

# Foreign Investment, COVID-19 Stringency Measures and Risk of Openness

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Received: January 26, 2021

Accepted: February 28, 2022

Online Published: March 11, 2022

doi:10.5539/ibr.v15n4p74

URL: <https://doi.org/10.5539/ibr.v15n4p74>

## Abstract

This paper analyzes the impact of the COVID-19 government stringency index on foreign investment, at the onset of the pandemic. Through a Robust Least Square regression estimation, we highlight that the relationship between foreign investment and the government containment measures displays a significant cross-country heterogeneity that depends on the level of the pandemic risk in the country. Foreign investors have indeed tilted their asset allocation towards those countries that implemented strong containment measures (as measured by the government stringency index) in the presence of a high risk (as measured by the risk of openness index). Conversely, they have shown a lower propensity to invest in assets issued by countries either adopting weak stringency measures despite a high risk of openness, or implementing drastic stringency measures in the presence of a relatively lower risk of openness. The above findings suggest the following interpretation: the government stringency measures and the pandemic risk have jointly affected foreign investors' behavior, which appeared relatively more prone towards assets issued by those economies better calibrating the policy interventions according to the pandemic harshness.

**Keywords:** international investments, COVID-19, stringency index, risk of openness index

**JEL Classifications:** G11, G15, G30

## 1. Motivation and Relevance

The outbreak of COVID-19 has caused significant financial market declines and increased financial market risks, with unprecedented massive spikes in uncertainty (Baker et al., 2020; Zhang et al., 2020).

Since the literature on the impact of previous epidemics on financial markets is limited, parallels between the epidemic and other natural disasters or terroristic attacks may be helpful, if interpreted with due caution (Godell, 2020). Investor behavior in the aftermath of crisis periods, natural disasters or terrorist attacks is often associated with more risk averse choices. Gerrans et al. (2015), relying on an international survey of individual investor clients of financial advisory firms, highlight that, financial risk tolerance remained relatively stable in the aggregate, even in the presence of a surge in economic uncertainty due to the global financial crisis. Conversely, Guiso et al. (2018) find that, for an Italian bank's clients, both qualitative and quantitative measures of risk aversion have increased after the 2008 financial crisis and that fear represents a potential mechanism underlying financial decisions. Bourdeau-Brien & Kryzanowski (2020) highlight that natural disasters caused a significant increase in aggregate financial risk aversion. As far as terrorist attacks are concerned, the literature has shown a reduced trading intensity and a reduced flow to risky assets because of these events (Levy & Galili, 2006; Wang & Young, 2020).

Analogously, in response to the outbreak of COVID-19, investors may have reduced their market exposure and risk-taking behavior. Bekaert et al. (2021) formulate a dynamic no-arbitrage asset pricing model, featuring time variation in both risk aversion and economic uncertainty. They highlight that risk aversion, which is substantially correlated with consumer confidence measures, reacted very strongly to new COVID cases in early 2020. Ampudia et al. (2020) find that, after the pandemic outbreak, the increase in perceived risks accompanied a noticeable rise in investors' risk aversion to negative tail events. Heo et al. (2021) confirm a general reduction in aggregate levels of financial risk tolerance during the initial peak of COVID-19 period.

The peak in economic and financial uncertainty has also affected foreign investments. The COVID crisis

represents a new and unprecedented source of investor risk for international enterprises and then has likely hit investor confidence (Saurav et al., 2020). OECD (2020a) pointed out that the COVID outbreak has brought erosion of confidence and a great deal of uncertainty in international investments. In particular, emerging economies have already witnessed a massive reduction of portfolio investment inflows, because the higher uncertainty induced foreign investors to move capital back home, or invest in safer assets (OECD (2020b) and OECD (2020c)). Giofré (2022) confirms that, within a generalized decline in foreign investment, advanced countries, with higher GDP per capita, members of the G7 group, or of the Euro area have been significantly less severely hit by the pandemic than emerging and developing countries.

Moreover, OECD (2020b) and OECD (2020c) anticipated a sharper decline of foreign direct investments because of the stringent public health measures to limit the spread of the COVID-19, with a remarkable degree of heterogeneity across countries. Indeed, the Coronavirus outbreak has forced many governments to impose restrictions with different intensity and timing (Hale et al., 2020b). Kizys et al. (2021) specifically investigate the impact of the COVID-19 governments' stringency measures on international stock markets and unveil that, in the first quarter of 2020, more severe containment policies have succeeded in reducing the multidimensional uncertainty, thus mitigating the investors' herding behavior.

Giofré (2021) finds that inward investments have not been affected by the average stringency measures adopted by the issuing country. However, the within-country standard deviation of the stringency index has displayed a positive and significant correlation with a particular subset of foreign investments, that is, foreign portfolio investments. On the one hand, this stronger responsiveness is consistent with the literature that stressed that foreign portfolio investments are more reactive and volatile than foreign direct ones. On the other hand, their marked sensitivity to the within-country standard deviation of the stringency index suggests that foreign portfolio investors prefer governments' prompt reactions (characterized by large standard deviations) than gradual ones (characterized by lower standard deviations): a plausible interpretation is that the former policies are perceived as more effective to contain the uncertainty induced by the virus's spread.

This paper contributes to the literature by investigating how an epidemic-specific source of risk, that is, the risk of openness, has affected the relationship between foreign investment and the government containment measures. We disclose that the non-significant correlation between inward foreign investment and the stringency index found by the literature (Giofré, 2021) hides an important source of heterogeneity across countries, which is strictly connected with the pandemic-induced uncertainty and risk aversion. The response of investors' behavior to the adoption of severe measures was related to the level of pandemic risk in the economy. Specifically, the extent to which severe containment measures - as measured by government stringency measures (SI) - significantly affected the inward foreign investments in a country crucially rested on the country level of risk directly connected with the non-adoption or removal of these stringency measures - as proxied by the risk of openness index (ROI).

At the onset of the epidemic, foreign investors have highly valued the assets issued by countries, which calibrated the stringency measures according to the risk of openness. On the one hand, they highly rated the implementation of strong containment measures in countries with high risk of openness; on the other hand, they appeared to avoid investing in those countries adopting weak stringency measures despite a high risk of openness, or those implementing drastic stringency measures, in the presence of a low risk of openness.

The rest of the paper is structured as follows. Section 2 defines the dependent variable and describes the regression model. Section 3 reports the data and some meaningful descriptive statistics. Section 4 analyzes the empirical findings and provides robustness checks. Section 5 summarizes and concludes.

## 2. Regression Model

We define the growth of liabilities ( $\Delta L$ ) in a given period as the change in liabilities divided by the beginning of period liabilities' position. When considering the first quarter (q1) of 2020, therefore, we construct  $\Delta q1$  as the difference between the liabilities' position at the end of the first quarter (March 2020) and the liabilities' position at the end of 2019 (December 2019), scaled by the liabilities' position at the end of 2019:

$$\Delta L = \Delta q1 \equiv (L_{03\_20} - L_{12\_19}) / L_{12\_19} \quad (1)$$

The growth in liabilities for the first semester of 2020 ( $\Delta s1$ ) is, analogously:

$$\Delta s1 \equiv (L_{06\_20} - L_{12\_19}) / L_{12\_19} \quad (2)$$

Since foreign investments can be influenced by seasonality, we define, as an alternative to  $\Delta L$ ,  $\text{diff}\Delta L$ , that is, the difference between the  $\Delta L$  measures in 2020 and 2019, as defined in equation (1) or (2), for the quarterly or semi-annual horizon, respectively.

Therefore,  $\text{diff}\Delta q1$ , for the first quarter, is defined as follows:

$$\text{diff}\Delta q1 \equiv \Delta q1_{2020} - \Delta q1_{2019} \quad (3)$$

while  $\text{diff}\Delta s1$ , for the first semester, is defined as:

$$\text{diff}\Delta s1 \equiv \Delta s1_{2020} - \Delta s1_{2019} \quad (4)$$

The dependent variable, in its different definitions, is regressed on several explanatory variables. The main regressors in this analysis are the average within-country stringency index (SI), the risk of openness index (ROI), and their interaction (SI · ROI). Their coefficients are estimated through the following model:

$$\Delta L = \alpha + \beta(SI) + \gamma(ROI) + \delta(SI \cdot ROI) + \text{controls} + \varepsilon \quad (5)$$

where  $\varepsilon$  represents the error term of the regression estimation and *controls* capture a bunch of controlling covariates added to the econometric specification.

Ordinary Least Squares estimators are sensitive to the presence of outliers. We estimate the parameters in equation (5) through a Robust Least Squares estimation, a regression method specifically designed to be robust to the presence of outliers. Among the various Robust Least Squares models, we adopt the M-estimation (Huber, 1973).<sup>1</sup> For comparison with our baseline findings, we report the estimates under alternative estimation methods, such as OLS and Quantile regressions.

We are mainly interested in the sign, significance and size of the  $\beta$ ,  $\gamma$  and  $\delta$  coefficients.  $\beta$  and  $\gamma$  capture the effect of the Stringency Index (SI) and of the Risk of Openness Index (ROI) on inward investments. Moreover, if the risk of openness in one country affects the way stringency measures influence foreign investments, then we should observe a significant  $\delta$ , the coefficient of the interaction term SI·ROI.

We can include a limited number of controls because of the low number of observations, but the construction of the dependent variable, in difference form, partials out all country-specific fixed effects, as these are removed by construction.

Among the *controls* reported in equation (5), we include the Nominal Effective Exchange Rate (NEER) appreciation, the number of new COVID-deaths (and its within-country standard deviation), and two binary indicators of economic and financial development, to control for the presence of any eventual flight to quality inclination by foreign investors (Giofré 2022).

### 3. Data and Descriptive Statistics

Our country sample includes 53 countries. We study the change in their foreign inward investments, which reflect their foreign liabilities' position, at the onset of the COVID crisis. The International Investment Position Statistics, released by the IMF, provides quarterly data on foreign assets and liabilities, by categories and instruments. For most of the analysis, we consider the wider Foreign Total Liabilities (FTL) asset class, but, in the last table, we also consider its sub-components, i.e., Foreign Direct (FDL) and Foreign Portfolio Liabilities (FPL).

The source of COVID-related data is the Coronavirus Open Citations Dataset, a Github ongoing repository of data on coronavirus. The Stringency Index and the Risk of Openness Index, the two main regressors of our analysis, are drawn from this source. They rely on the Oxford's Coronavirus Government Response Tracker (OxCGRT) (Hale et al., 2020a, 2020b): SI captures the severity of the government containment policy measures, while ROI is based on the recommendations set out by the World Health Organization (WHO) of the measures that should be put in place before Covid-19 response policies can be safely relaxed. From the same source, we also draw the epidemic data about new COVID-deaths and cases per million of inhabitants. While these are originally collected at a daily frequency, we consider their corresponding quarterly averages, for consistency with the quarterly dependent variable.

As anticipated above, we include as further controls, the NEER (Nominal Effective Exchange Rate), released by the Bank for International Settlements, and two binary indicators of economic and financial development, i.e.,

the GDP per capita and the market capitalization per GDP, both drawn from CEIC data.

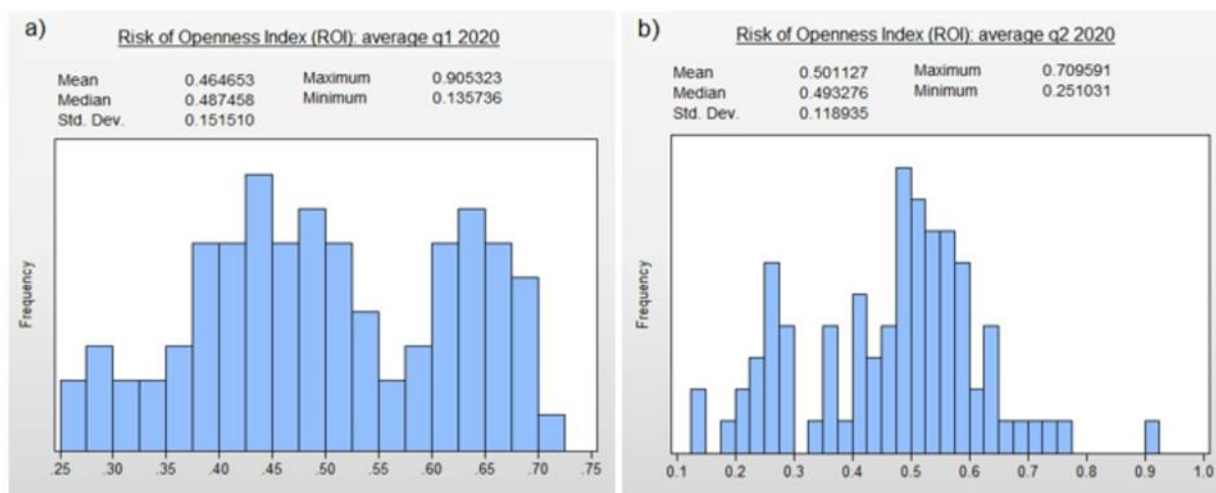


Figure 1. Risk of Openness: within-country average (by quarter)

Note. This figure reports the distribution and main descriptive statistics of the average within-country Risk of Openness, ROI. Panel a) refers to the first quarter of 2020, while panel b) refers to the second quarter of 2020.

Giofré (2021), adopting the same dataset, provides a graphical evidence of the main statistical characteristics of foreign portfolio liabilities and of the stringency index. In Figure 1, we report the distribution and the basic descriptive statistics of the newly introduced explanatory variable, that is, the average quarterly Risk of Openness (ROI), in the first and second quarter. We observe that, while the mean of ROI slightly increases in the second quarter of 2020, the median is almost unaffected, and the standard deviation decreases.

In Table 1, we report the correlation matrix of the COVID-related regressors included in the analysis. Statistically significant correlation coefficients are displayed in bold characters (with *p-values* in brackets). The correlation between new COVID-deaths and new COVID-cases per millions are significantly correlated in both quarters (0.578 and 0.296). SI is significantly correlated with new COVID-deaths, only in the first quarter (0.219), and is never significantly correlated with ROI. The latter is significantly correlated with new COVID-cases per million in both quarters (0.240 and 0.584), and with new COVID-deaths, only in the second quarter (0.361).<sup>2</sup>

Table 1. Correlation matrix of COVID regressors

Correlation matrix: q1 2020				
Pearson correlation coeff. [ <i>t-test p-value</i> ]	SI	ROI	ND	NC
Stringency Index (SI)	1			
Risk of Openness Index (ROI)	0.110 [0.320]	1		
New deaths per million (ND)	<b>0.219</b> [0.045]	0.156 [0.156]	1	
New cases per million (NC)	0.030 [0.784]	<b>0.240</b> [0.028]	<b>0.578</b> [0.000]	1
Correlation matrix: q2 2020				
Pearson correlation coeff. [ <i>t-test p-value</i> ]	SI	ROI	ND	NC
Stringency Index (SI)	1			
Risk of Openness Index (ROI)	0.171 [0.120]	1		
New deaths per million (ND)	0.042 [0.704]	<b>0.361</b> [0.001]	1	
New cases per million (NC)	0.113 [0.308]	<b>0.584</b> [0.000]	<b>0.296</b> [0.006]	1

Note. This table reports the correlation matrix of COVID-related regressors. The upper panel refers to the first quarter of 2020, while the second one refers to the second quarter. Statistically significant Pearson-correlation coefficients are reported in bold characters (*t-test p-values*, in square brackets).

## 4. Econometric Analysis

### 4.1 Main Results

Table 2 reports the main results of a multivariate regression analysis run under a Robust Least Squares estimation model. The dependent variable is the growth in Foreign Total Liabilities (FTL), as defined in equation (1), at the end of the first quarter ( $\Delta q1$ ). As anticipated in Section 2, the definition of the dependent variable in difference form ensures that all country-specific fixed effects are removed by construction.

The first main regressor included is the Stringency Index (SI), based on the Oxford's Coronavirus Government Response Tracker, which is the quarterly average of daily data. We include, as a first control, the appreciation of the economy's currency against a broad basket of currencies, as captured by the (one-month lagged) growth in the Nominal Effective Exchange Rate (NEER), because it may have affected foreign investments.<sup>3</sup> Second, we control for the quarterly average of new COVID-deaths per million of inhabitants.<sup>4</sup> Indeed, the recent literature on the effect of the COVID outbreak on financial markets highlighted a significant impact of COVID confirmed cases or deaths on volatility and liquidity (Ashraf, 2020; Albulescu, 2021; Baig et al., 2021; Salisu & Vo, 2020). As shown by the correlation matrix in Table 1, SI is correlated with these pandemic indicators, as it represents the measures adopted by governments as a reaction to new cases, intensive-care treatments, and deaths. Finally, since country-specific factors are swept away by construction of the dependent variable, rather than including the level of development of individual countries, we consider two binary indicators of development, GDP per capita and market capitalization to GDP. These are set equal to one, if the country belongs to the developed group, and 0 otherwise. If the flight to quality hypothesis is confirmed, as suggested by Giofré (2022), in the presence of a global shock, we expect foreign investors to deviate their investments to more stable and developed economies.<sup>5</sup>

We can notice that, in column (1) of Table 2, the coefficient of the stringency index is not significant, and the only significant coefficients are the ones related to economic and financial development. In column (2) of Table 2, we add the quarterly average Risk of Openness Index (ROI) as a covariate, in order to check whether the risk of relaxing containment measures and opening to social and economic activities has somehow affected the growth in foreign liabilities. We observe that both indexes are not significant determinants of the growth in total foreign liabilities.

We conjecture however that the non-significant effect of the stringency measures on foreign liabilities could hide a source of cross-country heterogeneity, which depends precisely on the risk of openness faced by the country. Investors aim at reducing the exposition to risk, so that their behavior can be particularly reactive to government actions aimed at challenging the severe sources of pandemic risk. The relevance of strong containment measures – as measured by SI - for investors could therefore crucially depend on the level of risk directly connected with the non-adoption or removal of these measures - as measured by ROI.

Table 2. Main findings:  $\Delta q1$

$\Delta q1$	Main findings				SI & ROI (0-1)			
	(1)	(2)	(3)	(4)	> mean	> median	> mean	> median
	(5a)	(5b)	(6a)	(6b)				
Stringency Index (SI)	0.0009 ( 0.0011 )	0.0008 ( 0.0011 )	-0.0094 ( 0.0061 )	0.0144 ( 0.0092 )	-0.0579 ** ( 0.0231 )	-0.0685 ** ( 0.0288 )	-0.0584 ** ( 0.0233 )	-0.0644 ** ( 0.0292 )
Risk of Openness Index (ROI)		-0.0531 ( 0.0813 )	-0.3834 * ( 0.2123 )	-0.3513 * ( 0.2034 )	-0.0429 ** ( 0.0211 )	-0.0672 *** ( 0.0253 )	-0.0360 * ( 0.0209 )	-0.0634 ** ( 0.0256 )
SI · ROI			0.0155 ( 0.0095 )	0.0144 ( 0.0092 )	0.1054 *** ( 0.0306 )	0.1054 *** ( 0.0346 )	0.0933 *** ( 0.0296 )	0.1016 *** ( 0.0350 )
new COVID deaths per mn	-0.0061 ( 0.0270 )	-0.0052 ( 0.0274 )	0.0094 ( 0.0260 )		-0.0250 ( 0.0228 )	0.0046 ( 0.0225 )		
new COVID cases per mn				-0.0006 ( 0.0011 )			-0.0012 ( 0.0010 )	-0.0002 ( 0.0010 )
high_GDPcap	0.0455 ** ( 0.0179 )	0.0461 ** ( 0.0186 )	0.0422 ** ( 0.0176 )	0.0482 *** ( 0.0184 )	0.0452 *** ( 0.0156 )	0.0517 *** ( 0.0176 )	0.0454 *** ( 0.0163 )	0.0525 *** ( 0.0184 )
high_MCAP/GDP	-0.0575 * ( 0.0318 )	-0.0545 * ( 0.0325 )	-0.0218 ( 0.0302 )	-0.0255 ( 0.0298 )	-0.0352 ( 0.0279 )	0.0297 * ( 0.0175 )	-0.0298 ( 0.0274 )	0.0261 ( 0.0178 )
$\Delta$ NEER (1-month lag)	0.7482 ( 0.6070 )	0.7504 ( 0.6155 )	0.7384 ( 0.5761 )	0.6159 ( 0.5722 )	0.6998 ( 0.5198 )	1.0991 ** ( 0.5363 )	0.4733 ( 0.5163 )	1.0052 * ( 0.5475 )
#obs	53	53	53	53	53	53	53	53
R <sup>2</sup>	0.14	0.12	0.11	0.11	0.19	0.21	0.19	0.19

*Note.* This table reports the results of a RLS regression (M-estimation), following equation (5). The dependent variable is the quarterly growth in Foreign Total Liabilities, defined as in equation (1). In columns (5a) and (5b), the Stringency Index (SI) and the Risk of Openness Index (ROI) are re-decoded as binary variables 0-1, if,

respectively, their average quarterly value is below or above the mean (column (5a)), or median (column (5b)). \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels, respectively.

To test this hypothesis, we add the interaction term between the stringency index SI and the risk of openness index ROI. If our conjecture is correct, we should observe a positive significant coefficient of the interaction term, thus suggesting that foreign investors consider the impact of the containment measures effective (or, at least, more effective) in economies experiencing a higher risk of openness.

While the results in column (3) do not fully support our initial conjecture, they suggest that it might be a promising direction. The coefficient of ROI is negative and significant (-0.383), while the coefficients of SI and of the interaction term SI-ROI are not statistically significant.<sup>6</sup> However, the non-significant coefficients are close to statistical significance, and their sign is consistent with our predictions: the coefficient of SI is negative, with a *p-value* equal to 0.121, while the coefficient of SI-ROI is positive and its *p-value* is 0.104.

Since Ashraf (2020) finds a difference between the stock market reaction to the growth in number of confirmed cases and its reaction to the growth in number of COVID deaths, in column (4), we replace the number of "new COVID-deaths per million of inhabitants" with the covariate "new COVID-cases per mn of inhabitants". We find that our coefficients are qualitatively unaffected by the inclusion of this alternative covariate, in terms of coefficients' significance and size.

It is important to notice that, the data source reports an explanatory note of the ROI index, which we directly quote here: it specifies that «the OxCGRT data cannot say precisely the risk faced by each country, it does provide for a rough comparison across nations. Even the "high level" view reveals that many countries are still facing considerable risks as they ease the stringency of policies» (Hale et al, 2020a). We check therefore if, by accounting for the unavoidable "measurement" error implicit in the construction of such an index, our hypothesis finds further support. We construct therefore a binary variable for each of the two indexes, ROI and SI, splitting the countries into those above and those below the mean.

Interestingly, we observe in column (5a) that, when both indexes are dichotomized, the results corroborate our hypothesis. To interpret the effects, it is worth considering that the default-excluded group in the regression is the subset of countries with both SI and ROI below the mean. We observe, first, that, in the first quarter of 2020, countries with a high SI and a low ROI feature a 5.79% lower growth in FTL, while countries with high ROI and low SI display a 4.3% lower growth in FTL. Those countries adopting high SI in the presence of high ROI, instead, display a significantly larger growth in inward foreign investment, as shown by the coefficient of the interacted term (10.54%). To seize the overall growth in FTL, for countries with high SI and high ROI relative to countries with high SI and low ROI, we need to add the coefficient of the interaction term to the "pure" effect of the SI index. When compared to countries with high SI and low ROI, which witness a decrease in FTL by 5.79%, those countries featuring high SI and high ROI display a 4.75% larger FTL (= -5.79%+10.54%). This finding supports our conjecture that foreign investors are affected by the implementation of stringency indexes, to the extent that these measures are meant to reduce a high risk of openness. Conversely, foreign investors in general appear to discard the assets issued by those countries whose containment policies are relatively mismatched with the risk of openness, that is, those adopting weak stringency measures despite a high risk of openness, or those implementing drastic stringency measures in the presence of a lower than average risk of openness.

In column (5b), we check whether our findings are sensitive to a different specification of the threshold to define the binary version of the two indexes. If we consider the median, as an alternative to the mean, we observe that the findings are substantially unchanged.

Finally, columns (6a) and (6b) replicate the regressions of columns (5a) and (5b), when the "number of new COVID-cases per million" replaces the "number of new COVID-deaths per million", and results are confirmed, with only modest changes in the size of the coefficients.

Table 3. Main findings: diffΔq1

diffΔq1	Main findings							
					SI & ROI (0-1)			
	(1)	(2)	(3)	(4)	> mean (5a)	> median (5b)	> mean (6a)	> median (6b)
Stringency Index (SI)	-0.0001 ( 0.0009 )	0.0000 ( 0.0009 )	-0.0099 * ( 0.0059 )	-0.0079 ( 0.0058 )	-0.0641 *** ( 0.0244 )	-0.0560 ** ( 0.0261 )	-0.0616 ** ( 0.0247 )	-0.0561 ** ( 0.0261 )
Risk of Openness Index (ROI)		-0.0631 ( 0.0716 )	-0.4025 ** ( 0.2043 )	-0.3573 * ( 0.2022 )	-0.0422 * ( 0.0221 )	-0.0590 *** ( 0.0225 )	-0.0413 * ( 0.0221 )	-0.0595 *** ( 0.0225 )
SI · ROI			0.0155 * ( 0.0092 )	0.0130 ( 0.0092 )	0.0850 *** ( 0.0320 )	0.0804 ** ( 0.0315 )	0.0826 *** ( 0.0312 )	0.0815 *** ( 0.0313 )
new COVID deaths per mn	0.0129 ( 0.0235 )	0.0131 ( 0.0240 )	0.0252 ( 0.0252 )		-0.0015 ( 0.0241 )	0.0034 ( 0.0205 )		
new COVID cases per mn				0.0009 ( 0.0011 )			0.0003 ( 0.0011 )	0.0002 ( 0.0009 )
high_GDPcap	0.0075 ( 0.0160 )	0.0115 ( 0.0169 )	0.0218 ( 0.0176 )	0.0209 ( 0.0193 )	0.0227 ( 0.0169 )	0.0472 *** ( 0.0165 )	0.0195 ( 0.0182 )	0.0465 *** ( 0.0173 )
high_MCAP/GDP	-0.0053 ( 0.0276 )	-0.0088 ( 0.0283 )	-0.0092 ( 0.0292 )	-0.0130 ( 0.0297 )	-0.0187 ( 0.0292 )	0.0017 ( 0.0157 )	-0.0175 ( 0.0291 )	0.0016 ( 0.0158 )
Δ NEER (1-month lag)	0.0890 ( 0.3682 )	0.1013 ( 0.3775 )	0.3697 ( 0.3917 )	0.4764 ( 0.4075 )	0.5280 ( 0.3882 )	0.5009 ( 0.3565 )	0.5401 ( 0.3943 )	0.5329 ( 0.3586 )
#obs	53	53	53	53	53	53	53	53
R <sup>2</sup>	0.01	0.02	0.07	0.07	0.11	0.16	0.11	0.16

Note. This table is the same as Table 2, but the dependent variable is defined as diffΔq1, as defined in equation (3).

Table 3 replicates Table 2, but the dependent variable is defined as diffΔq1 (equation (3)), rather than as Δq1 (equation (1)). This measure addresses the issue of the seasonality of foreign investments, as it is derived as the difference between the 2020 first quarter measure, and the corresponding first quarter measure in 2019. This table provides results very similar to the ones reported in Table 2. In the first two columns, we observe no significant coefficients, but in the third column, we find some hints in support of our hypothesis, as the coefficients of the SI and of the ROI index are negative, while the coefficient of the interaction term SI · ROI is positive. However, when replacing the "new COVID-deaths" control with the "new COVID-cases", all coefficients, with the exception of ROI's, fall below the standard bar of statistical significance. As in Table 2, when considering the indexes in a dichotomic version, the sign and significance of coefficients are restored and become fully consistent with our conjecture. In column (5a), we observe that, in the first quarter of 2020, countries with high SI and low ROI witness a decrease in FTL by 6.41% with respect to 2019, while those countries with high SI and high ROI indeed display an increase in FTL by 2.09% (= -6.41%+8.50%).

A comparison with Table 2 reveals that the effect is still present and statistically significant, thus supporting our hypothesis, although the effect on the growth of FTL in the first quarter of 2020, is halved in size. Results are confirmed when considering the median threshold, rather than mean (column (5b)), or when considering the alternative covariate "new COVID-cases", under both specification of the threshold (columns (6a) and (6b)).

Table 4 replicates the analysis of Table 2 and 3, when the dependent variable is the growth in liabilities at a one-semester time span. For the sake of brevity, we report only the relevant regressors. The upper part of the table (panel I) refers to the Δs1 measure (equation (2)), while the bottom part (panel II) refers to the diffΔs1 measure (equation (4)), defined as the difference between the growth of FTL in the first semester 2020 with respect to the first semester in 2019. We observe that, differently from the first quarter, the SI and ROI indexes have no significant role in driving foreign investors' decisions at the end of the first semester, under any specification of the indexes, or of the dependent variable.<sup>7</sup>

Table 4. Main findings:  $\Delta s1$  and  $\text{diff}\Delta s1$

I. $\Delta s1$	Main findings							
					SI & ROI (0-1)		SI & ROI (0-1)	
	(1)	(2)	(3)	(4)	> mean (5a)	> median (5b)	> mean (6a)	> median (6b)
Stringency Index (SI)	0.0001 ( 0.0004 )	0.0002 ( 0.0005 )	0.0003 ( 0.0017 )	0.0009 ( 0.0018 )	-0.0233 ( 0.0253 )	-0.0048 ( 0.0241 )	-0.0008 ( 0.0185 )	0.0021 ( 0.0172 )
Risk of Openness Index (ROI)		-0.0415 ( 0.0564 )	-0.0307 ( 0.2501 )	0.0289 ( 0.2575 )	-0.0312 * ( 0.0160 )	-0.0214 ( 0.0158 )	-0.0224 ( 0.0149 )	-0.0223 * ( 0.0134 )
SI · ROI			-0.0002 ( 0.0037 )	-0.0017 ( 0.0039 )	0.0415 ( 0.0294 )	0.0163 ( 0.0276 )	0.0154 ( 0.0238 )	0.0106 ( 0.0229 )
new COVID deaths per mn	-0.0040 ( 0.0034 )	-0.0027 ( 0.0039 )	-0.0027 ( 0.0040 )		-0.0030 ( 0.0035 )	-0.0014 ( 0.0032 )		
new COVID cases per mn				0.0002 ( 0.0003 )			-0.0007 ( 0.0031 )	0.0001 ( 0.0002 )
	#obs R <sup>2</sup>	51 0.36	51 0.38	51 0.38	51 0.36	51 0.40	51 0.37	51 0.36
II. $\text{diff}\Delta s1$								
	(1)	(2)	(3)	(4)	> mean (5a)	> median (5a)	> mean (6a)	> median (6b)
Stringency Index (SI)	-0.0004 ( 0.0006 )	-0.0002 ( 0.0006 )	0.0020 ( 0.0020 )	0.0023 ( 0.0021 )	-0.0352 ( 0.0325 )	0.0067 ( 0.0268 )	0.0276 ( 0.0385 )	0.0066 ( 0.0274 )
Risk of Openness Index (ROI)		-0.0454 ( 0.0731 )	0.2318 ( 0.2903 )	0.2587 ( 0.2985 )	-0.0263 ( 0.0206 )	-0.0105 ( 0.0217 )	-0.0259 ( 0.0208 )	-0.0126 ( 0.0215 )
SI · ROI			-0.0043 ( 0.0042 )	-0.0050 ( 0.0045 )	0.0336 ( 0.0377 )	-0.0179 ( 0.0342 )	-0.0001 ( 0.0003 )	-0.0189 ( 0.0362 )
new COVID deaths per mn	-0.0055 ( 0.0044 )	-0.0043 ( 0.0050 )	-0.0040 ( 0.0047 )		-0.0044 ( 0.0045 )	-0.0015 ( 0.0045 )		
new COVID cases per mn				0.0000 ( 0.0003 )			-0.0413 ( 0.0279 )	0.0000 ( 0.0003 )
	#obs R <sup>2</sup>	51 0.20	51 0.19	51 0.15	51 0.14	51 0.19	51 0.27	51 0.15
other controls: (lag) NEER, high_GDP per capita, high_MCAP_GDP								

Note. This table replicates Table 2 and 3, but relative to the first semester of 2020. In panel I, the dependent variable follows equation (2), while in panel II, it follows equation (4). Controls reported at the bottom of the table are included, but not reported.

#### 4.2 Robustness Checks and Additional Analysis

The empirical evidence above has shown that the measures of containment (SI) and the risk of openness (ROI) may help explain the foreign investors' choice, at the onset of the COVID outbreak, but not in the second quarter.<sup>8</sup> We now subject our findings to a bunch of robustness checks and additional studies, to understand the strengths and limits of the analysis.

In Table 5, we undergo the sensitivity of the (significant) findings for the first quarter to different estimation strategies and country-sample specification. As in Table 4, the upper part of the table (panel I) refers to the  $\Delta$  measure, while the bottom part (panel II) refers to the  $\text{diff}\Delta$  measure. The first three columns consider alternative estimation models, while columns (4) to (5c) consider different country-sample specifications. At the head of the rows, we specify that the indexes are defined in a dichotomic form (SI\_d and ROI\_d). In column (1) of panel I and II, we report, for comparability, the results of column (5a) of Table 2 and Table 3, following the Robust Least Squares (RLS) baseline approach. Column (2) reports the results of the regression under an OLS specification, which are qualitatively similar to the ones in column (1). Column (3) reports the results under a Quantile regression (computed at the median). We show that, in the first panel, the results relative to the median of the response variable are fully in line with our previous findings, both in terms of significance and size. Conversely, panel II, in which the dependent variable is defined as the difference between the growth of FTL in the first quarter of 2020 and the corresponding growth in 2019, displays less robust results, with a (marginally) significant coefficient of the interaction term SI·ROI, and a (marginally) non-significant coefficient of the SI term (*p-value* 0.11).

In columns (4) to (5c) of panel I and II, we test whether our findings are robust to the country sample specification. In column (4), we exclude China, which has been the first economy hit by the COVID outbreak, well before other countries. China's asynchronous timing of lockdown and loosening measures might have distorted or driven our results. We observe instead that the exclusion of China, in both panels, hardly affects the size and significance of the coefficients.



Table 5. Robustness checks: econometric model and sample specification

I. $\Delta q1$	Sensitivity analysis						
	Econometric model			Sample			
	RLS	OLS	Quantile model (q50)	No China	No offshore		
	(1)	(2)	(3)	(4)	(5a)	(5b)	(5c)
Stringency Index (SI_d)	-0.0579 ** ( 0.0231 )	-0.0526 ** ( 0.0251 )	-0.0779 ** ( 0.0327 )	-0.0617 ** ( 0.0258 )	-0.0732 *** ( 0.0245 )	-0.0689 *** ( 0.0225 )	-0.0698 *** ( 0.0172 )
Risk of Openness Index (ROI_d)	-0.0429 ** ( 0.0211 )	-0.0460 * ( 0.0229 )	-0.0548 ** ( 0.0255 )	-0.0431 * ( 0.0240 )	-0.0421 * ( 0.0224 )	-0.0507 ** ( 0.0207 )	-0.0601 *** ( 0.0160 )
SI_d · ROI_d	0.1054 *** ( 0.0306 )	0.1031 *** ( 0.0332 )	0.1308 *** ( 0.0445 )	0.0974 *** ( 0.0339 )	0.1172 *** ( 0.0320 )	0.1250 *** ( 0.0292 )	0.1342 *** ( 0.0218 )
new COVID deaths per mn	-0.0250 ( 0.0228 )	-0.0206 ( 0.0247 )	-0.0274 ( 0.0197 )	-0.0188 ( 0.0245 )	-0.0254 ( 0.0231 )	-0.0261 ( 0.0208 )	-0.0231 ( 0.0167 )
	#obs 53	53	53	52	49	47	45
	R <sup>2</sup> 0.19	0.39	0.23	0.16	0.22	0.26	0.27
II. diff $\Delta q1$	RLS	OLS	Quantile model (q50)	No China	No offshore		
	(1)	(2)	(3)	(4)	(5a)	(5b)	(5c)
Stringency Index (SI_d)	-0.0641 *** ( 0.0244 )	-0.0661 ** ( 0.0285 )	-0.0658 ( 0.0405 )	-0.0705 *** ( 0.0260 )	-0.0801 *** ( 0.0268 )	-0.0742 *** ( 0.0244 )	-0.0694 ** ( 0.0288 )
Risk of Openness Index (ROI_d)	-0.0422 * ( 0.0221 )	-0.0517 * ( 0.0258 )	-0.0381 ( 0.0322 )	-0.0491 ** ( 0.0240 )	-0.0375 ( 0.0245 )	-0.0474 ** ( 0.0224 )	-0.0525 ** ( 0.0261 )
(SI_d) · (ROI_d)	0.0850 *** ( 0.0320 )	0.1001 ** ( 0.0374 )	0.0921 * ( 0.0543 )	0.0949 *** ( 0.0339 )	0.0927 *** ( 0.0347 )	0.0978 *** ( 0.0315 )	0.0894 ** ( 0.0361 )
new COVID deaths per mn	-0.0015 ( 0.0241 )	-0.0027 ( 0.0281 )	-0.0040 ( 0.0247 )	0.0006 ( 0.0247 )	0.0029 ( 0.0254 )	-0.0037 ( 0.0226 )	0.0090 ( 0.0273 )
	#obs 53	53	53	52	49	47	45
	R <sup>2</sup> 0.11	0.29	0.13	0.12	0.14	0.16	0.14

other controls: (lag) NEER, high\_GDP per capita, high\_MCAP/GDP

Note. This table reports the results of the sensitivity analysis to different econometric and sample specifications. For the sake of brevity, only results with a binary definition of SI\_d and ROI\_d (1 if above the mean, 0 otherwise) are reported.

In columns (5a) to (5c) of Table 5, we exclude from the sample potential offshore financial centers, according to three different classifications. Column (5a) reports the results under the offshore classification proposed by Damgaard et al. (2018), column (5b) follows Zoromé(2007), while column (5c) follows Lane & Milesi-Ferretti (2017).<sup>9</sup> By comparison with column (1), we observe that the results are confirmed, and interestingly, the exclusion of offshore centers has even reinforced them: both the negative coefficient of the SI index and the positive coefficient of the interaction term SI·ROI are economically larger and statistically more significant.

Giofré (2021) finds that, at the end of the first quarter of 2020, the standard deviation of the stringency index ( $\sigma SI$ ) is positively and significantly correlated with a subset of foreign inward investment, that is, portfolio investments. She suggests that foreign portfolio investors, typically more reactive than foreign direct investors, could have been more responsive to governments' prompt reactions (featuring a larger SI standard deviation) than to gradual ones (featuring a smaller SI standard deviation), because the former policies may have been perceived as a more serious commitment to limit the uncertainty due to the spread of the virus.

In Table 6, we check if our results are affected by the inclusion of the standard deviation of the stringency index ( $\sigma SI$ ). If countries with a higher SI standard deviation are also those with a higher risk of openness, the omission one of the two factors can make the coefficient of the included covariate biased.<sup>10</sup> We consider therefore a regression specification including both regressors, to test if the two pieces of empirical evidence – the one reported in Giofré (2021) and the one described in this paper – can coexist or are mutually exclusive. Since Giofré (2021) underlines a different role for portfolio and direct inward investments, we partition Table 6 horizontally in three panels, and report the results for foreign total liabilities (FTL, panel I), foreign direct liabilities (FDL, panel II), and foreign portfolio liabilities (FPL, panel III).

The evidence on the coefficient of the  $\sigma SI$  regressor is fully in line with the results of Giofré (2021) for FTL, in terms of sign (positive), significance (marginal), and size (about 0.3%) of the associated coefficient. In panel II and III, we compare Foreign Direct Liabilities and Foreign Portfolio Liabilities. Giofré (2021) finds that foreign direct inward investment have shown a lower responsiveness to  $\sigma SI$  than foreign portfolio inward investments. In our analysis, we confirm that the coefficient of the  $\sigma SI$  is almost twice as large for FPL than for FDL, and its statistical significance is much stronger and systematic.

We observe in Table 6, after the inclusion of the additional covariate  $\sigma SI$ , the joint role of SI and ROI, which is the focus of the paper. In panel I, the regression setting is in fact the same as in Table 2, with the addition of the

standard deviation of the stringency index ( $\sigma$ SI) as a regressor. We observe that the coefficient of the SI regressor in the first two columns is not significant, as in our previous findings. Also after including the interaction term between SI and ROI, we do not observe any significant coefficient of SI, either when controlling for the new COVID-deaths (column (3)), or when controlling for the new COVID-cases (column (4)). Again, when we re-code the SI and ROI indexes in a dichotomic form (columns (5a) to (6b)), we find a statistically significant coefficient of the interaction term SI-ROI, consistently with our hypothesis, while the negative coefficient of the SI is statistically different from zero only if the mean is used as a threshold of the binary variables (columns (#a)).

Table 6. Direct and Portfolio Foreign Liabilities (additional control:  $\sigma$ SI)

$\Delta q_l$	Different liabilities				SI & ROI (0-1)			
			new deaths	new cases	new deaths per mn		new cases per mn	
	(1)	(2)	per mn	per mn	> mean	> median	> mean	> median
<b>I. FTL (Foreign Total Liabilities)</b>					(5a)	(5b)	(6a)	(6b)
Stringency Index (SI)	0.0005 ( 0.0011 )	0.0005 ( 0.0011 )	-0.0048 ( 0.0064 )	-0.0087 ( 0.0058 )	-0.0627 *** ( 0.0204 )	-0.0130 ( 0.0265 )	-0.0593 ** ( 0.0238 )	-0.0147 ( 0.0266 )
Risk of Openness Index (ROI)		-0.0418 ( 0.0794 )	-0.2188 ( 0.2261 )	-0.3513 * ( 0.2034 )	-0.0351 * ( 0.0188 )	-0.0379 ( 0.0247 )	-0.0318 ( 0.0215 )	-0.0378 ( 0.0246 )
SI · ROI			0.0083 ( 0.0101 )	0.0144 ( 0.0092 )	0.1065 *** ( 0.0271 )	0.0573 * ( 0.0332 )	0.0876 *** ( 0.0305 )	0.0568 * ( 0.0330 )
st.dev. stringency index ( $\sigma$ SI)	0.0027 * ( 0.0015 )	0.0026 * ( 0.0015 )	0.0023 ( 0.0015 )	-0.0255 ( 0.0298 )	0.0031 *** ( 0.0011 )	0.0019 ( 0.0014 )	0.0016 ( 0.0012 )	0.0017 ( 0.0013 )
#obs	53	53	53	53	53	53	53	53
R <sup>2</sup>	0.18	0.17	0.18	0.23	0.22	0.23	0.20	0.25
<b>II. FDL (Foreign Direct liabilities)</b>					(5a)	(5b)	(6a)	(6b)
Stringency Index (SI)	-0.0001 ( 0.0013 )	0.0000 ( 0.0013 )	-0.0074 ( 0.0062 )	-0.0078 ( 0.0056 )	-0.0819 *** ( 0.0235 )	-0.0118 ( 0.0329 )	-0.0899 *** ( 0.0229 )	-0.0170 ( 0.0332 )
Risk of Openness Index (ROI)		-0.0410 ( 0.0943 )	-0.2813 ( 0.2192 )	-0.2802 ( 0.1959 )	-0.0269 ( 0.0216 )	-0.0166 ( 0.0307 )	-0.0260 ( 0.0207 )	-0.0184 ( 0.0307 )
SI · ROI			0.0113 ( 0.0098 )	0.0118 ( 0.0088 )	0.1028 *** ( 0.0313 )	0.0338 ( 0.0413 )	0.1003 *** ( 0.0294 )	0.0353 ( 0.0413 )
st.dev. stringency index ( $\sigma$ SI)	0.0034 * ( 0.0018 )	0.0033 * ( 0.0018 )	0.0021 ( 0.0015 )	0.0025 * ( 0.0013 )	0.0021 ( 0.0013 )	0.0033 * ( 0.0017 )	0.0014 ( 0.0012 )	0.0028 * ( 0.0016 )
#obs	53	53	53	53	53	53	53	53
R <sup>2</sup>	0.09	0.09	0.09	0.10	0.17	0.15	0.17	0.14
<b>III. FPL (Foreign Portfolio liabilities)</b>					(5a)	(5b)	(6a)	(6b)
Stringency Index (SI)	-0.0007 ( 0.0012 )	-0.0006 ( 0.0012 )	-0.0146 ** ( 0.0058 )	-0.0157 *** ( 0.0055 )	-0.0639 ** ( 0.0273 )	-0.0266 ( 0.0264 )	-0.0554 * ( 0.0291 )	-0.0109 * ( 0.0060 )
Risk of Openness Index (ROI)		-0.0474 ( 0.0902 )	-0.5344 *** ( 0.2053 )	-0.5848 *** ( 0.1936 )	-0.0453 * ( 0.0251 )	-0.0343 ( 0.0233 )	-0.0410 ( 0.0262 )	-0.4153 * ( 0.2134 )
SI · ROI			0.0217 ** ( 0.0092 )	0.0234 *** ( 0.0087 )	0.0906 ** ( 0.0363 )	0.0585 * ( 0.0318 )	0.0780 ** ( 0.0373 )	0.0177 * ( 0.0095 )
st.dev. stringency index ( $\sigma$ SI)	0.0064 *** ( 0.0017 )	0.0065 *** ( 0.0017 )	0.0048 *** ( 0.0014 )	0.0042 *** ( 0.0013 )	0.0046 *** ( 0.0015 )	0.0048 *** ( 0.0012 )	0.0033 ** ( 0.0015 )	0.0036 ** ( 0.0014 )
#obs	53	53	53	53	53	53	53	53
R <sup>2</sup>	0.13	0.14	0.16	0.17	0.17	0.26	0.13	0.22

other controls: (lag) NEER, high\_GDP per capita, high\_MCAP/GDP, new COVID-deaths (or COVID-cases) per million of inhabitants

Note. Panel I: Foreign Total Liabilities; panel II: Foreign Direct Liabilities; panel III: Foreign Portfolio Liabilities. Additional control: within-country standard deviation of the stringency index ( $\sigma$ SI).

When considering the dichotomic version of the SI and ROI indexes in columns (5a) to (6b), we observe the following differences between FDL and FPL. In terms of significance, the coefficient of the interaction term SI·ROI for FDL is significant only in columns (#a), while it is always statistically different from zero for FPL (though marginally, when the threshold is the median). In terms of size, the overall effect of countries with high SI and high ROI is larger for FPL than for FDL. Indeed, although the negative coefficients of the SI regressor and the positive coefficients of the interaction term SI·ROI are larger (in absolute value) for FDL than for FPL, the overall net effect of high SI and high ROI on foreign liabilities' growth is smaller for FDL than for FPL. The difference is only marginal in column (5a), with a 0.0210 (= -0.0819+0.1028) for FDL versus a 0.0267 (=

-0.0639+0.0906) for FPL, while it is more evident in column (6a), with a 0.0103 (= -0.0899+0.1003) for FDL versus a 0.0225 (= -0.0554+0.0780) for FPL.

Moreover, the growth in foreign portfolio liabilities in the first quarter of 2020 is significantly associated with the stringency index SI, the risk of openness ROI, and their interaction, even in their continuous version. In columns (3) and (4) of panel III (FPL), the coefficients of SI, ROI, and SI·ROI, defined in their original continuous form, are all statistically significant, differently from FDL (panel II) and FTL (panel I), and, more generally, to the results in the whole analysis conducted so far. It means that, while the growth in foreign direct liabilities only responds to high versus low indexes, foreign portfolio liabilities are tilted also by a marginal difference of the stringency index, across economies differing by a marginal degree of openness risk exposure.

For instance, the results in column (4) of panel III, can be read as follows: an increase in the SI index, originally ranging from 0 to 100, by 1 unit leads to a -1.46% lower growth in FPL, if the risk of openness ROI is set at its minimum (that is equal to 0); the same unit increase in the SI index leads to an increase in the growth of FPL by 0.7% ( $0.0070 = -0.0146 + 0.0217$ ), when the level of risk of openness is set at its maximum (that is equal to 1).

This evidence points to a tighter and closer responsiveness of foreign portfolio liabilities rather than direct portfolio liabilities to the stringency measures adopted and to the COVID risk exposure of the country, consistently with the results in Giofré (2021), thus confirming a general higher reactivity by foreign portfolio investors to the COVID outbreak.

Overall, Table 6 shows that our findings and the evidence in Giofré (2021) are mutually consistent. On the one hand, the role of the standard deviation of the stringency index  $\sigma SI$  is confirmed as a significant driver of foreign portfolio investment, even after considering the risk of openness. On the other hand, the inclusion of  $\sigma SI$  does not invalidate our findings, but, on the contrary, enriches the analysis, by unfolding the multifaceted sensitivity of foreign portfolio investors to the adoption of COVID containment measures, at the onset of the virus spread.

## 5. Conclusions

We find that the response of investors' behavior to the adoption of COVID restrictive policies crucially depends on the level of the pandemic risk of the economy. Specifically, the extent to which severe containment measures (as measured by the government stringency index, SI) significantly affect inward foreign investments in a country depends on its level of pandemic risk, which is connected with the non-adoption or removal of these stringency measures (as proxied by the risk of openness index, ROI).

Foreign investors prefer countries that calibrate the stringency measures according to the risk of openness. On the one hand, they highly rate the implementation of strong containment measures in countries with high risk of openness. On the other hand, they appear to avoid investing in those countries either adopting weak stringency measures despite a high risk of openness, or implementing drastic stringency measures in the presence of a low risk of openness.

The limited time span, the cross-sectional nature of the analysis the low frequency of international asset holdings' data, on the one hand, prevents us from adopting more sophisticated statistical and econometric tools, and on the other hand, it may affect the general validity and policy implications of our findings. The availability of a longer time span may stimulate further research, and provide a wider perspective on the main drivers of the evolution of international investment during and after the COVID pandemic.

Notwithstanding the above-cited limitations, this study may provide some insights on the immediate reaction of foreign investors to the pandemic outbreak. The severity and speed of adoption of policies is strictly connected with the severity of the effects of the COVID spread, whose remarkable heterogeneity across countries has not been fully understood, yet. This paper emphasizes the importance of taking into account this multifaceted heterogeneity, by considering how the diversity in the risk of openness across countries may have affected the linkages between government containment policies and foreign investment decisions.

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## A Data appendix

### A.1 Dependent variables

#### Foreign inward investments

The growth in liabilities (L) at quarterly or semi-annual level (end of period), follows equation (1) and (2):

$$\Delta q1 \equiv (L_{03\_20} - L_{12\_19}) / L_{12\_19}; \quad \Delta s1 \equiv (L_{06\_20} - L_{12\_19}) / L_{12\_19}$$

or equation (3) and (4):

$$diff \Delta q1 \equiv (L_{03\_20} - L_{12\_19}) / L_{12\_19} - (L_{03\_19} - L_{12\_18}) / L_{12\_18}$$

$$diff \Delta s1 \equiv (L_{06\_20} - L_{12\_19}) / L_{12\_19} - (L_{06\_19} - L_{12\_18}) / L_{12\_18}$$

The liabilities L considered are Total Foreign Liabilities, with the exception of Table 6, which also considers Foreign Direct Liabilities and Foreign Portfolio Liabilities. Source: International Investment Position Statistics (IMF)

#### Baseline sample

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malaysia, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States.

#### Offshore countries

In Tables 5, potential offshore countries are excluded. Column (4a) follows the offshore classification in Damgaard et al. (2018): Hong Kong, Ireland, Luxembourg, the Netherlands and Singapore are excluded. Column (4b) follow Zoromé (2007): Cyprus, Hong Kong, Ireland, Latvia, Luxembourg, Malta, Singapore, Switzerland and United Kingdom are excluded. Column (4c) follows Lane and Milesi-Ferretti (2017): Belgium, Cyprus, Hong Kong, Ireland, Luxembourg, Malta, the Netherlands, Singapore, Switzerland and the United Kingdom are excluded.

## A.2 Regressors

### *Main regressors*

Stringency index (SI) The Stringency Index is a daily aggregate measure of the overall stringency of containment and closure policies. It is calculated by taking the ordinal value and adding a weighted constant if the policy is general rather than targeted, if applicable, which are then re-scaled by their maximum value to create a score between 0 and 100. More information can be found at Oxford's Government Response Tracker, <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker>

In our analysis, we consider and report as regressors both the quarterly overall mean of the daily stringency index (SI). In Table 6, to compare results with the literature, we also include its quarterly standard deviation ( $\sigma SI$ ), computed within each country over the corresponding quarter. Source: Hale et al. (2020b), <https://github.com/OxCGRT/covid-policy-tracker>

Risk of Openness Index (ROI) <<The Oxford COVID-19 Government Response Tracker (OxCGRT) provides a cross-national overview of the risk and response of different countries as they tighten and relax physical distancing measures. The Risk of Openness Index is based on the recommendations set out by the World Health Organization (WHO) of the measures that should be put in place before Covid-19 response policies can be safely relaxed. Considering that many countries have already started to lift measures, the Risk of Openness Index is a reviewed version of our previous 'Lockdown rollback checklist'. While the OxCGRT data cannot say precisely

the risk faced by each country, it does provide for a rough comparison across nations. Even this “high level” view reveals that many countries are still facing considerable risks as they ease the stringency of policies». Source: Hale et al. (2020a), <https://github.com/OxCGRT/covid-policy-tracker>

#### *Other controls*

**New COVID death per mn.** This variable is collected daily and is reported by the countries’ authorities. In our analysis, we consider its quarterly average. Source: <https://github.com>

**New COVID cases per mn.** This variable is collected daily and is reported by the countries’ authorities. In our analysis, we consider its quarterly average. Source: <https://github.com>

**Nominal Effective Exchange Rate (NEER)** Broad Indices, Monthly averages; 2010=100. The structure of the NEER regressor follows the structure of the dependent variable. For instance, if the dependent variable is  $\Delta q_1$  as defined in equation (1), then the regressor is included as  $(NEER_{03_20} - NEER_{12_19})/NEER_{12_19}$ . Source: Bank for International Settlements

**High MCAP/GDP** Market capitalization to GDP (year: 2019, or latest available data). It is included in the analysis as a binary variable equal to 1 if the market capitalization per GDP is larger than the sample mean, and 0 otherwise. Source: CEIC data

**High GDP per capita** GDP per capita (year: 2019, or latest available data). It is included in the analysis as a binary variable equal to 1 if the GDP per capita is larger than the sample median, and 0 otherwise. Source: CEIC data

#### **Notes**

<sup>1</sup> Our results are robust to alternative RLS methods (results not reported, but available upon request).

<sup>2</sup> New COVID-cases and new COVID-deaths are included as alternative controls in the analysis. To account for the significant correlation between the SI and ROI indexes, on the one hand, and the new COVID-death per million or new COVID-cases per million, on the other hand, we have also excluded these latter epidemic covariates from the specification, with no significant effect on the results.

<sup>3</sup> We include as a regressor the one-month lagged value to avoid endogeneity issues.

<sup>4</sup> Our findings are confirmed, if we consider a regression specification with the new COVID-deaths per million of inhabitants in logs, rather than in levels.

<sup>5</sup> These controls are not available at a quarterly frequency for most countries; we therefore consider their latest annual available datum.

<sup>6</sup> The large size of the ROI coefficient is due to the very definition of the risk index, ranging from 0 to 1. Indeed, if ROI goes from a risk of openness equal to 0 to a risk equal to 1, then the growth in foreign liabilities drops by about 38% (or, equivalently, an increase from 0 to 0.1 implies a drop of the dependent variable by 3.8%).

<sup>7</sup> In panel I, we only observe some sparse and non-systematic negative significant coefficients of the index ROI.

<sup>8</sup> Notice that the difference in the number of observations from the first quarter to the first semester is due to two missing observations for June 2020 (Croatia and Malaysia). Results are unchanged, after balancing the sample and excluding Croatia and Malaysia in the first quarter.

<sup>9</sup> See Appendix A.1, for details on the offshore countries considered in the three classifications.

<sup>10</sup> Notice, that in the first quarter, the correlation of  $\sigma SI$  with the SI index is equal to 0.18 (and only marginally significant:  $p\text{-value}=0.098$ ), while its correlation with the ROI index is equal -0.03 (but not statistically significant, at any conventional level).

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