How the Coronavirus Crisis Affects Japanese Industries: Evidence from the Stock Market

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Overview

- This presentation will consist of four parts:
- 1) An Introduction
- 2) The Data and Methodology
- 3) The Results
- 4) A Conclusion

1) Introduction

- ☐ Japan tried to limit the spread of COVID-19 (closing schools, voluntary lockdown, requesting nonessential businesses close, limiting concerts, restricting travel).

- ☐ By the end of May it lifted the state of emergency and eased some of the restrictions.

- ☐ Japan had already suffered two shocks before the Coronavirus Crisis: 1) U.S – China trade war and slowing growth in 2019 reduced manufacturing output. 2) Consumption tax increase in October 2019 reduced demand.

- ☐ GDP growth equaled -7.3 percent in the fourth quarter of 2019 and -3.4 percent in the first quarter of 2020.

- ☐ A bright spot was a boom in construction, tourism, and real estate development, driven by low interest rates and preparations for the 2020 Tokyo Olympics.

Evidence from Stock Prices

☐ The crisis has roiled the macroeconomy. GDP in the second quarter of 2020 is expected to fall by 20 percent.

☐ This paper investigates how different parts of the Japanese economy are affected by examining the response of stock prices.

☐ In theory stock prices equal the expected present value of future cash flows. 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."

☐ Schwert (1990), employing monthly, quarterly, and annual data over the 1889-1988 period, reported that stock returns explain a significant proportion of future industrial production growth. Stock prices thus shed light on how investors expect companies to be affected.

Previous Work

- [ ] Previous research has investigated how the COVID-19 crisis affects asset prices in countries other than Japan.

- [ ] Ramelli and Wagner (2020) adjusted U.S. returns using the CAPM and Fama-French (1993) factors. Found initially U.S. stocks exposed to China fell, then U.S. firms with more debt and less cash did worse than other stocks.

- [ ] Pagano, Wagner, and Zechner (2020) used the degree that jobs don't need close interactions to measure firms' exposure to the COVID-19 crisis. Found between 24 February – 20 March 2020 that unexposed firms outperformed exposed firms by 10%.

- [ ] Chan and Marsh (2020) reported that the DJIA fell much more during COVID Crisis than during previous pandemics.

- [ ] Gormsen and Koijen (2020) used dividend futures on U.S. stocks. Forecasted 9ppt drop in U.S. dividends over next year.

- [ ] This paper investigates Japanese stock prices.

2) Data and Methodology

Figure 1. Japanese Aggregate Stock Prices.
Source: Datastream database.

Sectoral Returns and Macroeconomic Factors

- ☐ Compound daily returns on 76 sectors from beginning of the Japanese stock market fall on 24 February until end of May.
- ☐ Employ return on aggregate stock market to control for economy-wide influences such as monetary and fiscal policy.
- ☐ Employ return on the world stock market to control for state of world economy.
- ☐ Employ Δyen/dollar to control for exchange rate exposure.
- ☐ Employ daily percentage change in the dollar spot price of Dubai crude oil to control for exposure to oil prices.
- ☐ Data from 1 September 1993 – 29 May 2020 come from Datastream.
- ☐ ADF tests permit rejection of null that series have unit roots.
- ☐ Sectoral returns are thus regressed on the four factors.

Equation to Be Estimated

The estimated equations take the form:

$$\Delta R_{i,t} = \alpha_0 + \alpha_1 \Delta R_{m,Japan,t} + \alpha_2 \Delta R_{m,World,t} + \alpha_3 \Delta (yen/dollar)_t$$
$$+ \alpha_4 \Delta Dubai_t, \qquad\qquad\qquad (1)$$

where $\Delta R_{i,t}$ is the daily change in the log of the price index for Japanese sector i, $\Delta R_{m,Japan,t}$ is the change in the log of the price index for Japan's aggregate stock market, $\Delta R_{m,World,t}$ is the change in the log of the price index for the world stock market, $\Delta (yen/dollar)_t$ is the change in the nominal yen per dollar exchange rate, and $\Delta Dubai_t$ is the change in the log of the spot price for Dubai crude oil.

The results from equation (1) can be used to decompose returns into the portion due to macroeconomic variables and the portion due to sector-specific factors. This decomposition sheds light on whether sectoral differences in performance are driven by the macroeconomic environment (e.g., the slowdown in the world economy) or by idiosyncratic factors affecting individual sectors (e.g., travel restrictions).

3) Results

- [ ] Table 1 presents the results. Average adjusted R-squared is 0.4354, good for regressions explaining daily stock returns.

- [ ] In columns (2) through (4) a value less than one implies that one yen invested on 24 February had lost value by 29 May and a value greater than one implies that it had gained value.

- [ ] Column (2) presents the results for the overall sectoral stock return, column (3) for the portion of the return driven by macroeconomic factors, and column (4) for the portion driven by idiosyncratic factors.

- [ ] To understand these numbers consider first sector listed (health care services). The value of 1.3436 in column (2) indicates that 1 yen invested on 24 February would be worth 1.3436 yen on 29 May, the value of 0.9835 in column (3) indicates that macro factors caused this 1 yen to fall to 0.9835 yen, and the value of 1.3718 in column (4) indicates that other factors caused the 1 yen to increase to 1.3718 yen.

Real Estate, Travel & Leisure, and Oil Have Suffered

- ☐ Real estate has suffered. REITs in column (2) equals 0.7021, mortgage finance equals 0.7398, real estate equals 0.7578, and home construction equals 0.8412. Has not suffered from macro environment but because of other factors. The state of emergency has interfered with real estate transactions.

- ☐ Travel and leisure have done badly. The value for casinos and gambling in column (2) is 0.6951, the value for airlines in 0.7190, the value for hotels & motels is 0.8346, and the value for travel & tourism is 0.8977. These losses have not been driven by macro factors but by restrictions on travel and the postponement of the 2020 Tokyo Olympics.

- ☐ Oil has also performed poorly. One yen invested in crude oil production decreased to 0.6697 and one yen in oil equipment & services to 0.7375. Largely driven by lockdowns and travel bans rather than macro factors.

Automobiles, Office Equipment, Machinery, & Banks Have Done Badly

- ☐ Automobile sector suffered. The value for automobiles in column (2) is 0.8335, for automobile parts 0.8652, for iron & steel 0.7333, and for tires 0.8738. Both the macroeconomic variables and other factors have contributed equally to the losses. Exports have collapsed and many dealers were shut.

- ☐ Electronic office equipment has lagged (column (2) value is 0.8152. Demand has fallen as many offices were closed.

- ☐ Machinery sector has suffered. One yen invested in specialized machinery stocks decreased to 0.853, one yen in tool stocks to 0.8842, and one yen in agricultural machinery to 0.8869. Losses were driven by macroeconomic factors, as slowdowns in Japan and the rest of the world have frozen demand.

- ☐ Banks have underperformed. Extended many real estate loans that are now at risk. Also business bankruptcies will cause nonperforming loans to increase.

Sectors that Have Benefited

- All of the sectors below gained from idiosyncratic rather than macro factors.

- Sectors related to health have done well. The value in column (2) for pharmaceuticals is 1.0845, the value for biotechnology is 1.1004, the value for drug retailers is 1.2076, the value for health care providers is 1.321, and the value for health care services is 1.3436.

- Businesses that provide entertainment and distractions at home have gained. The value for telecommunications equipment (including smartphones) is 1.236, the value for recreational services is 1.1097, the value for recreational products is 1.082, and the value for electronic entertainment is 1.0681. As people have huddled at home, their demand for entertainment products has soared.

- Delivery services have also benefitted. Their value is 1.3146. They provided critical lifeline for those forced to stay at home.

Explaining Why Macroeconomic Factors Affect Returns

- ☐ Table 2 explains sectors' exposure to macroeconomic variables. Presents return to 1 yen invested due to macroeconomic factors and sectors' betas to Japanese stock returns, world stock returns, yen/dollar exchange rate, and crude oil prices.
- ☐ Clear relationship between sectors that performed badly due to macro factors and their exposure to the Japanese stock market.
- ☐ Some relationship sectors that performed badly and their exposure to the world stock market.
- ☐ Average of 76 Japanese stock market betas is 0.87 while the average of the 76 world stock market betas is only 0.009.
- ☐ Relationship sectoral performance and the yen/dollar exchange rate or oil prices is less clear. Commodities are harmed when yen/dollar rate depreciates and manufactured goods benefit.
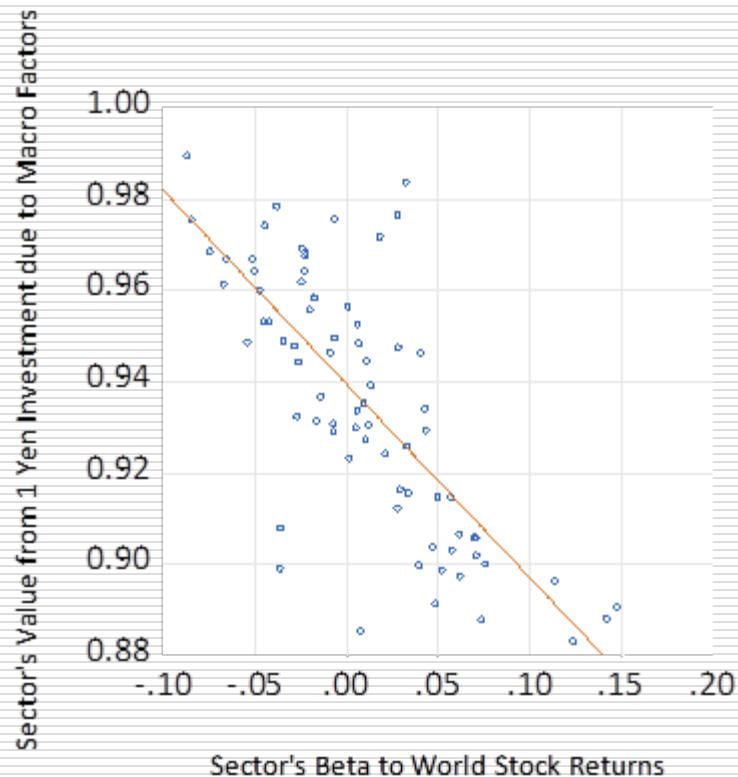
Figure 3. Relationship between Sectors' Performance due to Macro Factors and Their Exposure to Japanese Stock Returns
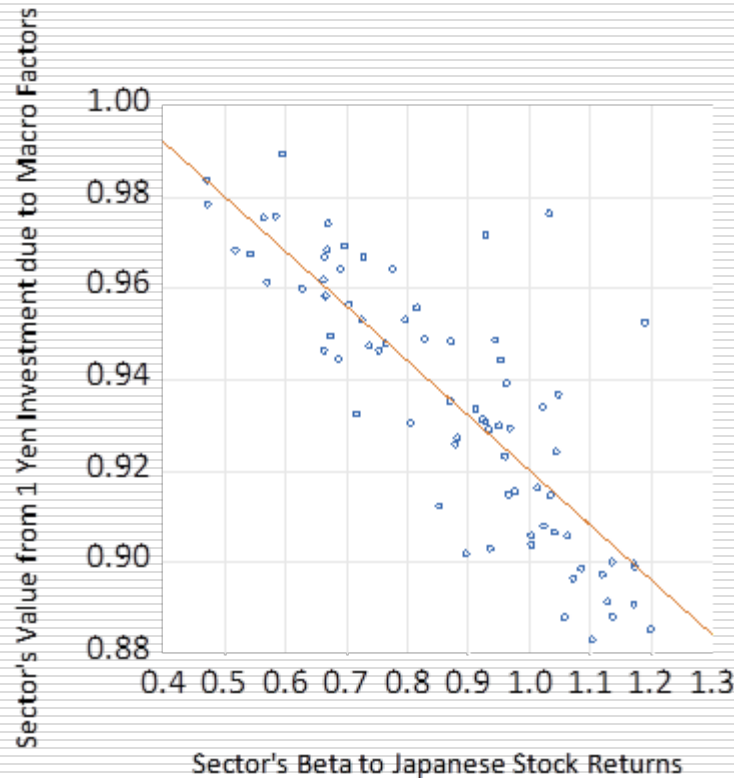
Figure 4. Relationship between Sectors' Performance due to Macro Factors and Their Exposure to World Stock Returns

4) Conclusion

- ☐ Investigates how Japanese sectoral stock returns have performed during the pandemic & whether these responses were driven by macroeconomic or by sector-specific factors.

- ☐ Japanese machinery sector harmed by the macroeconomic environment, as the slowdown froze demand for capital goods.

- ☐ Real estate and travel & leisure sectors harmed by specific influences such as the effects of the voluntary lockdown and travel restrictions on these industries.

- ☐ Electronic office equipment and automobiles have been hit by both the macroeconomic environment (slowdown in Japan) & idiosyncratic factors (e.g., the closing of auto dealerships).

- ☐ Sectors related to health and ability to obtain entertainment and goods and services at home have done well. These gains have been driven entirely by sectoral characteristics rather than by macroeconomic changes.

Conclusion (continued)

- ☐ Also investigates why sectors were harmed by macroeconomic factors. There is a strong relationship between sectors that have underperformed and those that are exposed to the Japanese stock market.

- ☐ The sooner Japan can bring the Coronavirus under control the better for sectors such as real estate and tourism that have suffered from restrictions on personal contacts.

- ☐ A recovery in the Japanese economy would advance sectors that have been harmed by the macroeconomic environment. A recovery in the world economy would also help, but a recovery in Japan matters the most.

- ☐ Nurturing the Japanese economy is thus crucial to helping Japanese firms rebound from this devastating crisis.

☐ Thank You