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COVID-19 stringency measures and foreign investment: an early assessment

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Abstract

This paper investigates the evolution of foreign investment in the immediate aftermath of the implementation of COVID-19 government stringency measures. The average stringency index is not correlated with inward investment positions. However, after removing country fixed-effect and controlling for the severity of the outbreak spread, 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. At the end of the second quarter, the same dispersion measure is instead not associated with a significant change in inward investment. We interpret this evidence as follows. 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 are perceived as a more serious commitment to stem the spread of COVID-19. In the second quarter, instead, the standard deviation of the index captures the abrupt retreats of the containment measures, together with the timeliness in the adoption of policies, thus becoming less informative for foreign investors.

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

Since the outbreak of the COVID-19 pandemic, many government have been forced to introduce unprecedented containment policies, such as travel restrictions, school and workplace closings, and stay-at-home orders. Though the assessment of the economic and financial consequences of these restrictions cannot be properly evaluated and measured yet, the global spread of COVID-19 has already lead recession, erosion of confidence and higher uncertainty (OECD (2020b)).

As underlined by Godell (2020), there is scarce literature on how epidemics impact financial markets, and all imperfect parallels with other natural disasters or terroristic attacks are hardly going to fit the COVID phenomenon, due to its vast and unprecedented nature.

The growing recent literature about the impact of the COVID event 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) empirically investigates the effect of the official announcements regarding the COVID-19 new cases of infection and fatality ratio on the financial markets volatility in the United States, and finds that the coronavirus pandemic is an important source of financial volatility. Similarly, Baig et al. (2020) find that increases in confirmed cases and deaths due to coronavirus in the US are associated with a significant increase in market illiquidity and volatility, while declining sentiment and the implementations of restrictions and lockdowns contribute to the deterioration of liquidity and stability of markets. Salisu and Vo (2020) find that COVID-19 health-news trends are good predictor of stock returns since the emergence of the pandemic. Ashraf (2020) finds that stock markets in 64 countries responded negatively and quickly to the growth in COVID-19 confirmed cases, with a response varying over time and depending on the stage of outbreak.

More directly related to the investor attitude, Smales (2021) examines the market response to changes in retail investor attention, as proxied by the Google search volume, and confirms that investor attention negatively influences global stock returns during the COVID crisis period.

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. Portfolio investments, typically more volatile and reactive than direct investment, react even earlier to the shock that the pandemic inflicted on the global economy: 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. 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 behaviour in international stock markets during the coronavirus COVID-19 outbreak. They disclose the presence of herding behaviour in the first three months of 2020 in 72 countries stock markets’ countries, but also highlight that this herding behaviour is mitigated by more stringent government response to the coronavirus crisis, by way of reducing multidimensional uncertainty.

This paper contributes to the existing literature, by empirically assessing whether and how foreign investment has changed in the immediate aftermath of the adoption of COVID-19 government stringency measures.

Foreign investors could be averted from investing in a country adopting more radical stringency measures, because it could entail a recession period making less profitable the assets issued by that country; conversely, foreign investors could be even allured by the assets issued by countries adopting more radical containment policies, because these could be perceived as a severe immediate cost to avoid even higher costs in the near future.

We find that the average stringency index is not correlated with inward investment positions. We then conjecture that the graduality in the introduction of these policies could matter.

In fact, as pointed out by Hale et al. (2020), as the disease has spread around the world, the governments’ restriction policies have differed across countries and over time: some 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 a reduction in community transmission; other countries
instead reacted with less severe rise and fall of containment measures, as small outbreaks occurred.

We check if this heterogeneity in graduality in the adoption of the stringency measures has significantly affected foreign investors. After partialling out the severity of the outbreak, as captured by new deaths or new cases, and removing country fixed-effects, we observe that, in the first quarter of 2020, a higher within-country standard deviation in the stringency measures seems to make the adopting economy relatively more attractive to foreign portfolio investors. We provide a temptative interpretation of this evidence: the within-country standard deviation could proxy, in the immediate aftermath of the COVID outbreak, the timeliness of governments’ action. If the prompt adoption of containment measures is interpreted as a serious commitment to restrain the uncontrolled spread of the virus, it could foster cross-border inward investment.

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, with some robustness checks. Section 5 concludes.

2 Estimable equation

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

Specifically, we empirically test the existence of a relationship between the stringency index in a country and its foreign liabilities (inward investments).

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, 03_20) and the liabilities at the end of 2019 (December 2019, 12_19), scaled by the liabilities at the end of 2019 (December 2019, 12_19):

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

We compute this growth in liabilities for the first two quarters ($\Delta q1$ and $\Delta q2$) and for the first
semester ($\Delta s1$) of 2020, for different types of liabilities: total, foreign direct and foreign portfolio inward investments.

We regress the growth in foreign liabilities on the average stringency index in the country ($SI$), and on its within-country standard deviation ($\sigma SI$), running the following regression:

$$\Delta L = \alpha + \beta (SI) + \gamma (\sigma SI) + controls + \varepsilon \quad (2)$$

We are interested in testing the sign and size of the $\beta$ and $\gamma$ coefficients. If the adoption of stringent containment measures ($SI$) deters (or attracts) foreign inward investment, then we should observe a significant negative (or positive) $\beta$ coefficient. We also include a measure of the within-country dispersion of the stringency ($\sigma SI$): a negative $\gamma$ would entail a reduction in attractiveness, while a positive $\gamma$ could reveal an appreciation by foreign investors.

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, since the dependent variable is defined in difference form, we can ignore any country-specific fixed effects, as these are removed by construction of the dependent variable.

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 an alternative definition of the dependent variable in the analysis.

To partial out the seasonality of foreign investment allocations, we consider the measure $diff \Delta L$, that is, the difference between the 2020 $\Delta L$ measure, as defined in equation (1), and the corresponding measure in 2019. For instance, $diff \Delta q1$ is the first quarter measure, and is defined as follows:
To estimate the parameters in equation (2), 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).\(^1\) 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 inward investment in 53 countries, upon data availability. Data on foreign liabilities, our dependent variable, 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. We consider, in our analysis, the split of total liabilities (total inward investments), into foreign direct and foreign portfolio investments.

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 regressor, the stringency index \( (SI) \), which represents a proxy for the severity of the containment policy measures adopted, and the data about new COVID-deaths and cases per million of inhabitants. These data are originally reported at a daily frequency, but in order to match the quarterly frequency of the dependent variable, we construct quarterly averages and within-country quarterly standard deviations.

We include in our specification other three controls. First, the NEER (Nominal effective ex-

\[ diff \Delta q_1 \equiv \Delta q_{1,2020} - \Delta q_{1,2019} \]  

\(^{1}\)Our results are robust to alternative Robust Least Squares methods, such as the S-estimation and the MM-estimation (results are not reported, but are available upon request).
change 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 of the dependent variable. Figure 1 relies on the \( \Delta \) measure defined in equation (1), for both the first quarter (\( \Delta q1 \), panels \( \#a \)) and the second quarter (\( \Delta q2 \), panels \( \#b \)). Panels (1a) and (1b) refer to total inward investments, panels (2a) and (2b) to foreign direct investment, while panels (3a) and (3b) refer to portfolio investments. We can observe, first, that the \( \Delta \) measure is more negatively skewed in the first quarter, than in the second quarter. Second, the distribution of portfolio inward investment is more negatively skewed than the distribution of direct investment.

Figure 2 is similar to Figure 1, but relies on the \( \text{diff} \Delta \) measure defined in equation (3): a comparison across quarters and types of investments (direct or portfolio) reveals the same pattern observed in Figure 1. By comparing Figure 1 and 2, we can notice that, in the first quarter, the distribution of the measure controlling for seasonality, defined in equation (3), is more negatively skewed than the one relying on equation (1), especially for portfolio investment.

In Figure 3, we report the distribution and main descriptive statistics of the quarterly stringency index and its within-country standard deviation. Panels (\#a) refer to the first quarter, while panels (\#b) refer to the second quarter. Panels (1a) and (1b) focus on the average quarterly stringency index (\( SI \)), while panels (2a) and (2b) refer to the within-country standard deviation (\( \sigma SI \)).

The average stringency index, whose original values range 0.100, in the first quarter is about 19, while in the second quarter is about 71, thus disclosing the dramatic tightening of the anti-COVID 19 containment measures.

However, panels (2a) and (2b) provide an additional piece of information on the stringency index: by comparing the within-country standard deviation in the two quarters, we observe that its average is significantly larger in the first than in the second quarter (26 versus 10). From Figure 3, we learn that, though the average stringency index \( SI \) in the first quarter is about one-fourth of its level in the second quarter, the average within-country standard deviation is about 2.5 times larger: the
adoption of containment measures has been more abrupt in the immediate aftermath of the COVID spread, in order to face the challenge of the unprecedented event and its severe consequences.\(^2\)

4 Regression analysis

4.1 Main findings

In Table 1, we report the main findings of our regression analysis for the first quarter, under a Robust Least Squares estimation. Columns (1a) and (1b) report results relative to total foreign inward investment, columns (2a) and (2b) refer to foreign direct investments, while columns (3a) and (3b) refer to portfolio investments. Columns (#a) rely on the liabilities growth measure $\Delta$, whose structure is defined in equation (1), while columns (#b) rely on the $diff\Delta$ measure, whose structure is defined in equation (3).

As anticipated in Section 2, we are forced to keep a parsimonious specification, because we can rely on a quite limited country sample.

It is worth stressing that the dependent variable is defined in difference form, which allows us to ignore any problem related to country-specific fixed effects, removed by construction.

We are however concerned about, on the one hand, time-varying regressors which might concur to explain the growth in foreign investments, and, on the other hand, covariates potentially correlated with our main regressors, whose exclusion could bias the estimated coefficients.

We include 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.\(^3\) Second, we control for the number of new COVID-deaths and its within-country standard deviation: the stringency index is likely correlated with this specific indicator of the epidemic, as it represents the government reaction to contain new

\(^2\)Notice that the value of the standard deviation of the stringency index reported in Panels (1a) and (1b) differs from the one reported in Panels (2a) and (2b), because the former seizes the overall standard deviation (within and between country), while the latter refers to the within-country standard deviation only.

\(^3\)We include its one-month lagged value, to avoid endogeneity issues.
cases, deaths, and intensive-care treatments.\textsuperscript{4}

Finally, we include two binary indicators of economic and financial development, to account for a potential different flow of foreign investments towards high versus low developed countries: for instance, according to the flight to quality rationale, in the presence of a global shock, foreign investors would deviate their investments to more stable and developed economies.\textsuperscript{5}

First of all, we observe a significant negative coefficient of the constant term. The constant’s coefficient represents the mean of the dependent variable, if all regressors are set to zero. We observe that the dynamic of the growth in foreign liabilities for countries with low economic and financial development (also the indicators of development are set to zero) is strongly negative, from -10\% to -33\%, depending on the growth definition and on the subset of liabilities considered, which is consistent with the substantial average decrease in foreign investment after the COVID outbreak, already observed in Figure 1 (panels 1a, 2a and 3a).

As far as our main regressors are concerned, we first observe that the average stringency index ($SI$) does not affect the growth in inward liabilities in the first quarter of 2020. However, the coefficients of the within-country standard deviation ($\sigma SI$) are positive and highly significant for foreign portfolio investment (columns (3a) and (3b)), for both $\Delta$ measures considered: a one-unit increase of the $\sigma SI$ pushes inward portfolio investment from 0.64 to 0.66\%. If we recall that, in the first quarter, the mean of $\sigma SI$ is 26 (the median is 27), we point to an economically sizeable effect. The coefficient of $\sigma SI$ for total liabilities, driven by the strong significance of its portfolio investment component, is about 0.3\%, while the coefficient for direct inward investment is significant only in column (2a)).

As far as the other regressors are concerned, the coefficients related to the COVID-new deaths per million are never significant, while the appreciation of the currency is (marginally) significant only for foreign direct investment, and only in the second specification of the growth measure. The binary regressors capturing the economic and financial development of the receiving economy seem

\textsuperscript{4}Results are left qualitatively unchanged, when considering a regression specification with the number of deaths per million of inhabitants in logs, rather than in levels.

\textsuperscript{5}Since these controls are not available at quarterly frequency for most of countries, we include them as time-invariant covariates.
to deliver contrasting, though not systematic results: on the one hand, countries with higher than median GDP per capita seems to observe a dampened drop in the growth of foreign liabilities; on the other hand, countries with higher than median market capitalization per GDP, seem to suffer even more the contraction in foreign inward investment. Though the evidence about the relationship between liabilities’ growth and development is worth-investigating, we must underline that, also in this case, the significance of the coefficients is usually quite weak and far from systematic across instruments and dependent variable’s specifications.

To allow an immediate comparison over time, across different types of liabilities, and definitions of the dependent variable and regressors, we report in a single table, Table 2, only the coefficients of the regressors of interest, $SI$ and $\sigma SI$; at the bottom of the table, we specify the other controls included in the regression, following the same econometric specification of Table 1.

Table 2 is horizontally partitioned into three panels: panel I refers to total foreign investment, panel II to foreign direct investment, while panel III to foreign portfolio investment. Columns (1a) and (1b) report results relative to the first quarter of 2020, already displayed in Table 1, columns (2a) and (2b) refer to the second quarter, while columns (3a) and (3b) refer to the first semester of 2020.

We observe that, after removing country fixed-effects and controlling for the severity of the epidemic spread across economies, as captured by the number of new COVID-death/new COVID-cases per million, the only significant coefficients refer to the effect of the within-country standard deviation ($\sigma SI$) for portfolio investors, and only at the end of the first quarter of 2020, as already found in Table 1. The coefficients are never significant in the last four columns, which refer to the 2020 second quarter and first semester growth.

From this table, we derive three main considerations. First, portfolio investors reveal to be the ones more sensitive to the stringency index. Second, the allocation of foreign portfolio investors seems to have been affected by the within-country standard deviation of the stringency index, rather

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6When considering the first quarter, $\Delta q1$ is regressed on the "pure" first quarter stringency index (as $SI$ was null at the end of 2019), while when considering the second quarter, $\Delta q2$ is regressed on the growth in the stringency index between the first and the second quarter. By considering the full semester $\Delta s1$, we check our regression findings when considering the "pure" second quarter stringency index as a regressor.
than by its average level. Third, the effect is significant only at the end of the first quarter.

Let’s try to provide an interpretative key to these pieces of evidence.

First of all, we are not surprised to observe that portfolio investments are more affected by the policy measures adopted, because they are typically more volatile and reactive than foreign direct investments, and then are expected to react earlier also to the shock inflicted by the pandemic.

Second, we observe that, at the end of the first quarter of 2020, portfolio investors have not been attracted by the average stringency of the policy adopted, but rather by the sharpness of the government reaction, as opposed to the graduality of the interventions.

Third, the difference across quarters is consistent with the work of Ashraf (2020), which suggests that stock markets have quickly responded to COVID-19 pandemic, and that this response has varied over time, depending on the stage of outbreak, with a stronger negative market reaction during early days of confirmed cases. The prompt adoption of containment measures in the immediate aftermath of the COVID crisis, compared to more gradual ones, might have been interpreted by foreign investors as a serious commitment to face the negative consequences of an uncontrolled spread of the virus. In the second quarter, instead, the standard deviation of the index within a country also seizes the retreat of the containment measures: when this index gets blurred and only loosely correlated with the timeliness in the implementation of rigorous containment measures, it also becomes loosely correlated with cross-border investment.

It is worth stressing that the aim of this research is to establish the existence of a connection between the COVID restrictive measures and foreign investors’ allocation choices. It does not aim to assess either the quality of the containment measures imposed by different countries or the appropriateness of their timing, as it would require a throughout investigation on the implementation of different policies in different economies, which is far beyond the scope of this paper. Indeed, both the degree and the speed of adoption of containment measures in different countries can be strictly related to the severity of the effects of the COVID spread, which has shown a notable degree of cross-country heterogeneity. The reasons behind this heterogeneity are quite obscure at the moment, and research will hopefully make them clearer in the near future. Accordingly, it can be legitimately
argued that governments cannot be blamed or praised for the measures adopted, as these have been country-specific reactions to country-specific conditions, in terms of severity of cases, deaths, and pre-existing efficiency of the national health system. By controlling for the new COVID deaths (or the new COVID cases) per million of inhabitants and by removing country fixed-effects, we try to partial out this cross-country heterogeneity, so that the eventual effects of the level ($SI$) and the within-country dispersion of stringency measures ($\sigma SI$) are computed on top of the severity of the spread, as accounted for by these epidemic indicators.\footnote{The correlation coefficient between the average stringency index ($SI$) and the "new COVID-deaths per mn" average is equal to 0.22 (significant at 5\% level) in the first quarter, and 0.04 (non significant) in second quarter. The correlation coefficient between the corresponding within-country standard deviation ($\sigma SI$) is not statistically significant (equal to 0.17 in the first quarter and -0.04 in the second quarter).}

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

### 4.2 Sensitivity checks

In the following tables, we check the sensitivity of our findings to alternative controls (Table 3), specification of the country sample (Table 4), and estimation strategy (Table 5).

In Table 3, we include in the pool of controls the variable "new COVID-cases per mn of inhabitants" (and its within-country standard deviation), as an alternative to "new COVID-deaths per mn of inhabitants" (and its within-country standard deviation). Ashraf (2020) find 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 therefore check whether our findings are affected by the introduction of this alternative covariate. We observe a pattern qualitatively very similar to Table 2, in which the only significant coefficients are those related to $\sigma SI$ in the first quarter for foreign portfolio investment: quantitatively, the effect is reduced but still important, since a one-unit increase in the dispersion index leads to 0.4\% larger inward portfolio investments.

In Table 4, we test whether our findings about the significant impact of $\sigma SI$ on foreign investors in the first quarter of 2020 survive to the exclusion of specific countries from the sample.

In columns (1a) and (1b) of Table 4, we exclude China from the sample. China has been the
first country to be struck by the COVID spread, several weeks before other countries. The effect of the stringency index and its dispersion measure could therefore have been distorted by China’s asynchronous timing of lockdown and loosening measures, in the first and second quarter.

By comparison with Table 2, we observe that the exclusion of China reduces the impact of $\sigma SI$ on foreign portfolio investors from 0.64 to 0.56%, when considering the $\Delta$ measure of column (1a), and from 0.66 to 0.65%, when considering the $\text{diff}\Delta$ measure of column (1b): the size of the coefficient is affected, but the effect remains still sizeable and significant.

In columns (2a) to (4b) of Table 4, 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: columns (2a) and (2b) report the results under the classification proposed by Damgaard et al. (2018), columns (3a) and (3b) follow Zoromé (2007), while columns (4a) and (4b) follow Lane and Milesi-Ferretti (2017) (see Appendix A.1, for details on the countries excluded).

We confirm that, at the end of the first quarter of 2020, foreign investors’ allocation appears affected by the within-country dispersion of the stringency index, rather than by the stringency index itself. Differently from previous findings, however, we observe, that $\sigma SI$ systematically affects all types of foreign investors, direct and portfolio, under both specifications of the dependent variable. The impact on foreign direct investors, negligible in the full sample-case, becomes not only statistically significant, but also economically sizeable, ranging from 0.43 to 0.62%. However, consistently with our previous findings, the impact is larger on foreign portfolio investors than on direct investors, and its size is significantly boosted after the exclusion of offshore countries, ranging from 0.71 to 0.80%, depending upon the specification. Interestingly, the exclusion of offshore centres makes our findings more general and systematically valid.\(^8\)

Finally, Table 5 reports results for the first quarter of 2020, under different econometric model specifications.

\(^8\)Tables 4a and 4b in Appendix B report the corresponding tables for the second quarter and the first semester. The coefficients are non significant, with the exception of one (marginally) significant negative coefficient for the average $SI$, in column (1a) of Table 4a, relative to foreign direct investment, but only for one of the two measures of the dependent variable.
The results under the OLS specification (columns (1a) and (1b)) are qualitatively similar to the ones following the Robust Least Squares approach, shown in Table 2: the coefficient in column (1a) is reduced (from 0.64 to 0.56%), while the coefficient in column (1b) is marginally increased (from 0.66 to 0.68%).

In columns (2a) to (4b), we report the results of a Quantile regression. The quantile regression estimates, relative to the least squares regression, 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). In columns (2a) and (2b), we report the conditional 25th percentile, in columns (3a) and (3b) the median, and in columns (4a) and (4b) the 75th percentile of the response variable.

We observe, first, that the coefficient of the $\sigma SI$ factor is again systematically significant only for foreign portfolio investors: there is only one (marginally) significant coefficient in the total investment panel, and one in the direct investment panel, both at the 25th percentile, but this significance is not robust across both $\Delta$ measures of the dependent variable. Focusing on panel III referred to foreign portfolio investment, we observe that the coefficients vary over percentiles and definitions of the $\Delta$ measure. The coefficient of the measure of dispersion $\sigma SI$ is (marginally) significant at the 25th percentile of the response variable (0.55, column (2b)), but only when defined as in equation (3), while it systematically affects the median and 75th percentile of the response variable, under both definitions of the $\Delta$ measure. Interestingly, there is no precise ranking in the effect of $\sigma SI$ over these two percentiles: according to the $\Delta$ measure defined in equation (1), the effect on the median of the response variable is larger than its effect on the 75th, and vice versa when considering the alternative $diff\Delta$ measure defined in equation (3).

The results of Table 5 indicate that our findings are not driven by the choice of the econometric model.\(^9\)

\(^9\)Tables 5a and 5b in Appendix B, referred, respectively, to the second quarter and the first semester of 2020, confirm the absence of significant effects in the second quarter of 2020. The only exception is relative to column (4b) of panel II (foreign direct investment) of Table 5b: there are two (marginally) significant negative coefficient for the average $SI$ and its standard deviation $\sigma SI$, but only for one of the two measures of the dependent variable.
5 Conclusions

This paper investigates the evolution in foreign investment in the immediate aftermath of the adoption of stringency measures to restrain the spread of COVID-19. Foreign investors could be averted from investing in a country adopting more radical stringency measures, because it could entail a recession period making less profitable the assets issued by that country. Conversely, foreign investors could be allured by the assets issued by countries adopting more radical containment policies, because these could be perceived as a severe immediate cost to avoid even higher costs in the near future.

We observe that the quarterly average stringency index in each country does not affect inward investment. However, the within-country standard deviation of the stringency index does. In particular, we observe that, after controlling for the severity of the COVID-contagion and removing country fixed-effect, a higher within-country standard deviation in the stringency index makes the adopting countries relatively more attractive for foreign portfolio investors, but only at the end of the first quarter of 2020. An increase of one unit of the within-country standard deviation of the stringency index pushes inward portfolio investments from 0.4% up to 0.8%, depending on the specification adopted. Being the average within-country standard deviation of the stringency index equal to 26 in the first quarter, we point to a sizeable average impact on foreign portfolio investments. This evidence can be interpreted as follows. At the end of the first quarter of 2020, the growth in foreign portfolio investments, typically more volatile and reactive than foreign direct ones, is positively associated with the adoption of COVID containment measures. In particular, since the growth responds to governments’ prompt and severe reactions more than to gradual ones, the former can represent for foreign investors a more serious commitment to stem the spread of COVID-19. At the end of the second quarter, instead, the standard deviation of the index within a country seizes also the retreat of the containment measures: when this index gets blurred and only loosely correlated with the timeliness in the implementation of rigorous containment measures, it also becomes loosely correlated with cross-border investment.

This early evidence seems to suggest that foreign portfolio investors value, rather than the average stringency index level, the speed in the adoption of necessary measures, as a commitment to stability,
lower uncertainty, and then higher adjusted risk-returns in the near future.
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Tables

Figure 1. Quarterly growth in inward investment

This figure reports, in panels #a) and #b), the growth in inward investment, at the end of the first, $\Delta q_1$, and second quarter of 2020, $\Delta q_2$, respectively, as defined in equation (1). Panels 1a) and 1b) refer to total foreign inward investments, panels 2a) and 2b) refer to foreign direct investments, and panels 3a) and 3b) refer to foreign portfolio investments. To enhance readability, growth rates are reported in percentage.
Figure 2. Quarterly growth in inward investment (difference relative to 2019 growth)

This figure is the same as Figure 1, but the quarterly growth in inward investment at the end of the first, $\text{diff}_1\Delta q1$, and second quarter of 2020, $\text{diff}_2\Delta q2$, respectively, are defined as differences with respect to the corresponding quarterly growth in 2019, as defined in equation (3). To enhance readability, growth rates are reported in percentage.
Figure 3. Stringency index: within-country average and standard deviation (by quarter)

This figure reports the distribution and main descriptive statistics of the average within-country Stringency Index, $SI$, in panels 1a) and 1b), and of the within-country standard deviation of the Stringency Index, $\sigma SI$, in panels 2a) and 2b). Panels #a) refer to the first quarter of 2020, while panels #b) refer to the second quarter of 2020.
Table 1. Main findings (first quarter, q1)

This table reports the results of a Robust Least Squares regression (M-estimation), following equation (2). The dependent variable is the quarterly growth in foreign liabilities, constructed as equation in (1), in columns #a, or as in equation (3), in columns #b. Columns (1a) and (1b) refer to foreign total, columns (2a) and (2b) to foreign direct, and columns (3a) and (3b) to foreign portfolio inward investment. ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

|                | Foreign total |             | Foreign Direct |             | Foreign portfolio |             |
|----------------|---------------|-------------|----------------|-------------|-------------------|-------------|
|                | Δq1           | diffΔq1     | Δq1            | diffΔq1     | Δq1               | diffΔq1     |
| constant       | -0.1459 ***   | -0.1577 *** | -0.1413 ***    | -0.1020 **  | -0.2638 ***       | -0.3153 *** |
| (0.0419 )      | (0.0477 )     | (0.0500 )   | (0.0446 )      | (0.0481 )   | (0.0551 )         |
| stringency index (SI) | 0.0005      | -0.0001     | -0.0001        | -0.0007     | -0.0007           | -0.0016     |
| (0.0011 )      | (0.0011 )     | (0.0013 )   | (0.0011 )      | (0.0013 )   | (0.0013 )         |
| st.dev. stringency index (σSI) | 0.0027 *     | 0.0030 *    | 0.0034 *       | 0.0021      | 0.0064 ***        | 0.0066 ***  |
| (0.0015 )      | (0.0017 )     | (0.0018 )   | (0.0016 )      | (0.0017 )   | (0.0020 )         |
| high_ econ. development | 0.0510 ***   | 0.0356      | 0.0278         | 0.0264      | 0.0393 **         | 0.0517 **   |
| (0.0188 )      | (0.0206 )     | (0.0225 )   | (0.0193 )      | (0.0216 )   | (0.0238 )         |
| high_fin. development | -0.0706 **   | -0.0541     | -0.0561        | -0.0261     | -0.0570           | -0.1059 *** |
| (0.0319 )      | (0.0329 )     | (0.0382 )   | (0.0308 )      | (0.0367 )   | (0.0380 )         |
| new COVID deaths per mn | -0.0590     | -0.0091     | -0.0200        | -0.0202     | -0.0103           | 0.0664      |
| (0.1256 )      | (0.1296 )     | (0.1501 )   | (0.1212 )      | (0.1443 )   | (0.1497 )         |
| st.dev. new COVID deaths per mn | 0.0171      | 0.0001      | 0.0001         | 0.0114      | -0.0165           | -0.0497     |
| (0.0565 )      | (0.0583 )     | (0.0675 )   | (0.0545 )      | (0.0649 )   | (0.0673 )         |
| ΔNEER (1-month lag) | 0.6045      | 0.0407      | 1.0991         | 0.8267 *    | 0.2868            | -0.2923     |
| (0.6051 )      | (0.4805 )     | (0.7228 )   | (0.4491 )      | (0.6950 )   | (0.5549 )         |
| # obs          | 53            | 53          | 53             | 53          | 53                | 53          |
| R²             | 0.18          | 0.08        | 0.09           | 0.15        | 0.13              | 0.15        |
Table 2. Main findings

This table reports only the coefficients of our main regressors (SI and σSI), following the econometric specification in equation (2), for the first quarter (columns (1a) and (1b)), the second quarter (columns (2a) and (2b)), and the first semester (columns (3a) and (3b)) of 2020. Panel I, II and III refer, respectively, to total, direct and portfolio inward investment. The econometric specification, as in Table 1, also includes the controls reported at the bottom of the table (the number of the new COVID deaths per mn, its standard deviation, the (one-month lagged) quarterly appreciation in the nominal effective exchange rate, and binary indicators of economic development and financial development). ***, **, and * indicate significance at the 1, 5, and 10% levels, respectively.

| INWARD INVESTMENT | Main findings | q1 (dec2019-mar2020) | diffq1 | q2 (mar2020-jun2020) | diffq2 | s1 (dec2019-jun2020) | diffs1 |
|-------------------|---------------|----------------------|--------|----------------------|--------|----------------------|--------|
|                   | Δq1           | diffΔq1             | Δq2    | diffΔq2             | Δs1    | diffΔs1             |
| I. FOREIGN TOTAL  |               |                      |        |                      |        |                      |
| stringency index, (SI) | 0.0005        | -0.0001              | -0.0008| -0.0008              | 0.0000 | -0.0002              |
|                   | (0.0011)      | (0.0001)             | (0.0034)| (0.0039)             | (0.0004)| (0.0005)             |
|                   | st.dev. stringency index, (σSI) | 0.0027* | 0.0030* | -0.0151 | -0.0091 | 0.0000 | 0.0012 |
|                   | (0.0015)      | (0.0017)             | (0.0189)| (0.0212)             | (0.0011)| (0.0012)             |
| #obs              | 53            | 53                   | 51     | 51                   | 51     | 51                   |
| R²                | 0.18          | 0.08                 | 0.06   | 0.07                 | 0.39   | 0.19                 |
| II. FOREIGN DIRECT |               |                      |        |                      |        |                      |
| stringency index, (SI) | -0.0001       | -0.0007              | -0.0057| -0.0049              | 0.0002 | -0.0006              |
|                   | (0.0013)      | (0.0011)             | (0.0037)| (0.0042)             | (0.0003)| (0.0005)             |
|                   | st.dev. stringency index, (σSI) | 0.0034* | 0.0021 | 0.0240 | -0.0001 | -0.0001 | -0.0020 |
|                   | (0.0018)      | (0.0016)             | (0.0202)| (0.0233)             | (0.0006)| (0.0013)             |
| #obs              | 53            | 53                   | 51     | 51                   | 51     | 51                   |
| R²                | 0.18          | 0.08                 | 0.06   | 0.07                 | 0.39   | 0.19                 |
| III. FOREIGN PORTFOLIO |             |                      |        |                      |        |                      |
| stringency index, (SI) | -0.0007       | -0.0016              | 0.0050 | 0.0020               | 0.0007 | 0.0011               |
|                   | (0.0013)      | (0.0013)             | (0.0037)| (0.0070)             | (0.0009)| (0.0010)             |
|                   | st.dev. stringency index, (σSI) | 0.0064*** | 0.0066*** | -0.0048 | -0.0415 | -0.0004 | 0.0022 |
|                   | (0.0017)      | (0.0020)             | (0.0202)| (0.0384)             | (0.0021)| (0.0024)             |
| #obs              | 53            | 53                   | 51     | 51                   | 51     | 51                   |
| R²                | 0.18          | 0.08                 | 0.06   | 0.07                 | 0.39   | 0.19                 |

other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (log) NEER, (log) economic development, (log) financial development
### Table 3. Sensitivity analysis: controls’ specification

This table is the same as Table 2, but the covariate "new number of COVID deaths per mn" is replaced by the covariate "new cases of COVID per mn", with its corresponding within-country standard deviation.

| INWARD INVESTMENT | Sensitivity analysis: new COVID cases per mn (alternative to new deaths per mn) |
|-------------------|---------------------------------------------------------------------------------|
|                   | Controls’ specification: new COVID cases per mn                                 |
|                   | Δq1 | diffΔq1 | Δq2 | diffΔq2 | Δs1 | diffΔs1 |
| I. FOREIGN TOTAL  | (1a) | (1b)    | (2a) | (2b)    | (3a) | (3b) |
| stringency index, (SI) | 0.0004 | 0.0003 | 0.0012 | 0.0008 | 0.0001 | 0.0000 |
| st.dev. stringency index, (σSI) | (0.0011) | (0.0008) | (0.0038) | (0.0041) | (0.0004) | (0.0006) |
| #obs | 53 | 53 | 51 | 51 | 51 | 51 |
| R²  | 0.17 | 0.07 | 0.04 | 0.05 | 0.44 | 0.18 |
| II. FOREIGN DIRECT | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| stringency index, (SI) | -0.0004 | -0.0006 | -0.0047 | -0.0040 | 0.0005 | -0.0003 |
| st.dev. stringency index, (σSI) | (0.0012) | (0.0011) | (0.0043) | (0.0053) | (0.0003) | (0.0006) |
| #obs | 53 | 53 | 51 | 51 | 51 | 51 |
| R²  | 0.17 | 0.07 | 0.04 | 0.05 | 0.44 | 0.18 |
| III. FOREIGN PORTFOLIO | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) |
| stringency index, (SI) | -0.0004 | -0.0010 | 0.0058 | 0.0017 | 0.0009 | 0.0011 |
| st.dev. stringency index, (σSI) | (0.0010) | (0.0013) | (0.0041) | (0.0070) | (0.0009) | (0.0010) |
| #obs | 53 | 53 | 51 | 51 | 51 | 51 |
| R²  | 0.17 | 0.07 | 0.04 | 0.05 | 0.44 | 0.18 |

other controls: new COVID cases per mn, st.dev. new COVID cases per mn, (lag) NEER, (lag) economic development, (lag) financial development
### Table 4. Sensitivity analysis: sample specification

This table is the same as Table 2, but the sample excludes China (columns (1a) and (1b)), or offshore countries (from columns (2a) to (4b)), according to three alternative offshore definitions: columns (2a) and (2b) follow the classification in Damgaard et al. (2018), columns (3a) and (3b) follow Zoromé (2007), columns (4a) and (4b) follow Lane and Milesi-Ferretti (2017) (see Appendix A.1 for details).

| Sample specification | No China | No offshore |
|----------------------|----------|-------------|
|                      | Δq₁      | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |
|                      | diffΔq₁  | Δq₁         |

| Sensitivity analysis | Sample specification |
|----------------------|----------------------|
|                      | (Jul-Dec 2019-Mar 2020) |
|                      | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |
| INWARD INVESTMENT    |      |      |      |      |      |      |      |      |
|                      | 0.0003 | -0.0002 | 0.0006 | -0.0006 | 0.0005 | -0.0005 | 0.0003 | -0.0006 |
|                      | (0.0016) | (0.0016) | (0.0009) | (0.0011) | (0.0011) | (0.0009) | (0.0011) | (0.0009) |
|                      | 0.0027 | * 0.0030 | * 0.0023 | * 0.0049 | *** 0.0047 | *** 0.0059 | *** 0.0049 | *** 0.0060 |
|                      | (0.0015) | (0.0018) | (0.0014) | (0.0019) | (0.0016) | (0.0016) | (0.0016) | (0.0017) |
|                      | 0.0016 | * 0.0015 | * 0.0015 | * 0.0013 | (0.0015) | (0.0012) | (0.0016) | (0.0013) |
|                      | 0.0028 | * 0.0023 | 0.0051 | ** 0.0043 | ** 0.0061 | *** 0.0060 | *** 0.0062 | ** 0.0059 |
|                      | (0.0016) | (0.0016) | (0.0022) | (0.0021) | (0.0023) | (0.0023) | (0.0025) | (0.0024) |
|                      | 0.0016 | * 0.0019 | (0.0014) | (0.0014) | (0.0013) | (0.0015) | (0.0014) | (0.0017) |
|                      | 0.0056 | *** 0.0065 | *** 0.0080 | *** 0.0080 | *** 0.0079 | *** 0.0071 | *** 0.0080 | *** 0.0072 |
|                      | (0.0016) | (0.0020) | (0.0021) | (0.0024) | (0.0021) | (0.0021) | (0.0022) | (0.0030) |

|                      | # obs | 52 | 52 | 49 | 49 | 47 | 47 | 45 | 45 |
|                      | R²    | 0.18 | 0.09 | 0.17 | 0.12 | 0.20 | 0.17 | 0.24 | 0.19 |
|                      |       | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |
|                      |       | 0.08 | 0.17 | 0.13 | 0.16 | 0.15 | 0.17 | 0.17 | 0.17 |
|                      |       | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |
|                      |       | 0.12 | 0.13 | 0.19 | 0.17 | 0.16 | 0.12 | 0.16 | 0.16 |

Other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development

* * * 0.05, ** 0.01, *** 0.001
### Table 5. Sensitivity analysis: specification of the econometric model

This table is the same as Table 2, but under alternative econometric specifications: OLS in columns (1a) and (1b), and Quantile regressions in columns (2a) to (4b).

| INWARD INVESTMENT | Sensitivity analysis | Econometric model specification |
|-------------------|----------------------|---------------------------------|
| q1(Dec2019-Mar2020) | OLS | Quantile regression |
| | Δq1 | diff[Δq1] | Δq1 | diff[Δq1] | Δq1 | diff[Δq1] | Δq1 |
| I. FOREIGN TOTAL | | | | | | | |
| stringency index, (SI) | 0.0006 | 0.0003 | 0.0011 | 0.0006 | 0.0001 | -0.0001 | 0.0000 | 0.0002 |
| (0.0012) | (0.0009) | (0.0011) | (0.0012) | (0.0011) | (0.0012) | (0.0011) | (0.0010) | |
| st.dev. stringency index, (σSI) | 0.0026 | 0.0026 | 0.0030 | 0.0052 | 0.0037 | 0.0048 | 0.0019 | -0.0002 |
| (0.0015) | (0.0018) | (0.0020) | (0.0027) | (0.0029) | (0.0035) | (0.0025) | (0.0023) | |
| # obs | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| R²/Pseudo-R² | 0.30 | 0.22 | 0.19 | 0.14 | 0.10 | 0.05 | 0.15 | 0.07 |
| II. FOREIGN DIRECT | | | | | | | |
| stringency index, (SI) | 0.0001 | 0.0002 | 0.0008 | -0.0001 | -0.0001 | -0.0003 | -0.0004 |
| (0.0013) | (0.0016) | (0.0013) | (0.0002) | (0.0014) | (0.0006) | (0.0012) | (0.0001) | |
| st.dev. stringency index, (σSI) | 0.0040 | 0.0036 | 0.0089 | 0.0052 | 0.0028 | 0.0037 | 0.0010 | 0.0008 |
| (0.0018) | (0.0024) | (0.0039) | (0.0033) | (0.0029) | (0.0035) | (0.0024) | (0.0023) | |
| # obs | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| R²/Pseudo-R² | 0.20 | 0.15 | 0.22 | 0.16 | 0.09 | 0.11 | 0.10 | 0.13 |
| III. FOREIGN PORTFOLIO | | | | | | | |
| stringency index, (SI) | -0.0009 | -0.0017 | 0.0010 | 0.0000 | -0.0018 | -0.0018 | -0.0005 | -0.0028 ** |
| (0.0016) | (0.0019) | (0.0026) | (0.0019) | (0.0025) | (0.0013) | (0.0010) | (0.0010) | |
| st.dev. stringency index, (σSI) | 0.0056 | 0.0068 ** | 0.0022 | 0.0055 * | 0.0072 ** | 0.0055 ** | 0.0045 * | 0.0074 ** |
| (0.0022) | (0.0029) | (0.0031) | (0.0032) | (0.0025) | (0.0024) | (0.0026) | (0.0023) | |
| # obs | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| R²/Pseudo-R² | 0.28 | 0.21 | 0.23 | 0.20 | 0.11 | 0.16 | 0.11 | 0.11 |

Other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development.
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):

\[
\Delta q_1 \equiv \frac{(L_{03\_20} - L_{12\_19})}{L_{12\_19}} \\
\Delta q_2 \equiv \frac{(L_{06\_20} - L_{03\_20})}{L_{03\_20}} \\
\Delta s_1 \equiv \frac{(L_{06\_20} - L_{12\_19})}{L_{12\_19}}
\]

or equation (3):

\[
diff \Delta q_1 \equiv \frac{(L_{03\_20} - L_{12\_19})L_{12\_19} - (L_{03\_19} - L_{12\_18})}{L_{12\_18}} \\
diff \Delta q_2 \equiv \frac{(L_{06\_20} - L_{03\_20})L_{03\_20} - (L_{06\_19} - L_{03\_19})}{L_{03\_19}} \\
diff \Delta s_1 \equiv \frac{(L_{06\_20} - L_{12\_19})L_{12\_19} - (L_{06\_19} - L_{12\_18})}{L_{12\_18}}
\]

The liabilities $L$ considered are, alternatively: Total foreign inward investment, Foreign Direct investment and Foreign Portfolio Investment.

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, 5a and 5b, we restrict the sample to exclude potential offshore countries. Columns (2) and (2a) refer to the offshore classification specified in Damgaard et al. (2018). From our original sample, Hong Kong, Ireland, Luxembourg, the Netherlands and Singapore are excluded. Columns (3) and (3a) refer 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. Columns (4) and (4a) refer 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 regressor

Stringency index (and its within-country standard deviation)

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 ($SI_j$) and its quarterly standard deviation ($\sigma SI_j$), computed within each country over the corresponding quarter.

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

**Other controls**

**New COVID death per mn (and its within-country standard deviation)**

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. This covariate closely follows the stringency index: it is always included in the regression specification in the form of the stringency index. To avoid eventual zeros at the denominator (when considering the growth rate of "new COVID death per mn" in the second quarter), we add 0.0001 to the corresponding values. (it is negligible relative to both the average and the standard deviation).

Source: https://github.com

**New COVID cases per mn (and its within-country standard deviation)**

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. This covariate closely follows the stringency index: it is always included in the regression specification in the form of the stringency index.

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 $\Delta q_1$ as defined in equation (1), then the regressor included is $(NEER_{03_20} - NEER_{12_19}) / NEER_{12_19}$

Source: Bank for International Settlements

**Economic Development**

GDP per capita (year: 2019, or latest available data). The regressor included is a binary variable equal to 1 if the GDP per capita is larger than the sample mean, and 0 otherwise.

Source: CEIC data

**Financial development**

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
Figure 4. Semi-annual growth in inward investment (%)

This figure is similar to Figure 1 and 2, but reports the growth in foreign liabilities at the end of the first semester of 2020. Panels #a) refer to the measure $\Delta s1$ defined analogously to $\Delta q1$ in equation (1), while panels #b) refer to the measure $diff s1$, defined analogously to $diff q1$ in equation (3). To enhance readability, growth rates are reported in percentage.
Table 4a. Sensitivity analysis: sample specification (second quarter 2020)
This table is the same as Table 4, but refers to the end of the second quarter of 2020 (relative to the first quarter), rather than to the first quarter.

| INWARD INVESTMENT | Sensitivity analysis | Sample specification |
|-------------------|---------------------|---------------------|
|                   | No China            | No offshore         |
|                   | Δq2 diffΔq2         | Δq2 diffΔq2         |
| I. FOREIGN TOTAL  | (1a) (1b)           | (2a) (2b)           |
| stringency index, (SI) | -0.0012 (0.0036) | -0.0005 (0.0041) |
| st.dev. stringency index, (σSI) | -0.0156 (0.0192) | -0.0084 (0.0215) |
| # obs             | 50                  | 50                  |
| R²                | 0.06                | 0.07                |
| II. FOREIGN DIRECT| (1a) (1b)           | (2a) (2b)           |
| stringency index, (SI) | -0.0069 *(0.0040) | -0.0041 (0.0044) |
| st.dev. stringency index, (σSI) | 0.0214 (0.0211) | 0.0017 (0.0231) |
| # obs             | 50                  | 50                  |
| R²                | 0.09                | 0.11                |
| III. FOREIGN PORTFOLIO| (1a) (1b)           | (2a) (2b)           |
| stringency index, (SI) | 0.0039 (0.0039) | 0.0041 (0.0073) |
| st.dev. stringency index, (σSI) | -0.0074 (-0.0208) | -0.0371 (-0.0387) |
| # obs             | 50                  | 50                  |
| R²                | 0.17                | 0.09                |

other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development
Table 4b. Sensitivity analysis: sample specification (first semester 2020)

This table is the same as Table 4, but refers to the end of the first semester of 2020 (relative to the end of 2019), rather than to the first quarter.

| INWARD INVESTMENT | Sensitivity analysis | Sample specification |
|-------------------|----------------------|----------------------|
|                   | No China | No offshore |
| I. FOREIGN TOTAL  | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 |
| stringency index, (SI) | 0.0000 | -0.0002 | 0.0000 | -0.0002 | 0.0002 | 0.0000 | 0.0001 | 0.0000 |
| st.dev. stringency index, (σSI) | 0.0000 | 0.0013 | 0.0001 | 0.0013 | 0.0013 | -0.0002 | 0.0013 | -0.0001 |
| # obs | 50 | 50 | 47 | 47 | 45 | 45 | 43 | 43 |
| R² | 0.40 | 0.19 | 0.47 | 0.22 | 0.53 | 0.40 | 0.55 | 0.39 |
| II. FOREIGN DIRECT | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 |
| stringency index, (SI) | 0.0002 | -0.0006 | 0.0001 | -0.0005 | 0.0005 | -0.0001 | 0.0005 | 0.0001 |
| st.dev. stringency index, (σSI) | -0.0001 | -0.0019 | -0.001 | -0.0019 | -0.0011 | -0.0001 | -0.0001 | -0.0010 |
| # obs | 50 | 50 | 47 | 47 | 45 | 45 | 43 | 43 |
| R² | 0.31 | 0.20 | 0.34 | 0.21 | 0.37 | 0.27 | 0.36 | 0.26 |
| III. FOREIGN PORTFOLIO | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 | Δs1 | diffΔs1 |
| stringency index, (SI) | 0.0007 | 0.0012 | 0.0007 | 0.0009 | 0.0008 | 0.0012 | 0.0007 | 0.0008 |
| st.dev. stringency index, (σSI) | 0.0000 | 0.0021 | 0.0005 | 0.0026 | -0.0003 | 0.0025 | -0.0001 | 0.0028 |
| # obs | 50 | 50 | 47 | 47 | 45 | 45 | 43 | 43 |
| R² | 0.38 | 0.15 | 0.41 | 0.24 | 0.40 | 0.15 | 0.41 | 0.17 |

other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development
Table 5a. Sensitivity analysis: econometric specification (second quarter 2020)
This table is the same as Table 5, but refers to the end of the second quarter of 2020 (relative to the first quarter), rather than to the first quarter.

| INWARD INVESTMENT | Sensitivity analysis | Econometric model specification |
|-------------------|----------------------|---------------------------------|
|                   |                      | (q2/Mar2019-Jun2020)            |

| Stringency index (SI)         | OLS | Quantile regression |
|-------------------------------|-----|---------------------|
|                               | p25 | p50 | p75 | Δ q2 | Δ q2 diff | Δ q2 | Δ q2 diff | Δ q2 | Δ q2 diff | Δ q2 | Δ q2 diff |
| I. FOREIGN TOTAL              |     |     |     |      |        |      |        |      |        |      |        |
|                               | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |     |     |     |
| stringency index (SI)         | -0.0007 | -0.0006 | -0.0008 | -0.0010 | 0.0002 | -0.0039 | 0.0014 | 0.0062 |     |     |     |
| st.dev. stringency index (eSI) | -0.0182 | -0.0155 | -0.0206 | -0.0243 | 0.0065 | -0.0277 | -0.0102 | 0.0169 |     |     |     |
|                               | (0.0057) | (0.0058) | (0.0047) | (0.0052) | (0.0053) | (0.0052) | (0.0051) | (0.0058) |     |     |     |
| II. FOREIGN DIRECT            |     |     |     |      |        |      |        |      |        |      |        |
|                               | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |     |     |     |
| stringency index (SI)         | -0.0040 | -0.0022 | -0.0026 | -0.0026 | -0.0060 | -0.0057 | -0.0081 | -0.0049 |     |     |     |
| st.dev. stringency index (eSI) | -0.0259 | -0.0236 | 0.0211 | 0.0016 | 0.0042 | -0.0096 | -0.0291 | -0.0265 |     |     |     |
|                               | (0.0084) | (0.0085) | (0.0057) | (0.0064) | (0.0053) | (0.0057) | (0.0057) | (0.0059) |     |     |     |
| III. FOREIGN PORTFOLIO         |     |     |     |      |        |      |        |      |        |      |        |
|                               | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |     |     |     |
| stringency index (SI)         | 0.0045 | 0.0035 | 0.0059 | 0.0065 | 0.0049 | 0.0044 | -0.0049 | 0.0113 |     |     |     |
| st.dev. stringency index (eSI) | 0.0043 | -0.0396 | -0.0026 | -0.0154 | -0.0079 | -0.0295 | -0.0418 | -0.0152 |     |     |     |
|                               | (0.0085) | (0.0077) | (0.0092) | (0.0094) | (0.0056) | (0.0081) | (0.0085) | (0.0094) |     |     |     |
| other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development |     |     |     |      |        |      |        |      |        |      |        |
Table 5b. Sensitivity analysis: econometric specification (first semester 2020)

This table is the same as Table 5, but refers to the end of the first semester of 2020 (relative to the end of 2019), rather than to the first quarter.

| INWARD INVESTMENT | Sensitivity analysis | Econometric model specification |
|-------------------|----------------------|---------------------------------|
|                   | OLS                  | Quantile regression             |
|                   | Δs1                  | p25    | p50    | p75    | Δs1    | p25    | p50    | p75    | Δs1    | p25    | p50    | p75    |
| I. FOREIGN TOTAL  |                      |        |        |        |        |        |        |        |        |        |        |        |
|                   | sI(Dc2019­Jun2020)  |        |        |        |        |        |        |        |        |        |        |        |
|                   | (1a)                 | (a)    | (2a)   | (2b)   | (3a)   | (3b)   | (4a)   | (4b)   |        |        |        |        |
| stringency index  | -0.0002              | -0.0006| 0.0001 | -0.0001| 0.0001 | -0.0005| 0.0000 | -0.0015|        |        |        |        |
| (SI)              | (0.0006)             | (0.0008)| (0.0004)| (0.0005)| (0.0006)| (0.0010)| (0.0007)| (0.0018)|        |        |        |        |
| st.dev. stringency index (eSI) | -0.0003    | 0.0016 | 0.0008 | 0.0023 | 0.0000 | 0.0016 | 0.0006 | 0.0000 |        |        |        |        |
|                   | (0.0015)             | (0.0018)| (0.0013)| (0.0016)| (0.0014)| (0.0018)| (0.0022)| (0.0026)|        |        |        |        |
| #obs              | 51                   | 51     | 51     | 51     | 51     | 51     | 51     | 51     |        |        |        |        |
| R²/Pseudo-R²      | 0.45                 | 0.38   | 0.50   | 0.38   | 0.31   | 0.16   | 0.23   | 0.14   |        |        |        |        |
| II. FOREIGN DIRECT|                      |        |        |        |        |        |        |        |        |        |        |        |
|                   | sI(Dc2019­Jun2020)  |        |        |        |        |        |        |        |        |        |        |        |
|                   | (1a)                 | (1b)   | (2a)   | (2b)   | (3a)   | (3b)   | (4a)   | (4b)   |        |        |        |        |
| stringency index  | 0.0000               | -0.0007| 0.0002 | 0.0000 | 0.0003 | -0.0006| 0.0008 | -0.0021| *      |        |        |        |
| (SI)              | (0.0008)             | (0.0010)| (0.0004)| (0.0006)| (0.0004)| (0.0016)| (0.0006)| (0.0012)|        |        |        |        |
| st.dev. stringency index (eSI) | -0.0012    | -0.0008| 0.0000 | -0.0007| -0.0007| -0.0015| -0.0002| -0.0037| *      |        |        |        |
|                   | (0.0019)             | (0.0024)| (0.0008)| (0.0013)| (0.0009)| (0.0022)| (0.0018)| (0.0018)|        |        |        |        |
| #obs              | 51                   | 51     | 51     | 51     | 51     | 51     | 51     | 51     |        |        |        |        |
| R²/Pseudo-R²      | 0.33                 | 0.28   | 0.40   | 0.31   | 0.31   | 0.20   | 0.13   | 0.10   |        |        |        |        |
| III. FOREIGN PORTFOLIO|                    |        |        |        |        |        |        |        |        |        |        |        |
|                   | sI(Dc2019­Jun2020)  |        |        |        |        |        |        |        |        |        |        |        |
|                   | (1a)                 | (1b)   | (2a)   | (2b)   | (3a)   | (3b)   | (4a)   | (4b)   |        |        |        |        |
| stringency index  | 0.0001               | -0.0002| 0.0007 | 0.0004 | 0.0011 | 0.0019 | 0.0000 | 0.0000 |        |        |        |        |
| (SI)              | (0.0012)             | (0.0013)| (0.0009)| (0.0013)| (0.0011)| (0.0013)| (0.0021)| (0.0022)|        |        |        |        |
| st.dev. stringency index (eSI) | 0.0030    | 0.0037 | 0.0020 | 0.0037 | 0.0021 | 0.0026 | -0.0020| 0.0026 |        |        |        |        |
|                   | (0.0030)             | (0.0031)| (0.0026)| (0.0033)| (0.0033)| (0.0036)| (0.0029)| (0.0054)|        |        |        |        |
| #obs              | 51                   | 51     | 51     | 51     | 51     | 51     | 51     | 51     |        |        |        |        |
| R²/Pseudo-R²      | 0.40                 | 0.39   | 0.42   | 0.23   | 0.28   | 0.18   | 0.23   | 0.15   |        |        |        |        |

other controls: new COVID deaths per mn, st.dev. new COVID deaths per mn, (lag) NEER, (lag) economic development, (lag) financial development