21st Jacques Polak

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21

LIVING IN THE EXTREME

Economics of Pandemics, Climate Change
and Tail Risks

November 5-6, 2020
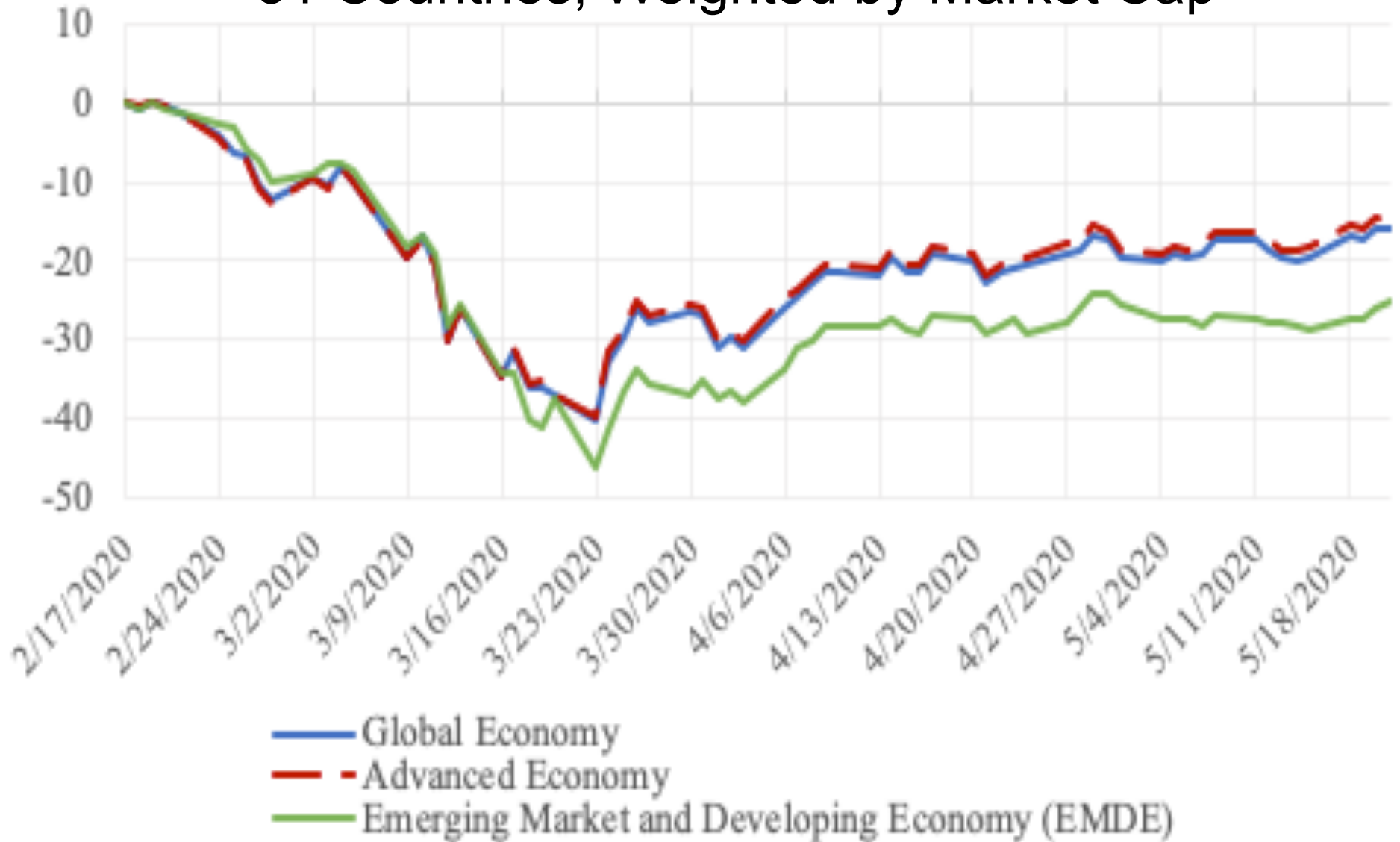Virtual Conference

INTERNATIONAL MONETARY FUND

Stock Prices, Lockdowns, and Economic Activity in the Time of Coronavirus

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Global Stock Prices in the Wake of the Pandemic
Percent Deviations from 17 February 2020, 31 Countries, Weighted by Market Cap
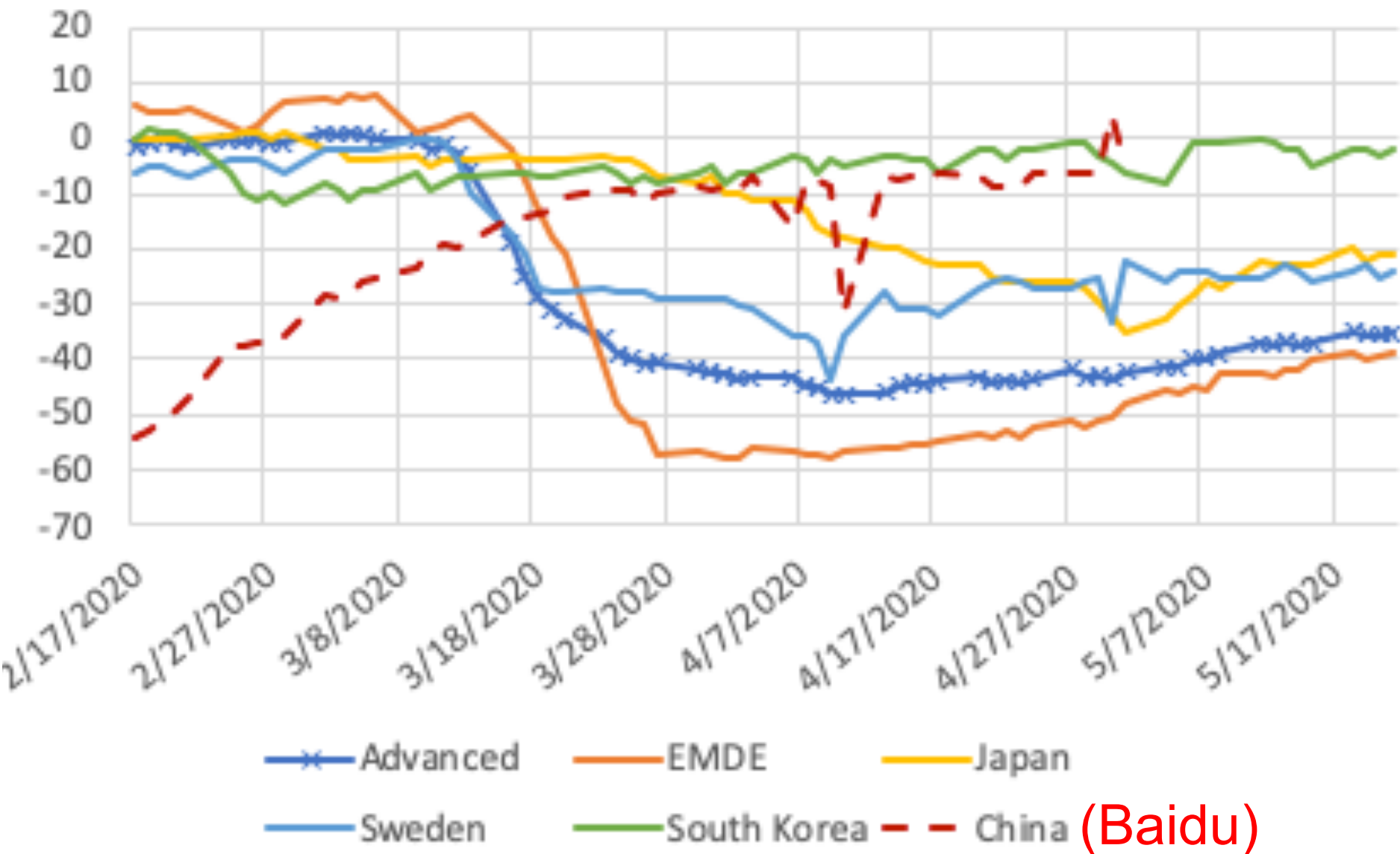
Main Findings, Part 1

1. Stock prices and workplace mobility trace out striking clockwise paths in daily data from mid-February to late May 2020.

   – Global stock prices fell 30 percent from 17 February to 12 March, *before* mobility fell.

   – Outliers: (a) China had coincident drops in stock prices and mobility in the early phase of its pandemic recession.
   (b) Workplace mobility fell little in South Korea.

2. National stock prices foreshadow own-country drops in workplace mobility, conditional on global developments.

3. Stricter lockdown policies, both in-country and globally, drove larger declines in national stock prices conditional on pandemic severity, workplace mobility, and income support and debt relief policies.
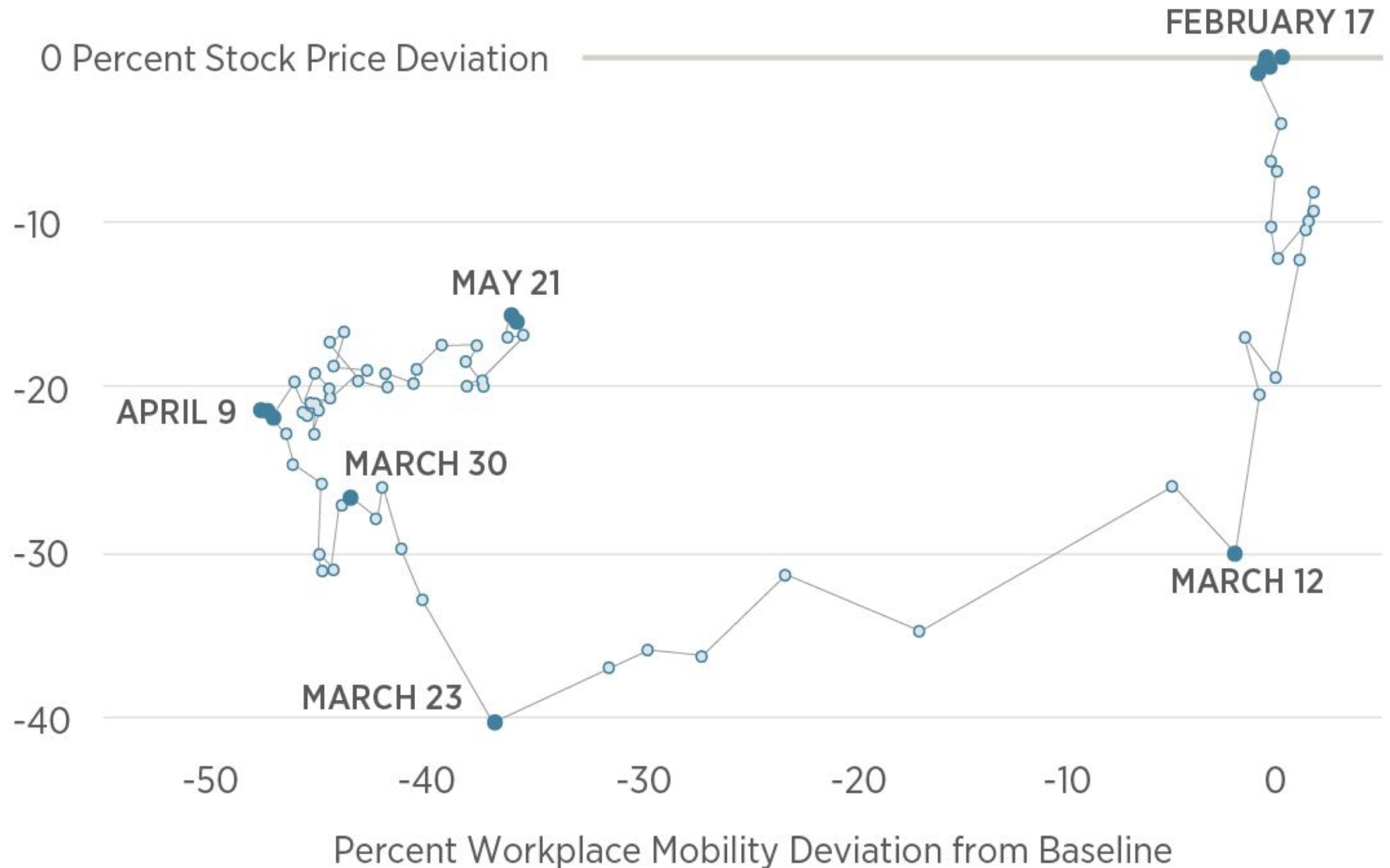
Workplace Mobility (Google) on Trading Days
Percent Deviations from Baseline

Time Path of Stock Prices and Workplace Mobility, Market-Cap Weighted Global Averages

31 Countries (excludes China), February 17 - May 21, 2020

FEBRUARY 17

0 Percent Stock Price Deviation

MAY 21

-10

APRIL 9

-20

MARCH 30

MARCH 12

-30

MARCH 23

-40

-50   -40   -30   -20   -10   0

Percent Workplace Mobility Deviation from Baseline

Did National Stock Prices Predict Own-Country Drops in Economic Activity?

We regress workplace mobility deviations on lagged stock price deviations in our panel of 31 countries.

<u>Sample for this analysis</u>: All workdays from 12 March to 23 March, where "workdays" refer to dates on which the country's stock market traded. We choose 23 March as the sample endpoint, because that is when stock prices in most countries began to increase even as mobility fell further.

$$WMD_{c,t} = \alpha SMD_{c,t-1} + I_c + I_t + \varepsilon_{c,t} \qquad (1)$$

$$\Delta WMD_{c,t} = \sum_{j=1}^{6} \beta^j \Delta SMD_{c,t-j} + I_t + \varepsilon_{c,t} \qquad (2)$$

$WMD_{c,t}$ = % Workplace Mobility Deviation in Country c on Trading Day t

$SMD_{c,t}$ = % Stock Price Deviation in Country c on Trading Day t

$\Delta WMD_{c,t} = WMD_{c,t} - WMD_{c,t-1}$

Yes

Coefficient Estimates	Dependent Variable: $WMD_{c,t}$				Dependent Variable: $\Delta WMD_{c,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)
α	0.78***	0.85***	0.30***	-0.07		
	(0.10)	(0.09)	(0.08)	(0.10)		
$\sum_{j=1}^{6}\beta^j$					1.54***	1.12***
					(0.35)	(0.34)
Intercept	3.87				-0.51	
	(3.45)				(1.22)	
Country Fixed Effects	NO	YES	NO	YES	NO	NO
Time Fixed Effects	NO	NO	YES	YES	NO	YES
Observation Count	241	241	241	241	241	241
Adjusted R^2	0.21	0.77	0.72	0.90	0.19	0.52

<u>Column (3):</u> When yesterday's national stock price is 10 percentage points below its baseline value, today's mobility deviation is 3 percentage points below its baseline, conditional on common global developments.

<u>Column (6):</u> A one percentage point drop in national stock prices on each of the previous six trading days predicts a 6.7 ppt drop in today's economic activity, conditional on common global developments.

Did Stock Markets React Too Slowly To an Impending Economic Disaster?

It was reasonable, as of early and mid-February 2020, to anticipate a modest impact of COVID-19 on economic activity and asset prices:

1. At least in the United States, the contraction triggered by COVID-19 has been much, much deeper than one would anticipate by extrapolating the impact of previous pandemics over the past 120 years, including the Spanish Flu and the influenza pandemic of 1957-58. See Baker et al. (2020a), Ferguson (2020) and Velde (2020).

2. No prior infectious disease outbreak (back to 1900) affected the U.S. stock market in a manner that resembles its response to COVID-19.

3. No prior infectious disease outbreak (back to 1990) affected stock markets in mainland China and Hong Kong in a manner that resembles their responses to COVID-19.

4. Yes, the WHO declared the new coronavirus 'a public health emergency of international concern' on January 30. But the WHO declared such emergencies on five prior occasions since 2009. None triggered a market crash, nor did any of the disease outbreaks unfold in a manner that warranted a major drop in equity prices.
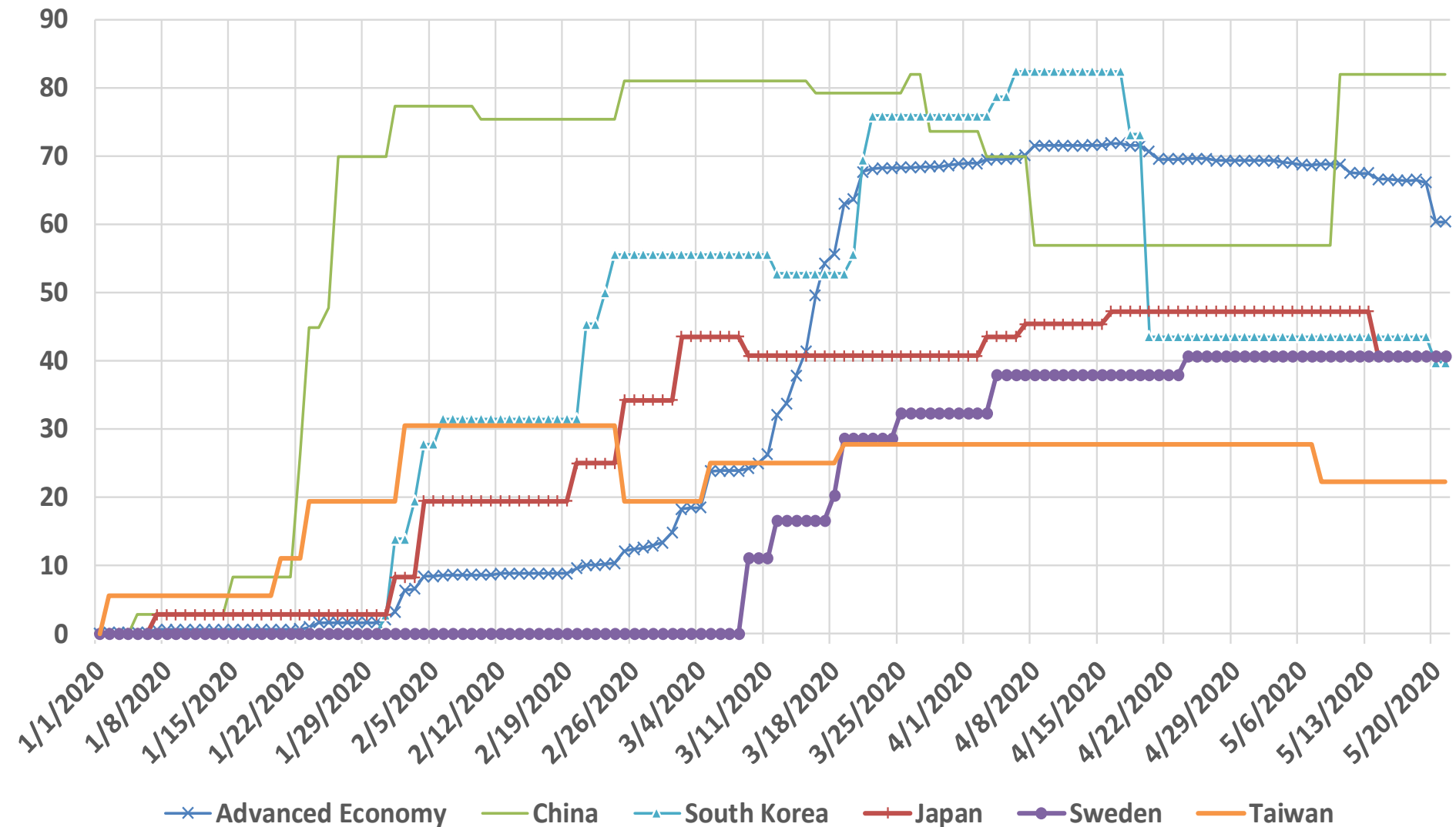
What Accounts for National Stock Price Moves in Early Stages of the Pandemic?

We fit regression models to national data for 31 countries on trading days from 17 February to 21 May 2020 →

The stringency of own-country and global lockdown measures have strong negative effects on national stock prices, conditional on (a) own and global pandemic severity, (b) own and global economic activity, and (c) own and global income support and debt relief policies.
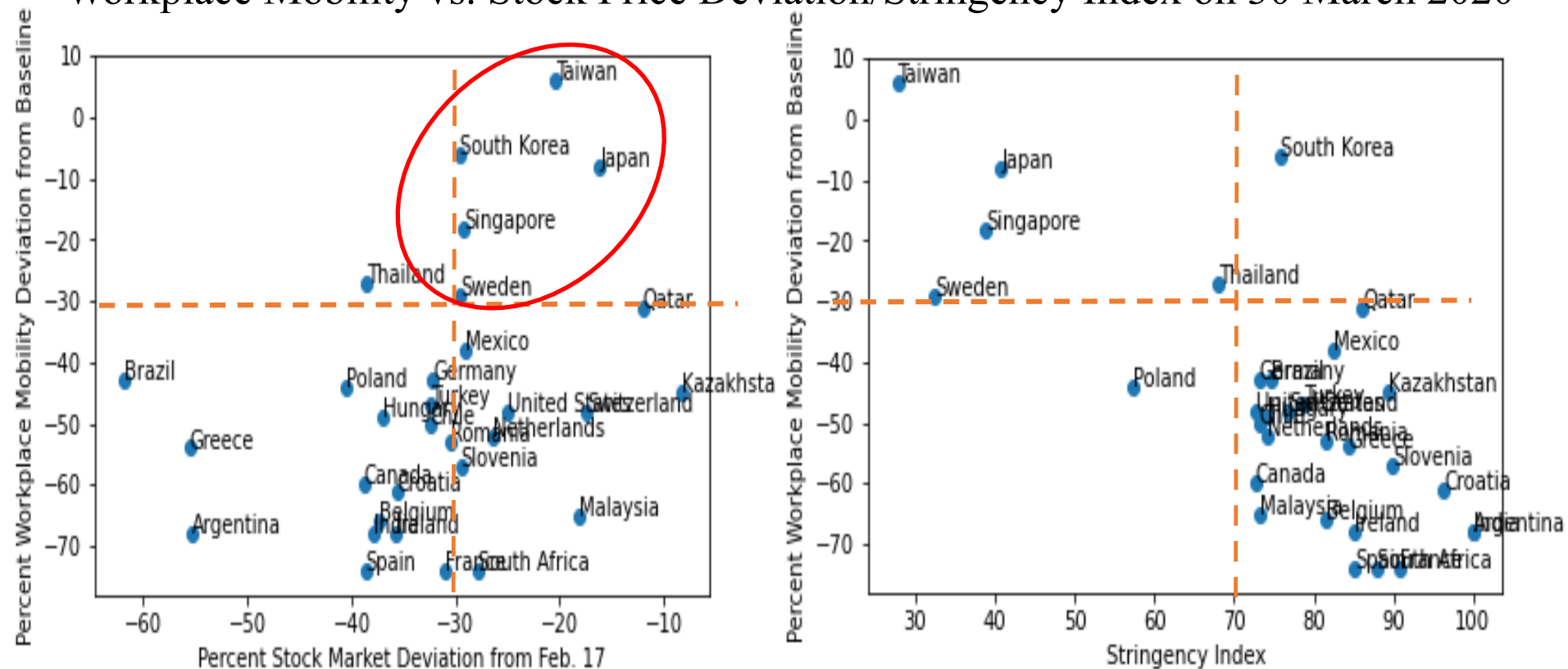
Coefficients on own-country and the global lockdown stringency indexes are negative and statistically significant at the 1% level. A unit standard deviation increase in own-country lockdown stringency lowers national stock prices by an estimated 3.0 percentage points, conditional on other variables. A unit standard deviation rise in global lockdown stringency lowers national stock prices by 4.7 percentage points, conditional on other variables.

Economic Lockdown Stringency Index, 1 January to 21 May 2020 (Hale et al., 2020)

Legend: Advanced Economy, China, South Korea, Japan, Sweden, Taiwan

Outlier Countries

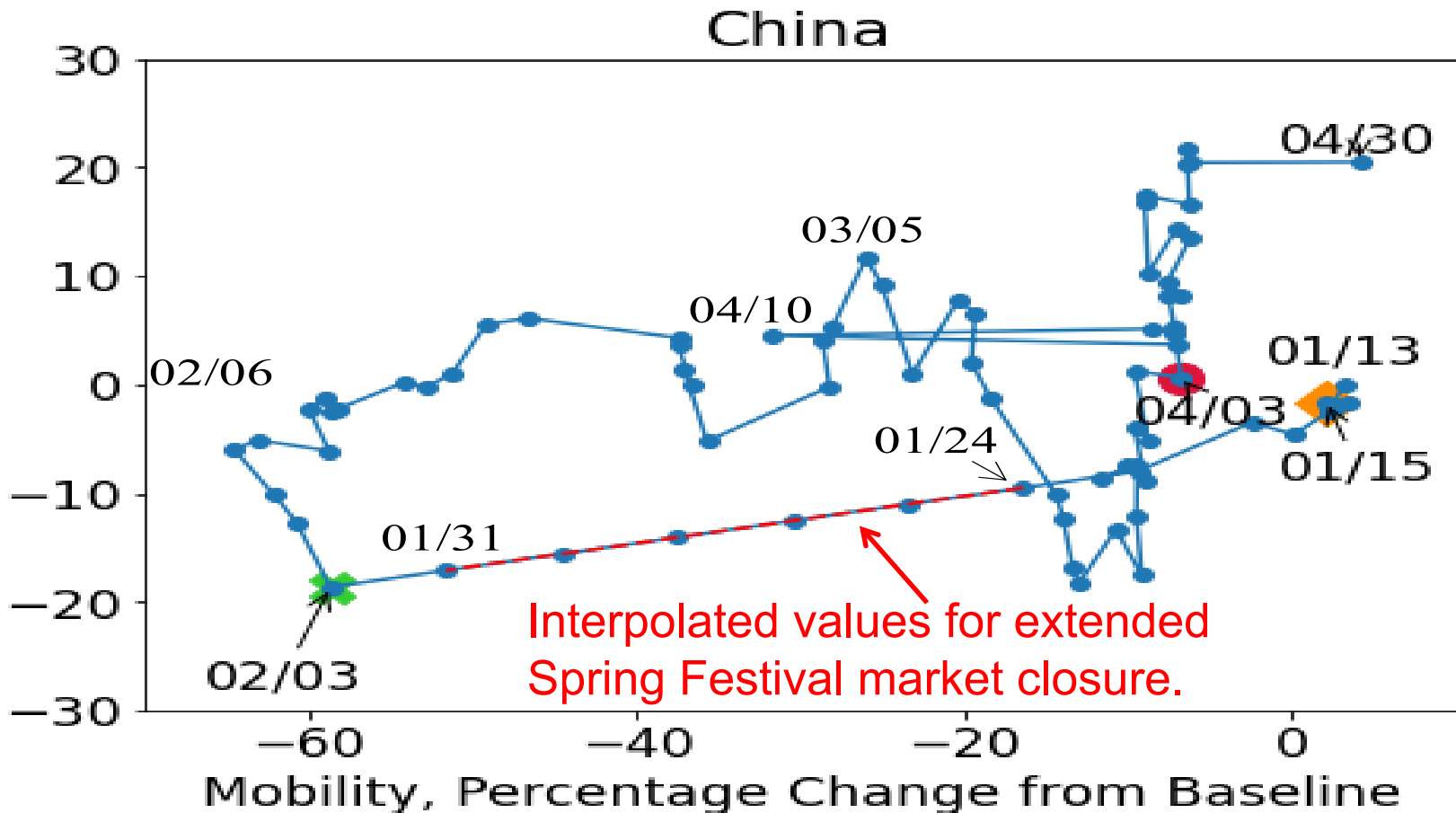Workplace Mobility vs. Stock Price Deviation/Stringency Index on 30 March 2020

- Oval highlights countries with relatively favorable performance in terms of stock prices and economic activity. All but South Korea had low lockdown stringency index values as of 30 March. (Even SK was quite late to impose hard lockdown.)

- Taiwan, Singapore, South Korea and Japan drew lessons from 2003 SARS epidemic. Before COVID-19 outbreak, they had established comprehensive laboratory and medical surveillance systems to cope with pandemics.

China: A Different Sort of Outlier

Time Path of Stock Price and Mobility Deviations

Unlike in other countries, mobility and stock prices fell together in China
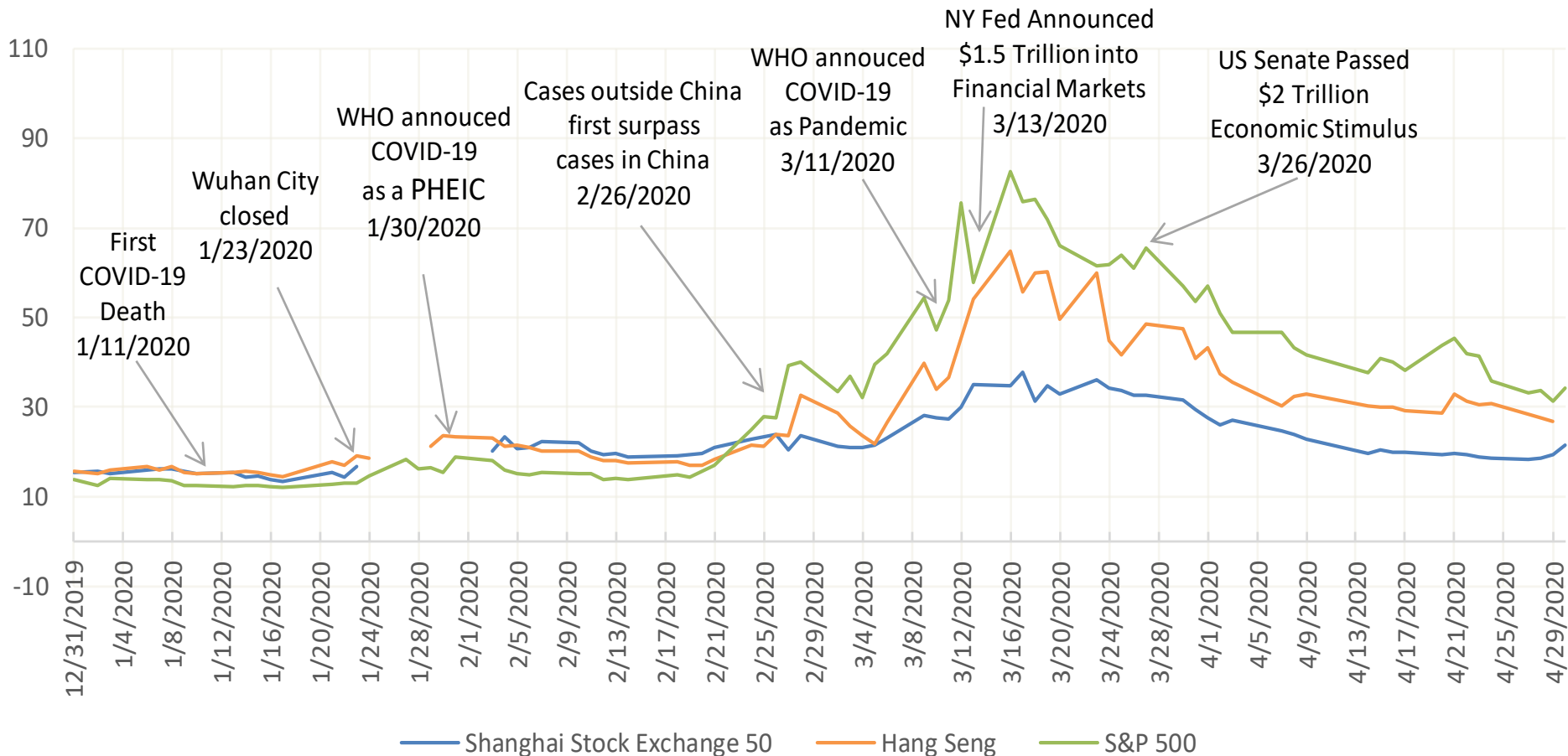
Main Findings, Part 2

4. COVID-19 had larger effects on stock prices and return volatilities in the U.S. than in China, **even before** it became evident that U.S. containment efforts would flounder.

5. In 2020, newspaper explanations for large daily stock market moves assign a **dominant role** to pandemic-related news in both counties. Before 2020, newspapers attribute **zero** large daily market moves to disease-related developments (since 1990 in China and 1900 in the U.S.).

6. China undertook major market interventions and PBOC actions to support stock prices in the wake of the COVID-19 pandemic.

Implied Volatilities, American and Chinese Stocks, 31 December 2019 to 30 April 2020

Data for Hang Seng Volatility Index (HSI Volatility Index) and the VIX (S&P 500) are from Yahoo Finance, downloaded on 4 May 2020. We calculated an implied volatility index for the Shanghai Stock Exchange 50 as explained in Appendix B, following the same approach as CBOE (2019) uses to calculate the VIX.

Large Daily Moves in Chinese Stock Markets, Classifications Based on Next-Day Accounts in Leading Chinese Newspapers

A. Shanghai Stock Exchange

Time Period	Jump Size	Number of Daily Stock Market Jumps	# Attributed to Economic Fallout of Pandemics	# Attributed to Policy Responses to Pandemics
26 December 1990 31 December 2019	≥ |4%|	384	0	0
2 January 2020 to 30 April 2020	≥ |4%|	1	1	0
	≥ |3%| and < |4%|	5	4	1

B. Hang Seng

Time Period	Jump Size	Number of Daily Stock Market Jumps	# Attributed to Economic Fallout of Pandemics	# Attributed to Policy Responses to Pandemics
26 December 1990 31 December 2019	≥ |3.8%|	213	--	--
2 January 2020 to 30 April 2020	≥ |3.8%|	7	5	2
	≥ |3%| and < |3.8%|	1	1	0

Baker et al. (2020a) find very similar results for the U.S. stock market.

Interventions to Support Stocks in China

Regulatory authorities:

1. Halted securities lending for 10 days in early February and sharply limited it afterwards (dampening short selling).

2. Told mutual funds not to sell equities except for investor redemptions.

3. Pushed firms to buy shares in their own mutual funds.

4. Pushed insurance companies to buy equities in advance of the Spring Festival market re-opening.

In addition:

5. Other institutional investors and shareholders made large, public equity purchases – at behest of the authorities?

6. Multiple PBOC actions to inject liquidity, shore up expectations, and relieve redemption pressures on funds.

7. Other efforts to manage expectations and media coverage.

Did These Interventions Affect China's Stock Market?

Our event-study analyses find some evidence that these interventions raised the volatility of returns on the mainland China stock market. See paper for details.

Summary

1. The early stages of the COVID-19 pandemic drove a spectacular rout in stock markets. Within a few weeks, value-weighted share prices fell 20 to 50 percent in countries around the world.

2. Stock market implosions foreshadowed collapses in economic activity. (Exceptions: South Korea, China)

3. Stricter lockdowns brought larger drops in national stock prices conditional on pandemic severity, economic support policies, and economic activity levels.

   – Both own-country and global average lockdown stringency have large negative stock price effects.

4. Countries that moved quickly to contain the spread of the virus – with or without aggressive market lockdown measures – enjoyed higher stock prices and better near-term economic performance.