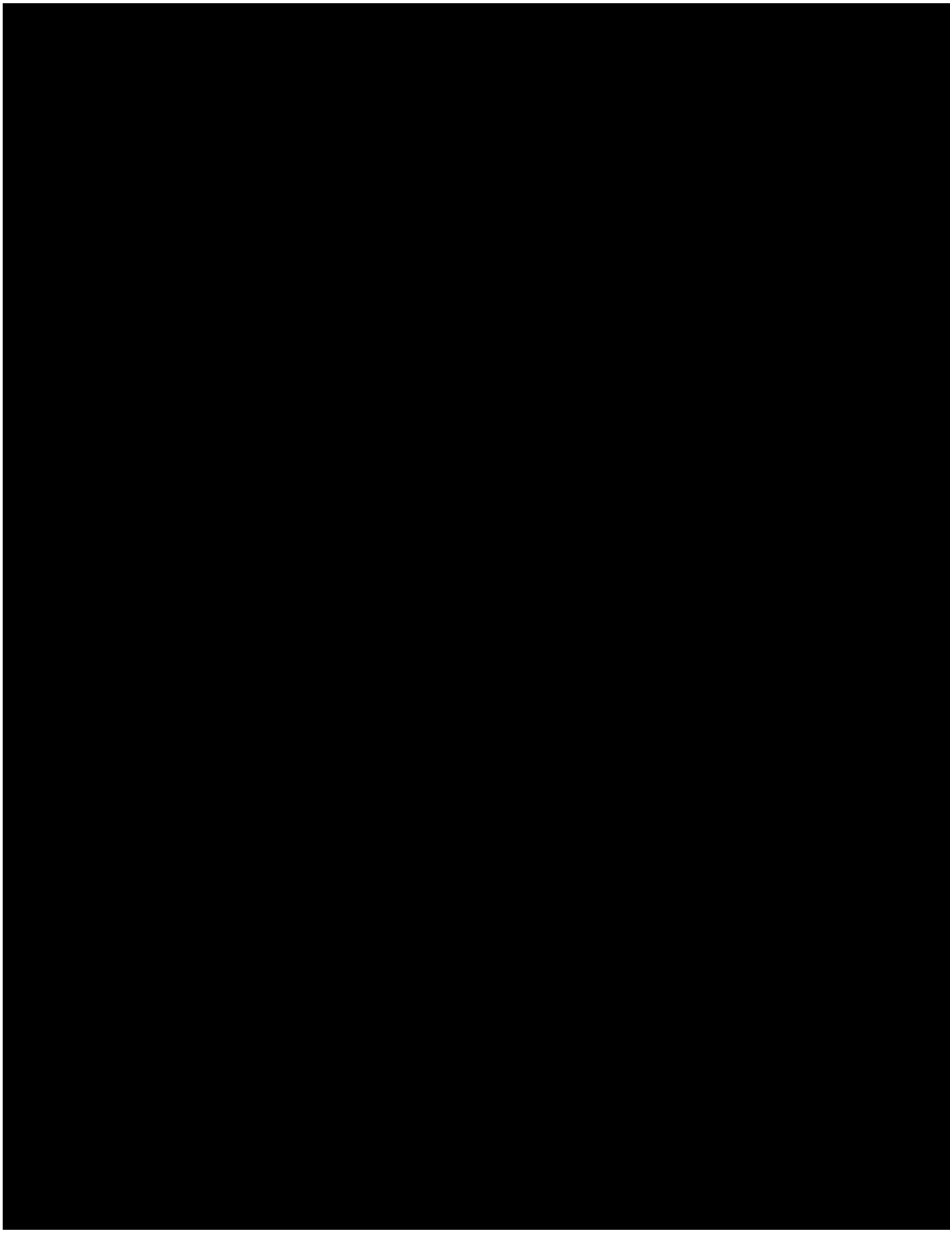

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Hang in There: Stock Market Reactions to Withdrawals of COVID-19 Stimulus Measures

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Abstract

The COVID-19 pandemic prompted unprecedented economic stimulus worldwide. We empirically examine the impact of a withdrawal of fiscal stimulus policies on the stock markets. After constructing a database of withdrawal events, we use event study analysis and cross-country regressions to assess the difference between the pre- and post-event stock price returns. We find that markets react negatively to premature withdrawals—defined as withdrawals at a time when the daily COVID cases are high relative to their historical average—likely reflecting concerns about the withdrawal impact on the prospects for economic recovery. The design of a successful exit strategy from COVID-19 policy responses should account for these concerns.

JEL Classification Numbers: E52, G18, G38, R8

Keywords: stock prices, event study, exit strategy, COVID-19

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CONTENT

I. INTRODUCTION

The COVID-19 crisis has triggered unprecedented stimulus policy responses by countries worldwide, particularly fiscal measures such as unemployment benefits, debt moratoria, state guarantees, and furlough schemes. Unsurprisingly, such responses come with large fiscal costs. For example, the U.S. federal budget deficit rose to a record USD 3.1 trillion in the 2020 fiscal year, more than double the previous record deficit of USD 1.4 trillion in 2009. Much of the spending was associated with the USD 2.2 trillion economic relief package the U.S. Congress passed in March 2020 (*New York Times*, October 16, 2020).

Observers have expressed concerns that the exceptional COVID-19-related spending might be unsustainable, concerns that are relevant not only for countries with limited fiscal space and high debt, but also for those enjoying adequate fiscal space before the crisis (Balajee, 2020; Creel, 2020; de Jong and Ho, 2020; Hurtgen, 2020). The size of the fiscal policy response has indeed been limited by the available fiscal space, as documented in Alberola and others (2020). Market observers speculated that fiscal concerns explained the recent decision of the U.S. Treasury not to extend several pandemic-related emergency lending facilities set up by the U.S. Federal Reserve (*Financial Times*, November 19, 2020).

However, early withdrawal of the fiscal stimulus could have negative consequences. For example, it may cut off the lifeline support for the hard-hit households and businesses and threaten the fledging economic recovery, particularly in the presence of the long-lasting scarring effects of the pandemic (Jorda, Singh, and Taylor, 2020; Kozlowski, Veldkamp, and Venkateswaran, 2020, among others).

Withdrawals may also signal to the market that the "firepower" of the government is limited and may be inadequate to support the economy in the future when new waves of COVID-19 outbreaks occur. Aware of these risks, several policymakers and international organizations have recently warned about the potential damaging effects were government support withdrawn too early, as the IMF Managing Director Georgieva did in October and November 2020.[2]

In view of this trade-off, it is worth learning from the recent experience from countries that have withdrawn some COVID-19 stimulus measures. This study moves in that direction and examines how markets reacted to the withdrawals of COVID-19-related fiscal stimulus measures. The assessment analyzes the price performance of the large capitalization, medium capitalization, and small capitalization segments of national stock markets before and after the different withdrawal stages of the fiscal stimulus.

The assessment is based on an event study analysis, which finds that stock price returns are generally lower in the aftermath of a stimulus withdrawal event; and on a cross-country regression, which suggests that a country's socio-economic fundamentals explain the magnitude of the stock price return decline. In particular, we find that when stimulus was withdrawn prematurely (i.e., when the daily COVID cases were still high relative to the historical pattern),

[2] Annual Meetings, October 14, 2020 ("Do as much as you can; Do not cut financial lifelines too early"); Caixin Summit, November 12, 2020. The ECB President also emphasized that those fiscal measures should stay in place even as the pandemic gradually phases out (*Bloomberg*, October 12, 2020).

stock market reactions were more negative. The results capture quantitively market concerns about insufficient fiscal and monetary policy response compounded by an early withdrawal of the government stimulus (Fitch Solutions, 2020). A prudent exit strategy from the COVID-19 stimulus should allay these concerns to restore market confidence, ideally through designing and communicating a contingency plan.

The rest of the paper is structured as follows: section II reviews related literature; section III presents the event study analysis; section IV presents the cross-country regressions; section V concludes and discusses some policy implications.

II. LITERATURE REVIEW

Our study is related to the literature analyzing the impact of COVID-19 government support measures on the economy and financial markets.[3] Economic models suggest that government intervention could be very effective in reducing COVID-related damage to the economy. For example, using a general equilibrium model, Elenev, Landvoigt, and Van Nieuwerburgh (2020) find that interventions in corporate credit markets (e.g., corporate loan programs) could reduce bankruptcies by about 50 percent and stop a corporate-financial doom loop; furthermore, the program would not incur additional fiscal costs since the costs of financial bailouts would be avoided. The most effective stabilization tool is seemingly unemployment insurance (Faria-e-Castro, 2020). Casado and others (2020) find that high earning replacement rates supported consumer spending. They estimate that the elimination of the Federal Pandemic Unemployment Compensation supplement could cause local spending to decline by 44 percent.

However, the effectiveness of government support measures depends on the implementation details, a tough challenge due to the urgent need to deploy the measures fast. For example, Céspedes, Chang, and Velasco (2020) show that fiscal transfers need to be large enough to change the behavior and induce people to stay at home; otherwise, the risk of contagion could remain high.

In addition, *empirical* evidence from the U.S. is indicative of the problems a government could face. The Paycheck Protection Program (PPP) consisted of loans designed to provide a direct incentive for small businesses to keep workers on the payroll. However, the geographic distribution of the PPP loans did not address the needs of the country's areas hit the hardest (Granja and others, 2020), and there was evidence that large firms were the main beneficiaries of the PPP loans (Neilson, Humphries, and Ulyssea, 2020).

[3] Related to economic analysis of the COVID-19 pandemic, there have been several studies examining the tradeoffs and costs associated with the *lockdown* policy. A large body of studies have analyzed the tradeoff between output losses due to stringency measures and the number of fatalities (Alvarez, Argente, and Lippi, 2020; Eichenbaum, Rebelo, and Trabandt, 2020; Jones, Philippon, and Venkateswaran, 2020; and Hall, Jones, and Klenow, 2020; Sheridan and others, 2020). Highlighting a different trade-off, Acharya, Liu, and Zhao (2020) find that stringency measures appear to boost confidence (as reflected by a decline in forward-looking volatility indices) and thus expedite the medium-term economic recovery, despite causing short-term disruptions.

Moreover, despite the positive impact on consumer spending in the U.S., survey data suggest that firms were not optimistic about the efficacy of the fiscal stimulus associated with the CARES Act Loan Program (Bartik and others, 2020). Consumer spending reallocation, with some sectors of the economy impacted more negatively by the pandemic (Barrero, Bloom, and Davis, 2020; Davis, Hansen and Seminario-Amez, 2020), may be partly responsible for the pessimistic views in the survey.

Besides the U.S., empirical evidence from a broader set of countries shows that monetary and fiscal stimulus might have been effective in reducing the harm that containment measures inflicted in the economy (Deb and others, 2020). Nevertheless, the harm to the economy was still substantial: over a 30-day period, industrial production declined by as much as 15 percent. Countries that could only provide limited fiscal and monetary policy stimulus recorded losses in industrial production as large as 20 percent.

With regard to asset markets, the announcement of government income support and debt relief measures appear to have had a positive impact on stock price returns (Ashraf, 2020). There is evidence, however, that strict lockdown policies were responsible for large stock price declines once the effects of pandemic severity, workplace mobility, and income support and debt relief measures are accounted for (Davis, Liu, and Sheng, 2020). Arguably, government support may also overshoot. For example, easy monetary policy in the U.S. in the wake of the pandemic appeared to have induced speculation in the housing markets, with the price growth accelerating at a faster pace than in the period prior to the 2007-09 global financial crisis (Zhao, 2020).

This study starts where earlier studies on the impact on financial markets left off. Specifically, it looks at the market reaction to successive withdrawal stages of government fiscal measures. To this end, a broad cross-country analysis based on event study analysis and cross-section regressions allows us to examine the reaction of stock prices to withdrawals in different segments of national stock price indices, and how much fundamental social and economic factors influenced the reaction. The next sections review the data, methodology, and results in detail.

III. EVENT STUDY ANALYSIS

Data

The event study uses daily price data obtained from the large-cap, medium-cap, and small-cap stock price indices in U.S. dollars that MSCI constructs for forty-seven (46) economies. The U.S. dollar-denominated indices are used to make stock index returns comparable across countries and to remove local currency effects, i.e., positive local currency returns may be misleading if the country experiences a substantial currency depreciation. The government response (impulse) index is obtained from the Oxford COVID-19 Government Response Tracker (OxCGRT). The responses covered by this dataset are COVID-related fiscal measures, including income support for households, debt/contract relief for households, and other announced fiscal measures (i.e., economic stimulus spending), as explained in Petherick (2020).

The data sample covers the period from January 1, 2020 to August 28, 2020. The country sample is evenly distributed between advanced economies (25) and emerging market and middle-income

economies (21). The advanced economies included are Austria, Belgium, Canada, Czech Republic (Czechia), Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan POC, and the United Kingdom.

The emerging market economies included are Argentina, Bahrain, Egypt, Hungary, India, Indonesia, Jordan, Kuwait, Malaysia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, Turkey, and the United Arab Emirates.

Government withdrawal events: definitions and characteristics

We assess the reaction of stock prices to the withdrawal of government support using event study analysis. First, we define the government withdrawal events as the first date the government response index fell below a certain threshold. Four types of events are considered, the only difference being the event threshold: a 5 percent decline from the peak value of the government response index, a 10 percent decline, a 15 percent decline, and a 20 percent decline.

Table 1 shows the withdrawal dates for the country sample in this study. For comparison purposes, the table also reports countries for which no withdrawal event took place as of end-August 2020. The latter set of countries include Australia, Brazil, China, Chile, Colombia, Oman, Qatar, and the U.S. In a few countries, mainly advanced economies (Bahrain, Canada, Denmark, South Africa, and the United Kingdom), the withdrawal was limited and less than 10 percent of the peak support value. Countries that reined in the pandemics fast during the first wave, such as Germany, Italy, Singapore, and South Korea, withdrew government support fast and by a large amount.

Figure 1 shows the number of days elapsed from the date the government response index reached its maximum value until the date of the withdrawal event.[4] On average, countries withdrew 5 percent of the support after 30 days, 10 percent of the support after 35 days, 15 percent of the support after 48 days, and 20 percent of the support after 58 days. The average number of days, however, may mask substantial policy differences among countries. For instance, Bahrain and Canada waited more than 75 days to withdraw 5 percent of the maximum government support; Denmark and Mexico waited more than 50 days. On the other hand, in Italy and South Korea, the withdrawal of government support was not gradual; rather, it reduced by more than 20 percent or more on a single day.

Methodology

With the withdrawal events defined as above, we proceed to use standard event study analysis to evaluate their impact on the stock prices of large-, medium-, and small-capitalization firms. The event study considers two 5-day windows surrounding the event date T. The pre-event window covers dates T-5, T-4, …, T-1; and the post-event window covers the dates T+1, T + 2, …, T + 5. The choice of short pre- and post-event windows aims at mitigating the impact of factors other than the event itself.

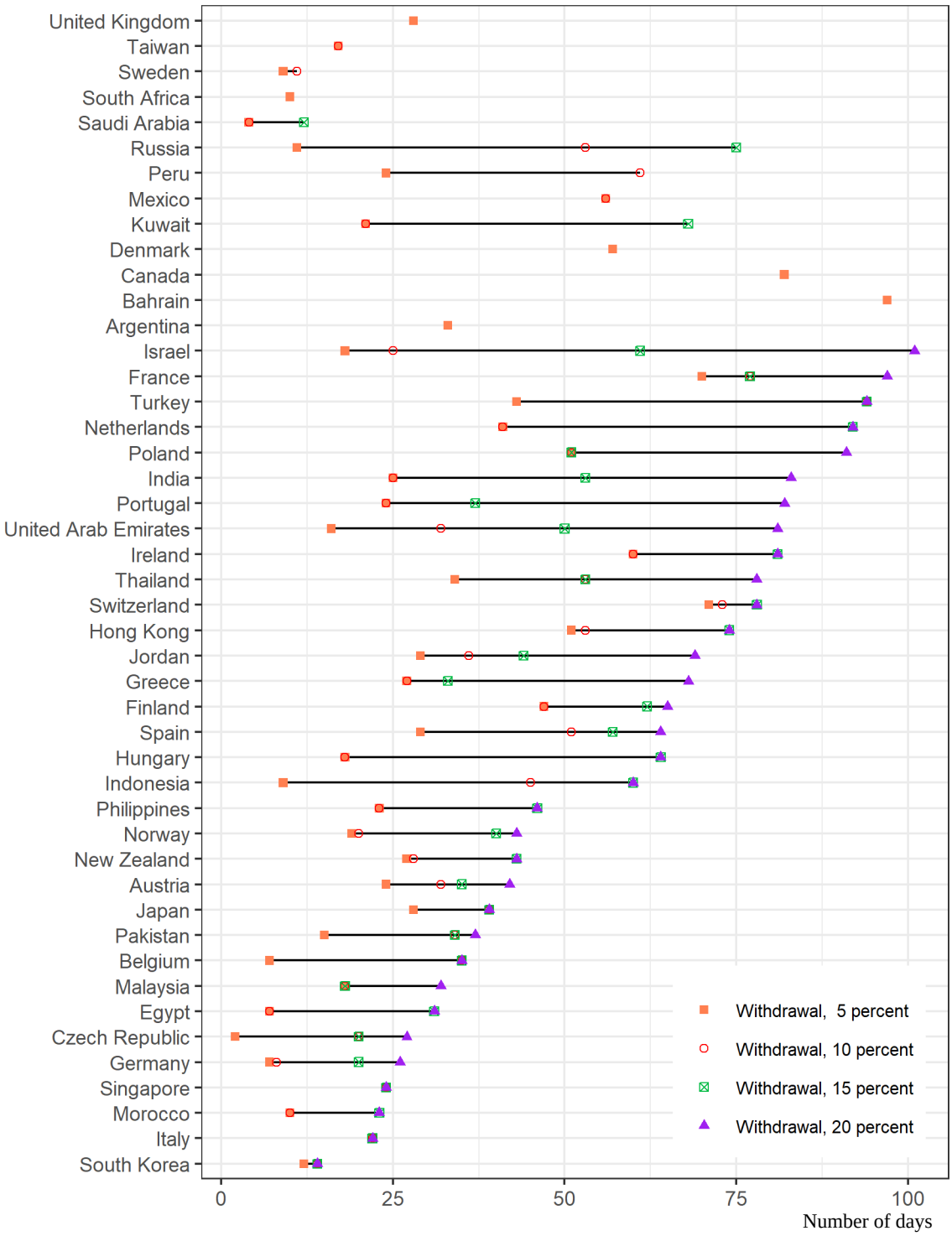
[4] For completeness, the figure also reports important advanced and emerging market economies that did not withdraw government support as of end-August 2020.

Table 1. Government response index, maximum levels and withdrawal event dates

Country	Government impulse, maximum level	Withdrawal, 5 percent	Withdrawal, 10 percent	Withdrawal, 15 percent	Withdrawal, 20 percent
Argentina	2020-03-25	2020-04-27	NA	NA	NA
Australia	2020-07-08	NA	NA	NA	NA
Austria	2020-03-30	2020-04-23	2020-05-01	2020-05-04	2020-05-11
Bahrain	2020-04-01	2020-07-07	NA	NA	NA
Belgium	2020-05-04	2020-05-11	2020-06-08	2020-06-08	2020-06-08
Brazil	2020-05-25	NA	NA	NA	NA
Canada	2020-04-01	2020-06-22	NA	NA	NA
Chile	2020-07-03	NA	NA	NA	NA
China	2020-05-21	NA	NA	NA	NA
Colombia	2020-04-27	NA	NA	NA	NA
Czech Republic	2020-03-31	2020-04-02	2020-04-20	2020-04-20	2020-04-27
Denmark	2020-05-12	2020-07-08	NA	NA	NA
Egypt	2020-05-31	2020-06-07	2020-06-07	2020-07-01	2020-07-01
Finland	2020-03-28	2020-05-14	2020-05-14	2020-05-29	2020-06-01
France	2020-03-17	2020-05-26	2020-06-02	2020-06-02	2020-06-22
Germany	2020-04-29	2020-05-06	2020-05-07	2020-05-19	2020-05-25
Greece	2020-04-08	2020-05-05	2020-05-05	2020-05-11	2020-06-15
Hong Kong	2020-04-06	2020-05-27	2020-05-29	2020-06-19	2020-06-19
Hungary	2020-04-16	2020-05-04	2020-05-04	2020-06-19	2020-06-19
India	2020-04-09	2020-05-04	2020-05-04	2020-06-01	2020-07-01
Indonesia	2020-04-24	2020-05-03	2020-06-08	2020-06-23	2020-06-23
Ireland	2020-04-06	2020-06-05	2020-06-05	2020-06-26	2020-06-26
Israel	2020-04-08	2020-04-26	2020-05-03	2020-06-08	2020-07-18
Italy	2020-04-12	2020-05-04	2020-05-04	2020-05-04	2020-05-04
Japan	2020-04-16	2020-05-14	2020-05-25	2020-05-25	2020-05-25
Jordan	2020-03-29	2020-04-27	2020-05-04	2020-05-12	2020-06-06
Kuwait	2020-05-10	2020-05-31	2020-05-31	2020-07-17	NA
Malaysia	2020-05-23	2020-06-10	2020-06-10	2020-06-10	2020-06-24
Mexico	2020-04-06	2020-06-01	2020-06-01	NA	NA
Morocco	2020-06-01	2020-06-11	2020-06-11	2020-06-24	2020-06-24
Netherlands	2020-03-31	2020-05-11	2020-05-11	2020-07-01	2020-07-01
New Zealand	2020-04-01	2020-04-28	2020-04-29	2020-05-14	2020-05-14
Norway	2020-04-01	2020-04-20	2020-04-21	2020-05-11	2020-05-14
Oman	2020-07-25	NA	NA	NA	NA
Pakistan	2020-05-01	2020-05-16	2020-06-04	2020-06-04	2020-06-07
Peru	2020-05-01	2020-05-25	2020-07-01	NA	NA
Philippines	2020-04-13	2020-05-06	2020-05-06	2020-05-29	2020-05-29
Poland	2020-04-09	2020-05-30	2020-05-30	2020-05-30	2020-07-09
Portugal	2020-04-10	2020-05-04	2020-05-04	2020-05-17	2020-07-01
Qatar	2020-07-24	NA	NA	NA	NA
Russia	2020-05-01	2020-05-12	2020-06-23	2020-07-15	NA
Saudi Arabia	2020-05-27	2020-05-31	2020-05-31	2020-06-08	NA
Singapore	2020-05-26	2020-06-19	2020-06-19	2020-06-19	2020-06-19
South Africa	2020-05-29	2020-06-08	NA	NA	NA
South Korea	2020-04-06	2020-04-18	2020-04-20	2020-04-20	2020-04-20
Spain	2020-04-05	2020-05-04	2020-05-26	2020-06-01	2020-06-08
Sweden	2020-06-04	2020-06-13	2020-06-15	NA	NA
Switzerland	2020-03-20	2020-05-30	2020-06-01	2020-06-06	2020-06-06
Taiwan	2020-04-21	2020-05-08	2020-05-08	NA	NA
Thailand	2020-04-14	2020-05-18	2020-06-06	2020-06-06	2020-07-01
Turkey	2020-04-19	2020-06-01	2020-07-22	2020-07-22	2020-07-22
United Arab Emirates	2020-04-13	2020-04-29	2020-05-15	2020-06-02	2020-07-03
United Kingdom	2020-06-08	2020-07-06	NA	NA	NA
United States	2020-03-27	NA	NA	NA	NA

Source: Oxford University and authors' calculations.

Figure 1. Days elapsed since the date the government impulse reached its maximum value



Note: Number of days from the date the government impulse reached its maximum value until the date of the support withdrawal. Four government withdrawal events are plotted, namely, the first date on which the government support index falls at least by 5 percent, 10 percent, 15 percent, and 20 percent relative to its maximum level.
Source: Oxford University and authors' calculations.

Following Brown and Warner (1980, 1985), the constant return model is used to evaluate whether the mean of the distribution of the average post-event daily returns across countries is different from the mean of the distribution of the average pre-event daily returns. Statistical significance is assessed using a paired-sample t-test.

Results

Tables 2-3 and Figure 2 summarize the results of the event study analysis. Regardless of the firm capitalization and the magnitude of the government support withdrawal, the market reaction is negative across countries. The mean difference between post-event window and pre-event window returns is negative, ranging from a minimum of -0.47 percent to a maximum of -0.09 percent. Nevertheless, the paired-sample t-tests and the non-parametric Kolmogorov-Smirnov and Wilcoxon tests suggest that the difference is not statistically significant in most cases. This is evident in Figure 2, which shows that the difference between pre-event and post-event return distributions is mainly concentrated on the tail behavior rather than the central section of the distribution.

Table 2. Mean average daily return differences between post-event and pre-event windows

Event	Withdrawal, gov. impulse, 5 pct			Withdrawal, gov. impulse, 10 pct		
	Large cap	Mid cap	Small cap	Large cap	Mid cap	Small cap
mean difference	-0.091	-0.195	-0.255	-0.470	-0.159	-0.401
Pair-sampled t-test, statistic	-0.400	-0.777	-1.121	-1.741	-0.687	-1.628
Pair-sampled t-test, p-value	0.691	0.441	0.268	0.090	0.496	0.111
Kolmogorov-Smirnov statistic	0.200	0.111	0.196	0.256	0.179	0.225
Kolmogorov-Smirnov, p-value	0.329	0.948	0.342	0.154	0.562	0.263
Wilcoxon statistic	533	583	584	471	451	495
Wilcoxon p-value	0.662	0.467	0.456	0.147	0.403	0.145

Event	Withdrawal, gov. impulse, 15 pct			Withdrawal, gov. impulse, 20 pct		
	Large cap	Mid cap	Small cap	Large cap	Mid cap	Small cap
mean difference	-0.216	-0.088	-0.138	-0.163	-0.156	-0.183
Pair-sampled t-test, statistic	-0.834	-0.412	-0.733	-0.636	-0.698	-0.816
Pair-sampled t-test, p-value	0.410	0.683	0.468	0.530	0.490	0.421
Kolmogorov-Smirnov statistic	0.143	0.200	0.167	0.188	0.125	0.212
Kolmogorov-Smirnov, p-value	0.867	0.492	0.707	0.627	0.964	0.453
Wilcoxon statistic	361	361	381	259	287	341
Wilcoxon p-value	0.281	0.461	0.460	0.837	0.451	0.288

Source: MSCI and authors' calculations.

Table 3, which shows the first four moments of the pre-event and post-event average return distributions, confirms the visual evidence presented in Figure 2. In the post-event distribution, besides the leftwards shift of the mean relative to the pre-event distribution, the distribution mass tends to shift to the right reflecting lower skewness. In addition, the tails of the distribution become thinner, reflecting lower and even negative excess kurtosis.

These results suggest that there are significant differences in the responses of stock market prices to government withdrawal events. Such differences merit further inspections using cross-country regressions, as done in the next section.

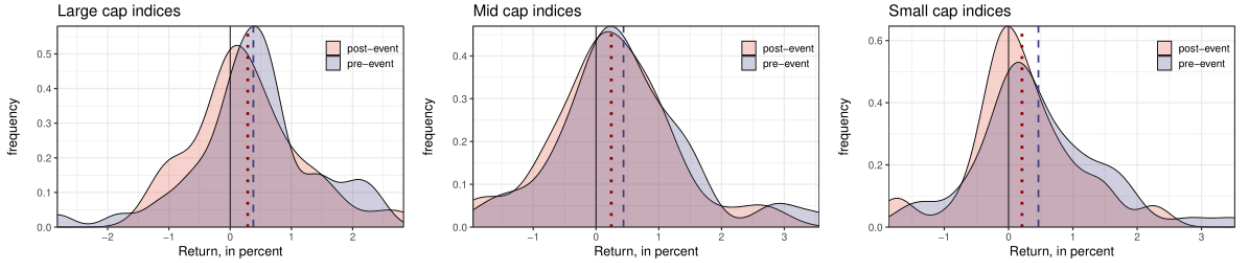
Table 3. Pre-event and post-event windows, 5-day average daily returns

Event		Withdrawal, gov. impulse, 5 pct			Withdrawal, gov. impulse, 10 pct		
		Large cap	Mid cap	Small cap	Large cap	Mid cap	Small cap
Pre-event	Mean	0.379	0.439	0.464	0.563	0.354	0.529
	Minimum	-2.821	-1.870	-1.614	-1.818	-2.074	-1.614
	Maximum	2.418	3.556	3.519	3.145	1.680	3.490
	Std. dev.	1.027	1.075	0.998	1.076	0.892	0.967
	Skewness	-0.436	0.587	0.595	0.238	-0.646	0.312
	Kurtosis	1.009	0.893	0.901	-0.130	0.191	0.777
Post-event	Mean	0.287	0.244	0.209	0.092	0.195	0.127
	Minimum	-1.324	-1.959	-1.863	-1.740	-1.865	-1.942
	Maximum	2.830	2.789	2.306	2.074	2.571	2.218
	Std. dev.	0.905	0.984	0.867	1.006	1.032	0.931
	Skewness	0.624	0.168	0.047	0.109	0.233	0.036
	Kurtosis	0.336	0.506	0.600	-0.897	-0.205	-0.380

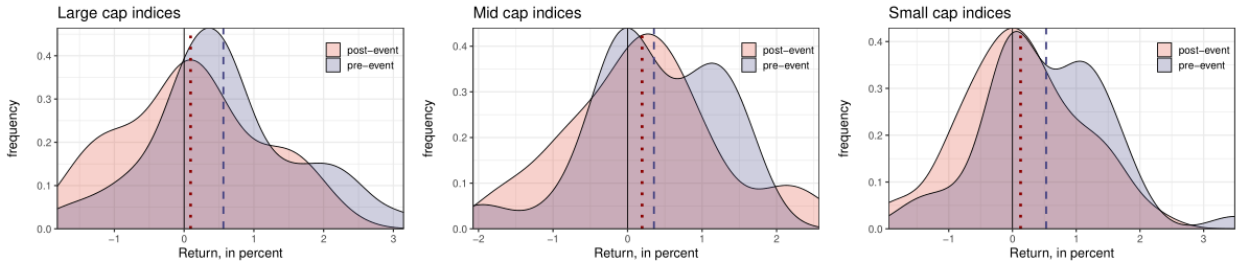
Event		Withdrawal, gov. impulse, 15 pct			Withdrawal, gov. impulse, 20 pct		
		Large cap	Mid cap	Small cap	Large cap	Mid cap	Small cap
Pre-event	Mean	0.429	0.322	0.435	0.268	0.267	0.382
	Minimum	-1.391	-2.074	-1.438	-0.658	-0.930	-1.621
	Maximum	3.145	1.680	1.606	3.145	2.211	2.402
	Std. dev.	1.053	0.857	0.738	0.852	0.712	0.742
	Skewness	0.556	-0.800	-0.261	1.647	0.623	0.056
	Kurtosis	-0.147	0.261	-0.490	2.885	-0.040	0.957
Post-event	Mean	0.213	0.235	0.297	0.105	0.111	0.199
	Minimum	-1.459	-1.568	-1.122	-1.793	-1.568	-1.299
	Maximum	2.407	2.706	3.180	2.407	2.706	3.180
	Std. dev.	0.982	0.986	0.929	0.891	0.844	0.891
	Skewness	0.232	0.304	0.679	0.401	0.430	1.075
	Kurtosis	-0.440	-0.189	0.601	0.528	1.288	1.998

Source: MSCI and authors' calculations.

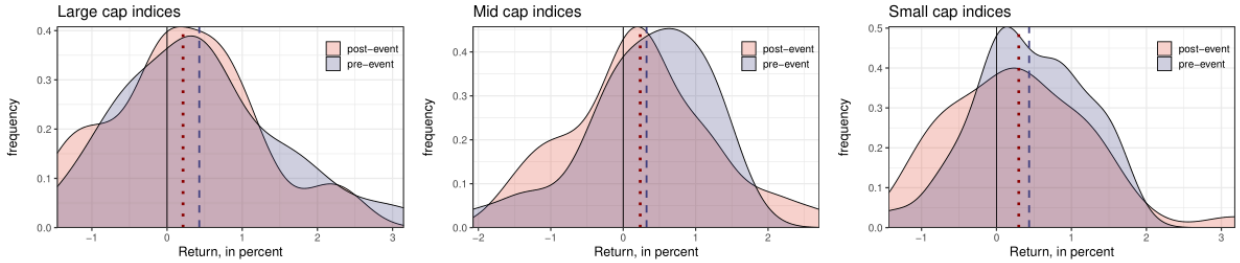
Figure 2. Stock indices, average daily returns in the 5-day pre-event and post-event periods



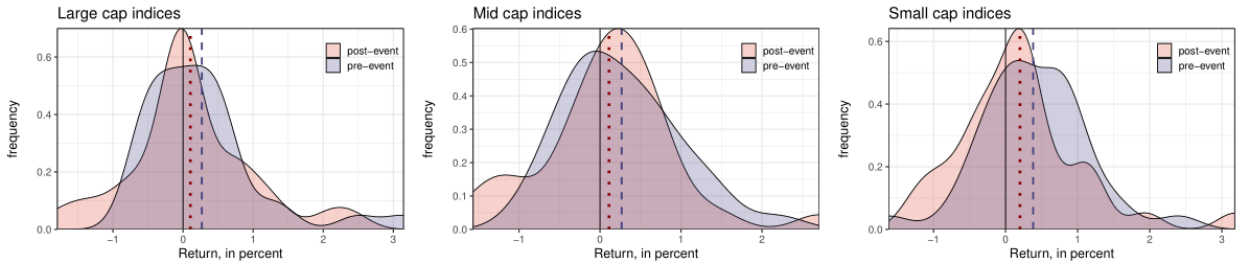
Panel B: withdrawal event, 10 percent



Panel C: withdrawal event, 15 percent



Panel D: withdrawal event, 20 percent



Note: The figure shows the distributions of the average daily returns of the stock price index in the pre-event (purple) and post-event windows (red) corresponding to large-, medium-, and small-capitalization firms. *Black* vertical line: *zero* return line; dashed *purple* line: mean average daily return during the *pre*-event period; dotted *red* line: mean average daily return during the *post*-event period.
Source: MSCI and authors' calculations.

IV. CROSS-COUNTRY REGRESSIONS

The cross-country regressions examine whether differences in socio-economic fundamentals help explain partly the stock market impact of government support withdrawals. The set of socio-economic fundamentals attempts to capture the strength of the economy before the pandemic started, the ability of the government to deploy an efficient pandemic response, the instability of the social fabric of the country, and the fiscal space available for providing government support. Note that the dependent variable in the cross-country regressions is the impact of withdrawal on stock return, rather than the stock return itself.

Data

Several priors guide our choice of proxies for the socio-economic fundamentals. The average annual GDP growth rate during the 5-year pre-COVID period (2015–19), calculated using publicly available data from the IMF World Economic Outlook database, serves to capture the pre-COVID strength of the economy. Economies that entered the pandemic in a strong cyclical position may be likely to exit faster and get back to their pre-pandemic growth trajectory with less government support than those caught in a weak cyclical position.

Corruption could prevent a government from deploying the support effectively since it makes it more likely that resources are not efficiently allocated. Thus, we use the 5-year pre-COVID average value of the Corruption Perception Index (CPI) constructed by Transparency International as a proxy for the efficient allocation and utilization of the government support measures.[5] The index value ranges from zero, the highest corruption level, to 100, the lowest corruption level. The data are downloaded from the World Bank online data repository.

Ceteris paribus, countries enjoying ample fiscal space could afford keeping the government support measures in place longer, although stock market prices may still react negatively if the withdrawal is viewed as *premature*. On the other hand, in countries with little fiscal space, markets may be more forgiving. We approximate the fiscal space variable with the 5-year pre-COVID average primary fiscal balance-to-GDP ratio. The data are sourced from the IMF World Economic Outlook public database.

Our last socio-economic fundamental variable is social unrest. Arguably, support withdrawal in a country with lower social stability and frequent public protests could lead to an escalation of social conflict and violence, which could have a large negative impact on markets.[6] In a more socially cohesive society, the stock market impact would be more subdued, all else being equal. To measure social unrest, we use the Reported Social Unrest Index (RSUI) by Barrett and others

[5] The CPI is a composite index combining data from 13 surveys and the most widely used indicator of corruption worldwide.

[6] See, for instance, Barrett and others (Forthcoming).

(2020) to construct a social unrest count variable.[7] The variable records the number of major unrest events that have occurred in a country since 2000.[8]

In addition to socio-economic fundamental variables, we also include a measure of how large the adjustment was at the time of the withdrawal event. Recall that the withdrawal event is measured as the first time the government response index falls below certain threshold values, i.e., 5 percent, 10 percent, 15 percent, and 20 percent. The withdrawal may be sudden and large at the time of the event, or it could have been gradual, extending over several days or weeks. In the former case, there would be a larger impact on stock prices if no advanced notice of the withdrawal was available. We capture the event-related withdrawal adjustment as the percentage change of government response index during the post-event period relative to the pre-event period.

Finally, our last explanatory variable is related to the severity of the pandemic at the time of the withdrawals. Withholding or reducing government support when the pandemic is raging would have a very different impact on markets than when the pandemic is receding. We capture the severity of the pandemic by the ratio of the 7-day backward moving average increase in COVID cases at the time of the withdrawal event to the 7-day moving average of the highest daily increase experienced up to the event date. Importantly, a higher ratio indicates a premature withdrawal of stimulus in the sense that it means the COVID outbreak was still severe when the stimulus policies were withdrawn.

Table 4 presents the summary descriptive statistics of the explanatory variables as well as the stock price returns of the large cap, medium cap, and small cap segments of the national stock market indices. Panels A, B, C, and D correspond respectively to the withdrawal events of 5 percent, 10 percent, 15 percent, and 20 percent. The number of countries included in the regression is less than in the event study analysis since data for all the explanatory variables are not available. Also, the number of countries decreases as the threshold of withdrawal increases (fewer countries committed to larger withdrawals). Depending on the event, the number of countries in the regression ranges from as high as 38 to as low as 28 (Table 5).

Following a withdrawal, the average stock price return falls in all three segments of the market, regardless of the size of the withdrawal. Larger withdrawals tend to be associated with larger stock price return declines although, as noted also in the previous section, the differences between the pre-event and post-event returns are not statistically significant.

[7] Barrett and others (2020) recommend using this event count instead of the social unrest index itself for cross-country comparison studies. The index is normalized to 100 in each country regardless of the number of events, and thus its use in cross-country studies is questionable.

[8] We use 2000 as a cutoff year after balancing the number of events (i.e., to avoid too few events) with timeliness (i.e., to avoid looking too far back and being subject to fundamental changes in the socio-economic structures).

Table 4. Summary statistics for data in cross-country regressions

Variable	Obs.	Mean	Median	Minimum	Maximum	Std. dev.
Panel A: withdrawal of government impulse, 5 percent						
Large cap return	37	-0.595	-0.507	-3.981	2.493	1.600
Mid cap return	37	-0.110	-0.264	-3.243	3.673	1.577
Small cap return	38	-0.267	-0.281	-3.404	4.920	1.771
Covid-19 acceleration	38	0.350	0.234	0.007	0.928	0.293
Withdrawal adjustment	38	0.904	0.915	0.752	0.948	0.040
Real GDP growth	38	2.857	2.446	-0.237	10.333	2.005
Corruption	38	59.342	57.600	30.200	88.800	19.536
Social unrest	38	3.132	3.000	0.000	7.000	2.095
Primary Balance to GDP	38	-0.502	0.085	-12.026	3.697	2.828
Panel B: withdrawal of government impulse, 10 percent						
Large cap return	32	-0.667	-0.585	-3.981	2.493	1.560
Mid cap return	32	-0.091	-0.201	-2.697	3.673	1.535
Small cap return	33	-0.277	-0.308	-2.839	4.920	1.763
Covid-19 acceleration	33	0.321	0.222	0.013	0.909	0.288
Withdrawal adjustment	33	0.861	0.876	0.731	0.899	0.047
Real GDP growth	33	3.093	2.682	0.096	10.333	2.019
Corruption	33	58.267	56.600	30.200	88.200	19.064
Social unrest	33	3.182	3.000	0.000	7.000	2.157
Primary Balance to GDP	33	-0.431	0.421	-12.026	3.697	2.984
Panel C: withdrawal of government impulse, 15 percent						
Large cap return	29	-0.672	-0.507	-3.981	2.493	1.469
Mid cap return	29	-0.208	-0.264	-2.598	3.673	1.297
Small cap return	30	-0.334	-0.519	-2.644	4.920	1.625
Covid-19 acceleration	30	0.275	0.133	0.006	0.880	0.283
Withdrawal adjustment	30	0.789	0.816	0.532	0.850	0.071
Real GDP growth	30	3.147	2.750	0.096	10.333	2.107
Corruption	30	59.020	57.600	31.800	88.200	18.138
Social unrest	30	3.067	3.000	0.000	7.000	2.132
Primary Balance to GDP	30	-0.493	0.259	-12.026	3.697	3.114
Panel D: withdrawal of government impulse, 20 percent						
Large cap return	27	-0.756	-0.662	-3.981	2.493	1.490
Mid cap return	27	-0.212	-0.264	-2.598	3.673	1.337
Small cap return	28	-0.365	-0.747	-2.644	4.920	1.680
Covid-19 acceleration	28	0.243	0.132	0.006	0.928	0.277
Withdrawal adjustment	28	0.738	0.756	0.532	0.797	0.059
Real GDP growth	28	3.313	2.911	0.936	10.333	2.074
Corruption	28	59.957	59.500	31.800	88.200	18.400
Social unrest	28	3.071	3.000	0.000	7.000	2.210
Primary Balance to GDP	28	0.204	0.460	-2.717	3.697	1.621

Sources: IMF, MSCI, Oxford University, World Bank, and authors' calculations.

Table 5. Cross-country regression samples

Country	sample	Country	sample	Country	sample	Country	sample
Argentina	a	India	a, b, c, d	Morocco	a, b, c, d	South Africa	a
Austria	a, b, c, d	Indonesia	a, b, c, d	Netherlands	a, b, c, d	Spain	a, b, c, d
Belgium	a, b, c, d	Ireland	a, b, c, d	New Zealand	a, b, c, d	Sweden	a, b
Canada	a	Israel	a, b, c, d	Norway	a, b, c, d	Switzerland	a, b, c, d
Czech Republic	a, b, c, d	Italy	a, b, c, d	Pakistan	a, b, c, d	Thailand	a, b, c, d
Denmark	a	Japan	a, b, c, d	Peru	a, b	Turkey	a, b, c, d
Finland	a, b, c, d	Jordan	a, b, c, d	Philippines	a, b, c, d	United Arab Emirates	a, b, c, d
Germany	a, b, c, d	Kuwait	a, b, c	Poland	a, b, c, d	United Kingdom	a
Greece	a, b, c, d	Malaysia	a, b, c, d	Portugal	a, b, c, d		
Hungary	a, b, c, d	Mexico	a, b	Saudi Arabia	a, b, c		

a: 5 percent withdrawal sample; b: 10 percent withdrawal sample; c: 15 percent withdrawal sample, d: 20 percent withdrawal sample
Source: Authors' calculations.

Methodology and Results

To examine in more detail what drives stock price returns lower following a withdrawal, we conducted a simple cross-country analysis by regressing the change in the stock return (i.e., the post-event return minus the pre-event return) on the pandemic severity, magnitude of withdrawal, and socio-economic fundamental variables. Table 6 presents the results of the cross-country regressions for the withdrawal events of 5 percent, 10 percent, 15 percent and 20 percent in the three market segments of national stock markets (large, medium, and small-cap markets). The table reports the coefficients and their corresponding p-values obtained using robust standard errors to allow for the potential presence of heteroskedasticity (White, 1980).

Our main variable of interest is the COVID acceleration variable, which proxies for the pandemic severity at the time of the withdrawal event (with a higher value indicating an "earlier" or premature withdrawal). As shown in Table 6, the sign of this variable is generally negative, which indicates that early withdrawals are received negatively when infection rates are high. Moreover, the absolute value of the coefficients increases as the withdrawal becomes larger.

The coefficients of this variable are statistically significant only at the higher threshold levels of 15 percent and 20 percent. This is intuitive because markets may not notice small withdrawals (i.e., those in the range of 5-10 percent) or consider them large enough to affect the overall level of government support. Despite the different significance levels for the COVID acceleration variable under different threshold levels, our regression results are still robust in the sense that all other variables (including GDP growth, corruption, social unrest, and primary balance-to-GDP ratio) have the same signs and mostly the same significance levels across all threshold levels (see below).

In addition, the coefficients are statistically significant only in the large-cap segment of the market, which provides some suggestive evidence that large-cap companies benefit more from the stimulus. Of course, we do not control for other factors such as industry composition, so this result is only indirect evidence for the hypothesis.

Table 6. Cross-country regressions

	Market segment					
	Large cap	Medium cap	Small cap	Large cap	Medium cap	Small cap
	Withdrawal, gov.impulse, 5 percent			Withdrawal, gov.impulse, 10 percent		
Covid-19 acceleration	-1.129	0.164	-0.499	-1.375	-0.882	-0.678
	(0.300)	(0.893)	(0.683)	(0.281)	(0.527)	(0.639)
Withdrawal adjustment	7.582	11.949**	7.839*	4.404	9.521**	3.854
	(0.199)	(0.025)	(0.084)	(0.356)	(0.025)	(0.453)
Real GDP growth	0.205*	0.125	0.260	0.271**	0.154	0.328*
	(0.052)	(0.322)	(0.171)	(0.020)	(0.223)	(0.095)
Corruption	-0.057***	-0.042**	-0.050**	-0.044**	-0.025	-0.033
	(0.001)	(0.060)	(0.015)	(0.019)	(0.316)	(0.179)
Social unrest	-0.280**	-0.265*	-0.424***	-0.195*	-0.161	-0.331**
	(0.028)	(0.081)	(0.004)	(0.075)	(0.249)	(0.024)
Primary Balance to GDP	-0.144*	0.005	-0.061	-0.165*	-0.042	-0.085
	(0.058)	(0.946)	(0.494)	(0.085)	(0.674)	(0.449)
Constant	-3.428	-7.998*	-3.685	-1.711	-6.512	-1.431
	(0.501)	(0.093)	(0.359)	(0.661)	(0.111)	(0.739)
Observations	37	37	38	32	32	33
R-squared	0.428	0.253	0.331	0.447	0.204	0.307
	Withdrawal, gov.impulse, 15 percent			Withdrawal, gov.impulse, 20 percent		
Covid-19 acceleration	-2.584**	-1.478	-1.577	-1.970*	-0.902	-1.406
	(0.028)	(0.095)	(0.120)	(0.071)	(0.352)	(0.133)
Withdrawal adjustment	-2.428	2.582	-1.593	-5.108	3.119	-0.578
	(0.498)	(0.516)	(0.811)	(0.164)	(0.344)	(0.932)
Real GDP growth	0.356***	0.345***	0.448***	0.340***	0.327***	0.479***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Corruption	-0.040**	0.009	-0.013	-0.035*	0.014	-0.006
	(0.032)	(0.686)	(0.484)	(0.055)	(0.600)	(0.797)
Social unrest	-0.166	-0.181	-0.311**	-0.138	-0.129	-0.272**
	(0.151)	(0.156)	(0.016)	(0.237)	(0.328)	(0.040)
Primary Balance to GDP	-0.278***	-0.153***	-0.204***	-0.303**	-0.104	-0.220
	(0.000)	(0.002)	(0.006)	(0.020)	(0.284)	(0.124)
Constant	3.572	-2.987	1.584	4.973	-3.800	0.063
	(0.293)	(0.334)	(0.764)	(0.166)	(0.273)	(0.991)
Observations	29	29	30	27	27	28
R-squared	0.577	0.327	0.457	0.535	0.301	0.457

*** 1 percent, ** 5 percent, * 10 percent significance; robust p-values (accounting for heteroskedasticity) in parentheses.
Source: Authors' calculations.

The size of the withdrawal adjustment appears not to matter much. An examination of Figure 1 suggests a plausible explanation: in most countries in the sample, withdrawals have been gradual, which is reflected by the small variability of the variable summary statistics shown in Table 4.

The cyclical position of the economy prior to the pandemic, proxied by the average real GDP growth, has a positive effect, reducing the gap between pre-event and post-event returns. With the economy growing at a strong pace, corporations have had room to build strong profits and buffers and should be more resilient both to the pandemic shock and to the withdrawal of the stimulus.

Higher levels of corruption, especially at the lower threshold levels, contribute to the widening of the stock return gap. Arguably, one explanation is that in more corrupt economies, firms are more dependent on government support. This, in turn, tends to be awarded to firms better connected with the authorities. And as the firms are more dependent on government support, the market believes that they would fare worse once the support is withdrawn.

Social unrest appears to hurt firms in the small-cap segment the most, as evident by the magnitudes and signs of the coefficients. Arguably, due to their local and small-scale operations, small businesses are more affected by the business disruptions and worsened security associated with social unrest; with the impact softened by the availability of government support. Reduced government support could worsen social unrest and lower output in the medium and long term (Hlatshwayo and Redl, Forthcoming; Sedik and Xu, 2020).

Lastly, the results corresponding to the fiscal space variable, the primary balance-to-GDP ratio, appear puzzling at first glance. The coefficients suggest that a country enjoying more fiscal space may experience a larger drop in the stock return of large-cap companies after the stimulus is withdrawn. One possible explanation is that market participants were disappointed when the government withdrew support while there was still ample fiscal space; they may question whether the government has made the right decision, and further question the soundness of the overall COVID-19 response strategy. Through this channel, economies with larger fiscal space tend to experience larger drops in stock returns compared with countries with restricted fiscal space. Recent surveys support the plausibility of this explanation (Fitch Solutions, 2020).

V. CONCLUSIONS AND POLICY IMPLICATIONS

In the time of COVID-19, extending the exceptional government support measures would lead to higher fiscal costs and increase the risk that the debt burden becomes unsustainable. Yet, unwinding the measures too early may disrupt the normalization of economic activities and damage the incipient economic recovery. This analysis attempts to quantify market views on the trade-off using a combination of event studies and cross-country regressions.

The results show that markets, as proxied by the behavior of stock price returns, tend to react negatively when government stimulus was withdrawn prematurely, that is, when the number of daily COVID-19 cases were still high relative to the recent past. In addition, we find that social

unrest hurts smaller firms the most, and the problem could be compounded if reduced government support further fuels social tensions.

Our results have several potential policy implications. First, it may not be wise to withdraw the fiscal support measures when the economy is not "out of the woods" yet. The pandemic experience so far, based on countries following diverse health and pandemic prevention policies, is that there could be successive infection waves as social distancing and mobility restriction measures are lifted so caution is warranted. In addition, even if policymakers are confident that there is no new COVID waves, the presence of long-lasting scarring effects would also prevent the economy from a quick recovery if the support measures were withdrawn too early.[9]

Second, a "blanket" withdrawal of the support measures (and forced re-use of the COVID fiscal support in case a new wave hits) may not work. Therefore, it is of utmost importance to design a clear contingency plan and communicate it clearly before announcing the withdrawal. The plan should clearly communicate that the reason why the government is withdrawing the exceptional fiscal support measures now is to restore fiscal prudence and ensure debt sustainability; but that the government stands ready to step in and resume support measures in case the pandemic situation deteriorates or the economic recovery falters. Compared with a blanket withdrawal, implementing such a contingency plan would anchor expectations and achieve a better balance among prudence, agility, and credibility of the fiscal policy framework.

[9] One caveat is that the continued government support, if mis-directed, may prop up zombie firms threatening long-term growth prospects (Laeven and others, 2020; Zoller-Rydzek and Keller, 2020).

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