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WORKING PAPER NO. 721

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June 2024

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ISSN: 2240-9696

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The Staying Power of Face-to-face in the Global Venture Capital Market

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Abstract
Technological advancements and globalization of venture capital (VC) point to a diminishing role of direct face-to-face (F2F) interactions between VCs and entrepreneurs seeking funding. We show that ability to conduct such interactions remains an important factor for segments of the VC market, and especially for its internationalization. Using a sample of VC deals around the world, and the staggered implementation of travel restrictions across countries in response to the spread of Covid-19 in 2020, we find that investment by foreign VCs in a country drops after it halts inbound travel. Our analysis of possible channels suggests that information asymmetry between contracting parties is the main driver of the importance of F2F, while technological constraints on the transmission of information and cultural differences are less significant.

JEL Classification: G24; F21; D81; E22; E44.

Keywords: Face-to-Face Interaction, Investments, Venture Capital.

Acknowledgments: For valuable comments and suggestions, we are grateful to Niklas Amberg, Silvia Dalla Fontana, Yudong Liu (discussant), Ettore Savoia, Ulf Söderström, and seminar and conference participants at the FMA European Conference (2024) and Sveriges Riksbank.

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1. Introduction

Since the 1990s, a common view among financial practitioners and scholars has been that "geographical location no longer matters in finance or matters much less than hitherto" (O'Brien, 1992, p. 1). Advances in information and communication technology (ICT) coupled with trends of deregulation have greatly reduced the information asymmetry problems present in many financial transactions, especially those involving the funding of small businesses and entrepreneurial firms, and have allowed providers of capital to increase their geographic reach. This increase in reach is often deemed as one of the two components of a binary trend, whose other piece is the reduction in direct face-to-face (F2F) interaction between providers of capital and firms and entrepreneurs in need of financial resources.[1] In this paper, we question the notion of equating "end of proximity" with "end of F2F" by showing that ability to interact F2F remains a fundamental part of financing transactions even if the transacting parties are located at a great geographical distance.

We base our empirical analysis on the venture capital (VC) industry. It offers an ideal test setting to explore the staying power of F2F in the provision of capital to firms in a global financial market. VC investors provide equity capital and managerial expertise to small, young, high-growth companies. Staged financing and syndication are often used to address information asymmetry and agency problems, and to reduce deal risk, establishing the need for on-site involvement and direct F2F interactions between VCs and entrepreneurs as well as within VC syndicates (Sahlman, 1990; Gompers and Lerner, 1999; Sorensen and Stuart, 2001; Chen et al., 2010; Cumming and Dai, 2010).

The advancement and diffusion of ICT, however, made the interactions between VCs and entrepreneurs less costly and more effective, facilitating the spatial expansion of VC investment (Pradhan et al., 2020). Consistent with the process of delocalization of financial activity, VCs have also increasingly internationalized investments (Makela and Maula, 2006; Aizenman and Kendall, 2012; Devigne et al., 2018). In fact, in recent years up to 50% of VC investments are in the form of cross-border deals (Alvarez-Garrido and Guler, 2023; Kollmann et al., 2023), and in some

[1] "Not only are borrowers growing physically more distant from lenders with whom they start a relationship, they are also communicating less and less in person" as noted by Petersen and Rajan (2002, p. 2534) in their description of the changing nature of banking in the United States. This points to reduction in the importance of F2F interaction between borrowers and lenders in loan contracting. This is further underscored by Berger et al. (2005, p. 255) as they posit that "impersonal communication and physical distance are clearly related – it is more difficult to visit a distant bank in person".

countries they can account for the majority of VC-funded firms (Dai and Nahata, 2016; Bradley et al., 2019). The substantial growth of cross-border investment suggests that the need for direct F2F interactions between VCs and entrepreneurs, as well as on-site involvement with portfolio firms might have lost relevance. However, we show that ability of VCs to have direct interaction with portfolio companies is important for the allocation of capital within the VC market and for its internationalization.

Our empirical strategy is based on the staggered adoption of international inbound travel restrictions across countries following the outbreak of the SARS-COV-2 (Covid-19) virus in 2020. As the pandemic spread around the globe, countries instituted various restrictions on international travel, completely banning entry in some cases. Such policies effectively prevent foreign VCs from entering a country and visiting entrepreneurial firms and investees, which leads to a wedge in the ability of foreign and domestic VCs to have on-site involvement and direct interaction with portfolio companies in this country. In our analysis, we exploit this wedge for identification.

Using a sample of VC deals that took place in 90 countries around the globe from January 2019 to December 2021, and staggered difference-in-differences (DiD) analysis, we first establish that the introduction of international inbound travel restrictions by a country leads to a significant reduction in the activity of foreign VCs in that country in terms of invested amounts and number of deals. Depending on the specification, we estimate reductions in invested amount of up to 39%, while the drop in number of deals is up to 6%. We subject our main results to a variety of robustness tests. First, we perform a few empirical exercises such as pre-treatment trends tests to examine the parallel trends assumption underlying DiD estimations and placebo analysis to verify our approach to treatment based on international inbound travel restrictions. Second, we address methodological challenges in DiD settings with a staggered adoption of non-absorbing treatment and heterogenous effects. Third, we examine the sensitivity of our insights to alternative sample construction criteria and operationalization of treatment. Last, we study internal restrictions on mobility and in-person interaction during the Covid-19 pandemic. Specifically, we test whether internal restrictions have a differential effect on the ability of foreign and domestic VCs to interact with entrepreneurs, and whether they impact domestic VC activity. The tests offer additional support for our identification approach based on international travel restrictions. Overall, our inferences robustly confirm the insight that the delocalization of the global VC market has not eliminated the importance of F2F contact and in-person communication for the provision of capital. They also suggest that the ability

of foreign VCs to directly interact with portfolio firms mitigates frictions in the VC market, and in the process facilitates capital allocation.

Once we establish the main effect of direct interaction, we procced to identify the frictions that make this interaction an important factor in the VC industry. We focus on three broad groups: information asymmetry between contracting parties, technological constraints to transmission of information, and cultural differences. To establish the relevance of a group, we introduce variation within our sample with respect to each factor and estimate heterogeneous effects.

First, if information asymmetry between VCs and entrepreneurial firms drives the need for direct interaction, the adverse effect of restrictions that eliminate such interaction should be more pronounced when information gaps between the contracting parties are larger. Relying on the idea that early-stage deals or younger start-ups exhibit greater information asymmetry, we consistently find that the adverse effect of travel restrictions is stronger in such cases. Second, direct interaction allows the transacting parties to establish a common ground by sharing cultural and local context. Such interactions can also mitigate challenges stemming from cultural differences. If this is a factor for the importance of F2F in the VC market, the effect of the travel restrictions should be stronger when the transacting parties are culturally more distant. Using measures of cultural differences between VCs and entrepreneurs based on linguistic similarity and Hofstede's cultural dimension of individualism, we show that cultural affinity does not significantly affect the consequences of international inbound travel restrictions. Third, direct F2F interaction results in an instantaneous information exchange and can thus eliminate technological inefficiencies related to transmission of information. To examine the point, we explore variation in the degree of digitalization of the countries of the transacting parties, but do not find robust support for this channel. Thus, we infer that information asymmetry is a main factor underlying the staying power of direct F2F interaction in the VC market, technological constraints to communication and exchange of information are relevant but less important, while cultural differences are not a significant factor.

Our paper contributes to the literature that examines the determinants and consequences of proximity and direct interaction in the VC industry. Proximity to entrepreneurial firms allows VCs to better identify investment opportunities and analyze potential targets for funding (Sorensen and Stuart, 2001). Proximity can also impact the monitoring ability of VCs (Lerner, 1995). Gathering information through on-site involvement and F2F meetings reduces information gaps between VCs and firms seeking funding, and allows VCs to understand their needs on an on-going basis (Tian,

2011). The on-site involvement of VCs with portfolio companies is also an important determinant of their success (Bernstein et al., 2016). These effects point to the positive roles of proximity and direct interaction between VCs and entrepreneurs. However, advances in information technology might have eliminated this role, allowing VCs to invest at a greater distance, especially during the time of Covid-19 lockdowns. Consistently, Han et al. (2023) document a significant increase in average distance between VCs and portfolio firms in domestic deals around the world during the pandemic. The increase in average VC-target distance around this time is confirmed by Alekseeva et al. (2023) for domestic deals in the United States. However, they also document a reduction in VC investments in startups located in large entrepreneurial hubs in California and Massachusetts, and an increase in investments in more mature firms in non-hub areas. Taken together, these results suggest that the increase in distance reflects a reallocation of capital toward the typical distant target company, and "a way to balance the limited access to this information" during the lockdown restrictions rather than "death of F2F interactions" in VC deals. Along this line, we document that an introduction of international inbound travel restrictions leads to a reallocation of VC investment from international deals toward domestic ones, confirming that F2F interactions remain important in the VC process.

Our paper also adds to the literature that examines cross-border flows and globalization of the VC market. Extant research points to institutional characteristics and macroeconomic factors as drivers of cross-border capital flows in the VC industry (Guler and Guillen, 2010; Schertler and Tykvova, 2011). Availability of qualified human capital, local business environments, and capital market development are relevant for global VC investors (Aizenman and Kendall, 2012). National distances can adversely affect the success of international VC investments, while the lack of trust and cultural differences can hinder VC internationalization (Li et al., 2014; Bottazzi et al., 2016). Despite a trend of globalization of the VC market, national borders remain a discouraging factor for VC investment (Colombo et al., 2019). Our analysis highlights how variation in regulatory environments across countries can impact the ability of foreign VCs to reach local entrepreneurs, and thus affect cross-border flow of capital.

Cross-border VC investments are subject to particular challenges (Wright et al., 2005). To overcome such challenges, which can limit applicability and effectiveness of domestic approaches, VCs might develop specific strategies when investing abroad (Devigne et al., 2018). These can include, among others, focusing on information-transparent investments and providing strategic

expertise rather than operational advice (Pruthi et al., 2003; Dai et al., 2012). While these strategies can reduce the need for direct F2F interactions between VCs and entrepreneurs, extant research suggests that national cultural differences between VCs and portfolio firms can increase the need for monitoring and on-site involvement (Nahata et al., 2014). We highlight the importance of such direct interactions for foreign VCs.

Our paper also adds to a broader literature on the role of proximity and F2F interaction in economic activity as well as economic policies intended to promote development of VC markets across countries. In this context, Storper and Venables (2004) suggest the most fundamental aspect of proximity is the possibility of F2F contact, and this is particularly important when information is imperfect, rapidly changing, and hard to codify. The VC market presents a setting that reflects well these characteristics, and we show that frictions in the ability of market participants to conduct direct interactions affect the functioning of the market. Our findings are also relevant for research that documents effects of public initiatives and private actions that (indirectly) facilitate exchange and contact between VCs and entrepreneurial firms (Da Rin et al., 2006; Lerner, 2009; Bernstein et al., 2016). We present consequences of the introduction of barriers to this process.

Last, our paper contributes to the literature examining the impact of the Covid-19 pandemic on VC activity. At its onset, the pandemic led to a global decline in investment (Brown and Rocha, 2020; Howell et al., 2020; Gompers et al., 2021). Importantly, Covid-19 caused a reallocation of capital towards pandemic-related sectors such as biotech and away from industries such as tourism (Bellavitis et al., 2022; Bellucci et al., 2023). Our results are consistent with a (spatial) reallocation of capital towards domestic investment in the presence of international inbound travel restrictions.

The rest of the paper is organized as follows. We discuss data and empirical strategy in the next section. The main results, establishing the adverse effect of reduction in direct F2F interaction between VCs and entrepreneurial firms, are in Section 3. In this section, we also examine the identifying assumptions of our strategy and test the robustness of our main insight. In Section 4 we identify some economic mechanisms driving the estimated effect. We conclude in Section 5.

2. Data and empirical strategy

2.1. Data

To capture the effect of direct F2F interactions between VCs and entrepreneurial firms, we need (some) exogenous variation in these interactions. As a source of such variation, we use the

international travel restrictions implemented by many countries around the world during the spread of Covid-19 in 2020. The restrictions were introduced by governments as health policy responses to the global pandemic with the objective to limit the spread of the virus and were motivated mostly by medical science and some political considerations. Hence, the introduction and stringency of the inbound travel restrictions can be seen as exogenous to the VC market.

We collect data on travel restrictions from the Oxford COVID-19 Government Response Tracker database. The database hosts systematic cross-country and cross-temporal measures of government policies implemented in response to the pandemic (Hale et al., 2021).[2] For our main analysis, we focus on measure C8 "Restrictions of International Travel", a categorical variable from 0 to 4 with the following values: 0 – no restriction; 1 – requirement for screen upon arrival; 2 – requirement for quarantine for arrivals from some or all regions; 3 – ban for arrivals from some regions; 4 – ban for arrivals from all regions or total border closure. This is our main measure, but we also use other measures from the database in some of the tests.

We restrict the timeframe of the analysis until the end of 2021. By the end of 2021, a few countries around the world such as Sweden, France, and the United States, among others, begin to implement inbound travel policies conditional on vaccination status, granting entry based on less restrictive protocols to vaccinated travelers. While the share of vaccinated people worldwide is low during the early months of 2021, by January 2022 it reaches about 50%, with many countries well above this percentage. The inability to properly capture the relevant entry requirements, as individual data on vaccination status are not readily available, jeopardizes our identification strategy. Hence, the end date of the analysis.

To examine the effect of restricted ability of VCs to directly interact with portfolio firms, we also need data on interactions during "normal" times. As the first confirmed case of Covid-19 is around the end of 2019, and our timeframe ends in December of 2021, we begin the analysis in January of 2019. We construct a dataset of VC deals that took place globally around that time. Specifically, we start with all deals available on Zephyr, a Bureau van Dijk database, between January 2019 and December 2021 in 117 countries. Zephyr is a comprehensive database with information about VC deals (e.g., amount, date, stage), VC investors (e.g., name, country), and

[2] Data and methodology are available at https://github.com/OxCGRT/covid-policy-tracker. We last downloaded the data on July 4, 2023. Table A.1 of the Appendix provides information about names, codes, and measurement. It also includes descriptions of the various restrictions. Details are available at https://www.bsg.ox.ac.uk/research/covid-19-government-response-tracker.

VC-backed companies (e.g., name, industry, country). For our purposes, a key advantage of the database is information about the country of origin of the lead VC and syndicate participants, as well as the funded venture. In this setting, we can test the importance of direct F2F interactions with varying stringency of the definition of foreign VC or cross-border deal. While we start with 117 countries, some have limited representation in the data. We exclude countries with less than 5 deals over the whole sample period. Consequently, our analysis is based on 90 countries. We verify that our insights hold if we include all countries in robustness tests.

We arrange the data as a panel. As a temporal unit, we use two-week periods. This leads to a total of 72 bi-monthly periods over the 3-year window (from January 1, 2019 to December 31, 2021). We opt for the two-week periods because this strikes a balance between daily or weekly intervals, which could yield too few deals per period in many countries, and monthly or quarterly intervals, which might fail to capture well the dynamics of travel restrictions.

As a cross-sectional unit, we aggregate all VC transactions within each temporal unit into two categories: foreign and domestic. Aggregation is based on the country of origin of the VC-funded firm. We identify deals as *Domestic* if all VCs in the deal are in the same country as the firm. Deals with VCs not in the country of the VC-backed firm are *Foreign*. If a deal is funded by a single VC, the categorization is straightforward. In case of syndicated deals, we consider the transaction as *Foreign* if at least one VC in the syndicate is in a country different from that of the firm. In the robustness section, we modify this definition and verify our results.

2.2. Measures and empirical model

We study the effects of direct F2F interaction in the VC industry by comparing foreign and domestic deals before and after introduction of international inbound travel restrictions by a country. The premise of our strategy is that when inbound travel is restricted, the ability of VCs outside the country of the firm seeking funding to interact with it directly is limited. By contrast, VCs in the country are not affected by the international travel restrictions. Hence, *Foreign* deals constitute the treated group, while *Domestic* deals are the control group.

We identify as treatment periods the temporal units between January 2019 and December 2021 affected by travel restrictions. For each country-period, we use measure C8 "Restrictions on International Travel" to construct a binary variable *Restriction*, which takes the value of 1 if there is complete international inbound travel ban from all regions (category 4 of the measure), and 0

otherwise. We use the highest level of the measure to clearly capture cases of full border closure and complete inbound travel ban that cannot be circumvented by exploiting possible triangulations among countries with partial restrictions.[3] Figure 1 shows the global spread of travel restrictions over time.

[INSERT FIGURE 1 HERE]

The figure shows the fraction of countries in our sample with a complete restriction of international inbound travel (*Restriction* = 1) for each quarter from Q1 of 2020 to Q4 of 2021. The implementation of restrictions begins in Q1 of 2020, covering less than 5% of the countries, and rapidly increases in Q2 of the same year to reach about 50%. The prevalence of international travel restrictions varies over time and aligns with different phases of the pandemic and waves of the virus. We note from the figure that there is substantial variation in treatment over time. As travel restrictions, and treatment, can be modified, dropped, or reintroduced within a country, we use several alternative operationalizations of treatment to ensure that our insights are robust.

We focus on two outcomes: amount of VC investment and number of transactions. Both metrics are aggregated for domestic and foreign deals in each country, within each temporal unit of two weeks. We estimate the effect of the ability of VCs to have direct interaction with portfolio firms using a difference-in-differences (DiD) strategy that compares VC investment for foreign (treated) and domestic (control) deals in periods with and without international travel restrictions (treatment). Leveraging the staggered adoption of treatment, we use the following baseline model:

$$Y_{git} = \gamma Foreign_g \times Restriction_{it} + \phi_{gi} + \phi_t + \varepsilon_{git} \quad (1)$$

where *g* refers to group (treated or control), *i* to country, *t* to temporal unit (bi-monthly period), and *Y* is one of the outcomes (invested amount or number of transactions). We take logarithmic transformation of the outcome variables in the estimation. The baseline model includes country-group (*ID*) fixed effects, ϕ_{gi}, to control for unobservable heterogeneity, and time fixed effects, ϕ_t,

[3] *Restriction* is equal to 1 if C8 "Restrictions on International Travel" is at level 4 "Ban on all regions or total border closure" for the entire temporal unit of two weeks. We examine alternative operationalizations in the robustness tests.

to account for temporal shocks. In more comprehensive specifications, we also add country-group trends. The errors, ε_{git}, are clustered at country level.[4]

In Equation (1), γ is the estimate of the effect of international inbound travel restrictions on foreign deals. A negative and statistically significant coefficient implies that foreign VCs reduce their activity in a country once it limits inbound travel. This would be consistent with the idea that constraining the ability of VCs to have direct interaction and on-site involvement with portfolio companies generates frictions in the VC market that adversely affect its functioning and allocation of capital. In short, $\gamma < 0$ indicates that F2F interaction is relevant for VC investing.

To offer preliminary insights, we provide aggregate statistics in Table 1. Specifically, we compute the share of foreign VC activity (as a fraction of total activity) for each country-period. We show the average of the shares for treated periods, when restrictions are in place in a country (*Restriction* = 1), and for control periods, when international travel in a country is not restricted (*Restriction* = 0). We also report p-values of tests of equality of means for each variable across the two groups.

[INSERT TABLE 1]

From Table 1 we note that the average share of foreign VC activity, measured in invested amount, during the control periods is about 65%. The share drops to about 60% when restrictions are in place. This suggests that introduction of travel restrictions has an adverse effect on foreign VC activity. We observe a similar effect if we focus on number of deals. We conclude that the preliminary analysis is consistent with the notion that the ability of VCs to interact directly with portfolio firms is relevant. We next examine this point in a more formal way.

3. Results

3.1. Baseline results

Table 2 reports the results of the estimation of Equation (1). For each dependent variable, we have one specification with linear trend at country-group level and one without. In column (1), we find that international travel restrictions are associated with a reduction in the amount of

[4] For robustness tests, we also estimate Equation (1) with 1) standard errors clustered at the country-group level and 2) time trends. Our results continue to hold and the results are available upon request.

investment by foreign VCs. The coefficient of the interaction *Foreign* × *Restriction* is -0.444. The point estimate is statistically significant at the 1% level and the magnitude highlights its economic importance. Given the log-linear specification, we infer that foreign VC investment drops by about 36%, relative to domestic one, in a country after it restricts international inbound travel. In column (2) we augment the baseline model with country-group trends. The estimated coefficient of the interaction *Foreign* × *Restriction* is -0.499 and it is significant at the 1% level. In columns (3) and (4), we document a negative impact on number of transactions by foreign VCs. The estimated coefficients are -0.039 and -0.062 and they are significant at the 5% and 1% levels, respectively. This implies a reduction in number of deals by foreign VCs between 4% and 6% once a country bans international inbound travel. Combined, the results point to a reduction in the activity of foreign VCs in terms of amount and number of deals, but also a shift towards smaller deals.

[INSERT TABLE 2 HERE]

Overall, the baseline analysis is consistent with the notion that F2F interactions between investors and investees are important for the (cross-border) activity of VCs. Hence, we infer that policies that limit the ability of VCs to directly interact with portfolio firms can lead to frictions in (segments) of the market. We examine the channels underlying these frictions in Section 4.

3.2. Assumptions underlying the DiD analysis

The DiD analysis relies on an assumption of parallel trends in the outcomes for treated and control groups if there were no treatment. In our case, these are the trends of *Foreign* and *Domestic* deals if there were no international inbound travel restrictions. While the assumption is inherently unverifiable, we conduct several tests and placebo analyses to offer insights into the validity of our approach.

First, we conduct a common trend test following Gertler et al. (2016). We compare average growth rates of the outcome variables for treated (*Foreign*) and control (*Domestic*) groups of deals during the pre-treatment period. Table 3 shows the average growth rates. We find no statistically significant differences between the two groups, which is consistent with the underlying assumption of the DiD analysis.

[INSERT TABLE 3 HERE]

We also conduct a test based on Autor (2003). We augment the baseline model with a set of interaction terms between the treatment variable and binary indicators for pre-treatment periods. Lack of statistically significant estimates of the interaction terms is consistent with common trends. We plot in Figure 2 coefficient estimates, and 99% confidence intervals, of the interaction terms from 24 to 2 bi-monthly periods before the implementation of international inbound travel restriction in country *i*. The figure also shows the average post-treatment estimate and treatment time, indicated by a vertical dashed line. We note that the pre-treatment estimates are not statistically significant. Hence, the results are in line with the assumption of our empirical strategy.

[INSERT FIGURE 2 HERE]

Second, we perform some placebo exercises. Following Christensen et al. (2016), we use random assignment of "pseudo-treatment" date to each country prior to the actual date it restricts travel. We then re-estimate Equation (1) using the pseudo-treatment dates. We repeat the process 1,000 times and plot in Figure 3 the coefficients of the 1,000 DiD estimates and 90% confidence interval. Our baseline estimates from columns (2) and (4) of Table 2 are below the cut-offs corresponding to the 1% tail of the distributions derived under the pseudo-treatment. Hence, this test yields further support for our empirical strategy.

[INSERT FIGURE 3 HERE]

3.3. Internal restrictions

Our identification strategy relies on a wedge, from the restriction of international inbound travel, between the abilities of foreign and domestic VCs to interact with entrepreneurial firms. As another test, we explore the effect of country-level internal restrictions that principally should not lead to such a wedge. We re-estimate Equation (1) using restrictions with a domestic impact that should equally affect domestic and foreign VCs. A significant effect in this case would question our identification. For the analysis, we use the Oxford COVID-19 Government Response Tracker dataset to construct three additional indicators: 1) *Gathering Restriction*, which is 1 for deals in

country-periods with full restriction on small (of 10 people or less) gatherings; 2) *Movement Restriction*, which is 1 for deals in country-periods with a full restriction on internal movement; and 3) *Workplace Closing*, which is 1 for deals in country-periods with a complete workplace closure.[5] The results of the analysis are in Panel A of Table 4. The coefficients of the interactions between *Foreign* and the indicators for internal restrictions are not statistically significant. This shows that there is no wedge in the activity of foreign and domestic VCs from the implementation of domestic restrictions.

[INSERT TABLE 4 HERE]

While we leverage the complete closure of borders for identification, it might be useful to study the effect of limited ability to interact within a country on domestic deals. However, such an approach might not correctly identify the effect of ability to interact directly because investors and start-ups might still have (limited) opportunities to conduct in-person meetings if both are in the same country. Moreover, international restrictions can be enforced more easily. To examine, we restrict our analysis to the domestic deals and use the three indicators for internal restrictions: *Gathering Restriction*, *Movement Restriction*, and *Workplace Closing*. Panel B of Table 4 shows that introduction of domestic restrictions does not affect domestic VC activity in a significant way. This highlights the use of our international setting for identification of the effect of direct F2F interactions in the VC market.

3.4. Methodological challenges with DiD analysis

If treatment adoption is staggered and non-absorbing, and treatment effects differ across units and over time, the DiD analysis presents some methodological concerns (e.g., Gardner, 2022; Freedman et al., 2023; Roth et al., 2023). To address these concerns, we apply several refinements. First, we restrict the sample to a "clean" control group of countries that never implement a full travel restriction and a "clean" treated group of countries that introduce restrictions and keep them in place until the end of the sample period. Countries that implement restrictions but reverse them later are excluded. With this sub-sample, *Restriction (permanent)* takes the value 1 for periods when a country has a "permanent" international inbound travel restriction, and 0 otherwise.

[5] The indicators are based on measures C4, C7, and C2 of the database and described in Table A.1 of the Appendix.

Second, we retain the "clean" control group but change the condition of "permanent" restrictions for the treated group. Specifically, if a country implements several rounds of travel restrictions, we focus only on the "first wave" of restrictions and drop the country-periods after the first wave. With this sub-sample, we construct *Restriction (first wave)* that takes the value 1 for periods with travel restrictions part of the "first wave" for the country, and 0 otherwise. Third, we implement a two-stage DiD approach that is robust to treatment-effect heterogeneity under staggered adoption (Gardner, 2022). In the first stage, the outcomes of interest (invested amount and number of deals) are regressed on period and country-group fixed effects using untreated observations. In the second stage, the outcomes are adjusted for the estimated effects and these adjusted outcomes are used to estimate treatment effect. Last, we retain the full sample but augment the model with the triple interaction *Foreign* × *Restriction* × *Restricted Periods*, where *Restricted Periods* is the cumulative total number of periods with international travel restrictions the country has experienced up to that point in time. The results of the tests are in Table 5. They suggest that our insights are robust to methodological challenges of DiD analysis with staggered adoption of treatment.

[INSERT TABLE 5 HERE]

3.5. Operationalization of treatment

While the previous tests suggest that our insights are robust to methodological concerns, we further examine the key measures in the analysis: *Foreign* and *Restriction*. Thus, we refine the operationalization of treatment group and treatment period. First, recall that *Foreign* takes the value of 1 if at least one VC in the deal is outside the country of the funded firm. We construct two alternative indicators. The first is *Foreign (all foreign vs. others)*. It takes the value of 1 if all VCs in a deal are outside the country of the funded firm, and 0 otherwise. The second is *Foreign (all foreign vs. all domestic)*. It takes the value of 1 if all VCs in the deal are outside the country of the funded firm, and 0 if all are in the country. We eliminate deals that include both foreign and domestic VCs. We estimate Equation (1) using these measures and report the results in Table 6. Our insights are not sensitive to the definition of treatment group adopted in the main analysis.

[INSERT TABLE 6 HERE]

Second, we use alternative treatment periods. In the baseline analysis, *Restriction* takes the value of 1 for country-periods with a complete ban on international inbound travel (i.e., when the measure C8 takes on a value of 4). However, toward the end of the sample period, countries start to implement policies conditional on vaccination status, but comprehensive information on the status of each VC is not available. To examine the robustness of our insights, we focus on the period before majority of the population of the three main source countries for venture capital is vaccinated and exclude periods after that. Specifically, we consider China, the United States, and the United Kingdom as they represent 70% of all foreign VCs. The vaccination rates in the three countries exceed 50% by August 2021. Hence, we drop all temporal units after that point in time. For expositional purposes, we rename the country-period treatment indicator *Restriction (before vaccination)*. The results of the estimation of Equation (1) on this sub-sample are in columns (3) and (6) of Table 6. Our insights remain unchanged.

3.6. Additional robustness tests

We perform several additional robustness tests. First, we check if our results are driven by other policies or confounding factors. For instance, our analysis uses complete border closure, but it is possible that less restrictive policies such as quarantine requirements that reduce ease of entry but do not fully eliminate it also affect foreign VC activity. This can lead to a measurement error in the identification of "control" periods. Hence, we construct a variable *Restriction Weak*. This is an indicator that takes the value of 1 for country-periods with weaker international travel restrictions, and 0 otherwise.[6] We augment the baseline model with the interaction *Foreign* × *Restriction Weak*. A second concern is that the observed effect depends on the spread of Covid-19 rather than on the actual travel restrictions. For instance, foreign investors might avoid taking risks such as international travel in a pandemic context, even if travel is allowed. To investigate, we construct a variable *First Case*, which takes the value of 1 for country-periods after the first case of Covid-19 in the country, and 0 otherwise. We add the interaction *Foreign* × *First Case* to the baseline model. We also consider the extend of the spread of Covid-19. We construct *Covid Cases* as the natural logarithm of 1 plus the number of cases for each country-period and add the

[6] The weaker restrictions are based on C8 categories of 1 (screening arrivals), 2 (quarantining arrivals from some or all regions), and 3 (banning arrivals from some regions). Details are provided in Table A.1 of the Appendix.

interaction *Foreign* × *Covid Cases*. The results of these augmented models are in Table 7. They confirm the effect of international inbound travel restrictions on the activity of foreign VCs.

[INSERT TABLE 7 HERE]

Second, we examine if our results are influenced by a specific country. While we control for country-group (ID) fixed effects in our models, we also estimate equation (1) excluding one country at a time. We record the coefficient of the interaction *Foreign* × *Restriction* obtained in each estimation and plot all 90 coefficients with the 90% confidence interval in Figure 4. All estimates are negative and statistically significant. We conclude that the impact of international travel restrictions on foreign VC activity does not appear to be uniquely driven by any country.[7]

[INSERT FIGURE 4 HERE]

Third, we note that in our main analysis we estimate the effects of restricting the ability of VCs to interact F2F with entrepreneurs in terms of amount and number of deals. Alternatively, we operationalize our dependent variables as amount and number of foreign deals relative to the total amount and number of deals in a country. We estimate Equation (1) using as dependent variables the foreign VC invested amount and number of transactions as a share of the total VC activity (foreign plus domestic) in the country. The results in Table 8 show that the effect is consistently negative and statistically significant across all specifications.

[INSERT TABLE 8 HERE]

4. Mechanisms and channels

The baseline analysis points to a significant reduction in the activity of foreign VCs after a country implements inbound travel restrictions. The restrictions limit the opportunity for direct interaction between entrepreneurs and foreign VCs and the estimated negative effect suggests that

[7] We perform additional robustness tests on our sample and sample period. The tests are reported in Table A.2 of the Appendix. We also examine possible differential effects in major VC markets (e.g., China, the European Union, and the United States) and industry. The estimation results are in Table A.3 of the Appendix. For the sake of brevity, we do not discuss these additional tests in detail.

direct interactions eliminate frictions in the VC market and facilitate the process of funding and managing startups. To understand the economic mechanisms underlying the relevance of direct F2F interaction between VCs and startups, we study three groups of frictions. For each group, we use sample variation with respect to measures intended to capture the magnitude of the frictions and estimate heterogenous effects to infer the relevance of the particular characteristic.

4.1. Information asymmetry

We start with the notion that proximity and direct interaction allow contracting parties to overcome challenges caused by information asymmetry. To examine the argument, we use two proxies for degree of information asymmetry between VC and startup. First, we focus on the financing stage. The idea is that frictions due to information gaps are more pronounced for early-stage deals. This is consistent with research that suggests the uncertainty caused by the pandemic or in general can lead VCs to adopt more cautious strategies for such deals (Kaplan and Schoar, 2005; Gompers et al., 2008; Townsend, 2015; Howell et al., 2020; Bellucci et al., 2023). Second, we capture opacity of a startup using its age. The rationale is that younger firms are more opaque and the information frictions between VCs and investees are more pronounced in this case.

To analyze stage-related heterogeneous effects, we construct an indicator *Later Stage* that takes the value of 1 for late-stage investments, and 0 for early-stage ones. We consider as early-stage deals at the seed round, as well as 1st and 2nd rounds. Late-stage deals are all stages beyond round 2. We add to the baseline model a triple interaction *Foreign* × *Restriction* × *Later Stage*. Similarly, we construct *Older Firm* that takes the value of 1 for startups in the top quartile of the sample distribution of firm age, and 0 otherwise. We measure firm age as the difference between firm incorporation date and deal date. We augment the baseline model with a triple interaction *Foreign* × *Restriction* × *Older Firm*. In the augmented models, the coefficient of the interaction term *Foreign* × *Restriction* provides an estimate of the effect of restrictions when information asymmetry is higher. The coefficients of the triple interaction terms capture the differential effect when information asymmetry is lower.

The results of the estimation of the augmented models are in Table 9. In columns (1) and (3) we use funding stage as proxy for magnitude of frictions caused by information asymmetry, while in columns (2) and (4) the proxy is firm age. The coefficients of *Foreign* × *Restriction* are negative and significant in all columns. Thus, we infer that if information asymmetry is high, the

ability of VCs to directly interact with portfolio firms is important. The triple interaction terms in all columns are positive, which indicates a reduction in the magnitude of the effect. To facilitate interpretation, we report in the table the sum, or linear combination, of the coefficient of a double interaction term and the respective triple interaction term. All linear combinations are negative, but they are not statistically significant. Hence, we infer that if information asymmetry is lower, the ability of VCs to directly interact with portfolio firms is less relevant. Thus, we conclude that frictions due to information gaps are an important driver of the staying power of F2F interaction.

[INSERT TABLE 9 HERE]

4.2. Cultural differences

A challenge in cross-border deals is that the transacting parties might not share a common culture and systems of values and beliefs (Moore et al., 2015). Cultural differences can influence trust and communication (Steensma et al., 2000; Johanson and Vahlne, 2009). Moreover, they can impact the relations between firms and VCs and the need for monitoring (Nahata et al., 2014). If a direct interaction mitigates frictions caused by cultural differences, this could be an explanation for the staying power of F2F in the VC market.

To examine the argument, we use two sets of measures of cultural difference. First, we use language similarity to capture the degree of cultural affinity between the contracting parties (Melitz and Toubal, 2014). We construct two indicators: 1) *Common Language* takes the value of 1 if VCs and entrepreneurs share the same official language, and 0 otherwise and 2) *Similar Language* takes the value of 1 if the linguistic distance between the languages of VC and entrepreneurial firm is below the median linguistic distance in the sample, and 0 otherwise. We augment the baseline model with the triple interactions *Foreign* × *Restriction* × *Common Language* and *Foreign* × *Restriction* × *Similar Language*. Alternatively, we measure cultural similarity along the dimension of individualism (Hofstede, 2011). We construct an indicator *Similar Individualism* that takes the value of 1 if both VC and entrepreneur are in countries with similar scores (i.e., both have above-median or below-median score) along this dimension, and 0 otherwise. We augment the baseline model with the triple interaction *Foreign* × *Restriction* × *Similar Individualism*. Table 10 presents the results of the estimations of the augmented models.

[INSERT TABLE 10 HERE]

In all columns of Table 10, the coefficient of the double interaction *Foreign* × *Restriction* is negative and statistically significant at 5% level or better. We infer that direct interactions in the VC market are important if the degree of cultural affinity is lower. To examine the relevance of direct interactions when cultural affinity is higher, we compute the linear combinations of the coefficients of *Foreign* × *Restriction* and the respective triple interaction *Foreign* × *Restriction* × *Common Language*, *Foreign* × *Restriction* × *Similar Language*, or *Foreign* × *Restriction* × *Similar Individualism*. All combinations are negative and statistically significant. This suggests that variation in the degree of cultural affinity does not lead to a differential effect of the ability to have direct interactions in the VC market. Hence, we conclude that the potential of F2F interaction to mitigate frictions due to cultural differences is not a main driver of its staying power.

4.3. Technological constraints to information exchange

Direct interactions can eliminate technological constraints on information transmission as a direct in-person interaction leads to an instantaneous exchange of information. With advances in ICT, financial markets have adopted numerous innovative digital solutions (Bollaert et al., 2021). However, digital communication and exchange of information can still exhibit inefficiencies. For instance, digital communication can limit the ability to detect subtle cues. It can also constrain the effects of collocation as a factor that facilitates communication and information exchange (Olson and Olson, 2000).

To examine whether the relevance of direct F2F interaction in the VC market is through elimination of technological constraints, we introduce variation in their magnitude using a Digital Adoption Index (DAI) by the World Bank. DAI is a general index that measures the prevalence of digital technologies in more than 170 countries globally. We also use the business sub-index of DAI because it focuses on adoption of digital technologies for business activities in a country.[8]

[8] DAI has several advantages over other measures, including its ability to capture accessibility level and adoption of digital technologies by individuals, businesses, and government entities. It provides a more comprehensive view of technology diffusion and is more robust than survey-based measures. The index is constructed with data on coverage and usage from the World Bank. DAI Business is an average of four normalized indicators: proportion of businesses with websites, quantity of secure servers, download speed, and 3G coverage within the country.

To capture the magnitude of technological constraints, we construct an indicator *DAI* that takes the value of 1 if the country of the VC and the country of the portfolio company both have above-median DAI, and 0 otherwise. Similarly, we construct an indicator *DAI Business* using the business sub-index of DAI. If the staying power of direct interaction is through the elimination of technological constraints, the effect of international inbound travel restrictions should be stronger when digitalization is lower. The effect should be weaker for deals when both contracting parties are technologically advanced. To examine the conjecture, we add to the baseline model the triple interactions *Foreign* × *Restriction* × *DAI* and *Foreign* × *Restriction* × *DAI Business*. In these models the coefficient of *Foreign* × *Restriction* captures the effect for deals with a lower level of digitalization, while the coefficients of the triple interactions show the incremental effect for the more digitalized ones. The results of the estimations of the augmented models are in Table 11.

[INSERT TABLE 11 HERE]

We note from the table that the coefficients of the interaction *Foreign* × *Restriction* are negative and statistically significant in all columns. Hence, direct interaction is important when the technological advancement is limited. The linear combinations of the coefficients on *Foreign* × *Restriction* and *Foreign* × *Restriction* × *DAI* or *Foreign* × *Restriction* × *DAI Business* are negative. However, they are statistically significant at the 10% level only in columns (1) and (2) of the table. Thus, we infer that the potential of direct interactions to eliminate frictions caused by technological constraints and inefficiency in the transmission of information is relevant but is not a robust driver of the staying power of F2F in the VC market.

5. Conclusion

Academic research and industry trends suggest that a factor traditionally recognized as a key characteristic of the VC industry – geographic proximity between VCs and portfolio firms – might have lost its relevance. While technological advancements allow VCs to extend their reach when investing, we demonstrate that the ability to have a direct F2F interaction remains relevant for the VC market, and especially for its globalization.

Our empirical strategy uses the staggered implementation of international inbound travel restriction policies around the globe in response to the spread of the Covid-19 virus in 2020 as an

arguably exogenous shock to the ability of foreign VCs to enter a market and directly interact with the entrepreneurs there. Using a staggered DiD analysis, we demonstrate that foreign VC activity, in terms of invested amount and number of deals, decreases once a country "closes its borders" to international inbound travel. The effect is not only statistically significant but also economically important. Thus, our analysis points to the staying power of F2F interaction in the VC industry, especially in some of its segments.

The findings are consistent with the notion that direct F2F interaction facilitates the VC market by eliminating frictions in the process of funding and managing entrepreneurial firms. To identify the channels underlying the positive effect, we examine three sets of frictions related to information gaps, cultural differences, and technological constraints on exchange of information. Our analysis suggests that information asymmetry between contracting parties is the main factor for the staying power of F2F interactions, while technological constrains and cultural differences are somewhat less relevant in the context of the global VC market.

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Table 1 VC Activity

The table reports summary statistics for measures of foreign VC activity for country-periods with international travel restrictions (Restricted) and country-periods without restrictions (Unrestricted). *Share Foreign VC volume (%)* is the invested amount for *Foreign* deals in a country to the total invested amount in the country (*Foreign* plus *Domestic*). *Share Foreign VC transactions (%)* is the number of *Foreign* deals in a country to the total number of deals in the country. The last column shows p-values of t-tests of equality of means of each variable across the two groups.

	Restricted		Unrestricted		Means difference
	Mean	S.D.	Mean	S.D.	p-value
Share Foreign VC volume (%)	0.599	0.022	0.645	0.008	0.020
Share Foreign VC transactions (%)	0.540	0.021	0.571	0.008	0.076

Table 2 Baseline Results – International Inbound Travel Restrictions

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	VC invested amount		VC number transactions	
Dependent Variable	(1)	(2)	(3)	(4)
Foreign × *Restriction*	-0.444***	-0.499***	-0.039**	-0.062***
	(0.122)	(0.132)	(0.018)	(0.021)
Observations	12,960	12,960	12,960	12,960
Adjusted R-squared	0.589	0.588	0.755	0.760
ID Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
ID × Trend	No	Yes	No	Yes

Table 3 Test of Equal Trends

This test is based on Gertler et al. (2016) and compares the average growth rates of the dependent variables between the groups of foreign and domestic deals during the pre-treatment periods. Deals are "foreign" if at least one VC is outside the country of the VC-backed firm, and "domestic" otherwise. The last column shows p-values of t-tests of equality of means of each variable across the two groups.

	Foreign		Domestic		Means difference
	Mean	S.D.	Mean	S.D.	p-value
VC invested amount	-0.139	0.371	-0.109	0.313	0.559
VC number transactions	-0.057	0.292	-0.069	0.195	0.739

Table 4 Internal Restrictions

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Gathering Restriction* is an indicator that takes the value of 1 for country-periods with full restrictions on gatherings (restrictions on gatherings of 10 people or less), and 0 otherwise. *Movement Restriction* is an indicator that takes the value of 1 for country-periods with full restriction on internal movement, and 0 otherwise. *Workplace Closing* is an indicator that takes the value of 1 for country-periods with full workplace closing (required closing or work from home for all-but-essential workplaces), and 0 otherwise. Panel A uses the whole sample, while Panel B uses a sub-sample of domestic deals. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A – Internal Restrictions and Foreign VC Activity

	VC invested amount			VC number transactions		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Foreign × Gathering Restriction	0.145			0.021		
	(0.160)			(0.020)		
Foreign × Movement Restriction		-0.100			0.008	
		(0.156)			(0.022)	
Foreign × Workplace Closing			0.016			0.011
			(0.294)			(0.042)
Observations	12,960	12,960	12,960	12,960	12,960	12,960
Adjusted R-squared	0.587	0.587	0.587	0.760	0.760	0.760
ID Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend	Yes	Yes	Yes	Yes	Yes	Yes

Panel B – Internal Restrictions and Domestic VC Activity

	VC invested amount			VC number transactions		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Gathering Restriction	-0.124			-0.025		
	(0.109)			(0.022)		
Movement Restriction		-0.073			-0.020	
		(0.107)			(0.022)	
Workplace Closing			-0.242			-0.029
			(0.162)			(0.030)
Observations	5,904	5,904	5,904	5,904	5,904	5,904
Adjusted R-squared	0.644	0.644	0.644	0.797	0.797	0.797
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5 Refinement of Treatment Groups and Treatment Periods

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign (all foreign vs. others)* is an indicator that takes the value of 1 when all VCs in a deal are outside the country of the VC-backed firm, and 0 otherwise. *Foreign (all foreign vs. all domestic)* is an indicator that takes the value of 1 when all VCs in a deal are outside the country of the VC-backed firm, and 0 when all VCs are in the country. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Restriction (before vaccination)* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions before the majority (50%) of the population of the three major source countries of VC investment (United States, China, and the United Kingdom) is vaccinated, and 0 otherwise. The estimations in columns (3) and (6) exclude temporal units after that time. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	VC invested amount			VC number transactions		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Foreign (all foreign vs. others) × Restriction	-0.547***			-0.081***		
	(0.181)			(0.025)		
Foreign (all foreign vs. all domestic) × Restriction		-0.518***			-0.072***	
		(0.134)			(0.021)	
Foreign × Restriction (before vaccination)			-0.550***			-0.064***
			(0.143)			(0.024)
Observations	12,960	12,960	11,340	12,960	12,960	11,340
Adjusted R-squared	0.566	0.545	0.590	0.755	0.731	0.763
ID Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Staggered DiD Methodology

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction (permanent)* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions if the country imposes travel restrictions and keeps them till the end of the sample period, and 0 for countries that never have restrictions during the sample period. *Restriction (first wave)* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions considering only the first wave of restrictions (if there are multiple waves) for the country, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Restricted Periods* is the cumulative total number of periods with international travel restrictions the country has experienced up to the current period. Estimations in columns (3) and (7) are based on a two-stage DiD approach developed by Gardner's (2021). In the first stage, outcome variables are regressed on ID and time fixed effects using the untreated observations. In the second stage, adjusted outcomes obtained by subtracting the estimated ID and time effects from the original outcome variables are regressed on the treatment status. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	VC invested amount				VC number transactions			
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign × *Restriction (permanent)*	-1.129***				-0.195**			
	(0.378)				(0.088)			
Foreign × *Restriction (first wave)*		-0.478**				-0.068**		
		(0.197)				(0.032)		
Foreign × *Restriction*			-0.093***	-0.574***			-0.013*	-0.088***
			(0.033)	(0.181)			(0.007)	(0.025)
Foreign × *Restriction* × *Restricted Periods*				0.012				0.004
				(0.019)				(0.003)
Observations	4,032	8,754	12,960	12,960	4,032	8,754	12,960	12,960
Adjusted R-squared	0.673	0.649	0.588	0.588	0.854	0.801	0.750	0.761
Two-Stage DID approach (Gardner, 2021)	No	No	Yes	No	No	No	Yes	No
ID Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 Confounding Factors

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Restriction Weak* is an indicator that takes the value of 1 for country-periods with weaker international travel restrictions (such as testing or quarantine), and 0 otherwise. *First Case* is an indicator that takes the value of 1 for country-periods after the first confirmed case of Covid-19 in the country, and 0 otherwise. *Covid Cases* is the natural logarithm of 1 plus number of Covid-19 cases by country-period. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	VC invested amount			VC number transactions		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Foreign × *Restriction*	-0.657***	-0.442***	-0.470***	-0.063**	-0.065***	-0.060***
	(0.185)	(0.145)	(0.132)	(0.026)	(0.024)	(0.023)
Foreign × *Restriction Weak*	-0.251			-0.002		
	(0.172)			(0.025)		
Foreign × *First Case*		-0.220			0.013	
		(0.214)			(0.030)	
Foreign × *Covid Cases*			-0.012			-0.001
			(0.018)			(0.003)
Observations	12,960	12,960	12,960	12,960	12,960	12,960
Adjusted R-squared	0.588	0.588	0.588	0.760	0.760	0.761
ID Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 Share of Foreign Activity

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Share Foreign VC amount (%)* is invested amount of *Foreign* deals in a given country to total invested amount in the country (*Foreign* plus *Domestic*). *Share Foreign VC transactions (%)* is number of *Foreign* deals in a given country to total number of deals in the country (*Foreign* plus *Domestic*). *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Share Foreign VC amount (%)		*Share Foreign VC transactions (%)*	
Dependent Variable	(1)	(2)	(3)	(4)
Restriction	-0.091***	-0.104***	-0.068***	-0.071**
	(0.026)	(0.032)	(0.024)	(0.029)
Observations	2,863	2,863	2,863	2,863
Adjusted R-squared	0.211	0.212	0.305	0.311
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Country Trend	No	Yes	No	Yes

Table 9 Mechanisms and Channels – Information Asymmetry

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Later Stage* is an indicator that takes the value of 1 for deals that are later-stage, and 0 for early-stage ones. *Older Firm* is an indicator that takes the value of 1 for VC-backed companies in the top quartile of the sample distribution of age of the funded firms as of the year of funding, and 0 otherwise. The linear combinations of coefficients represent the point estimates, and their statistical significance, of the treatment effect on the outcome variables for later investment rounds (A+B) and older startups (A+C), respectively. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		VC invested amount		VC number transactions	
Dependent Variable		(1)	(2)	(3)	(4)
Foreign × *Restriction*	(A)	-0.369**	-0.268**	-0.051**	-0.028*
		(0.148)	(0.121)	(0.024)	(0.017)
Foreign × *Restriction* × *Later Stage*	(B)	0.297		0.043*	
		(0.182)		(0.024)	
Foreign × *Restriction* × *Older Firm*	(C)		0.198		0.023
			(0.201)		(0.022)
Linear combination (A) + (B)		-0.072		-0.008	
Linear combination (A) + (C)			-0.070		-0.005
Observations		25,920	25,920	25,920	25,920
Adjusted R-squared		0.554	0.578	0.740	0.736
ID Fixed Effects		Yes	Yes	Yes	Yes
Time Fixed Effects		Yes	Yes	Yes	Yes
ID × Trend		Yes	Yes	Yes	Yes

Table 10 Mechanisms and Channels – Cultural Affinity

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *Common Language* is an indicator that takes the value of 1 if VC and entrepreneurial firm share the same official language, and 0 otherwise. *Similar Language* is an indicator that takes the value of 1 if the linguistic distance between the language of the VC and that of the entrepreneurial firm is below the median linguistic distance, and 0 otherwise. *Similar Individualism* is an indicator that takes the value of 1 when both the country of the VC and that of the entrepreneur have above-median or below-median level of Individualism (Hofstede, 2011), and 0 otherwise. The linear combinations of coefficients represent point estimates, and their statistical significance, of the treatment effect on the outcome variables for VCs and entrepreneurial firms sharing the same language (A+B), similar language (A+C), and similar levels of individualism (A+D) respectively. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		VC Invested Amount			VC Number Transactions		
Dependent Variable		(1)	(2)	(3)	(4)	(5)	(6)
Foreign × *Restriction*	(A)	-0.277***	-0.238**	-0.189***	-0.041***	-0.041***	-0.032***
		(0.097)	(0.100)	(0.069)	(0.014)	(0.015)	(0.011)
Foreign × *Restriction* × *Common Language*	(B)	0.121			0.009		
		(0.100)			(0.013)		
Foreign × *Restriction* × *Similar Language*	(C)		0.038			0.011	
			(0.094)			(0.012)	
Foreign × *Restriction* × *Similar Individualism*	(D)			-0.162			-0.005
				(0.149)			(0.024)
Linear combination (A) + (B)		-0.157**			-0.032***		
Linear combination (A) + (C)			-0.200***			-0.029***	
Linear combination (A) + (D)				-0.351**			-0.037*
Observations		25,920	25,920	25,920	25,920	25,920	25,920
Adjusted R-squared		0.443	0.468	0.595	0.485	0.500	0.748
ID Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend		Yes	Yes	Yes	Yes	Yes	Yes

Table 11 Mechanisms and Channels – Digitalization and Technology

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *DAI* is an indicator that takes the value of 1 for deals completed between VCs and startups operating in countries with higher levels of digitalization based on the *Digital Adoption Index*, and 0 otherwise. *DAI Business* is an indicator that takes value of 1 for deals completed between VCs and startups operating in countries with higher levels of digitalization for business purposes based on the *Digital Adoption Index*, and 0 otherwise. The linear combinations of coefficients represent point estimates, and their statistical significance, of the treatment effect on the outcome variables for VCs and entrepreneurial in higher *DAI* countries (A+B) and higher *DAI Business* countries (A+C), respectively. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		VC invested amount		VC number transactions	
Dependent Variable		(1)	(2)	(3)	(4)
Foreign × *Restriction*	(A)	-0.281**	-0.318**	-0.041**	-0.045**
		(0.119)	(0.143)	(0.020)	(0.019)
Foreign × *Restriction* × *DAI*	(B)	0.080		0.020	
		(0.170)		(0.025)	
Foreign × *Restriction* × *DAI Business*	(C)		0.149		0.034
			(0.177)		(0.028)
Linear combination (A) + (B)		-0.201*		-0.020	
Linear combination (A) + (C)			-0.169*		-0.011
Observations		25,920	25,920	25,920	25,920
Adjusted R-squared		0.629	0.627	0.770	0.767
ID Fixed Effects		Yes	Yes	Yes	Yes
Time Fixed Effects		Yes	Yes	Yes	Yes
ID × Trend		Yes	Yes	Yes	Yes

Figure 1 Diffusion of International Travel Restrictions

The graph shows the diffusion of international inbound travel restrictions over time (from Q1 of 2020 to Q4 of 2021). The bars show the proportion of countries with international inbound travel restrictions during the quarter. A country has restrictions in place if the value of measure C8 "Restrictions on International Travel" is at the highest level of 4 (Ban on all regions or total border closure).

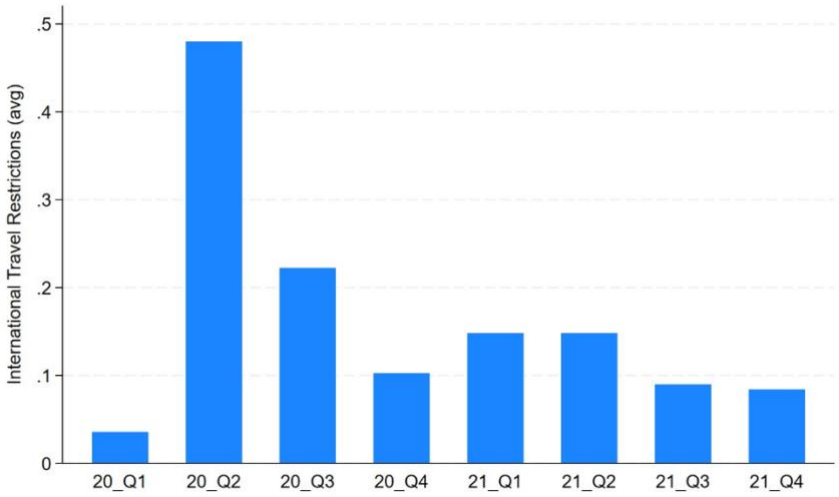


Figure 2 Common Trend Assumption (Autor test)

The graphs are based on the estimation of augmented models that include interaction terms between the treatment indicator and time indicators for pre-treatment periods. The plots show period-by-period coefficients starting from 24 periods before the treatment date up to the treatment date, the coefficient of the average post-treatment effect, and the 99% confidence intervals of the coefficient estimates. The vertical dashed lines denote treatment time.

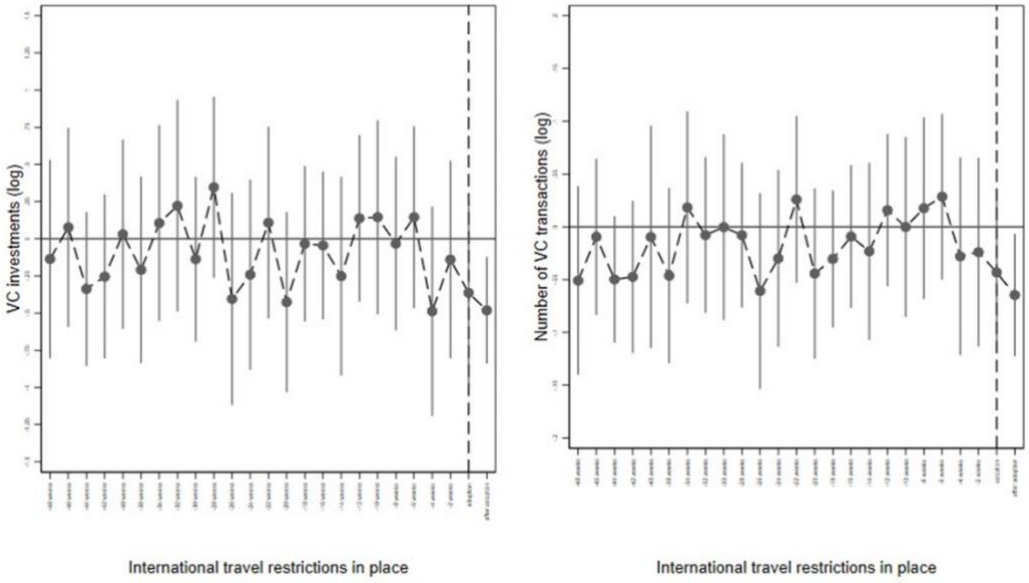
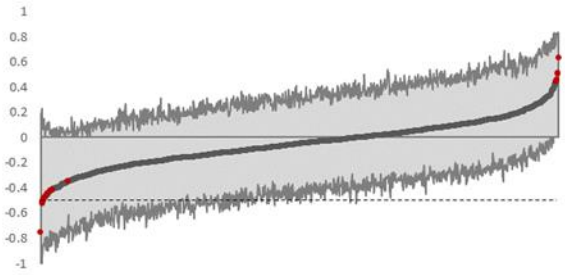


Figure 3 Randomized Placebo

The graphs plot coefficients and 90% confidence intervals of 1,000 estimations of Equation (1) based on random pseudo-treatment dates. In each estimation, the pseudo-treatment date is randomized by country-period with the requirement that it is not after the first international travel restriction put in place in the country. The red dots denote the statistically significant coefficients. The dashed lines indicate the estimated coefficients of the baseline models in columns (2) and (4) of Table 2.

VC invested amount



VC number transactions

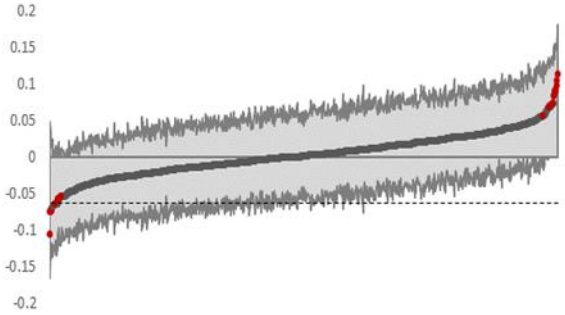
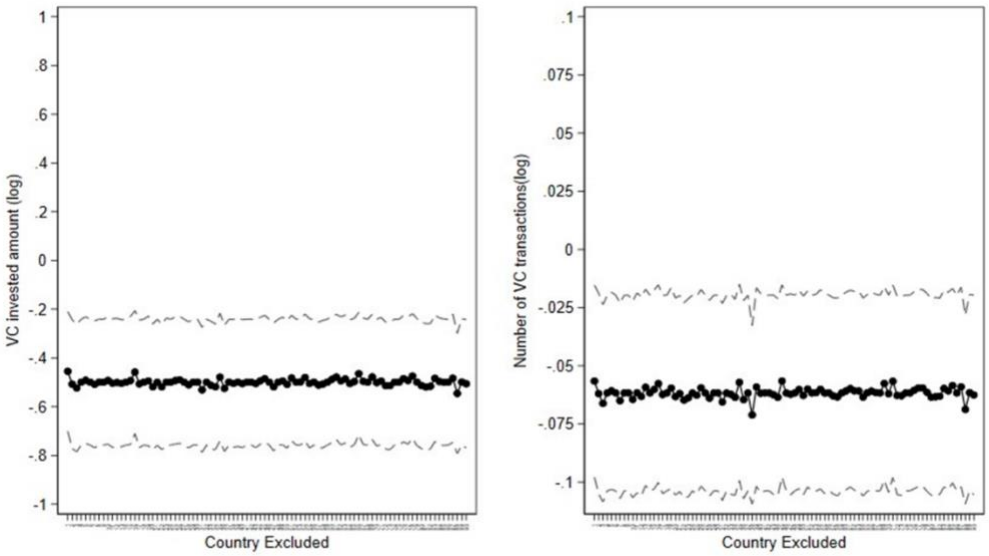


Figure 4 Country Exclusion

The graphs plot coefficients and 95% confidence intervals of 90 estimations of Equation (1) excluding deals completed in one single country at a time.



Appendix

Table A.1 Definitions of Restrictions

Indicator	Code	Description	Scale	Coding
International Travel Restrictions	C8	Record restrictions on international travel	4	Ban on all regions or total border closure
			3	Ban arrivals from some regions
			2	Quarantine arrivals from some or all regions
			1	Screening arrivals
			0	No restrictions
Restrictions on Internal Movements	C7	Record restrictions on internal movement between cities/regions	2	Internal movement restrictions in place
			1	Recommend not to travel between regions/cities
			0	No measures
Restrictions on Gatherings	C4	Record limits on gatherings	4	Restrictions on gatherings of 10 people or less
			3	Restrictions on gatherings between 11-100 people
			2	Restrictions on gatherings between 101-1000 people
			1	Restrictions on very large gatherings (the limit is above 1000 people)
			0	No restrictions
Workplace closing	C2	Record closings of workplaces	3	Require closing (or work from home) for all-but-essential workplaces
			2	Require closing (or work from home) for some sectors or categories of workers
			1	Recommend closing (or recommend work from home) or all businesses open with alterations resulting in significant differences compared to non-COVID-19 operation
			0	No measures

Note: Restrictions due to COVID-19 pandemic retrieved from the Oxford Covid-19 Government Response Tracker (source of the codebook: https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md#containment-and-closure-policies)

Table A.2 Sample and Sample Period

Foreign is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. Estimations in different columns are based on different samples: 1) all 117 countries including minor markets (columns (1) and (6)); 2) no deals less than €50,000 (columns (2) and (7)); 3) no countries without VC activity during international inbound travel restrictions (columns (3) and (8)); 4) year 2018 included covering period from 2018 to 2021 (columns (4) and (9)); 5) Country × Trend added to the model (columns (5) and (10)). *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	VC invested amount					VC number transactions				
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign × *Restriction*	-0.374***	-0.500***	-0.525***	-0.571***	-0.444***	-0.046***	-0.059***	-0.060**	-0.064***	-0.039**
	(0.105)	(0.129)	(0.159)	(0.134)	(0.122)	(0.017)	(0.019)	(0.026)	(0.020)	(0.019)
Observations	16,848	12,960	7,344	17,280	12,960	16,848	12,960	7,344	17,280	12,960
Adjusted R-squared	0.615	0.588	0.556	0.599	0.589	0.771	0.767	0.747	0.774	0.759
All countries	Yes	No	No	No	No	Yes	No	No	No	No
Excluding small VC deals	No	Yes	No	No	No	No	Yes	No	No	No
No countries without VC activity under restrictions	No	No	Yes	No	No	No	No	Yes	No	No
Including 2018	No	No	No	Yes	No	No	No	No	Yes	No
ID Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country × Trend	No	No	No	No	Yes	No	No	No	No	Yes
ID × Trend	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No

Table A.3 Heterogeneity Analyses (Geography and Sector)

The analysis covers 72 bi-monthly periods from 01/01/2019 to 12/31/2021 and 90 countries. *Foreign* is an indicator that takes the value of 1 for deals with at least one VC outside the country of the VC-backed firm, and 0 otherwise. *Restriction* is an indicator that takes the value of 1 for country-periods with international inbound travel restrictions, and 0 otherwise. *US* is an indicator that takes the value of 1 for VC-backed companies in the United States, and 0 otherwise. *Asia-Pacific* is an indicator that takes the value of 1 for VC-backed companies in Asia and Oceania, and 0 otherwise. *EU* is an indicator that takes the value of 1 for VC-backed companies in the EU-27, and 0 otherwise. *Digital Sectors* is an indicator that takes the value of 1 for VC-backed companies operating in the ICT sector, and 0 otherwise. *ID* denotes country-group pair (group is foreign or domestic). The table reports coefficient estimates and standard errors, clustered at the country level, in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		VC invested amount				VC number transactions			
Dependent Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign × *Restriction*	(A)	-0.500***	-0.552***	-0.432***	-0.294**	-0.059***	-0.061**	-0.059**	-0.038**
		(0.132)	(0.158)	(0.135)	(0.130)	(0.021)	(0.029)	(0.022)	(0.016)
Foreign × *Restriction* × *US*	(B)	0.070				-0.603***			
		(0.132)				(0.021)			
Foreign × *Restriction* × *Asia-Pacific*	(C)		0.160				-0.002		
			(0.283)				(0.040)		
Foreign × *Restriction* × *EU*	(D)			-0.492				-0.019	
				(0.432)				(0.068)	
Foreign × *Restriction* × *Digital Sectors*	(E)				0.050				0.004
					(0.201)				(0.023)
Linear Combination (A) + (B)		-0.430***				-0.662***			
Linear Combination (A) + (C)			-0.392*				-0.063**		
Linear Combination (A) + (D)				-0.925**				-0.078*	
Linear Combination (A) + (E)					-0.244*				-0.034*
Observations		12,960	12,960	12,960	25,920	12,960	12,960	12,960	25,920
Adjusted R-squared		0.588	0.588	0.588	0.548	0.761	0.760	0.761	0.717
ID Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ID × Trend		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes