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(Article begins on next page)
COVID-19 stringency measures, risk of openness and foreign investment: some preliminary evidence

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Abstract

This paper investigates the relationship between foreign investment and the containment measures, in the aftermath of the COVID-19 spread. We find that the non significant correlation between the average quarterly stringency index and inward foreign investment at the end of the first quarter of 2020 hides a source of heterogeneity across countries. Foreign investors highly rate the implementation of strong containment measures - as measured by government stringency index - in countries with high risk - as measured by the risk of openness index. Conversely, foreign investors are less attracted by assets issued by countries adopting weak stringency measures despite a high risk of openness, or those implementing drastic stringency measures in the presence of a relatively lower risk of openness.

Keywords: International Investments, COVID-19, stringency index, risk of openness index.
JEL Classifications: G11, G15, G30
1 Motivation and relevance

As the COVID disease has spread around the world, many government have been forced to impose restriction policies with different intensity and timing (Hale et al. (2020)): some countries have rapidly introduced very strict measures in the immediate aftermath of the crisis, such as total lockdown, and then have removed them, as a consequence of an improvement in the transmission; other countries instead reacted with more gradual and punctual interventions, as soon as small outbreaks occurred.

The economic and financial consequences of these restrictions cannot be properly evaluated yet, and any attempt of making predictions can be incautious: the literature on the impact of epidemics on financial markets is indeed scarce, and all parallels with other natural disasters or terroristic attacks are bound to be unreliable (Godell (2020)). However, it is evident that the COVID outbreak has already lead recession, erosion of confidence and higher uncertainty (OECD (2020b)).

The growing recent literature about the impact of the COVID outbreak on financial markets generally converges on the evidence of a significant impact of COVID confirmed cases or deaths on financial markets’ volatility and liquidity (Albulescu (2020); Baig et al. (2020); Salisu and Vo (2020); Ashraf (2020)).

As far as international investments are concerned, Saurav et al. (2020) highlight that the COVID-19 crisis represents for international enterprises a new and unprecedented source of investor risk that is depressing investor confidence. OECD (2020a) and OECD (2020c) assess that foreign direct investments of firms are expected to decline sharply as a consequence of the pandemic and of the stringent public health measures to limit the spread of the COVID-19, with a notable heterogeneity across countries. Emerging economies have already experienced a massive drop of portfolio investment inflows, because international investors transfer capital back home, or invest in safer assets during periods of uncertainty. Giofre’ (2020a) 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 are significantly less severely hit by the pandemic than emerging and developing countries. Kizys et al. (2021) study the effects of the Oxford COVID-19 Government Response Tracker, whose higher scores are associated with greater stringency, on herding behavior in international stock mar-
kets during the coronavirus COVID-19 outbreak. They disclose the presence of herding behavior in the first three months of 2020 in 72 countries stock markets’ countries, but also highlight that this herding behavior is mitigated by more stringent government response to the coronavirus crisis, by way of reducing multidimensional uncertainty. Giofre’ (2020b) finds that the average stringency index is not correlated with inward investment positions, but the within-country standard deviation of the stringency index is positively and significantly correlated with inward portfolio investments at the end of the first quarter of 2020: foreign portfolio investments, typically more volatile and reactive than foreign direct ones, are more responsive to governments’ prompt reactions than to gradual ones at the end of the first quarter, thus suggesting that the former policies might be perceived as a more serious commitment to stem the spread of COVID-19.

This paper contributes to the literature by further investigating the presence of a significant cross-country heterogeneity in the relationship between foreign investment and the government containment measures, at the end of the first quarter of 2020. Investors scrutinize sources of risk and the means through which this risk can be reduced. Foreign investors could be therefore deterred from or attracted by investing in a country adopting more radical stringency measures, depending on how these policies are perceived in terms of commitment to stability, lower uncertainty, and then higher adjusted risk-returns in the near future. We find indeed that the non significant correlation between inward foreign investment at the end of the first quarter of 2020 and the average quarterly stringency index hides an important heterogeneity across countries: the response of investors’ behavior to the adoption of severe measures depends indeed on the level of pandemic risk in the economy. Specifically, the extent to which severe containment measures - as measured by government stringency measures (SI) - significantly affect the inward foreign investment in a country would crucially depends 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).

The empirical evidence actually shows that foreign investors, at the end of the first quarter of 2020, value the assets issued by countries, which calibrate the stringency measures 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 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 remainder of the paper is structured as follows. In Section 2, we sketch the estimable
equation. In Section 3, we describe the data, and provide some descriptive statistics. In Section 4,
we report the results of the empirical analysis. Section 5 concludes.

2 Estimable equation

Our objective is to establish the evolution of international investments in the immediate aftermath
of the adoption of COVID-19 containment measures.

We empirically test the existence of a relationship between the average stringency index in a
country and its end-of-period (quarter/semester) foreign liabilities.

Let’s define, first, the growth of liabilities ($\Delta L$) in the first quarter ($q1$) of 2020 as $\Delta q1$: it is
the difference between the liabilities at the end of the first quarter (March 2020, $L_{03\_20}$) and the
liabilities at the end of 2019 (December 2019, $L_{12\_19}$), scaled by the liabilities at the end of 2019
(December 2019, $L_{12\_19}$):

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

We compute this growth in liabilities also for the first semester ($\Delta s1$) of 2020.

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

where $L_{06\_20}$ is the value of foreign liabilities at the end of the second quarter of 2020.

In our main specification, we regress the growth in foreign liabilities on the average within-country
stringency index ($SI$), risk of openness index ($ROI$), and their interaction ($SI \cdot ROI$), as follows:

$$\Delta L = \alpha + \beta(SI) + \gamma(ROI) + \delta(SI \cdot ROI) + controls + \varepsilon$$  (3)
We are mainly interested in the sign and size of the $\beta$, $\gamma$ and $\delta$ coefficients. If the adoption of severe stringency of containment measures ($SI$), or a high risk of openness ($ROI$), deter foreign inward investment, then we should observe a significant negative $\beta$, or $\gamma$, coefficient, and vice versa. If the risk of openness ($ROI$) in one country affects the way severe stringency measures ($SI$) are perceived and valued by foreign investors, then we should observe a significant $\delta$ coefficient.

We trade-off a parsimonious specification, due to the low number of observations, with the need to include time-varying regressors, which might contribute to explain the growth in foreign investments, and covariates potentially correlated with our main regressors, whose exclusion could bias the estimated coefficients. It is worth stressing that, we can ignore any country-specific fixed effects, as these are removed by the construction of the dependent variable in difference form.

We include, first, the (lagged) appreciation in the Nominal Effective Exchange Rate (NEER), because its change might have affected foreign investment. Second, we control for the number of new COVID-deaths and its within-country standard deviation, as the stringency index is potentially strongly correlated with the health indicators of the epidemic. Finally, we include two binary indicators of economic and financial development, to control, for instance, for the presence of any eventual flight to quality propensity by foreign investors.

We consider two alternative definitions of the dependent variable in the analysis. Beyond the measure of liabilities’ growth derived in equation (1), we add the measure $\text{diff} \Delta L$, in the attempt to address the issue of seasonality of foreign investment allocations: it is derived as the difference between the 2020 $\Delta L$ measure, as defined in equation (1), and the corresponding measure in 2019.

For instance, $\text{diff} \Delta q1$ is the first quarter measure, and is defined as follows:

$$
\text{diff} \Delta q1 \equiv \Delta q1_{2020} - \Delta q1_{2019}
$$

and, analogously, $\text{diff} \Delta s1$ is defined for the semi-annual period as:

$$
\text{diff} \Delta s1 \equiv \Delta s1_{2020} - \Delta s1_{2019}
$$
To estimate the parameters in equation (3), we adopt, in the baseline specification, a Robust Least Squares estimation. Ordinary least squares estimators are sensitive to the presence of observations that lie outside the norm for the regression model of interest. The sensitivity of conventional regression methods to these outlier observations can result in coefficient estimates that do not accurately reflect the underlying statistical relationship. Robust least squares refers to a variety of regression methods specifically designed to be robust, or less sensitive, to outliers. Among Robust least squares, we adopt the M-estimation developed by Huber (1973).\textsuperscript{1} Alternative estimation methods, such as standard OLS and Quantile regressions, are run for comparison with our baseline results.

3 Data and descriptive statistics

We consider foreign inward investment (or foreign liabilities) in 53 countries, upon data availability. Data are drawn from the International Investment Position Statistics, released by the IMF, which provides information on foreign assets and liabilities, classified in several categories and instruments, at a quarterly frequency. For most of the analysis, we consider Foreign Total Liabilities (FTL), but in the last table we also consider its sub-components, Foreign Direct and Foreign Portfolio Liabilities.

The source of COVID-related data is a Github ongoing repository of data on coronavirus, the Coronavirus Open Citations Dataset.

We draw from this dataset our main regressors relying on the Oxford’s Coronavirus Government Response Tracker (OxCGRT) (Hale et al. (2020)): the stringency index ($SI$), which represents a proxy for the severity of the containment policy measures adopted and the Risk of Openness Index ($ROI$), based on the recommendations set out by the World Health Organisation (WHO) of the measures that should be put in place before Covid-19 response policies can be safely relaxed. We also include data about new COVID-deaths and cases per million of inhabitants. All these data are originally reported at a daily frequency, but we construct the corresponding quarterly averages, in order to match the quarterly frequency of the dependent variable.

\textsuperscript{1}Our results are robust to alternative Robust Least Squares methods, such as the S-estimation and the MM-estimation (results not reported, but available upon request).
We include in our specification other three controls. First, the NEER (Nominal effective exchange rate, broad index), released by the Bank for International Settlements. Then, we include two binary indicators of economic and financial development, i.e., the GDP per capita and the market capitalization per GDP, drawn from CEIC data.

In Figure 1 and 2, we report the distribution and main descriptive statistics of the dependent variable. Figure 1 considers the growth of FTL in the first quarter of 2020, while Figure 2 considers the growth of FTL in the first semester of 2020. Panel a) in both figures relies on the $\Delta$ measure defined in equation (1) and (2), while panel b) relies on the $\text{diff} \Delta$ measure defined in equation (4) and (5). We can observe, first, that the $\Delta$ measure is more negatively skewed in the first quarter, than in the first semester. Second, the distribution of the measure $\text{diff} \Delta$, defined in equation (4) and (5), is more negatively skewed than the $\Delta$ measure, in both the first quarter and the first semester.

In Figure 3, we report the distribution and main descriptive statistics of the average quarterly Stringency Index ($SI$) in the first and second quarter.

The average stringency index, whose original values range 0-100, is about 19 in the first quarter, while in the second quarter grows to 71, thus pointing to a sharp tightening of the anti-COVID 19 containment measures in the second quarter of 2020.

Figure 4 reports the distribution and main descriptive statistics of the average quarterly Risk of Openness ($ROI$) in the first and second quarter. While the mean slightly increases in the second quarter of 2020, the median in 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 reported 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). The Stringency Index is significantly correlated with new COVID-deaths, only in the first quarter (0.219), and is never significantly correlated with the Risk of Openness Index. 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).²

4 Regression analysis

4.1 Main findings

In Table 2, we report the main findings of our multivariate regression analysis for the first quarter, under a Robust Least Squares estimation. The dependent variable is the growth in Foreign Total Liabilities (FTL), as defined in equation (1), at the end of quarter (or semester). As anticipated in Section 2, the fact that the dependent variable is defined in difference form, allows us to ignore any problem related to country-specific fixed effects, removed by construction. We are forced to keep a parsimonious specification, because we can rely on a quite limited country sample. We include, on the one hand, time-varying regressors which might concur to explain the growth in foreign liabilities, and, on the other hand, covariates potentially correlated with our main regressors, whose exclusion could bias the estimated coefficients.

Our main regressor is the Stringency Index (SI), based on the Oxford’s Coronavirus Government Response Tracker, and is computed as the quarterly average of daily data. We include, as a first control, the (one-month lagged) growth in the Nominal Effective Exchange Rate (NEER), a measure of the appreciation of the economy’s currency against a broad basket of currencies, because its change might have affected foreign investment in the country.³ Second, we control for the quarterly average of new COVID-deaths per million of inhabitants: as shown in Table 1, the stringency index is correlated with this specific indicator of the epidemic, as it represents the government reaction to contain new cases, deaths, and intensive-care treatments.⁴

Finally, we include two binary indicators of economic and financial development, GDP per capita ²New COVID-cases and new COVID-deaths are always included as alternative controls. To account for the significant correlation of the SI and ROI indexes with the new COVID-death per million (or new COVID-cases per million), we have also performed our regression analysis excluding these covariates, with no significant effect on our results.
³We include its one-month lagged value, to avoid endogeneity issues.
⁴Our findings are left qualitatively unchanged, when considering a regression specification with the new COVID-deaths per million of inhabitants in logs, rather than in levels.
and market capitalization to GDP. Since country specific factors are swept away by construction of the dependent variable in difference form, we do not include the level of development of individual countries. We consider, instead, two indicators of development, equal to 1 if the country belongs to the developed group, and 0 otherwise, in order to control for the presence of a flow of foreign investments towards high versus low developed countries: according to the flight to quality rationale, for instance, in the presence of a global shock, foreign investors would deviate their investments to more stable and developed economies.\footnote{Since these controls are not available at a quarterly frequency for most of countries, we include their latest yearly available datum.}

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 particular, the coefficient of the economic development indicator is positive and statistically significant, while the coefficient of the financial development dummy variable is negative and (marginally) significant. These latter findings are in line with the results in Giofre’ (2020a), which reveal that investment in less developed countries have been more dramatically reduced by the COVID outbreak. It is worth noticing that while the positive effect of the economic development dummy (high_GDP_cap) is more reliable, since stable and significant across different regression specifications, the negative coefficient of the MCAP/GDP binary variable, as already pointed out in Giofre’ (2020a), is instead not reliable, since unstable in terms of significance and sign across regression specifications.

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 affected the growth in foreign liabilities. We observe that both indexes are not significant determinants of the growth in total foreign liabilities in the first quarter.

We conjecture however that the non significant effect of the stringency measures on foreign liabilities could hide a cross-country heterogeneity. We test in particular if the response of one country’s inward foreign investment to its government’ containment policy depends upon the risk of openness faced by the same country. Investors are interested in monitoring sources of risk and the
means to reduce it, and their behavior can be particularly reactive to government actions aimed at challenging severe risks. We conjecture therefore that the importance of strong containment measures - as measured by government stringency measures (SI) - could crucially depend on the level of risk directly connected with the non adoption or removal of these measures - as measured by the risk of openness index (ROI).

We add to our regression model the interaction between the stringency index $SI$ and the risk of openness index $ROI$: if our hypothesis 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 more effective in economies with a higher risk of openness.

While the results in column (3) do not fully support our initial conjecture, they point to a promising direction. The coefficient of $ROI$ is negative and significant (-0.383), while the coefficients of $SI$ and of the interaction term $SI \cdot ROI$ are not statistically significant. 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 $SI \cdot ROI$ is positive and its p-value is 0.104.

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". Ashraf (2020) finds that stock markets reacted more proactively to the growth in number of confirmed cases as compared to the growth in number of COVID deaths. We find that our findings are qualitatively unaffected by the introduction of this alternative covariate, in terms of significance and size of coefficients.

The explanatory note of the $ROI$ index specifies that "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". We check whether accounting for the natural "measurement" error implicit in the construction of any index, and then considering it less "literally", helps supporting our hypothesis.

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$^6$The large size of the $ROI$ coefficient is due to the definition of the risk index, ranging 0-1: if $ROI$ passes 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%).
We construct therefore a binary variable for each of the two indexes, \( ROI \) and the \( SI \), splitting countries into those above and those below their respective mean.

Interestingly, we observe in column (5a) that the results corroborate our hypothesis, when both indexes are dichotomized. To interpret the effects, it is worth considering that the default-excluded group in the regression is the subset of countries with a below the mean \( SI \) and \( ROI \). 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 \( ROI \) display instead 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: compared to countries with high \( SI \) and low \( ROI \) which witness a decrease in FTL by 5.79%, those countries with high \( SI \) and high \( ROI \) display a higher FTL by 4.75% (-5.79% + 10.54%).

This finding supports our conjecture that foreign investors are influenced by the implementation of stringency indexes as long as 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 -median instead of mean- for defining the binary version of the two indexes, and 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-deaths per million" is replaced by the "number of new COVID-cases per million", and results are confirmed, with only modest changes in the size of the coefficients.

Table 3 replicates Table 2, but the dependent variable relies on the \( diff \Delta \) measure, whose structure is defined in equation (4), rather than on the \( \Delta \) measure. This measure aims to address the
issue of the seasonality of foreign investment allocations, as it is derived as the difference between the 2020 measure, and the corresponding 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 $SI \cdot ROI$ 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, only when considering the indexes in a dichotomic version, the sign and significance of coefficients get 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, as a difference to the corresponding quarter of 2019, is halved in size. Results are confirmed, when considering the median threshold rather than mean for the construction of the binary indexes of $SI$ and $ROI$ (column (5b)), or when considering the alternative covariate "new COVID-cases" under both specification of the threshold (columns (6a) and (6b)).

Table 4 reports the results of Table 2 and 3, but relative to the end of the second quarter, so that the dependent variable becomes the growth in liabilities at a one-semester distance. For the sake of brevity, we report only the relevant regressors. The upper part of the table (panel I) refers to the $\Delta$ measure, while the bottom part (panel II) refers to the $diff\Delta$ measure, 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 second quarter, under any specification of the indexes, or of the dependent variable.\footnote{We only observe in panel I, some sparse and non systematic negative significant coefficients of the $ROI$ index.}
The empirical evidence shows that the measures of containment and the risk of openness may help explain the foreign investors’ choice in the immediate aftermath of the COVID outbreak, but not in the second quarter.\footnote{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, when balancing the sample and excluding Croatia and Malaysia also in the first quarter.}

4.2 Sensitivity checks and additional analysis

In the remainder of the paper, we undergo our findings to a bunch of robustness checks and additional studies, to understand the strengths and limits of the analysis.

In Table 5, we check the sensitivity of our first quarter significant findings to the estimation strategy and specification of the country sample.

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 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 baseline approach.

Column (2) reports the results of the regression under an OLS specification, which are qualitatively similar to the ones in column (1). Columns (3) report the results of a Quantile regression. The quantile regression estimates are more robust against outliers in the response measurements: whereas the method of least squares estimates the conditional mean of the response variable, quantile regression estimates its conditional median (or other quantiles). 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, where 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.
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 survive to the exclusion of specific countries from the sample.

In column (4), we exclude China. China has been the first country to be struck by the COVID spread, several weeks before other countries. The estimate of the stringency measures on foreign investors’ choices at the end of the first quarter could therefore have been significantly driven by China’s asynchronous timing of lockdown and loosening measures.

By comparison with column (1), we observe that the exclusion of China, in both panels, hardly affects the size and significance of the effects, which remain still sizeable and significant.

In columns (5a) to (5c) of Table 5, we exclude from the sample potential offshore financial centres, to make sure our results are not driven by economies distorting investors’ decisions for reasons hard to control in our analysis. We consider three different classifications proposed by the literature: column (5a) reports the results under the classification proposed by Damgaard et al. (2018), column (5b) follows Zoromé (2007), while column (5c) follows Lane and Milesi-Ferretti (2017) (see Appendix A.1, for details on the countries excluded). By comparison with column (1), we observe that qualitatively the results are confirmed, and interestingly, the exclusion of offshore centres even reinforce them: both the negative coefficient of the $SI$ index and the positive coefficient of the interaction term $SI \cdot ROI$ are larger in size, and even more statistically significant.

In the two following tables, Table 6 and 7, we perform additional analysis, to match our findings with the evidence of the recent empirical literature on the evolution of foreign investment, after the spread of the COVID contagion.

In particular, OECD (2020a) and OECD (2020c) assess that foreign direct investments of firms are expected to decline sharply as a consequence of the pandemic, with a notable heterogeneity across countries, and that emerging market economies have indeed already experienced a massive drop of portfolio investment inflows, because international investors transfer capital back home, or invest in safer assets during periods of uncertainty. Giofre’ (2020a) 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.

In Table 6, we check whether accounting for different country grouping invalidate or modify our findings. In columns (1a) and (1b), we report, for comparison, the results of columns (5a) and (5b) of Table 2. Columns (#a) report results when the two OxCGRT indexes are recoded as binary indicators with the mean as threshold, while in columns (#b) the threshold is the median. We consider different alternative to the GDP per capita to define the group of advanced economies following Giofre’ (2020a), and we also find that foreign investment in these countries have been less severely hit by the crisis, as the coefficients of the dummy associated with advanced, G7 and Euro area countries are positive and statistically significant, also after accounting for the binary OxCGRT indexes and their interaction.

We observe that when we include as control a dummy for advanced economies, results are very close to our baseline; when we include, as a control, the G7 group, the coefficients of the SI and $SI \cdot ROI$ are significant only is dichotomized around the mean, though the size of the interaction term’s coefficient is smaller; finally, when controlling for the Euro area country group, we observe consistent coefficients of the interaction terms (though smaller in size), but no significant negative coefficient of the $SI$ regressor (i.e., for countries with high $SI$ and low $ROI$).

Finally, we check how our results are affected by the inclusion of the standard deviation of the stringency index ($\sigma SI$) in our regression specification. Giofre’ (2020b) finds that the within-country standard deviation of the stringency index is positively and significantly correlated with foreign inward investments, at the end of the first quarter of 2020, but only as far as portfolio investments are concerned. She suggests that foreign portfolio investors, typically more reactive than foreign direct investors, could have be more responsive to governments’ prompt reactions than to gradual ones in the immediate aftermath of the outbreak, since the former policies could have been perceived as a more serious commitment to stem the spread of COVID-19.

Our model specification provides an alternative explanation to the non significant effect of the $SI$ index on foreign investment: we check within a unified framework if the two pieces of empirical
evidence are consistent or mutually exclusive. If countries with a higher standard deviation in $SI$ are also those with a higher risk of openness, by omitting one of the two factors makes the coefficients of the included covariates biased.\footnote{The correlation of the first quarter $\sigma SI$ with the average stringency index $SI$ is equal to 0.18 (and only marginally significant: p-value=0.098), while its correlation with the average risk of openness index $ROI$ is equal -0.03 (but not statistically significant at any conventional level).} We consider a regression specification including both regressors, to shed light on the drivers of the growth in foreign inward investments. Since Giofre’ (2020b) underlines a different role for portfolio and direct inward investments (that is, foreign direct and foreign portfolio liabilities), we consider their respective growth, together with the growth of total foreign inward investments.

In Figure 5, we show the main descriptive statistics and the distribution in the first quarter of the growth in Foreign Direct Liabilities (FDL) in panel (a) and of Foreign Portfolio Liabilities (FPL) in panel (b). We observe that the growth for FPL is more negatively skewed than the distribution of FDL.

To allow an immediate comparison across different types of liabilities, we report the coefficients of our regressors of interest in Table 7, which is horizontally partitioned into three panels: panel I refers to FTL, panel II to FDL, and panel III to FPL.

Let’s focus, first, on how our findings are affected by the inclusion of the $\sigma SI$ as a regressor, and, then, on how the results in Giofre’ (2020b) are altered by imposing our framework.

In panel I, the regression setting is 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)). When we instead recode the $SI$ and $ROI$ indexes in a dichotomic form (columns (5a) to (6b)), we find again a statistically significant coefficient of the interaction term $SI \cdot ROI$, consistently with our hypothesis, while the negative coefficient of the $SI$ is statistically different from zero only when the threshold of the dummy is the mean (columns (#a)).\footnote{A coefficient of the $SI$ regressor not statistically different from zero, implies that countries with a high $SI$ and...}
The evidence on the $\sigma SI$ regressor is fully in line with the results of Giofre’ (2020b) for FTL, both 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. Giofre’ (2020b) finds that foreign direct inward investment have shown a lower responsiveness to $\sigma SI$, than foreign portfolio inward investments. Indeed, also in our setting, 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.

Let’s now consider how the interaction of the two OxCGRT indexes may have differently affected the growth in foreign direct and foreign portfolio liabilities.

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.

On the one hand, the coefficient of the interaction term $SI \cdot ROI$ is significant only for columns (#a) for FDL, while is always statistically different from zero for FPL (though only marginally, when the threshold is computed over the median); on the other hand, the overall effect of countries with high $SI$ and high $ROI$ is larger for foreign portfolio liabilities than for foreign direct liabilities. Indeed, though the negative coefficients of the $SI$ regressor and the positive coefficients of the interaction term $SI \cdot ROI$ are larger (in absolute value) for FDL than for FPL (when both are significant), the overall net effect of high $SI$ in economies with high $ROI$ on foreign liabilities’ growth is smaller for FDL than for FPL: in column (5a) it is $0.0210 (-0.0819+0.1028)$ for FDL versus $0.0267 (-0.0639+0.0906)$ for FPL, while in column (6a) it is $0.0103 (-0.0899+0.1003)$ for FDL versus $0.0225 (-0.0554+0.0780)$ for FPL.

Moreover, we observe that in columns (3) and (4) of panel III, the coefficients of $SI$, $ROI$, and $SI \cdot ROI$, 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 a low $ROI$ do not display a growth in liabilities different from other country groups. The fact that the coefficient of $SI \cdot ROI$ is instead positive and statistically significant implies that countries with a high $SI$ and a high $ROI$ display a growth in liabilities significantly larger than other country groups, consistently with our hypothesis.
so far, the growth in foreign portfolio liabilities in the first quarter of 2020, is significantly associated also with the continuous version of the stringency index $SI$, of the risk of openness $ROI$, and of their interaction. It means that, while the growth in foreign direct liabilities only respond to high versus low indexes, foreign portfolio liabilities are tilted by a cross-country marginal difference of the stringency index within economies with a varying 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 lower growth in FPL by 1.46% if the risk of openness $ROI$ is set at its minimum, that is equal to 0, while the same increase in the $SI$ index by 1 unit 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 to the stringency measures adopted and to the COVID risk exposure of the country, and is in line with the results in Giofre’ (2020b), confirming a general higher reactivity by foreign portfolio investors than by direct investors in the immediate aftermath of the crisis.

Overall, the results of Table 7 show that our findings and the evidence in Giofre’ (2020b) are both consistent within a more general framework: on the one hand, the role of the standard deviation of the stringency index $\sigma SI$ survives as a significant driver of foreign portfolio investment, and, on the other hand, the inclusion of a potentially correlated regressor, such as $\sigma SI$, does not affect the validity of our findings, and even enriches the analysis, by unfolding a peculiar sensitivity of foreign portfolio investors to the adoption of COVID containment measures at the end of the first quarter of 2020.

5 Conclusions

This paper investigates the evolution of foreign investment in the immediate aftermath of the adoption of stringency measures to restrain the spread of COVID-19. Investors scrutinize sources of risk and the means through which this risk can be reduced. Foreign investors could therefore be deterred
from or attracted by investing in a country adopting more radical stringency measures, depending on how these policies are perceived in terms of commitment to stability, lower uncertainty, and then higher adjusted risk-returns in the near future. We find that the non significant correlation between the average quarterly stringency index and inward foreign investment at the end of the first quarter of 2020 hides a source of heterogeneity across countries: the response of investors’ behavior to the adoption of COVID restrictive policies depends indeed on the level of pandemic risk of the economy. Specifically, the extent to which severe containment measures, as measured by the government stringency index, significantly affects the inward foreign investment in a country depends on its level of risk connected with the non-adoption or removal of these stringency measures, as proxied by the risk of openness index.

The empirical evidence relative to the end of the first quarter of 2020 actually shows that foreign investors value the assets issued by countries, which calibrate the stringency measures 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 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.

It is worth emphasizing that the objective of this research is to establish the existence of a connection between COVID restrictive measures and foreign investors’ allocation choices, and not to question the appropriateness of the containment measures imposed by different countries: the policies adopted represent the country-specific reactions to country-specific conditions, in terms of severity of cases, deaths, and pre-existing efficiency of the national health system. Indeed, severity and speed of adoption of policies in different countries can be strictly related to the severity of the effects of the COVID spread, which has shown a remarkable cross-country heterogeneity, for reasons that are worth investigating in the near future. This paper emphasizes the importance of taking into account this multifaceted heterogeneity, by considering how the diversity in the risk of openness across countries has affected the relationship between government containment policies and foreign investment decisions.
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Tables

Figure 1. Quarterly growth in Foreign Total Liabilities
This figure reports the distribution and main statistics of the growth in Foreign Total Liabilities at the end of the first quarter 2020. Figure 1a) refers to the growth measure $\Delta q_1$, as defined in equation (1), while figure 1b) refers to the growth measure $diff \Delta q_1$, as defined in equation (4). To enhance readability, growth rates are reported in percentage.

Figure 2. Semi-annual growth in Foreign Total Liabilities
This figure replicates Figure 1, but is referred to the first semester of 2020, rather than to the first quarter. To enhance readability, growth rates are reported in percentage.
Figure 3. Stringency Index: within-country average (by quarter)
This figure reports the distribution and main descriptive statistics of the average within-country Stringency Index, $SI$. Panel a) refers to the first quarter of 2020, while panel b) refers to the second quarter of 2020.

![Stringency Index (SI): average q1 2020](image)

![Stringency Index (SI): average q2 2020](image)

Figure 4. Risk of Openness: within-country average (by quarter)
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.

![Risk of Openness Index (ROI): average q1 2020](image)

![Risk of Openness Index (ROI): average q2 2020](image)
Table 1. Correlation matrix of COVID regressors

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).

|                      | SI         | ROI       | ND        | NC        |
|----------------------|------------|-----------|-----------|-----------|
| **Correlation matrix: q1 2020** |            |           |           |           |
| Pearson correlation coeff. ([t-test p-value]) |            |           |           |           |
| Stringency Index (SI) | 1          |           |           |           |
| Risk of Openness Index (ROI) | 0.110 [0.320] | 1         |           |           |
| New deaths per million (ND) | **0.219 [0.045]** | 0.156 [0.156] | 1         |           |
| New cases per million (NC) | 0.030 [0.784] | **0.240 [0.028]** | **0.578 [0.000]** | 1         |
| **Correlation matrix: q2 2020** |            |           |           |           |
| Pearson correlation coeff. ([t-test p-value]) |            |           |           |           |
| Stringency Index (SI) | 1          |           |           |           |
| Risk of Openness Index (ROI) | 0.171 [0.120] | 1         |           |           |
| New deaths per million (ND) | 0.042 [0.704] | **0.361 [0.001]** | 1         |           |
| New cases per million (NC) | 0.113 [0.305] | **0.584 [0.000]** | **0.296 [0.006]** | 1         |
Table 2. Main findings: \( \Delta q_1 \)
This table reports the results of a Robust Least Squares regression (M-estimation), following equation (3). The dependent variable is the quarterly growth in Foreign Total Liabilities, at the end of the first quarter of 2020, 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, respectively, below or above the mean (column (5a)), or median (column (5b)). ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

| Main findings | SI & ROI (0-1) |
|---------------|----------------|
| \( \Delta q_1 \) | > mean | > median | > mean | > median |
| Stringency Index (\( SI \)) | 0.0009 | 0.0008 | -0.0094 | 0.0144 | -0.0579 ** | -0.0685 ** | -0.0584 ** | -0.0644 ** |
| Risk of Openness Index (\( ROI \)) | -0.0531 | -0.3834 * | -0.3513 * | -0.0429 ** | -0.0672 *** | -0.0360 * | -0.0634 ** |
| SI - ROI | 0.0155 | 0.0144 | 0.1054 *** | 0.1054 *** | 0.0933 *** | 0.1016 *** |
| new COVID deaths per mn | -0.0061 | -0.0052 | 0.0094 | -0.0250 | 0.0046 |
| new COVID cases per mn | (0.0270) | (0.0274) | (0.0260) | (0.0228) | (0.0225) |
| high GDP cap | 0.0455 ** | 0.0461 ** | 0.0422 ** | 0.0482 *** | 0.0452 *** | 0.0517 *** | 0.0454 *** | 0.0525 *** |
| high MCAP/GDP | (0.0179) | (0.0186) | (0.0176) | (0.0184) | (0.0156) | (0.0176) | (0.0163) | (0.0184) |
| \( \Delta \) NEER (1-month lag) | 0.7482 | 0.7504 | 0.7384 | 0.6159 | 0.6998 | 1.0991 ** | 0.4733 | 1.0052 * |
| \# obs | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| \( R^2 \) | 0.14 | 0.12 | 0.11 | 0.11 | 0.19 | 0.21 | 0.19 | 0.19 |
Table 3. Main findings: $diff \Delta q_1$

This table is the same as Table 2, but the dependent variable is constructed as $diff \Delta q_1$ in equation (4). ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

| diff$\Delta q_1$ | Main findings | SI & ROI (0-1) |
|------------------|---------------|---------------|
|                  | (1)           | (2)           | (3) | (4) | (5a) | (5b) | (6a) | (6b) |
| Stringency Index (SI) | -0.0001       | 0.0000        | -0.0099 * | -0.0079 | -0.0641 *** | -0.0560 ** | -0.0616 ** | -0.0561 ** |
| Risk of Openness Index (ROI) | -0.0631       | -0.4025 **   | -0.3573 * | -0.0422 * | -0.0590 *** | -0.0413 * | -0.0595 *** |
| SI - ROI | 0.0155 *    | 0.0130        | 0.0850 *** | 0.0840 ** | 0.0826 *** | 0.0815 *** |
| new COVID deaths per mn | 0.0129    | 0.0131        | 0.0252 | -0.0015 | 0.0034 |
| new COVID cases per mn | 0.0235 )   | ( 0.0240 )    | ( 0.0252 ) | ( 0.0241 ) | ( 0.0205 ) |
| high_GDPcap | 0.0075       | 0.0115        | 0.0218 | 0.0209 | 0.0227 | 0.0472 *** | 0.0195 | 0.0465 *** |
| high_MCAP/GDP | -0.0053     | -0.0088       | -0.0092 | -0.0130 | -0.0187 | 0.0017 | -0.0175 | 0.0016 |
| $\Delta$ NEER (1-month lag) | 0.0890      | 0.1013        | 0.3697 | 0.4764 | 0.5280 | 0.5009 | 0.5401 | 0.5329 |
| # obs | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| $R^2$ | 0.01 | 0.02 | 0.07 | 0.07 | 0.11 | 0.16 | 0.11 | 0.16 |
### Table 4. Main findings: Δs1 and diffΔs1

This table replicates Table 2 and 3, but relative to the first semester of 2020. In panel I, the dependent variable is constructed following the structure of equation (1), while in panel II, the dependent variable follows the structure of equation (4). The econometric specification is the same as in previous tables: it also includes the controls reported at the bottom of the table.

| I. Δs1 | Main findings | SI & ROI (0-1) | SI & ROI (0-1) |
|--------|---------------|----------------|----------------|
|        | (1)  (2)  (3) (4) | > mean  > median | > mean  > median |
|        | (5a)  (5b)  (6a)  (6b) |
| Stringency Index (SI) | 0.0001  0.0002  0.0003  0.0009 | -0.0233  -0.0048 | -0.0008  0.0021 |
| (0.0004)  (0.0005)  (0.0017)  (0.0018) | (0.0253)  (0.0241) | (0.0185)  (0.0172) |
| Risk of Openness Index (ROI) | -0.0415  -0.0307  0.0289 | -0.0312 * -0.0214 | -0.0224 -0.0223 * |
| (0.0564)  (0.2501)  (0.2575) | (0.0160)  (0.0158) | (0.0149)  (0.0134) |
| Stringency Index (SI) · Risk of Openness Index (ROI) | -0.0002  -0.0017  0.0415  0.0163 | 0.0154  0.0106 |
| (0.0037)  (0.0039)  (0.0294)  (0.0276) | (0.0238)  (0.0229) |
| new COVID deaths per mn | -0.0040  -0.0027  -0.0027  -0.0030  -0.0014 |
| (0.0034)  (0.0039)  (0.0040) | (0.0035)  (0.0032) |
| new COVID cases per mn | 0.0002 |
| (0.0003) | -0.0007  0.0001 |
| R² | 0.36 0.38 0.38 0.36 | 0.37 0.37 |
| # obs | 51 51 51 51 51 51 51 51 |

| II. diffΔs1 | Main findings | SI & ROI (0-1) | SI & ROI (0-1) |
|-------------|---------------|----------------|----------------|
|            | (1)  (2)  (3) (4) | > mean  > median | > mean  > median |
|            | (5a)  (5b)  (6a)  (6b) |
| Stringency Index (SI) | -0.0004  -0.0002  0.0020  0.0023 | -0.0352  0.0067 | 0.0276  0.0066 |
| (0.0006)  (0.0006)  (0.0021)  (0.0021) | (0.0325)  (0.0268) | (0.0385)  (0.0274) |
| Risk of Openness Index (ROI) | -0.0454  0.2318  0.2587  -0.0263 | -0.0105  -0.0259 | -0.0126 |
| (0.0731)  (0.2903)  (0.2985) | (0.0206)  (0.0217) | (0.0208)  (0.0215) |
| SI · ROI | -0.0043  -0.0050  0.0336  -0.0179 | -0.0001  -0.0189 |
| (0.0042)  (0.0045)  (0.0377)  (0.0342) | (0.0003)  (0.0362) |
| new COVID deaths per mn | -0.0055  -0.0043  -0.0040  -0.0044  -0.0015 |
| (0.0044)  (0.0050)  (0.0047) | (0.0045)  (0.0045) |
| new COVID cases per mn | 0.0000 |
| | -0.0413  0.0000 |
| R² | 0.20 0.19 0.15 0.14 0.19 0.27 0.15 0.23 |
| # obs | 51 51 51 51 51 51 51 51 |

Other controls: (lag) NEER, high GDP per capita, high MCAP/GDP.
Table 5. Sensitivity analysis: econometric model and sample specification

This table reports the results of the sensitivity analysis to different specifications of econometric model and sample. In Panel I, the dependent variable is the growth of Foreign Total Liabilities, $\Delta q_1$, as defined in equation (1), while in Panel II the dependent variable is $\text{diff}\Delta q_1$, as defined in equation (4). For the sake of brevity, only results with binary definition of $SI_d$ and $ROI_d$ (1 if above the mean, 0 otherwise) are reported. Column 1 of Panel I and II reports, for comparability, the results under a Robust Least Squares estimation of column (5a) of Table 2 and 3, respectively. Column 2 and 3 report the results of the same regression under a standard OLS estimation and a Quantile regression computed at the median of the dependent variable. Columns (4) to (5c) report results when excluding China (columns (4)), or offshore countries (from columns (5a) to (5c)) from the sample. Offshore countries are defined according to three alternative offshore definitions: column (5a) follows the classification in Damgaard et al. (2018), column (5b) follows Zoromé (2007), columns (5c) follows Lane and Milesi-Ferretti (2017) (see Appendix A.1 for details).

| I. $\Delta q_1$ | Sensitivity analysis | Econometric model | Sample | No China | No offshore |
|----------------|---------------------|-------------------|--------|----------|------------|
| Stringency Index ($SI_d$) | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0579 ** | -0.0526 ** | -0.0779 ** | -0.0617 ** | -0.0732 *** | -0.0689 *** | -0.0698 *** |
| (0.0231) | (0.0251) | (0.0327) | (0.0258) | (0.0245) | (0.0225) | (0.0172) |
| Risk of Openness Index ($ROI_d$) | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0429 ** | -0.0460 * | -0.0548 ** | -0.0431 * | -0.0421 * | -0.0507 ** | -0.0601 *** |
| (0.0211) | (0.0229) | (0.0255) | (0.0240) | (0.0224) | (0.0207) | (0.0160) |
| $SI_d \cdot ROI_d$ | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| 0.1054 *** | 0.1031 *** | 0.1308 *** | 0.0974 *** | 0.1172 *** | 0.1250 *** | 0.1342 *** |
| (0.0306) | (0.0332) | (0.0445) | (0.0339) | (0.0320) | (0.0292) | (0.0218) |
| new COVID deaths per mn | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0250 | -0.0206 | -0.0274 | -0.0188 | -0.0254 | -0.0261 | -0.0231 |
| (0.0228) | (0.0247) | (0.0197) | (0.0245) | (0.0231) | (0.0208) | (0.0167) |
| # obs | 53 | 53 | 53 | 52 | 49 | 47 | 45 |
| $R^2$ | 0.19 | 0.39 | 0.23 | 0.16 | 0.22 | 0.26 | 0.27 |

| II. $\text{diff}\Delta q_1$ | Sensitivity analysis | Econometric model | Sample | No China | No offshore |
|----------------|---------------------|-------------------|--------|----------|------------|
| Stringency Index ($SI_d$) | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0641 *** | -0.0661 ** | -0.0658 | -0.0705 *** | -0.0801 *** | -0.0742 *** | -0.0694 ** |
| (0.0244) | (0.0285) | (0.0405) | (0.0260) | (0.0268) | (0.0244) | (0.0288) |
| Risk of Openness Index ($ROI_d$) | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0422 * | -0.0517 * | -0.0381 | -0.0491 ** | -0.0375 | -0.0474 ** | -0.0525 ** |
| (0.0221) | (0.0258) | (0.0322) | (0.0240) | (0.0245) | (0.0224) | (0.0261) |
| $(SI_d) \cdot (ROI_d)$ | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| 0.0850 *** | 0.1001 ** | 0.0921 * | 0.0949 *** | 0.0927 *** | 0.0978 *** | 0.0894 ** |
| (0.0320) | (0.0374) | (0.0543) | (0.0339) | (0.0347) | (0.0315) | (0.0361) |
| new COVID deaths per mn | | | | | |
| (RLS) | (1) | (2) | (3) | (4) | (5a) | (5b) | (5c) |
| -0.0015 | -0.0027 | -0.0040 | -0.0006 | -0.0027 | -0.0037 | 0.0090 |
| (0.0241) | (0.0281) | (0.0247) | (0.0247) | (0.0254) | (0.0226) | (0.0273) |
| # obs | 53 | 53 | 53 | 52 | 49 | 47 | 45 |
| $R^2$ | 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
Table 6. Different country grouping

This table replicates, in columns (1a) and (1b), for comparability, the results of columns (5a) and (5b) of Table 2. Columns (2a) to (4b) reports results under a country grouping alternative to the classification relying on GDP per capita. Columns (#a) considers binary indicators of SI and ROI with the mean as a benchmark, while columns (#b) considers the median as a benchmark. The econometric specification is the same as in previous tables: it also includes the controls reported at the bottom of the table.

| Aq1       | Different groupings       | advanced       | G7            | Euro area       |
|-----------|---------------------------|----------------|---------------|-----------------|
|           | high_GDPcap               | median         | mean          | median          |
|           | (1a)                      | (1b)           | (2a)          | (2b)            | (3a)           | (3b)           |
| Stringency Index (SI_d) | -0.0579 **       | -0.0685 **    | -0.0526 **    | -0.0594 **     | -0.0442 **     | -0.0350       |
|           | (0.0231)                  | (0.0283)       | (0.0230)      | (0.0295)       | (0.0196)       | (0.0246)       |
| Risk of Openness Index (ROI_d) | -0.0429 **       | -0.0672 ***   | -0.0593 *     | -0.0550 **     | -0.0197       | -0.0202       |
|           | (0.0211)                  | (0.0253)       | (0.0208)      | (0.0255)       | (0.0175)       | (0.0211)       |
| SI_d · ROI_d | 0.1054 ***         | 0.1054 ***    | 0.1007 ***    | 0.0947 ***     | 0.0538 **     | 0.0481        |
|           | (0.0306)                  | (0.0346)       | (0.0303)      | (0.0352)       | (0.0256)       | (0.0294)       |
| new COVID deaths per mn | -0.0250      | 0.0046        | -0.0215       | -0.0023        | -0.0231       | -0.0192       |
|           | (0.0228)                  | (0.0225)       | (0.0224)      | (0.0238)       | (0.0192)       | (0.0202)       |
| high_MCAP/GDP | -0.0352       | 0.0297 *      | -0.0159       | 0.0230         | -0.0134       | 0.0020        |
|           | (0.0279)                  | (0.0175)       | (0.0274)      | (0.0181)       | (0.0233)       | (0.0154)       |
| high_GDPcap | 0.0452 ***       | 0.0517 ***    | 0.0433 ***    | 0.0399 **      | 0.0737 ***    | 0.0679 ***    |
|           | (0.0156)                  | (0.0176)       | (0.0154)      | (0.0164)       | (0.0194)       | (0.0205)       |
| advanced  | G7            | 0.0737 ***    | 0.0679 ***    | 0.0429 *       | 0.0412 **     |
|           | Euro area       | 0.0737 ***    | 0.0679 ***    | (0.0177)       | (0.0178)      |
| ΔNEER (1-month lag) | 0.6998        | 1.0991 **     | 0.5822        | 0.8413         | 1.4856 ***    | 1.3557 ***    |
|           | (0.5198)                  | (0.5363)       | (0.5235)      | (0.5555)       | (0.4455)       | (0.4613)       |
| R²        | 0.19                   | 0.21          | 0.19          | 0.17           | 0.19          | 0.17          |

Note: Stringency Index (SI) and Risk of Openness Index (ROI) are measured as binary indicators with the mean or median as a benchmark. The econometric specification is the same as in previous tables: it also includes the controls reported at the bottom of the table.
Figure 5. Quarterly growth in Foreign Direct and Portfolio Liabilities

This figure reports the distribution and main statistics of the growth in Direct and Portfolio Liabilities at the end of the first quarter 2020, as defined in equation (1). To enhance readability, growth rates are reported in percentage.
Table 7. Different liabilities and $\sigma SI$

This table reports the results of a regression including also the within-country standard deviation of the stringency index ($\sigma SI$). Panel I refers to Foreign Total Liabilities, panel II to Foreign Direct Liabilities, and panel III to Foreign Portfolio Liabilities.

| $\Delta q_{1}$ | Different liabilities | SI & ROI (0-4) | SI & ROI (0-4) | SI & ROI (0-4) |
|----------------|-----------------------|---------------|---------------|---------------|
|                | new deaths | new cases | new deaths | new cases | new deaths | new cases |
| I. FTL (Foreign Total Liabilities) | (1) | (2) | (3) | (4) | (5a) | (5b) | (6a) | (6b) |
| Stringency Index (SI) | 0.0005 | 0.0005 | -0.0048 | -0.0087 | -0.0627 *** | -0.0130 | -0.0593 *** | -0.0147 |
| Risk of Openness Index (ROI) | (0.0011) | (0.0011) | (0.0064) | (0.0058) | (0.0204) | (0.0265) | (0.0238) | (0.0266) |
| $st. dev. stringency index, (eSI)$ | 0.0027 * | 0.0026 * | 0.0023 | -0.0255 | 0.0031 *** | 0.0019 | 0.0016 | 0.0017 |

| II. FDL (Foreign Direct liabilities) | (1) | (2) | (3) | (4) | (5a) | (5b) | (6a) | (6b) |
| Stringency Index (SI) | -0.0001 | 0.0000 | -0.0074 | -0.0078 | -0.0819 *** | -0.0118 | -0.0899 *** | -0.0170 |
| Risk of Openness Index (ROI) | (0.0013) | (0.0013) | (0.0062) | (0.0056) | (0.0235) | (0.0329) | (0.0229) | (0.0332) |
| $st. dev. stringency index, (eSI)$ | 0.0034 * | 0.0033 * | 0.0021 | 0.0028 * | 0.0021 | 0.0033 * | 0.0014 | 0.0028 * |

| III. FPL (Foreign Portfolio liabilities) | (1) | (2) | (3) | (4) | (5a) | (5b) | (6a) | (6b) |
| Stringency Index (SI) | -0.0007 | -0.0006 | -0.0146 ** | -0.0157 *** | -0.0639 ** | -0.0266 | -0.0554 * | -0.0109 * |
| Risk of Openness Index (ROI) | (0.0012) | (0.0012) | (0.0058) | (0.0055) | (0.0273) | (0.0264) | (0.0291) | (0.0060) |
| $st. dev. stringency index, (eSI)$ | 0.0064 *** | 0.0065 *** | 0.0048 *** | 0.0042 *** | 0.0046 *** | 0.0048 *** | 0.0033 ** | 0.0036 ** |

**Note:** Other controls: log(NER, high, GDP per capita, high, NCap/GDP, new COVID-deaths (or COVID-cases) per million of inhabitants.
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):

\[ \Delta q_1 \equiv (L_{03 - 20} - L_{12 - 19})/L_{12 - 19} \]
\[ \Delta s_1 \equiv (L_{06 - 20} - L_{12 - 19})/L_{12 - 19} \]

or equation (4):

\[ diff\Delta q_1 \equiv (L_{03 - 20} - L_{12 - 19})L_{12 - 19} - (L_{03 - 19} - L_{12 - 18})/L_{12 - 18} \]
\[ diff\Delta s_1 \equiv (L_{06 - 20} - L_{12 - 19})/L_{12 - 19} - (L_{06 - 19} - L_{12 - 18})/L_{12 - 18} \]

The liabilities $L$ considered are Total Foreign Liabilities, with the exception of Table 7, 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, we restrict the sample to exclude potential offshore countries. Column (4a) refers to the offshore classification specified in Damgaard et al. (2018): from our original sample, Hong Kong, Ireland, Luxembourg, the Netherlands and Singapore are excluded. Column (4b) refers to the offshore classification specified in Zoromé (2007): from our original sample Cyprus, Hong Kong, Ireland, Latvia, Luxembourg, Malta, Singapore, Switzerland and United Kingdom are excluded. Column (4c) refers to the offshore classification specified in Lane and Milesi-Ferretti (2017): from our original sample 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 \((SI)\) and its quarterly standard deviation \((\sigma SI)\), in Table 7, computed within each country over the corresponding quarter.

Source: 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 Organisation (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: https://github.com/OxCGRT/covid-policy-tracker

**Other controls**

**New COVID death per mn**

This is a daily variable, reported by the countries’ authorities. In our analysis, we consider both the quarterly average of new COVID-19 deaths and its standard deviation, computed within each country over the corresponding quarter.

Source: https://github.com

**New COVID cases per mn**

This is a daily variable, reported by the countries’ authorities. In our analysis, we consider both the average quarterly number of new COVID-19 cases and its standard deviation, computed within each country over the corresponding quarter.

Source: https://github.com

**Nominal Effective Exchange Rate**

BIS effective exchange rate Nominal, Broad Indices Monthly averages; 2010=100. The NEER regressor is included with the same structure as the dependent variable. For instance, if the dependent variable is \(\Delta q1\) as defined in equation (1), then the regressor included is \((NEER_{03-20} - NEER_{12-19})/NEER_{12-19}\)

Source: Bank for International Settlements

**High MCAP/GDP**

Market capitalization to GDP (year: 2019, or latest available data). The regressor included is 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**

The regressor included is a binary variable equal to 1 if the GDP per capita is larger than the sample median, and 0 otherwise.

GDP per capita (year: 2019, or latest available data).

Source: CEIC data

Advanced, G7, Euro area
The regressor included is a binary variable equal to 1 if the country belongs to the "advanced", "G7", or "Euro area" group, respectively, and 0 otherwise.

Source: Fiscal Monitor database, IMF’s Fiscal Affairs Department.