron & steel, electronic components, and a variety of industrial sectors. For the base rate these include precious metals & mines and property & casualty insurance.

Table 2 employs the results from Table 1 to calculate the changes in returns driven by macroeconomic factors and by sector-specific factors. Column (2) shows the total return on 4 December 2020 to 1 won invested on 17 February 2020. The worst performing sectors in column (2) include food retail & wholesale, electricity, casinos & gambling, travel & leisure, cosmetics, and marine transport. The values on 4 December of 1 won invested on 17 February was 0.748 won for food retail & wholesale, 0.811 won for electricity, 0.817 won for casinos & gambling, 0.830 won for travel & leisure, 0.871 won for cosmetics, and 0.875 won for marine transport. Columns (3) and (4) indicate that these losses were driven entirely by sector-specific responses during the pandemic and not by changes in the macroeconomic environment. The wholesale & retail trade sector is composed primarily of convenience stores. During the pandemic visits to these stores have tumbled. The entire tourism sector, including casinos & gambling and travel & leisure, has also suffered. As people have left their house less, the demand for cosmetics such as lipstick has fallen. Also with a reduction in world trade, the marine transport (shipbuilding) sector has suffered.

The best performing sectors in column (2) include industrial machinery, chemicals, health care, biotechnology, consumer digital services, pharmaceuticals, automobiles, software &

computer services, leisure goods, electronic entertainment, consumer electronics, electronic components, and household furnishings. The values on 4 December of 1 won invested on 17 February were 2.11 won for industrial machinery, 1.71 won for chemicals, 1.68 won for healthcare, 1.67 won for biotechnology, 1.66 won for consumer digital services, 1.42 won for pharmaceuticals, 1.37 won for automobiles and for software & computer services, 1.29 won for leisure goods, 1.26 won for electronic entertainment and for consumer electronics, 1.25 won for electronic components, and 1.21 won for household furnishings. Columns (3) and (4) indicate that these gains were driven both by macroeconomic and by sector-specific factors. As the Korean and world macroeconomic outlooks have improved, the prospects for Korean manufactured goods such as industrial machinery, automobiles, consumer electronics, and electronic components have improved. Chemical companies such as LG Chem have benefited from the demand for lithium ion batteries. Healthcare, biotechnology, and pharmaceuticals have also gained from increased demand during the pandemic. Finally, sectors such as consumer digital services, software & computer services, leisure goods, electronic entertainment, and household furnishings have benefited from increased demand by consumers hunkered down at home.

Column (5) indicates that all of the sectors lost over the 17 February to 19 March period. The worst performing sectors include construction machinery, industrial machinery, life insurance, industrial engineering, automobiles, marine transport, and electronic components. The value on 19 March of 1 won invested on 17 February was 0.428 won for construction machinery, 0.437 won for industrial machinery, 0.456 won for life insurance, 0.501 won for automobiles, 0.523 won for marine transport, and 0.539 won for electronic components. For all of these sectors except marine transport, columns (6) and (7) indicate that the losses were driven

by both macroeconomic and sector-specific factors. For marine transport, the losses were driven primarily by the macroeconomic environment. The slowdown in the Korean and world economy led to a reduction in trade that harmed Korea's goods producing sectors including machinery, shipbuilding, automobiles, and electronic components.

Column (5) indicates that the best performing sectors (the sectors that lost the least) over the 17 February to 19 March period include security services, electronic entertainment, leisure goods, tobacco, consumer digital services, consumer staples, pharmaceuticals, distillers and vintners, and healthcare. The value on 19 March of 1 won invested on 17 February was 0.943 won for security services, 0.849 won for electronic entertainment, 0.787 won for leisure goods, 0.758 won for tobacco, 0.755 won for consumer digital services, 0.743 won for consumer staples, 0.736 won for pharmaceuticals, 0.730 won for distillers & vintners, and 0.729 for healthcare. In every case except tobacco, the macroeconomic environment generated large losses that were partly offset by idiosyncratic factors. Security services were in demand as many businesses temporarily closed down. Electronic entertainment, leisure goods, consumer digital services, and consumer staples benefited from consumers sheltering at home. The pharmaceutical and health care sectors benefitted from increased demand during the outbreak. The demand for tobacco and alcoholic beverages initially remained steady.

Column (8) indicates that the worst performing sectors over the 19 March to 4 December period include food retail & wholesale, tobacco, cosmetics, casinos & gambling, and travel & leisure. The value on 4 December of 1 won invested on 19 March was 1.029 for food retail & wholesale, 1.086 won for tobacco, 1.106 for cosmetics, 1.190 for casinos & gambling, and 1.208 for travel & leisure. Columns (9) and (10) indicate that, in every case, idiosyncratic factors would have produced large losses if they had not been offset by gains driven by macroeconomic

forces. Tobacco performed poorly as consumers recognized the relationship between smoking and catching COVID.

Column (8) indicates that the best performing sectors over the 19 March to 4 December period include the best performing sectors over the whole 17 February to 4 December sample period. The value on 4 December of 1 won invested on 17 February was 4.395 won for industrial machinery, 2.587 won for chemicals, 2.430 won for automobiles, 2.141 won for consumer digital services, 2.074 won for healthcare, 2.066 won for biotechnology, 1.958 won for electronic components, 1.926 won for software and computer services, and 1.859 won for life insurance. These gains were driven both by macroeconomic and by idiosyncratic factors. On the macroeconomic front, as governments in the rest of the world stimulated their economies, demand was channeled more to goods than to services. Korea, as a country manufacturing sophisticated goods, benefited from the increased demand for goods. For the life insurance sector, investors decreased their forecasts of the death toll as they saw Korea successfully containing the spread of the virus.

The important implication of these results is that many sectors such as convenience stores and tourism that employ lower paid service workers have suffered during the pandemic. On the other hand, firms employing higher skilled workers and producing electronics, automobiles, industrial machinery, software and computer games face brighter prospects. This dichotomy risks exacerbating inequalities that have developed in Korea after the 1997-98 Asian Financial Crisis.

4. Conclusion

Korea has a history of coming through crises well. So far this has proven to be true during the COVID-19 pandemic. Copious testing, contact tracing, and quarantining for exposed individuals has allowed Korea to overcome the first two waves of the virus in 2020. Korea achieved this without resorting to strict lockdowns.

This paper has investigated how the pandemic affects the economy by examining how the stock market has responded. Stock prices aggregate investors' forecasts of how sectors and industries will fare. The results indicate that, despite suffering initially, industrial machinery stocks have more than doubled in value in the nine months after the crisis hit. Other sectors that benefit individuals hunkered at home such as consumer digital services, software and computer services, leisure goods, and electronic entertainment have also done well. On the other hand, sectors providing services such as travel & leisure, casinos & gambling, and convenience stores have languished.

While the overall Korean economy is recovering, the pandemic is reinforcing harmful trends that existed before the crisis. For instance, the manufacturing sector is doing better than the service sector. In addition to providing relief to suffering service sector workers, the government should consider using the crisis to push through reforms such as easing product market regulations that could reduce longer-term structural inequities between manufacturing workers and service workers and between conglomerates and SMEs (see OECD, 2020).

If the number of cases surges, Korea should also consider imposing a lockdown. Goolsbee and Syverson (2020) investigated whether the U.S. economic downturn arose from shelter-in-place (S-I-P) orders or from individuals seeking to avoid infections. Using cellphone data on visits to 2.25 million businesses in 110 industries, they found that legal S-I-P orders

explained only seven percentage points (ppt) of the 60 ppt drop in consumer visits during the crisis. This implies that actions to avoid infection rather than S-I-P policies caused spending to fall. If Korea needs to impose a lockdown for health reasons, then controlling the spread of the virus will give consumers confidence to venture out again to restaurants, convenience stores, tourist destinations, and other places that they have avoided for fear of catching the virus.

Spending on fighting the pandemic, on the Green New Deal, and on hiring public sector workers is increasing Korea's debt and deficit. Much of Korea's success historically has combined fiscal prudence with an energetic private sector. Korea should be careful going forward that its public sector spending does not crowd out spending and jobs in the private sector.

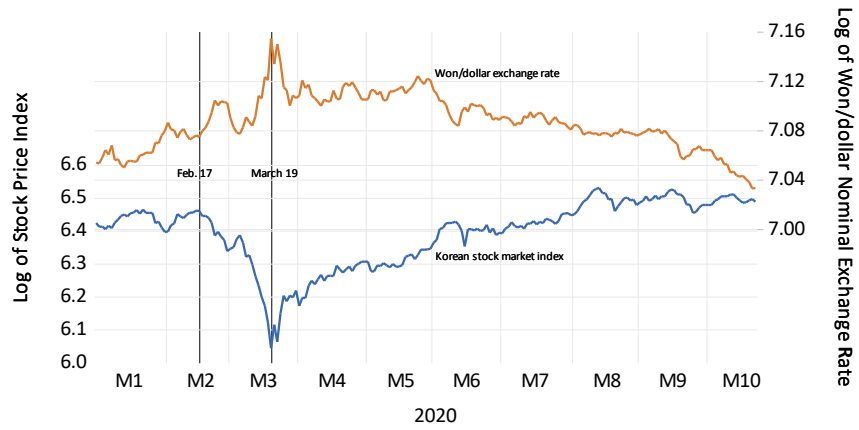


Figure 1. The Korean Won/U.S. dollar Exchange Rate and the Aggregate Korean Stock Market During the COVID-19 Pandemic

Source: Datastream database.

Table 1. The Exposure of Korean Sectors to Macroeconomic Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sector		Korean Stock Market Beta	S.E.	Won/US Dollar Beta	S.E.	Dubai Oil Price Beta	S.E.	World Stock Market Beta	S.E.	BOK Base Rate	S.E.	Ad- justed R ²
Airlines		1.05***	0.03	-0.15	0.09	-0.09***	0.01	0	0.07	0.01	0.02	0.274
Auto Parts		1.02***	0.02	0.23***	0.05	-0.01	0.01	-0.11***	0.04	0	0.01	0.367
Automobiles		1.06***	0.03	0.23***	0.06	-0.02*	0.01	-0.05	0.03	0	0.01	0.406
Banks		1.05***	0.02	0	0.08	0.01	0.01	0.02	0.04	0	0.01	0.555
Basic Materials		0.99***	0.02	-0.08*	0.04	0.03***	0	0.11***	0.02	0	0	0.628
Basic Resources		0.91***	0.02	-0.07	0.04	0.04***	0	0.13***	0.03	0	0.01	0.488
Beverages		0.39***	0.08	-0.14	0.1	0.03**	0.01	0.02	0.05	0	0.01	0.063
Biotechnology		0.78***	0.05	-0.02	0.1	-0.03*	0.01	-0.07	0.06	0	0.01	0.097
Casinos/Gambling		0.69***	0.03	-0.06	0.06	0	0.01	0.04	0.03	-0.01	0.01	0.191
Chemicals		1.12***	0.02	-0.1*	0.05	0.01	0.01	0.04	0.03	0	0	0.489
Commercial Vehicle Parts		1.11***	0.03	-0.23***	0.08	0.05***	0.01	0.15***	0.04	0.01	0.02	0.412
Computer Hardware		1.12***	0.03	0.18***	0.06	0	0.01	0.02	0.04	-0.01	0.01	0.356
Computer Services		0.79***	0.05	-0.1	0.09	0	0.01	0.04	0.05	0.02***	0	0.181
Consumer Digital Services		0.92***	0.03	-0.07	0.06	-0.01	0.01	-0.03	0.04	0	0	0.217
Consumer Discretionary Goods		0.90***	0.01	0.06***	0.02	-0.01**	0	-0.03*	0.01	0	0	0.726
Consumer Electronics		1.12***	0.02	0.22***	0.06	0	0.01	0	0.04	-0.02***	0	0.435
Consumer Staples		0.96***	0.02	0.13***	0.02	-0.02***	0	-0.07***	0.02	0	0	0.633
Cosmetics		0.58***	0.03	-0.07	0.06	-0.03**	0.01	0	0.04	0	0.01	0.119
Construction		1.07***	0.03	-0.17***	0.05	0.02*	0.01	0.05*	0.02	0	0.01	0.485
Construction Machinery		0.88***	0.19	-0.63**	0.28	0.08***	0.02	-0.25**	0.09	0.01	0.03	0.208
Distillers & Vintners		0.39***	0.08	-0.14	0.1	0.03**	0.01	0.02	0.05	0	0.01	0.063
Diversified Industries		1.13***	0.02	0.01	0.04	0.01	0.01	0.08**	0.03	0.01	0.01	0.515
Diversified Retailers		0.76***	0.02	-0.14***	0.03	0.01*	0	0.01	0.03	0.02	0.01	0.322
Drugs/Grocery Stores		0.56***	0.02	-0.03	0.05	-0.02**	0.01	-0.06	0.04	0	0	0.131
Electronic Entertainment		0.88***	0.04	0.04	0.07	0	0.01	0	0.06	0	0.02	0.174
Electricity		0.64***	0.03	-0.11	0.08	-0.03***	0.01	0	0.04	0	0.01	0.237
Electronic Components		1.07***	0.02	-0.02	0.04	0	0.01	0.07**	0.03	0.01	0.01	0.467
Food Products		0.56***	0.02	-0.14***	0.04	-0.01	0	0.02	0.02	0	0.01	0.252
Food Retail, Wholesale		0.54***	0.08	-0.02	0.12	0	0.02	0	0.06	0.01	0.01	0.054
Generalized Industrials		1.13***	0.02	0	0.04	0.01	0.01	0.08**	0.03	0.01	0.01	0.516
Health Care		0.47***	0.03	-0.07	0.06	-0.02*	0.01	0.01	0.04	0	0.01	0.082
Household Furnishing		0.34***	0.05	-0.14*	0.07	0.01	0.01	0.09*	0.05	0	0.01	0.036

Industrial Engineering	1.14***	0.03	-0.23***	0.07	0.04***	0.01	0.08*	0.04	0	0.01	0.464
Industrial Machinery	1.04***	0.04	-0.3***	0.09	0.02*	0.01	0.13**	0.05	-0.02	0.01	0.255
Industrial Metals & Mines	0.92***	0.02	-0.08*	0.05	0.04***	0	0.13***	0.03	0	0.01	0.487
Industrial Support Services	0.77***	0.02	-0.14**	0.07	0.01*	0.01	0.07*	0.03	0.02	0.02	0.319
Industrial Transport	0.95***	0.02	-0.14***	0.04	-0.02**	0.01	-0.02	0.02	0	0	0.369
Iron & Steel	0.92***	0.02	-0.07	0.05	0.04***	0	0.14***	0.03	0	0.01	0.459
Leisure Goods	1.02***	0.02	0.21***	0.05	0	0	-0.01	0.03	-0.02***	0	0.463
Life Insurance	0.73***	0.05	-0.03	0.07	0	0.01	0.02	0.04	0.02	0.02	0.231
Marine Transport	1.12***	0.03	-0.16**	0.06	0.05***	0.01	0.15***	0.03	0	0.01	0.439
Nonlife Insurance	0.85***	0.02	0.01	0.04	0	0.01	-0.03	0.03	0.01	0	0.339
Oil Refining & Marketing	0.85***	0.05	-0.14**	0.06	0.07***	0.01	0.18***	0.04	0	0	0.291
Personal Goods	0.60***	0.02	-0.04	0.05	-0.03***	0.01	-0.01	0.03	0	0.01	0.166
Personal Product	0.56***	0.03	-0.03	0.05	-0.02**	0.01	-0.05	0.04	0	0.01	0.126
Pharmaceuticals	0.54***	0.05	-0.43***	0.11	-0.02	0.02	-0.04	0.05	-0.05	0.03	0.061
Precious Metals & Mines	0.89***	0.03	-0.25***	0.08	0.05***	0.01	0.12***	0.04	0.03***	0.01	0.25
Property/Casualty Insurance	0.86***	0.02	0.02	0.04	0	0.01	-0.03	0.03	0.01*	0	0.334
Retailers	0.76***	0.02	-0.13***	0.03	0.01	0	0.01	0.03	0.01	0.01	0.332
Software & Computer Services	0.99***	0.04	-0.05	0.06	0	0.01	-0.05	0.04	0	0	0.272
Security Services	0.59***	0.03	0.01	0.06	-0.01	0.01	-0.02	0.03	0.01	0.01	0.15
Semiconductors	1.30***	0.05	0.06	0.07	-0.01	0.01	-0.05	0.05	-0.01	0.01	0.301
Telecommunications Equipment	0.97***	0.05	-0.16	0.1	0	0.01	0.14**	0.06	0.03	0.02	0.14
Telecommunications Services	0.55***	0.02	0.01	0.04	-0.01*	0	-0.03	0.02	0	0	0.258
Tires	0.81***	0.03	0.12*	0.06	0	0.01	0.02	0.04	0	0	0.201
Tobacco	0.36***	0.02	-0.01	0.05	-0.01*	0.01	-0.03	0.02	0.01	0	0.086
Travel & Leisure	0.79***	0.02	-0.03	0.04	-0.01*	0.01	0.07***	0.02	0	0	0.357
Trucking	0.85***	0.04	0.06	0.09	-0.01	0.02	0	0.04	0.02*	0.01	0.16
Utilities	0.63***	0.03	-0.12*	0.06	-0.02**	0	0	0.03	0	0.01	0.266

Note: The table presents results from regressions of the sectoral returns listed in column (1) on the return on the aggregate Korean stock market, (2) the change in the won/dollar nominal exchange rate, (3) the change in the log of the spot price for Dubai crude oil, (4) the return on the world stock market, and (4) change in the Bank of Korea Base Rate. Column (12) presents the adjusted R-squared coefficients from the regressions. The sample period extends from 4 December 2000 to 4 December 2020. There are 5218 observations. In cases where return data are not available on 4 December 2000, the sample begins on the first date when return data become available. Heteroscedasticity and autocorrelation consistent standard errors are reported in parentheses.

Source: Datastream database and calculations by the author.

*** (**)[*]denotes significance at the 1% (5%) [10%] level

Table 2. Korean Sector-Specific Returns During the Pandemic

(1)	Value on 4 December 2020 of 1 Won Invested on 17 February 2020			Value on 19 March 2020 of 1 Won Invested on 17 February 2020			Value on 4 December 2020 of 1 Won Invested on 19 March 2020		
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sector	Due to all factors	Due to macro factors	Due to sector- specific factors	Due to all factors	Due to macro factors	Due to all factors	Due to all factors	Due to macro factors	Due to all factors
Airlines	1.068	1.225	0.855	0.666	0.666	1.009	1.394	1.691	0.803
Auto Parts	1.036	1.217	0.862	0.595	0.701	0.85	1.638	1.61	1.026
Automobiles	1.37	1.153	1.207	0.501	0.673	0.748	2.43	1.586	1.552
Banks	0.931	1.134	0.828	0.584	0.621	0.941	1.439	1.671	0.87
Basic Materials	1.472	1.207	1.231	0.569	0.608	0.942	2.224	1.819	1.232
Basic Resources	1.13	1.145	0.984	0.605	0.614	0.985	1.709	1.718	0.993
Beverages	0.993	1.038	0.966	0.73	0.802	0.915	1.208	1.243	0.979
Biotechnology	1.673	1.357	1.242	0.728	0.772	0.947	2.066	1.653	1.256
Casinos/Gambling	0.817	1.108	0.749	0.624	0.736	0.852	1.19	1.42	0.848
Chemicals	1.712	1.272	1.371	0.534	0.599	0.903	2.587	1.922	1.367
Commercial Vehicle Parts	0.853	1.131	0.754	0.579	0.54	1.07	1.25	1.882	0.668
Computer Hardware	1.11	1.092	1.007	0.686	0.62	1.099	1.519	1.614	0.935
Computer Services	0.89	1.218	0.739	0.566	0.685	0.83	1.461	1.659	0.885
Consumer Digital Services	1.661	1.301	1.263	0.755	0.697	1.08	2.141	1.729	1.223
Consumer Discretionary Goods	1.199	1.189	1.014	0.619	0.679	0.914	1.78	1.623	1.101
Consumer Electronics	1.259	1.163	1.064	0.642	0.642	0.998	1.775	1.665	1.05
Consumer Staples	0.983	1.18	0.822	0.743	0.704	1.052	1.227	1.558	0.779
Cosmetics	0.871	1.247	0.705	0.77	0.8	0.962	1.106	1.486	0.749
Construction	0.929	1.187	0.785	0.581	0.599	0.972	1.428	1.796	0.797
Construction Machinery	0.82	1.046	0.809	0.428	0.655	0.672	1.483	1.437	1.054

Distillers & Vintners	0.993	1.038	0.966	0.73	0.802	0.915	1.208	1.243	0.979
Diversified Industrials	0.89	1.189	0.741	0.608	0.587	1.031	1.37	1.844	0.737
Diversified Retailers	0.951	1.133	0.847	0.653	0.694	0.943	1.333	1.523	0.882
Drug/Grocery Stores	0.988	1.221	0.812	0.756	0.826	0.917	1.246	1.414	0.884
Electronic Entertainment	1.261	1.239	1.006	0.849	0.687	1.229	1.424	1.679	0.841
Electricity	0.811	1.082	0.751	0.623	0.772	0.807	1.235	1.327	0.932
Electronic Components	1.25	1.211	1.05	0.539	0.609	0.894	1.958	1.818	1.091
Food Products	1.091	1.131	0.974	0.692	0.778	0.894	1.39	1.383	1.012
Food Retail, Wholesale	0.748	1.095	0.69	0.654	0.789	0.832	1.029	1.327	0.782
Generalized Industrials	0.866	1.188	0.721	0.601	0.587	1.019	1.338	1.843	0.721
Health Care	1.681	1.268	1.342	0.729	0.833	0.88	2.074	1.465	1.429
Household Furnishings	1.21	1.182	1.04	0.716	0.825	0.873	1.38	1.385	1.011
Industrial Engineering	1.074	1.189	0.899	0.48	0.558	0.874	1.769	1.913	0.921
Industrial Machinery	2.113	1.195	1.749	0.437	0.583	0.756	4.395	1.855	2.322
Industrial Metals & Mines	1.197	1.149	1.042	0.585	0.612	0.954	1.869	1.727	1.084
Industrial Support Services	0.774	1.103	0.697	0.756	0.671	1.121	0.993	1.532	0.645
Industrial Transport	0.981	1.163	0.857	0.569	0.671	0.854	1.535	1.596	0.973
Iron & Steel	1.197	1.139	1.051	0.585	0.609	0.96	1.87	1.721	1.087
Leisure Goods	1.288	1.181	1.074	0.787	0.67	1.17	1.546	1.632	0.935
Life Insurance	0.941	1.032	0.933	0.456	0.705	0.654	1.859	1.376	1.37
Marine Transport	0.875	1.162	0.763	0.523	0.55	0.958	1.451	1.905	0.769
Nonlife Insurance	0.89	1.162	0.764	0.603	0.699	0.864	1.35	1.549	0.868

Oil Refining & Marketing	0.992	1.161	0.885	0.496	0.607	0.825	1.642	1.761	0.964
Personal Goods	0.871	1.246	0.705	0.77	0.803	0.96	1.105	1.48	0.752
Personal Products	1.042	1.229	0.85	0.782	0.825	0.949	1.288	1.424	0.905
Pharmaceuticals	1.418	1.33	1.076	0.736	0.826	0.895	1.742	1.522	1.153
Precious Metals & Mines	0.869	1.24	0.689	0.671	0.608	1.098	1.196	1.868	0.63
Property/Casualty Insurance	0.891	1.162	0.764	0.603	0.698	0.865	1.35	1.551	0.867
Retailers	0.909	1.139	0.807	0.625	0.696	0.901	1.321	1.527	0.872
Software and Computer Services	1.365	1.29	1.047	0.679	0.672	1.008	1.926	1.765	1.078
Security Services	0.856	1.141	0.749	0.943	0.793	1.184	0.907	1.374	0.66
Semiconductors	1.023	1.106	0.912	0.649	0.588	1.099	1.483	1.692	0.865
Telecommunications Equipment	1.133	1.212	0.906	0.729	0.612	1.179	1.612	1.821	0.858
Telecommunications Services	0.96	1.017	0.949	0.723	0.802	0.903	1.256	1.214	1.038
Tires	1.162	1.185	1.003	0.583	0.712	0.824	1.731	1.566	1.129
Tobacco	0.903	1.104	0.823	0.758	0.877	0.865	1.086	1.222	0.894
Travel & Leisure	0.83	1.103	0.762	0.624	0.695	0.901	1.208	1.487	0.821
Trucking	1.135	1.174	0.985	0.545	0.7	0.781	1.893	1.568	1.225
Utilities	0.978	1.082	0.763	0.724	0.767	0.789	1.286	1.335	0.963

Note: Column (2) presents the stock market return as of 4 December 2020 from investing 1 dollar in the sector listed in column (1) on 17 February 2020. Column (3) presents the portion of returns in column (2) driven by five macroeconomic factors. These factors are (1) the return on the aggregate Korean stock market, (2) the change in the won/dollar nominal exchange rate, (3) the change in the log of the spot price for Dubai crude oil, (4) the return on the world stock market, and (5) the change in the Bank of Korea Base Rate. Column (4) presents the portion of returns in column (2) not explained by the five macroeconomic factors. Column (4) thus captures sector-specific responses during the coronavirus pandemic period. Column (5)–(7) and (8)–(10) are analogous to columns (2)–(4) except the returns on a one won investment are calculated over the 17 February 2020–19 March 2020 and 19 March 2020–4 December 2020 periods, respectively.

Source: Datastream database and calculations by the author.

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