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TRANSNATIONAL CORPORATIONS

INVESTMENT AND DEVELOPMENT

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EDITORIAL STATEMENT

Transnational Corporations[1] is a longstanding policy-oriented refereed research journal on issues related to investment, multinational enterprises and development. It is an official journal of the United Nations, managed by the United Nations Conference on Trade and Development (UNCTAD). As such it has a global reach, a strong development policy imprint, and high potential for impact beyond the scholarly community.

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The journal aims to advance academically rigorous research to inform policy dialogue among and across the business, civil society and policymaking communities. Its central research question – feeding into policymaking at subnational, national and international levels – is how to make international investment and multinational enterprises contribute to sustainable development. It invites contributions that provide state-of-the-art knowledge and understanding of the activities conducted by, and the impact of multinational enterprises and other international investors, considering economic, legal, institutional, social, environmental or cultural aspects. Only contributions that draw clear policy conclusions from the research findings will be considered.

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The scale and complexities of the "grand challenges" faced by the international community, such as climate change, poverty, inequality, food security, health crises, and migration – as embodied in the United Nations' Sustainable Development Goals (SDGs) – are enormous. These challenges, combined with the impact of disruptive technologies on business, rapidly evolving trends in international production and global value chains, new emerging-market players and new types of investors and investment, make it imperative that policymakers tap a wide range of research fields. Therefore, the journal welcomes submissions from a variety of disciplines, including international business, innovation, development studies, international law, economics, political science, international finance, political economy and economic geography. However, submissions should be accessible across disciplines (as a non-specialized journal idiosyncratic research should be avoided); interdisciplinary work is especially welcomed. The journal embraces both quantitative and qualitative research methods, and multiple levels of analyses at macro, industry, firm or individual/group level.

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Transnational Corporations aims to provide a bridge between academia and the policymaking community. It publishes academically rigorous, research-underpinned

[1] Previously: The CTC Reporter. In the past, the Programme on Transnational Corporations was carried out by the United Nations Centre on Transnational Corporations (1975–1992) and by the Transnational Corporations and Management Division of the United Nations Department of Economic and Social Development (1992–1993).

and impactful contributions for evidence-based policymaking, including lessons learned from experiences in different societies and economies, both in developed and developing-country contexts. It welcomes contributions from the academic community, policymakers, research institutes, international organizations, and others. Contributions to the advancement and revision of theories, frameworks and methods are welcomed as long as they are relevant for shedding new light on the investigation of investment for development, such as advancing UNCTAD's *Investment Policy Framework for Sustainable Development*.

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UNCTAD INSIGHTS

Globalization of innovation: the moderating role of project-level investment strategy and country type in location choice for R&D-related FDI*

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Peter D. Ørberg Jensen[c] and Søren Feodor Nielsen[d]

Abstract

The current stage of globalization involves geographically dispersed research and development (R&D) investments that are not confined to advanced economies. These cross-border R&D investments are driven by multinational enterprises' (MNEs') strategies for exploring and/or exploiting foreign locations. In this paper, we analyse location choice and the moderating effect of project-level investment strategy (i.e. exploration or exploitation) and type of host economy (i.e. advanced or emerging) on the importance of the innovation framework and local innovation capabilities. Our analysis of 588 R&D-related foreign direct investment (FDI) projects in the pharmaceutical and biotech industries during the 2006–2016 period reveals that whereas a host country's innovation framework and capability overall do affect the location decision, their ultimate effects are conditional on the combination of project-level investment strategy and type of economy. Our findings have policy implications for FDI policies aiming at enhancing linkages between MNEs and local actors and national science, technology, innovation and educational policies and programmes.

Keywords: emerging markets, innovation framework, innovation capabilities, investment strategy, R&D internationalization, location choice

JEL classification numbers: L16, L21, L50, O32, O43

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1. Introduction

The innovation activities of multinational enterprises (MNEs) today are dispersed globally and internationalized (D'Agostino, Laursen and Santangelo, 2013; UNCTAD, 2013). Since the turn of the millennium, emerging markets and developing countries (together called emerging markets in this paper) have increasingly been chosen as locations for foreign direct investment (FDI) related to research and development (R&D) (Demirbag and Glaister, 2010; Haakonsson and Ujjual, 2015; UNCTAD, 2005). This change calls for a deeper understanding of the role of locational characteristics in MNEs' decisions to locate R&D investments in emerging markets rather than advanced economies. The policy relevance of this study is twofold. To build or sustain competitiveness in this new geography of innovation, countries must actively create and facilitate a strong position in the global innovation networks driven by MNEs. In addition, creating such a position has more facets than conventional FDI policy as it connects to the institutional framework as well as the innovation capabilities present in the location. This calls for a holistic policy approach that integrates industrial, innovation and educational policy areas while establishing and maintaining an attractive location for R&D-related FDI.

Decades ago, MNEs' internationalization of innovation began a shift from a reliance on exploitation strategies (e.g. seeking access to markets) towards also adopting exploration strategies (Papanastassiou, Pearce and Zanfei, 2020). In an exploitation strategy, the MNE follows a market expansion strategy in which internationalized R&D activities focus on adapting products or services to a new context. More recently, MNEs' strategies have changed into exploration strategies, in which they invest in R&D activities abroad in order to access specialized knowledge and capabilities that are location-bound for a variety of reasons (Papanastassiou et al., 2020). By following exploration strategies, MNEs are able to tap into and connect to knowledge that is not available in their home economy (Archibugi, Howells and Michie, 1999; Kuemmerle, 1999). The interplay between MNE investment strategies and locational factors that create an attractive environment for innovation in host economies, such as the institutional framework and innovation capabilities, is an area that remains underexplored and would benefit from interdisciplinary approaches (Cano-Kollmann et al., 2016; Beugelsdijk and Mudambi, 2013; Kim and Aguilera, 2016).

In this paper, we address this gap by investigating the following research question: How do R&D project investment strategy and type of economy moderate the effect of location characteristics for the location choice in R&D-related FDI?[1]

[1] As explained in section 3.3, we operationalize location choice at the country level. As a result, we use the terms "location" and "country" interchangeably throughout the paper.

We analyse two particular location characteristics that are central for R&D location choice, namely the innovation framework, encompassing *structural* elements, and innovation capabilities, including the capabilities of local industrial *actors*. Drawing on institutional theory and the literature on innovation capabilities, we know that these two factors are essential for successful investment (Lundvall, 2007; Patel and Pavitt, 1994).

Empirically we analyse the location choice of 588 R&D-related FDI projects from the fDi Markets database in the pharmaceutical and biotech industries from 2006 to 2016. Data from fDi Intelligence show that the pharmaceutical and biotech industries had the highest share of R&D-related FDI (19 per cent and 33 per cent of total FDI, respectively) between 2003 and 2016, making them the most internationalized industries in terms of R&D. Not least in light of the COVID-19 crisis, the pharmaceutical and biotech industries stand out, as most products are of global relevance and in some cases even national security (Gereffi, 2020; UNCTAD, 2020). The Pfizer-Biontech COVID-19 vaccine illustrates the global reach of the pharmaceutical and biotech industries. According to Pfizer (2020), development, testing, and manufacturing of the vaccine involves 23 Pfizer sites in 11 countries and draws on Pfizer's global network of 200 suppliers. As such, the development of the Pfizer-Biontech vaccine as well as other COVID-19 vaccines indicates MNEs' role in orchestrating innovation networks and the importance of synergies between actors and locations (Papanastassiou, 2021). In addition, the internationalization of intellectual property rights in the Agreement on Trade Related Aspects of Intellectual Property Rights has contributed to the global dispersion of innovation (Haakonsson, Jensen and Mudambi, 2013; Papageorgiadis, Chengang and Magkonis, 2019). Meanwhile, pharmaceutical MNEs are experiencing significant pressure to reorganize innovation processes by reducing costs and developing new drugs because existing patents (and profits) are being eroded by competing generic products. These features make the pharmaceutical and biotech industries especially interesting, since they show how the globalization of innovation develops in industries that are highly exposed to the forces of economic globalization.

In this paper, we contribute to the literature on R&D internationalization, especially the stream of literature examining why some countries are more attractive than others as destinations for MNEs' R&D investments. Although the literature on R&D internationalization is extensive, there is a continued need to explore the impact of various host-country institutional factors on R&D investment flows (Papanastassiou et al., 2020). In this context, we submit that our contribution lies in the empirical combination of factors in the host-country institutional environment and their influence on the attraction of different types of R&D investment projects. We investigate how firms' investment strategies for R&D projects and host-country type moderate the effects of host-country characteristics on location choice probabilities for R&D investment projects.

While the literature on the role of emerging markets in economic globalization has emphasized differences between emerging markets and advanced economies (Grosse, 2019; Khanna and Palepu, 2010), the findings in this study suggest that the differences between the two types of countries are not as pronounced as they were in the past, when we focus on countries in the emerging market group that are able to attract R&D-related FDI. The gap between advanced economies and some emerging markets in the innovation domain appears to be closing, and this may be rooted in changes in the countries as well as in the investing firms. For emerging markets, the national innovation (eco)-system with innovation capabilities matters for the ability to attract R&D-related investments undertaken with an exploration strategy. This particular type of investment project is important, as it brings the potential for value-creating linkages and spillovers to the local economy (De Beule and Somers, 2017; Hansen, Pedersen and Petersen, 2009; UNCTAD, 2001). However, to benefit from this potential, countries face the challenge of upgrading and sustaining domestic investments in the development of the country's innovation capability. From financial and organizational perspectives, this is especially a challenge for governments in emerging markets.

In section 2, we review the literature on R&D internationalization along with expectations derived from it. To respond to calls for integrative theoretical approaches (Cano-Kollman et al., 2016; Kim and Aguilera, 2016) and adopt a nuanced perspective on the drivers of R&D internationalization, we develop an integrated framework that includes elements from the literature on international business, economic geography, institutions and strategy. In section 3, we introduce the methodology and our econometric approach, together with the data used in the analysis. Section 4 presents the empirical results, followed by a discussion and our conclusions in section 5.

2. Determinants and drivers of the internationalization of innovation

This study builds on a rich literature on the internationalization of innovation (for recent reviews, see Papanastassiou et al., 2020; Santos-Paulino et al., 2014). Previous studies show how cross-border organization of firms' R&D activities and locational choices is orchestrated (Hatem, 2011; Santos-Paulino et al., 2014; UNCTAD, 2005, 2013) and how internationalization of R&D has the potential to positively influence innovation and firm productivity (Nieto and Rodríguez, 2011). Firm-strategic choices influence location choices, as they orient investments towards different types of locations. Nevertheless, there is a gap in the literature as regards research on the geographical dimensions of this process and how those dimensions relate to MNEs' investment strategies (Beugelsdijk and Mudambi, 2013).

2.1 Innovation framework, innovation capability and MNE investment strategy

Location attractiveness for R&D-related investments is determined by a combination of institutional elements related to the innovation framework and the innovation capabilities (D'Agostino et al., 2013; Papanastassiou et al., 2020; Santos-Paulino et al., 2014). We focus on the role of two main locational characteristics, that is, the destination country's innovation framework and its innovation capabilities, for attracting R&D-related FDI from foreign MNEs (Siedschlag et al., 2013). We assume that MNEs placing their R&D investments in a foreign country assess the quality of the host country's *innovation framework*.

In this regard, the literature focusing on national systems of innovation has emphasized the need to understand the role of institutions as "the wider setting" (Lundvall, 2007, p. 102). A national system of innovation builds on institutional elements such as the education system, the labour market, innovation policy, protection of intellectual property rights and competition (Freeman, 2002; Lundvall, 1992; Nelson, 1993). The role of location characteristics differs according to industry variety; for example, for pharmaceuticals and biotech, intellectual property rights are important (Fagerberg, Mowery and Verspagen, 2009). However, the particular advantages of a national system of innovation can be reached through direct interaction as "elements of knowledge important for economic performance are localized and cannot be easily moved from one place to another" (Lundvall, 2007, p. 107).

The interaction between firms, the national system of innovation and its knowledge infrastructure are relevant in defining a country's *innovation capabilities*. These capabilities rest on a foundation composed of the capabilities of individuals and their formal educational backgrounds, their professional experiences, and their firm- and activity-specific knowledge (e.g. UNCTAD, 2004). These capabilities are particularly important in advanced value chain activities, such as R&D, which incorporate both explicit and tacit knowledge, as well as knowledge of routines (UNCTAD, 2005). Furthermore, innovation capabilities are not easily substitutable or transferable (Nelson, 1993).

The importance of innovation capabilities is broadly discussed in the literature on strategy and organization. This literature mentions different dimensions of capabilities, for example the capability to combine organizational knowledge, the importance of higher-order capabilities as a foundation for value creation and the possession of organizational capabilities as a source of innovation (Kogut and Zander, 1992; Subramaniam and Youndt, 2005). Fagerberg and Srholec (2008) have conceptualized the national systems of innovation literature to include industry-level phenomena of social and technological capabilities as well as absorptive capacity. Innovation capabilities are linked to the innovation framework as it includes the degree to which the framework conditions are used.

The distinction between exploration and exploitation, originating from James March's (1991) seminal work on organizational learning, has profoundly influenced theoretical constructs across different literature, including that on the internationalization of R&D (Papanastassiou et al., 2020). In a seminal article on R&D internationalization, Kuemmerle (1999) developed a typology in which the strategies for internationalizing innovation fall into two main categories. The first is the "home-base-exploiting" strategy, which occurs when an MNE aims to introduce innovative products developed at home to new markets, increase embeddedness in a market or adopt a cost-out strategy and thereby increase efficiency. This process may involve some adjustment to local demands or co-location in new markets. The second strategy is the "home-base-augmenting" strategy, which occurs when an MNE taps into new knowledge sources in foreign locations to enrich and further develop the knowledge of the MNE as a whole. In the remainder of the paper, we refer to these investment strategies as, respectively, *exploitation* and *exploration* strategies.

Although host-country factors have been shown to play a role in the attraction of R&D projects (Demirbag and Glaister, 2010; Jensen and Pedersen, 2011; Papanastassiou et al., 2020), we expect that the two different types of investment strategies will moderate the role of the host country's innovation framework and innovation capabilities as determinants of location choices differently. Investment projects following an exploration strategy are likely to be more demanding in terms of the input needed from factors in the host countries than investment projects driven by an exploitation strategy. Therefore, locations characterized by relatively strong innovation frameworks and capabilities are more attractive for exploration projects. On the basis of these expectations, we present our first hypothesis:

> H1: The effects of innovation framework (H1a) and capability (H1b) on location choice are stronger for projects driven by an exploration strategy than for projects driven by an exploitation strategy.

2.2 Placing investments in advanced economies and emerging markets

Advanced economies have been attractive locations for the offshoring of R&D activities for decades. In fact, throughout earlier phases of globalization the advanced economies in North America, Western Europe (EU15) and Japan experienced the most significant growth as destinations for R&D activity (e.g. Ohmae, 1985; Hatem, 2011; Santos-Paulino et al., 2014). As advanced economies fostered industrial clusters and world-class research environments focused on highly specialized technological fields and were characterized by high purchasing power, they were the most attractive locations for R&D-related FDI until the turn of the millennium. R&D investments in emerging markets are a more recent phenomenon (D'Agostino et al., 2013; Grosse, 2019). Although advanced economies are still preferred

as locations for offshored R&D, there has been a clear shift, with relatively more R&D-related investment projects placed in emerging markets, especially in Asia (Grimes and Miozzo, 2015; D'Agostino et al., 2013).

The literature on emerging markets emphasizes the importance of institutions and institutional voids that exist in these countries and influence domestic and foreign firms operating there (e.g. Khanna and Palepu, 2010). We may extend this argument to the field of innovation, meaning that the characteristics of the host country's innovation framework create the environment in which R&D-related FDI is placed.

For emerging markets, the more severe the innovation-related institutional voids in a country, the less attractive the country will appear as a potential destination for R&D-related FDI. However, emerging markets have become more attractive for investment and the roles of the innovation framework and innovation capabilities in emerging markets are different than in the past. Today, emerging markets are part of the global flow of innovation activities. However, in general, emerging markets still have poorer institutions and capabilities. This implies that in a context where institutional voids are on average large (i.e. emerging markets), a better quality of institutional framework and capabilities means more for the location decision than in a context where institutional voids are generally very low (i.e. advanced economies). Therefore, we expect the type of host country (advanced versus emerging) to have a moderating effect on the importance of the innovation framework and innovation capabilities in location decisions. We expect this moderating effect to show that the innovation framework and capabilities have stronger effects when emerging markets are selected as destination countries than when advanced economies are selected.

> H2: The effects of the innovation framework (H2a) and capability (H2b) on location choice are stronger for projects placed in emerging markets than for projects based in advanced economies.

Prior research asserts that the understanding of the global strategies of MNEs by nature includes multilevel factors at macro (e.g. country), meso (e.g. firm, industry) and micro levels (e.g. individual managers, employees, projects, activities) and that interrelations between such factors influence the strategies of MNEs (Contractor et al., 2019; Johnson, Melin and Whittington, 2003). Especially micro-level factors are important in this respect and have found some application in global strategy research – for example concerning the innovation capability (Nuruzzaman, Gaur and Sambharya, 2019), and absorptive capacity (Lewin, Massini and Peeters, 2011) of MNE subsidiaries, yet they remain underexplored in the field (Contractor et al., 2019). We therefore proceed with a more exploratory approach for our final hypothesis about the interrelations between micro-level (project investment strategy), meso-level (innovation framework, innovation capability) and macro-level (type of economy) factors and the resulting location choice in the following way:

H3a: The moderating effect of project-level investment strategy on the relationship between innovation framework and location choice (H1a) is in turn moderated by the type of economy in which an investment is made.

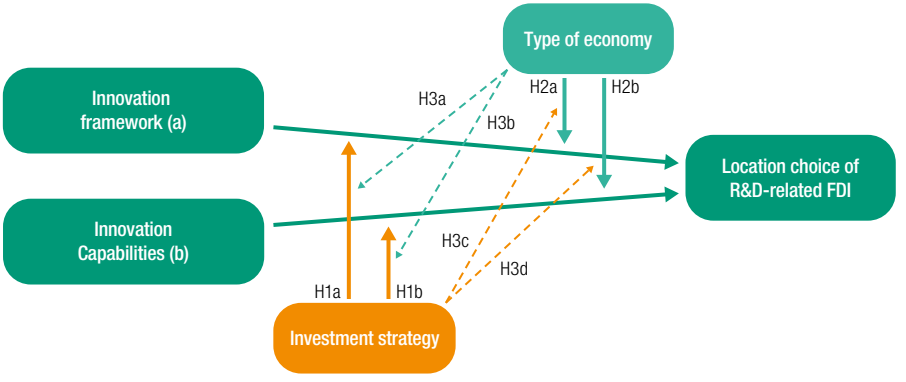
H3b: The moderating effect of project-level investment strategy on the relationship between innovation capability and location choice (H1b) is in turn moderated by the type of economy in which an investment is made.

H3c: The moderating effect of type of economy on the relationship between innovation framework and location choice (H2a) is in turn moderated by the investment strategy of a given project.

H3d: The moderating effect of type of economy on the relationship between innovation capability and location choice (H2b) is in turn moderated by the investment strategy of a given project.

We summarize the three sets of hypotheses in figure 1.

Figure 1. Analytical framework for location choice in R&D-related FDI



Source: Authors' elaboration.

Note: The full lines represent relationships already established in the literature. Our paper focuses on testing the moderating effects of investment strategy and type of economy and their interrelationships, represented by the dashed lines (H1a-b; H2a-b) and the dotted lines (H3a-d) respectively.

3. Data and methodology

3.1 Sample and data

Our analysis relies on data from three main sources. At the core, we use the fDi Markets data from fDi Intelligence, a division of the Financial Times Ltd., which provides detailed information on cross-border investment projects over time and across different activities, industries and countries. In our analysis, we use R&D-related cross-border investment projects by firms within the biotech and pharmaceutical industries between 2006 and 2016.[2] In addition to providing information on the investing firms, their origin and the location of each cross-border investment, the fDi Markets data provide a description of each of the investment projects. This database has previously been used by international organizations investigating the development of FDI in different industries and regions (e.g. UNCTAD, 2005) and by scholars interested in understanding R&D investment across countries (e.g. Castellani, Jimenez and Zanfei, 2013; Demirbag and Glaister, 2010; Castellani and Lavoratori, 2020).

We combine the project-level data from fDi Markets with country-level data from the World Competitiveness database of the Institute for Management Development (IMD) and patent data from the United States Patent and Trademark Office (USPTO). The combination of project-level data with country-level data allows us to look at how host-country characteristics affect location decisions for R&D-related cross-border investments and to uncover the moderating effects of project-specific investment strategies and types of economy.

The complete sample of R&D-related cross-border investment in the biotech and pharmaceutical industries for the 2006–2016 period includes 622 projects. Unfortunately, the IMD's World Competitiveness database is missing data for some of the countries in some years included in our sample. As a result, we omit investments for which the necessary data from IMD are missing for the chosen location.[3] Moreover, we could not identify the investment strategy for a few projects from the description provided in the fDI Markets data. As a result, our final sample consists of 588 R&D-related cross-border investment projects,

[2] Our sample consists of cross-border investment projects that are classified by FDI Intelligence as R&D projects.

[3] In cases where missing data affect a non-chosen location, we delete the location from the choice set for the given investment.

carried out by 314 firms in 44 countries.[4] In our sample, 73 per cent of the firms conducted only one R&D-related cross-border investment project between 2006 and 2016, whereas one of the firms conducted up to 16 investment projects. On average, firms with multiple investment projects conducted around four investments in our sample period.[5]

In our sample, the proportion of projects going to emerging markets remained rather stable between 2006 and 2016, accounting for 31 per cent of all projects. Not surprisingly, given the context of high-tech industries of this study, most of the emerging markets included in our sample are high-income or upper-middle-income countries. Our sample also shows a slight increase in exploitation-driven cross-border R&D investment within the two industries over time, though exploration-driven investment projects account for a slight majority (51 per cent) of the projects.

3.2 Empirical approach

To model the location choice for each investment project in our sample, we follow recent research and use mixed logit models (e.g. Castellani and Lavoratori, 2020). This way of modelling location choices is very close in spirit to the widely used conditional logit model (CLM) (McFadden, 1974), but carries the advantage of not relying on the strict, and likely violated, assumption of independence of irrelevant alternatives. When using the mixed logit model, one assumes that a firm chooses the location in a given choice set that maximizes its utility (i.e. its profit function[6]). In our paper, the expected utility to firm f of placing R&D-related investment i in location j is given by the following equation:

$$U_{fj,i} = \beta'_f x_{fj,i} + \varepsilon_{fj,i}$$

[4] The investments are made within the following 44 countries (respective number of investment policies in parenthesis): United States (96), United Kingdom (73), China (66), India (55), Singapore (36), France (23), Canada (22), Germany (22), Belgium (17), Ireland (17), Spain (16), Hungary (11), Italy (10), Netherlands (10), Switzerland (9), Austria (8), Brazil (8), Malaysia (8), Republic of Korea (8), Colombia (6), Czechia (6), Japan (6), Poland (6), Sweden (6), Australia (4), Chile (4), Hong Kong (China) (4), Mexico (4), Denmark (3), Israel (3), Thailand (3), Bulgaria (2), Finland (2), Russian Federation (2), Taiwan Province of China (2), Turkey (2), Croatia (1), Estonia (1), Lithuania (1), New Zealand (1), Peru (1), Philippines (1), Romania (1), Ukraine (1).

[5] We account for the presence of multiple investments by the same firm by clustering standard errors at the firm level in our estimations.

[6] Our choice set contains a maximum of 57 alternative locations (i.e., countries). In addition to the countries stated in footnote 4, the choice set contains Argentina, Greece, Iceland, Indonesia, Kazakhstan, Luxembourg, Mongolia, Norway, Portugal, Qatar, Slovakia, Slovenia, and the Bolivarian Republic of Venezuela. The number of locations in the choice set varies depending on the country of origin of the investing firm (we exclude the country of origin from the choice) and data availability at the country-year level.

where $x_{fj,i}$ is a vector of observable location characteristics that may vary over firms, β_f is a vector of estimated coefficients for these characteristics and represents the preference of firm f at the time of making the choice i, and $\varepsilon_{fj,i}$ is a random term that is extreme value (Train, 2009). Contrary to the classic linear model, the mixed logit model allows for β to vary over the population of investing firms with a density $f(\beta)$ (Train, 2009). Assuming that $f(\beta)$ follows a normal distribution, β_f can be decomposed into its mean (fixed part) and standard deviation (random part). In this paper, we focus primarily on the estimated mean coefficients of our covariates of interest, allowing for heterogeneity in the drivers of location choice over firms.

As 27 per cent of the companies in our sample were involved in more than one FDI project, we use firm-level clustered standard errors in the statistical tests to account for the dependence between choices made by the same company.[7]

3.3 Dependent variable

In line with our research question and hypotheses, our outcome variable is based on a categorical variable reflecting the chosen location for each R&D-related cross-border investment contained in our sample (Croissant, 2020; Castellani and Lavatori, 2020).

Consistent with the dominant practice in international business research (for reviews, see Kim and Aguilera, 2016; Rugman and Verbeke, 2003), we look at firms' choice of country when locating R&D activities abroad. As such, our location choice variable is at the country level. Admittedly, recent studies have begun exploring questions pertaining to location factors and choice at subnational levels, e.g. industry clusters and "global cities" (e.g. Goerzen, Asmussen and Nielsen, 2013). Since the country level of analysis is a crude measure, especially for large countries with large subregional diversity, more detailed research on locational aspects can provide richer accounts. There is a literature stream consisting of qualitative studies of industry clusters; however, data limitations in conducting quantitative studies at the subnational level continue to pose methodological challenges (Nielsen, Asmussen and Weatherall, 2017). In view of these limitations, analysing location choice at the country level still provides better opportunities for including other variables at the country level, and it relates directly to policy implications at the national level.

[7] We run the models in R, using 10,000 simulations and 140,668 as the random seed.

3.4 Explanatory variables

3.4.1 Innovation framework

In this paper, we refer to a location's innovation framework as the institutional environment surrounding innovative activities. In line with that, we operationalize *innovation framework* by averaging three indicators:[8] the extent to which intellectual property rights are enforced (e.g. Castellani and Lavatori, 2020), the extent to which the legal environment supports the development and application of technology, and the extent to which laws related to scientific research encourage innovation.[9] The three indicators are taken from the IMD World Competitiveness Executive Opinion Survey and range between 0 and 10, where 0 is the lowest and 10 is the highest.[10] The Cronbach's alpha for this score is 0.93.

3.4.2 Innovation capability

We consider a location's innovation capability as being the result of the use and combination of resources available for innovation activities in the country. As such, we operationalize innovation capability by using the number of patents within biotechnology (including drugs) granted by the USPTO in a given location. We use the $log(\#\ patents\ granted) + 1$ to ensure that the variable is defined also for those locations without patents.[11] We argue that the number of patents granted by the USPTO, which we see as a measure of innovation output, captures the presence of R&D-related capabilities in the country and signals that domestic actors are capable of developing patentable innovations. Patents are commonly used to measure the innovation capabilities and/or performance of a region, country or city (see e.g. Castellani and Lavatori, 2020; Papanastassiou et al., 2020).

3.4.3 Investment strategy

In line with our research question, we categorize each cross-border investment project according to whether it is driven by an exploitation or an exploration strategy (e.g. Kuemmerle, 1999). *Investment strategy* is defined at the project level, meaning that a firm that has made several investments during our sample period may be associated with both strategies.

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[8] As these indicators are highly correlated, we average them into one indicator to avoid multi-collinearity.

[9] Previous literature on location choice commonly used the rule of law to capture the strength of the institutional environment of a given location (e.g. Castellani and Lavatori, 2020). While we acknowledge that a country's broader institutions possibly matter for the location of R&D activities, we exploit the fact that our sample contains only R&D investment projects within the pharmaceutical and biotech industries and instead use indicators that are more closely related to the institutional environment relevant for the context of our study.

[10] As a result, *Innovation framework* has a theoretical range of 0 to 10.

[11] The theoretical range of *Innovation capability* is therefore 0 to infinity.

To categorize the projects, we use the description of each investment provided in the fDi Markets database. To ensure the validity of our categorization, two of the authors individually coded each investment project and then compared their results. In the event of disagreement, the case was discussed until consensus was reached. R&D-related cross-border investment projects identified as driven by exploration strategies included investments aimed at establishing an R&D centre or facility, and those focused on discovery, development and proximity to universities. Projects based on exploitation strategies included those focused on providing services for another company (affiliated or not), handling market-specific clinical trials and establishing offices centred on a particular market; those described as phases two or three of clinical trials; and those established for conducting clinical development.

3.4.4 Type of economy

To test hypotheses 2 and 3, we categorized the 57 potential locations in our choice set according to whether they are emerging and developing economies (considered together as emerging economies) or advanced economies. To determine which countries fall into the category of emerging economies, we use the classification of the International Monetary Fund, which classifies the world into advanced economies or emerging market and developing economies, according to each country's (i) per capita income level, (ii) export diversification and (iii) degree of integration into the global financial system (IMF, 2018).

3.4.5 Control variables

Following previous literature, we include a series of control variables that are related to the location choice for (R&D-related) cross-border investments. First, in view of the FDI literature's focus on the role of the host country's market size in attracting FDI (Nielsen et al., 2017), we control for market size. In previous research, GDP and/or GDP per capita have commonly been used as proxies for market size (see e.g. Castellani and Lavoratori, 2020). One strength of exclusively focusing on the pharmaceutical and biotech industries though is that we can meaningfully apply industry-specific proxies for constructs known to influence firms' location decision. As such, we use the log of a location's total health expenditure per capita (in United States dollars) as a measure of a location's market potential (or local demand) in the particular context of the pharmaceutical and biotech industries. This variable is available from the IMD World Competitiveness Executive Opinion Survey.

Second, we control for economic factors that could favour particular locations over others. More precisely, we control for the tax rate and wage costs in a given location (Nielsen et al., 2017). And more particularly, we control for the corporate

tax rate on profit in a given location[12] (Castellani and Lavatori, 2020) as well as for the remuneration of engineers in managerial positions (total base salary plus bonus and long-term incentives, in dollars) as a proxy for wage costs relevant to R&D-related cross-border investments within the pharmaceutical and biotech industries.[13] Both variables are available from the IMD World Competitiveness Executive Opinion Survey.

Third, we control for potential agglomeration effects associated with a particular location (Nielsen et al., 2017; Castellani and Lavatori, 2020). We capture these effects by including a variable (called *agglomeration*) that indicates the cumulative number of R&D-related FDI investment projects made in a particular location within a running three-year window prior to a given investment being made. To do so, we rely on the fDi Markets data from as far back as 2003 for the first year of our sample.

Finally, since international experience is one of the most studied characteristics in international business research (Xu et al., 2021), we control for an investing firm's experience within a given location. Following recent studies (e.g. Castellani and Lavatori, 2020), we consider a firm has within-country experience if, according to the fDi Markets data, the firm has made an R&D-related investment in a given location between 2003 and $t\text{-}1$, and that otherwise it has no within-country experience.[14]

We acknowledge that the decision to make an investment is not made overnight and therefore all time-varying variables are calculated for the year prior to the investment. We also mean-centre the variables for numerical stability and to remove some collinearity. Table 1 presents summary statistics for the explanatory and control variables. Despite some of the variables being correlated, collinearity is a minor issue for our results as the variance inflation factors for innovation framework and capability are generally below 10 (Kennedy, 1992).[15] However, as there are high correlations between the innovation framework and innovation capability variables, we run two separate models for each hypothesis: one to test the hypothesis in relation to innovation framework, and another to test the hypothesis in relation to innovation capability.

[12] We acknowledge that some countries may have policies to particularly attract FDI (e.g., favourable tax rate for foreign-owned firms) but owing to data limitations, we are unable to control for this aspect. We invite future research to investigate the presence and effect of such policies on the location decision for R&D FDI.

[13] Previous research commonly used average wage at the country level (see e.g. Hatem, 2011). As our study focuses on the pharmaceutical and biotech industries only, we use a proxy that is more closely connected to the location decisions for the firms in our sample.

[14] Admittedly, a firm may gain country-specific experience from activities other than R&D-related activities located in the host country (Castellani and Lavatori, 2020). Unfortunately, we do not have access to information related to prior investments of the firms in our sample, other than R&D-related investments.

[15] Only when estimating the effect of innovation capability for exploration-driven projects in advanced locations is the variance inflation factor slightly above 10.

Table 1. Summary statistics for explanatory and control variables with correlations

Descriptive	Mean	Standard deviation	Minimum	Maximum	Advanced economy	Health expenditure	Corporate tax	Wage costs	Agglomeration effects	Innovation framework	Innovation capability
Advanced economy	0.619	0.486	0	1	1						
Health expenditure	7.215	1.312	3.444	9.212	0.789	1					
Corporate tax	25.364	6.746	10	48	0.063	0.052	1				
Wage costs	11.193	0.621	8.021	12.199	0.460	0.670	0.273	1			
Agglomeration effects	3.269	5.926	0	36	0.074	0.015	0.243	0.125	1		
Innovation framework	5.955	1.408	2.173	8.647	0.632	0.680	0.085	0.538	0.242	1	
Innovation capability	2.714	2.097	0.000	8.910	0.470	0.548	0.411	0.538	0.487	0.586	1

Source: Authors' calculations based on data sources introduced in section 3.

4. Empirical results

To put our findings into perspective, we start by showing how the location choice probabilities depend on a location's innovation framework and capability without taking into account the moderating effect of investment strategy and type of economy. We use these results as a basis for comparison with our subsequent findings. As expected, our findings show that companies prefer locations characterized by a better innovation framework (table 2, column 1) and possessing better innovation capability (table 3, column 1).

To investigate the moderating effect of project-level investment strategy on the importance of a location's innovation framework and capability for location choice of R&D-related FDI projects, we use the same model as above but run it on subsamples consisting of exploration-driven projects and exploitation-driven projects respectively. The estimation results are presented in table 2, columns 3 and 5 for innovation framework, and in table 3, columns 3 and 5 for innovation capability. From these tables, we can see that the quality of a location's innovation framework and capability matter for both exploration- and exploitation-driven projects. In table 6, we provide test statistics and p-values for tests of effect modification. The null hypothesis for these tests is that there is no difference between the effects for projects with exploration strategies and for those with exploitation strategies. Table 6, column 1 shows us that whereas the preference for locations with innovation framework of higher quality and stronger innovation capability applies to both types of projects, the magnitude of the effects is not significantly different across project-level strategies. These results contrast with our expectation that a location's innovation framework and capability would matter more for exploration-driven projects than for exploitation-driven projects. We therefore conclude that H1a and b are not supported.

To assess the moderating effect of type of economy on the importance of a location's innovation framework and capability for the location choice of R&D-related cross-border investments, we run our baseline model but allow the effects to depend on the type of economy. The estimation results are presented in table 4, column 1 for the effect of innovation framework and table 5, column 1 for that of innovation capability. To our surprise, the results show that the quality of a location's innovation framework is positive and significant for advanced locations only, which means that only in such locations does an innovation framework of higher quality increase the probability of choosing a particular location. However, the test of effect modification presented in table 6, column 2 shows that the magnitude of the effect of the innovation framework in emerging and advanced locations is not significantly different. This result diverges from what we expected and therefore we conclude that H2a is not supported. When it comes to the effect of a location's innovation capability, the results in table 5 tell us that innovation capability matters in both emerging and advanced locations. However, the size of the effects appears not to be significantly different across types of economy (see table 6, column 2), which leads us to also reject H2b.

Table 2. Effect of innovation framework – estimates by project-level investment strategy

	All projects		Exploration		Exploitation	
	Mean	StdDev	Mean	StdDev	Mean	StdDev
Innovation framework	0.260*** (0.057)	0.257*** (0.066)	0.175* (0.083)	0.153 (0.226)	0.292*** (0.086)	0.219 (0.134)
Advanced economy	-0.524* (0.210)	0.049 (2.816)	-0.219 (0.408)	0.009 (13.217)	-0.440 (0.266)	1.328 (0.710)
Health expenditure	0.107 (0.070)	0.006 (1.684)	0.189 (0.115)	0.002 (3.851)	-0.069 (0.097)	0.022 (1.305)
Corporate tax	0.033*** (0.008)	0.045** (0.016)	0.028* (0.013)	0.007 (0.145)	0.027* (0.011)	0.075*** (0.020)
Wage costs	0.332 (0.200)	0.014 (3.598)	0.592 (0.353)	0.006 (14.865)	0.244 (0.241)	0.002 (3.647)
Within-country experience	1.111*** (0.128)	0.303 (0.511)	1.641*** (0.182)	0.006 (12.675)	0.522** (0.181)	0.626* (0.295)
Agglomeration effects	0.108*** (0.005)	0.019 (0.015)	0.106*** (0.008)	0.002 (0.214)	0.117*** (0.009)	0.040** (0.013)
Projects	588		302		286	
Log Likelihood	-1809.881		-882.290		-889.344	

Source: Authors' calculations based on data sources introduced in section 3.
Note: Coefficients from mixed logit estimation with clustered standard errors in parentheses. * p<0.05 ** p<0.01 *** p<0.001.

Table 3. Effect of innovation capability – estimates by project-level investment strategy

	All projects		Exploration		Exploitation	
	Mean	StdDev	Mean	StdDev	Mean	StdDev
Innovation capability	0.422*** (0.051)	0.166** (0.056)	0.328*** (0.073)	0.011 (0.990)	0.479*** (0.078)	0.177 (0.105)
Advanced economy	-0.180 (0.216)	0.040 (3.612)	0.047 (0.443)	0.009 (13.536)	-0.193 (0.253)	1.114* (0.450)
Health expenditure	-0.191* (0.088)	0.001 (1.603)	-0.070 (0.149)	0.003 (3.896)	-0.344** (0.120)	0.009 (1.264)
Corporate tax	-0.033*** (0.010)	0.035 (0.018)	-0.023 (0.016)	0.003 (0.387)	-0.046** (0.015)	0.063** (0.020)
Wage costs	0.446* (0.203)	0.017 (5.196)	0.703 (0.397)	0.008 (14.386)	0.290 (0.266)	0.011 (4.308)
Within-country experience	1.017*** (0.126)	0.311 (0.439)	1.525*** (0.182)	0.004 (13.263)	0.435* (0.181)	0.725** (0.262)
Agglomeration effects	0.074*** (0.007)	0.009 (0.029)	0.078*** (0.011)	0.002 (0.218)	0.078*** (0.011)	0.037** (0.013)
Projects	588		302		286	
Log Likelihood	-1774.026		-868.049		-868.203	

Source: Authors' calculations based on data sources introduced in section 3.
Note: Coefficients from mixed logit estimation with clustered standard errors in parentheses. * p<0.05 ** p<0.01 *** p<0.001.

Table 4. Effect of innovation framework – estimates by type of economy and project-level investment strategy

	All projects		Exploration		Exploitation	
	Mean	StdDev	Mean	StdDev	Mean	StdDev
Advanced economy	286 -882.147	0.016 (4.907)	-1.005 (1.760)	0.005 (12.861)	-0.937 (1.044)	0.021 (5.542)
Advanced economies						
Innovation framework	0.250*** (0.067)	0.351** (0.108)	0.112 (0.092)	0.328 (0.192)	0.413*** (0.105)	0.337 (0.227)
Health expenditure	0.040 (0.160)	0.373 (0.302)	0.248 (0.224)	0.012 (5.374)	-0.390 (0.286)	0.625 (0.434)
Corporate tax	0.033** (0.011)	0.002 (0.158)	0.026 (0.014)	0.00004 (0.476)	0.028 (0.019)	0.055* (0.023)
Wage costs	0.472 (0.321)	0.238 (1.098)	1.136* (0.495)	0.011 (21.656)	0.057 (0.444)	0.009 (6.747)
Within-country experience	1.113*** (0.163)	0.206 (0.707)	1.550*** (0.221)	0.004 (20.001)	0.441 (0.258)	0.091 (4.382)
Agglomeration effects	0.109*** (0.008)	0.034* (0.016)	0.105*** (0.010)	0.002 (0.314)	0.120*** (0.015)	0.060* (0.024)
Emerging markets						
Innovation framework	0.258 (0.140)	0.015 (2.994)	0.246 (0.233)	0.005 (19.514)	0.246 (0.198)	0.018 (2.645)
Health expenditure	-0.039 (0.239)	0.088 (0.367)	0.158 (0.517)	0.001 (7.457)	-0.110 (0.260)	0.383 (0.198)
Corporate tax	0.0005 (0.037)	0.0001 (0.227)	-0.009 (0.083)	0.0001 (0.598)	0.007 (0.046)	0.010 (0.077)
Wage costs	0.371 (0.380)	0.018 (3.835)	-0.171 (0.722)	0.004 (31.396)	0.630 (0.502)	0.029 (4.088)
Within-country experience	0.974*** (0.212)	0.333 (0.534)	1.894*** (0.319)	0.011 (17.671)	0.339 (0.296)	0.815 (0.451)
Agglomeration	0.098*** (0.012)	0.001 (0.158)	0.111*** (0.025)	0.00002 (0.708)	0.100*** (0.016)	0.006 (0.093)
Projects	588		302		286	
Log Likelihood	-1808.504		-875.716		-882.147	

Source: Authors' calculations based on data sources introduced in section 3.
Note: Coefficients from mixed logit estimation with clustered standard errors in parentheses. * p<0.05 ** p<0.01 *** p<0.001.

Table 5. Effect of innovation capability – estimates by type of economy and project-level investment strategy

	All projects		Exploration		Exploitation	
	Mean	StdDev	Mean	StdDev	Mean	StdDev
Advanced economy	-0.080 (0.810)	0.032 (4.390)	-0.176 (1.921)	0.010 (13.983)	1.035 (1.124)	0.006 (3.349)
Advanced economies						
Innovation capability	0.389*** (0.063)	0.123 (0.104)	0.258** (0.098)	0.052 (0.248)	0.569*** (0.103)	0.008 (2.312)
Health expenditure	-0.283 (0.196)	0.179 (0.785)	-0.004 (0.325)	0.005 (8.373)	-0.662* (0.310)	0.365 (0.691)
Corporate tax	-0.033** (0.013)	0.002 (0.115)	-0.016 (0.016)	0.0003 (0.443)	-0.074*** (0.022)	0.057** (0.020)
Wage costs	0.756* (0.323)	0.654 (0.418)	1.258* (0.524)	0.017 (21.387)	-0.002 (0.466)	0.015 (14.182)
Within-country experience	1.040*** (0.152)	0.386 (0.376)	1.496*** (0.222)	0.008 (16.223)	0.401 (0.290)	0.144 (2.809)
Agglomeration	0.080*** (0.009)	0.035* (0.015)	0.083*** (0.013)	0.011 (0.067)	0.084*** (0.016)	0.052 (0.028)
Emerging markets						
Innovation capability	0.819*** (0.237)	0.312 (0.639)	1.598*** (0.416)	0.011 (21.484)	0.295 (0.333)	0.740 (0.535)
Health expenditure	-0.175 (0.225)	0.001 (3.736)	0.042 (0.562)	0.0003 (8.127)	-0.240 (0.285)	0.258 (0.288)
Corporate tax	-0.025 (0.036)	0.0003 (0.186)	-0.034 (0.088)	0.0003 (0.553)	-0.019 (0.046)	0.006 (0.123)
Wage costs	0.288 (0.360)	0.008 (9.730)	-0.720 (0.788)	0.005 (31.736)	0.639 (0.444)	0.049 (10.240)
Within-country experience	0.056*** (0.015)	0.0005 (0.451)	0.058* (0.028)	0.00002 (0.578)	0.061** (0.021)	0.0004 (0.385)
Agglomeration effects	0.481*** (0.098)	0.148 (0.216)	0.704*** (0.202)	0.008 (5.075)	0.416** (0.154)	0.188 (0.239)
Projects	588		302		286	
Log Likelihood	-1773.665		-858.094		-861.799	

Source: Authors' calculations based on data sources introduced in section 3.
Note: Coefficients from mixed logit estimation with clustered standard errors in parentheses. * p<0.05 ** p<0.01 *** p<0.001.

Table 6. Innovation framework and capability – tests of effect modification

Effect modification by	All projects strategy	All projects, type of economy	Emerging markets strategy	Advanced economy strategy	Exploration projects, type of economy	Exploitation projects, type of economy
Innovation framework	0.946 (0.331)	0.003 (0.956)	0.00000 (0.999)	4.644* (0.031)	0.292 (0.589)	0.568 (0.451)
Innovation capability	2.013 (0.156)	0.685 (0.408)	1.289 (0.256)	4.793* (0.029)	4.441* (0.035)	0.797 (0.372)

Source: Authors' calculations based on data sources introduced in section 3.
Note: Wald test using clustered standard errors with p-values in parentheses. * p<0.05 ** p<0.01 *** p<0.001.

To investigate in greater detail the interplay between the moderating effects of project-level investment strategy and type of economy, we estimate similar models as above but this time we allow the effects of the covariates to depend on both the type of economy and the project-level investment strategy. The results are provided in table 4, columns 3 and 5 for the effect of innovation framework. The table reveals that innovation framework only has a positive and significant effect for exploitation-driven projects in advanced locations. This result is particularly interesting as one may intuitively have expected that the effect of the innovation framework would be stronger in exploration-driven projects in emerging markets. The tests of effect modification presented in table 6, columns 3 and 4 confirm that, when comparing the effect of the innovation framework across project-level investment strategies, it is statistically different for projects located in advanced locations. As such, the type of economy in which an investment project is located appears to influence the moderating effect of project-level investment strategy on the relationship between innovation framework and location choice. H3a is therefore supported.

Table 5, columns 3 and 5 report the results for the effect of innovation capability. Contrary to the results for the effect of the innovation framework, our results reveal that innovation capability has a positive and significant effect across project-level investment strategies and types of economy (except for exploitation-driven projects in emerging locations). When comparing the effect of innovation capability across project-level investment strategies, the magnitude of the effect of a location's innovation capability differs only in advanced locations, as shown by the significant tests of effect moderation presented in table 6, column 4. More particularly, we find that innovation capability has a larger effect on location choice when it comes to exploitation-driven projects within advanced locations. As such, the type of economy in which an investment project is located appears to influence the moderating effect of project-level investment strategy on the relationship between innovation capability and location choice. H3b is therefore also supported.

If we compare across types of economy, the magnitude of the effect of a location's innovation framework does not appear to differ depending on the combination of project-level investment strategy and type of economy (see table 6, column 5). These findings lead us to conclude that H3c is not supported.

Finally, if we compare across types of economy, the magnitude of the effect of a location's innovation capability differs only for exploration-driven investment projects (see table 6, column 5). More particularly, our results show that, for exploration-driven projects, innovation capability has a larger effect on location choice for projects located in emerging countries. These findings lead us to conclude that H3d is supported.

An overview of our hypotheses and results is provided in table 7. The effects of the innovation framework and innovation capability mentioned here are furthermore illustrated in figure 2. As the effect of a covariate in a mixed logit model is non-linear in the choice probabilities (with larger effects for probabilities close to 50 per cent), we show how each possible value of the choice probability is changed when the value of innovation framework (or innovation capability) is increased by one. The figure reads in the following way: one selects a value for the choice probability on the horizontal axis and reads off the corresponding value of the choice probability when innovation framework or capability is increased by one on the vertical axis.

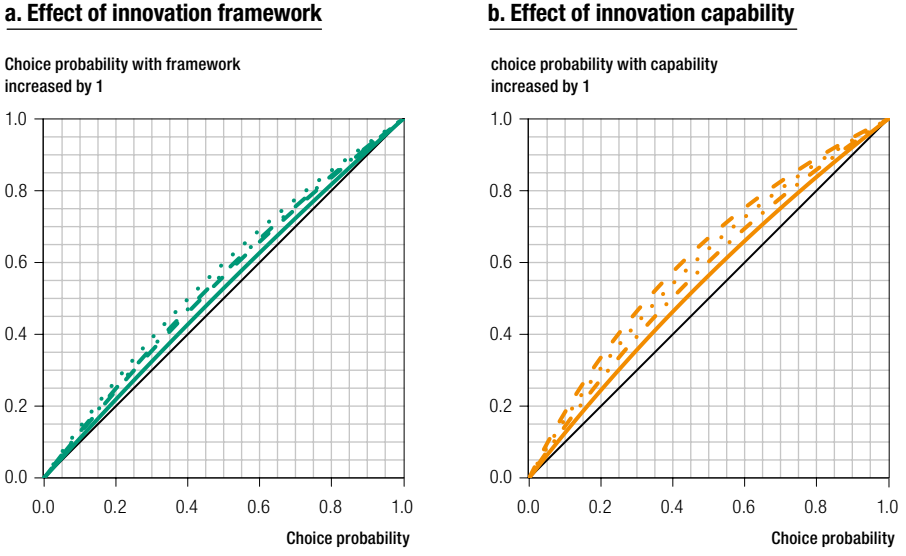
Table 7. Summary of hypotheses and conclusions

Hypothesis		Result
H1a	The effect of innovation framework on location choice is stronger for projects driven by an exploratory strategy than for projects driven by an exploitation strategy.	Not supported
H1b	The effect of innovation capability on location choice is stronger for projects driven by an exploratory strategy than for projects driven by an exploitation strategy.	Not supported
H2a	The effect of innovation framework on location choice is stronger for projects placed in emerging markets than for projects based in advanced economies.	Not supported
H2b	The effect of innovation capability on location choice is stronger for projects placed in emerging markets than for projects based in advanced economies.	Not supported
H3a	The moderating effect of project-level investment strategy on the relationship between innovation framework and location choice (H1a) is in turn moderated by the type of economy in which an investment is made.	Supported
H3b	The moderating effect of project-level investment strategy on the relationship between innovation capability and location choice (H1b) is in turn moderated by the type of economy in which an investment is made.	Supported
H3c	The moderating effect of type of economy on the relationship between innovation framework and location choice (H2a) is in turn moderated by the investment strategy of a given project.	Not supported
H3d	The moderating effect of type of economy on the relationship between innovation capability and location choice (H2b) is in turn moderated by the investment strategy of a given project.	Supported

Source: Authors' elaboration.

The figure therefore shows the effect of a one-unit increase and shows how it depends on the combination of type of economy and project strategy, keeping everything else constant. For instance, figure 2-B shows that for a choice probability of 10 per cent, a one-unit increase in a location's innovation capability raises the choice probability to slightly below 20 per cent for exploration-driven projects in emerging markets (dashed curve), compared with about 12.5 per cent exploration-driven projects in advanced locations (solid line) and with about 15 per cent for exploitation-driven projects in either advanced or emerging locations (dotted and dashed-dotted lines). Moreover, judging from the curvature of the two graphs, figure 2 suggests that the effect of innovation capability is generally more pronounced than the effect of the innovation framework.

Figure 2. Effect of country characteristics on location choice for R&D-related FDI in emerging markets and advanced economies



Source: Authors' calculation based on tables 4 (for figure 2A) and 5 (for figure 2B).

5. Discussion and conclusions

5.1 Location choice and destination-country characteristics in R&D-related FDI

The main conclusions of the study concern the relationship between host-country characteristics and investment strategy (exploration- or exploitation-driven) and type of destination country (emerging market or advanced economy), and their influence on MNE location choice for R&D-related FDI projects.

Our analysis showed that innovation framework and capabilities in the host economy matter for attracting FDI related to exploitation as well as exploration strategies. Hence, contrary to our expectations, the importance of the locational characteristics for location attractiveness turned out not to be moderated by type of strategy. Given the nature of the investment as contact point in the firms' global innovation networks, we expected exploration-driven investments to be more demanding in terms of the requirements of the host country, whereas exploitation strategies are undertaken with a more narrowly defined purpose, such as a need to adjust products to new host markets. Regardless of the strategy behind the R&D-related FDI investment project, however, innovation framework and innovation capability both have an effect on location choice. As expected, these activities in general demand the presence of a solid infrastructure in a location to make it attractive for R&D investments.

Contrary to our expectations, the analysis showed that while innovation framework and innovation capabilities matter in general, they are not significantly different in emerging markets compared with advanced economies. This finding contrasts with previous research, which has emphasized that weak and volatile institutions in emerging markets discourage MNEs from choosing the location for foreign investments (Khanna and Palepu, 2010). In fact, in our analysis, the innovation framework was shown to be insignificant in emerging markets, indicating a variation among emerging-market countries capable of attracting R&D-related FDI. Innovation capability was shown to be important in both types of destination country. Hence, the innovation capabilities of local actors play a more important role for foreign MNEs than institutions related to the national system of innovation. Although ample evidence in previous research shows that weak institutions in the host country generally have a negative influence on incoming FDI, that may not be the case across all countries and industries. At least our findings indicate that MNEs in the pharmaceutical and biotech industries that invest in emerging markets in the upper-middle- to high-income segment are not particularly deterred by institutional constraints. Part of the explanation could be the implementation of international agreements on intellectual property rights (Papageorgiadis et al., 2019).

These findings raise the question whether the traditional configuration of national systems of innovation is adequate to fully grasp the dynamics of a globalized flow of innovation activities. Having domestic firms capable of developing new products and filing international patents has a stronger effect on the attractiveness of a location than the innovation framework conditions alone. This observation points in the same direction as previous research emphasizing the importance of local firm capabilities and capabilities in the labour force (e.g. Haakonsson et al., 2013). The effect of innovation framework on location attractiveness was shown to be significant in advanced economies only.

Furthermore, the relatively marginal differences between advanced economies and emerging markets when considering location characteristics as well as the moderating role of project investment strategy suggest that some emerging markets have matured as destinations for R&D-related FDI. Meanwhile, as MNEs have reorganized activities globally for decades, these firms may also have gained more knowledge on and experience in how to operate in emerging markets.

5.2 Policy implications

Overall, the results are consistent with previous research as they show that MNEs investing in R&D abroad prefer locations with better innovation frameworks *and* better innovation capabilities. It follows as a general policy implication that enhancing the innovation framework and capability of a country will increase the country's likelihood of attracting R&D-related FDI. Aligning policies for science, technology and innovation and industrial policies is at the core of building attractiveness for R&D-related FDI in emerging markets. While this general relation is clear, it is also evident that taking on this task is a major financial, organizational and educational policy challenge, especially for governments in emerging markets. International alliances and linkages are crucial for building innovation capabilities and increase the effects of technology transfer to an emerging-market location. This supports the work by Papanastassiou et al. (2020), as they discuss policy challenges in the current globalization of innovation. They also point out that the foundation for appropriate policies in the current era is still emerging.

In order to push this frontier and identify more specific policy implications, and in contrast studies focusing on institutional framework alone, innovation capability was shown to be an important factor in determining a host location's ability to attract R&D-related FDI. This raises the question of how countries most effectively can develop innovation capabilities. Until now, the literature on national systems of innovation has emphasized the importance of having a developed national innovation framework. Our findings reveal the lack of a clear connection between the quality of the innovation framework and the attraction of R&D-related investment.

However, the innovation framework does play an indirect role in developing innovation capability, which seems to have a more direct effect. Therefore, investing in innovation capabilities through industrial policy has a significant effect on increasing the probability for attracting R&D-related FDI. This is particularly the case in emerging-market economies since an improvement in innovation capability increases the likelihood of attracting investment projects. Here the effect is more pronounced than in advanced economies (see figure 2).

As shown in earlier research, the attraction of advanced activities with a high value added has the potential to lead to further benefits for the destination country in terms of linkages and spillover effects between the foreign MNE and local firms (Hansen et al., 2009). Furthermore, MNEs' initial investments are frequently followed by additional investments in order to benefit from co-location of value chain activities (Castellani and Lavoratori, 2020). These investments may lead to further linkages and spillover effects. This is important since the net benefits of FDI depend on the quality of FDI. FDI quality is, in turn, related to the motivation driving MNE investment and the mandate and autonomy of MNE subsidiaries; it also depends on the capacity of actors in the host countries to absorb, internalize and upgrade their knowledge assets (Narula and Pinelli, 2016). The reciprocal relationship between the strategies of MNEs and the innovation capabilities of the host country alludes to the existence of a positive spiralling effect: R&D-related FDI can contribute to host-country innovation capabilities – and vice versa. Where such innovation capabilities exist, more R&D-related FDI driven by exploration motives are likely to follow.

Two policy implications may be derived from this study. First, national FDI policy can prioritize augmenting the local embeddedness and ties between the MNE and local actors through linkage-building initiatives and programmes. While this is not per se a new type of policy initiative (see UNCTAD, 2001), it remains relevant, especially in the context of development (see also Narula and Pinelli, 2016). Second, the presence of innovation capabilities in a country is the outcome of science, technology, innovation and educational policies and programmes. Building and maintaining such capabilities require continuous policy attention and domestic investments. As UNCTAD's recent Technology and Innovation Report (UNCTAD, 2021) stresses, this is a particular challenge for developing countries. Here, it is relevant to mention again that the emerging markets attracting R&D-related FDI mainly consist of high-income or upper-middle-income countries. In general, the higher the developmental level of the country the better the possibilities of investing in domestic innovation capabilities.

5.3 Limitations and future research

The pharmaceutical and biotech industries have had the highest share of R&D-related FDI over the decade, making them the most internationalized in terms of R&D. These characteristics position the industries as highly relevant and comparable, but extreme, cases. Hence, from a policy perspective, the implications derived from this study do not necessarily extend beyond the boundaries of the two industries. It would therefore be relevant to test whether our results hold for R&D-related cross-border investments made by MNEs in other industries. Furthermore, our paper focuses on project-level investment strategy and type of economy as moderators of the effect of two location characteristics (i.e. innovation framework and capability). Another obvious avenue for further research would be investigating firm-level learning and the resulting accumulation of experience. The research domain on globalization of innovation would gain from better understanding the role of experience in the globalization of R&D. It remains relevant to further uncover the role of MNEs in constructing innovation networks and the implications for emerging markets and developing countries.

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Home-country export regulations, credit markets, and corruption: implications for different types of internationalization

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Abstract

Direct exporting activities and outward foreign direct investment (OFDI) are two types of internationalization that differ in firms' opportunities, resources and risks. We study home-country institutional factors for internationalization and empirically investigate the direct and joint effects of export regulations, credit markets and corruption in explaining exporting and OFDI from a country. Using country-level data from 96 developed and developing countries between 2000 and 2018, we test a series of hypotheses and examine nonlinearity in the relationships. The results of the study suggest that export regulations partially affect exporting but do not affect OFDI. Access to financial resources can be critical in parts for both exports and OFDI. The findings also show that corruption can have different implications for exports and OFDI. The interactions of corruption with export regulations and credit markets reveal some unexpected and counter-intuitive results, highlighting the importance of distinguishing between the direct and indirect (joint) effects of business environment factors and corruption on exports and OFDI. The results of the study contain important information for policymakers.

Keywords: institutions, exports, OFDI, corruption, export regulation, credit markets

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1. Introduction

Many countries have undertaken significant policy interventions in the form of regulatory reforms intending to promote internationalization (Stoian and Mohr, 2016; Becker-Ritterspach et al., 2019) for domestic firms to achieve growth in foreign markets. Exports and outward foreign direct investment (OFDI) are two types of internationalization activities that differ in motivation and process, required resources, cost structure and associated risk (Benacek et al., 2000; Asamoah et al., 2019).

Exporting provides access to new markets, and OFDI can broadly support economic development and macroeconomic gains in some contexts (see Knoerich, 2017). Yet, firms seeking new markets when they internationalize can seek access to these markets in different ways. Many business decisions and activities, including internationalization, may be chosen on the basis of the institutional environment (see Williamson, 2000; Cuervo-Cazurra et al., 2015). OFDI widens the options for firms to respond to the home-country environment, in addition to exporting. For instance, OFDI can help a firm escape challenges in the home country (see Cuervo-Cazzura et al., 2017, 2015; Cuervo-Cazurra and Ramamurti, 2017; Shi et al., 2017; Witt and Lewin, 2007), whereas exports may not provide that option. Yet, exporting may entail fewer foreign market risks (Gaur et al., 2014) or a different kind of known risk, and a firm can use the home-country environment (Cuervo-Cazurra et al., 2015) to its advantage (see McDougall and Oviatt, 2000; Lu and Beamish, 2001).

The institutional environment for internationalization includes not only institutions that directly govern exporting (export regulations) but also the institutions that provide necessary capital inputs to firms to be able to internationalize (credit markets) (see Armour and Cumming, 2008; Rajan and Zingales, 1998). Thus, policymakers play an essential role in setting the conditions under which firms internationalize. In addition, the process of getting it all done, such as the extent to which corruption is embedded in the environment, is an essential consideration for firm decisions in many contexts (Chowdhury et al., 2019; Altomonte, 2000).

Previous research shows that the interplay between formal institutions such as regulations and informal institutions such as corruption are important in understanding both firm outcomes (Audretsch et al., 2021; Chowdhury et al., 2019) and whether, for example, corruption is “sand” or “grease” for the process of internationalizing (Méon and Weill, 2010; Méon and Sekat, 2005). Therefore, policymakers need to consider internationalization processes in the context of corruption.

To understand how these interact, we investigate the relationship between these two types of internationalization (exports and OFDI) with an institutional context, specifically home-country export regulations, domestic credit markets

and corruption. We draw on institutional frameworks to derive and test a set of hypotheses about exports and OFDI, and we use data from 96 countries from 2000 to 2018 to test a set of hypotheses about the direct and indirect effects of institutional context. We provide insight into how home-country institutional conditions can shape internationalization (Bernard et al., 2007; Luiz et al., 2017; Krammer et al., 2018), which is relatively less studied than the host country context.

In doing so, our study advances knowledge in two substreams of research. First, we contribute insights into the effect of export regulations and credit markets during internationalization (Vujanović et al., 2021; Audretsch et al., 2019; Luiz et al. 2017) by demonstrating that exports and OFDI activity respond to changing tariff and non-tariff regulation, market disclosure and non-financial investment. Second, we advance knowledge on home-country factors in the extensive literature on the dynamics of different types of internationalization (Luiz et al., 2017). Finally, we extend international business and management research by distinguishing between the direct and indirect (joint) effects of business environment factors and corruption on exports and OFDI (see Lu and Beamish, 2001; Bernard et al. 2007; Krammer et al. 2018).

Our analysis is relevant for public policy. We find that corruption can play a mixed role in exports and OFDI and that greater regulation of exports limits exports and OFDI. We find lower tariff rates to be associated with exports. Finally, our results show that improving access to credit and easing export requirements can be relevant considerations for internationalization in some contexts.

Next, we present and hypothesize about links among export regulations, credit markets, corruption and internationalization. In the third section, we describe our data and methodology. The fourth section presents our results, followed in the next section by the robustness check. Section six reports conclusions, policy implications and recommendations, and section seven offers future research directions.

2. Theory and hypotheses

2.1 Institutional context and internationalization

Institutions reflect the “rules of the game” that shape economic activity (North, 1990). Broadly, formal institutions represent codified conditions, and informal institutions reflect norms and uncodified “systems of meaning” (Deephouse et al., 2016). Whereas formal rules themselves may be explicit and well-articulated, informal institutions tend to “have never been consciously designed” (Sugden, 1986, p. 54).

The institutional environment in a country shapes conducive or challenging conditions for business activities (Dunning and Lundan, 2008; North, 1990; Witt and Lewin, 2007) and is an important influence on business decisions of firms, which can respond in different ways such as whether and how to internationalize (see Cuervo-Cazurra et al., 2019; Oliver, 1991). In addition, interactions between formal institutions and informal institutions (i.e. corruption) are important, as monitoring and enforcement of rules can vary across countries (see Acemoglu et al., 2001; Miller, 2000). In some environments, informal institutions can be as or even more important than formal institutions (see Baumol, 1990).

Regulatory institutions directly shape business activities. For example, an exporting firm needs to clear export regulations in the home country and meet requirements in another country. However, any number of dimensions and regulatory focus area permutations means that the effects of regulation on a firm are not always clear or linear (Audretsch et al., 2019). For example, the financial cost (e.g. filing fees) to file a required document may be low, but the time it takes to complete the document may be lengthy. Or, the same type of documentation required to register property in one country may be easy to accomplish, but it may be difficult in another country with a different system. In addition, some regulatory arrangements may raise transaction costs, whereas others may protect consumers and firms, facilitate transactions and reduce uncertainty (see Beltiski et al., 2016; Chowdhury et al., 2019).

2.2 Home-country export regulation and internationalization

Firms need to navigate clusters of action (see Krammer et al., 2018), including obtaining the requisite permissions, licences and legal requirements to engage in the internationalization process. Both exporting and OFDI require compliance with home-country regulations in the internationalization process, such as to finance domestic production expansion or capabilities or to move capital or goods across borders. Firms interested in internationalizing incur fixed costs that are sunk costs (Impullitti et al., 2013) – known, upfront costs necessary to comply with regulations (Chetty and Hamilton, 1993; Bernard et al., 2007).

Under conditions where export regulations are easy to navigate and firms incur relatively fewer costs to meet regulatory requirements, exporting may be an attractive activity. When the stated requirements are clear and reflect the process in practice, firms can rely on such information and commit to exporting what they produce in their home country. They can anticipate the costs of internationalization accordingly. In contrast, when firms become misaligned with the regulatory environment (see Witt and Lewin, 2007), they may experience a competitive disadvantage and may reposition themselves (Yamakawa et al., 2013; Witt and Lewin, 2007) by acquiescing, complying or adapting, appealing or compromising, defying, manipulating, or escaping or avoiding the regulatory environment

(Cuervo-Cazurra et al., 2019; Oliver, 1991). Furthermore, OFDI activities can widen the options for firms to respond to a challenging home-country environment by establishing a subsidiary in another country. We therefore hypothesize as follows:

> **Hypothesis 1:** More extensive home-country export regulations will (a) discourage internationalization through exports and (b) encourage internationalization through OFDI.

2.3 Home-country credit markets and internationalization

Access to capital varies across countries, reflecting differences in the development and strength of credit markets. Differences in credit market development can help explain differences in export patterns (Manova, 2008). Both exports and OFDI require financial capital for several reasons. Export regulations can be accompanied by direct financial costs in the form of permits and fees. In addition to these direct costs, there can also be indirect costs, such as staff time spent in complying with regulations, which could be redirected away from conducting firm growth-oriented activities or paying for legal or accounting expertise.

Firms could also incur costs related to search (Cuervo-Cazurra, 2012) and exploration in foreign markets to determine if they should export or invest and to assess potential profitability in the foreign market (Bernard et al., 2007). In addition, firms that expand in foreign markets can face a wide range of costs, such as those related to transportation (e.g., freight and time costs), policy (e.g., tariffs and non-tariff matters), information, contracts, currency, legal and regulatory needs, and local distribution costs (Anderson and Wincoop, 2004: 692). Thus, financing is an important consideration for firms looking to internationalize.

Creditor rights can play a prominent role in economies with functional bankruptcy systems (Djankov et al., 2007; Chetty and Hamilton, 1993). Previous research has found that loans have more concentrated ownership in countries with stronger creditor protection, longer maturities and lower interest rates (see Qian and Strahan, 2007). Investor protections affect how firms raise the capital needed to start and grow, innovate, diversify and compete. Without investor protections, equity markets are stunted and banks become the only source of finance. Economies with deep, dynamic capital markets tend to protect investors effectively, as they receive the information they can trust more. In the absence of such protections, they may be reluctant to invest in their home country unless they become controlling shareholders, reducing the supply of equity capital in-house (Dahya et al., 2008). A weak financial system in the home country may result in firms moving away from internationalization activities because they are not able to finance them. Or, it could result in firms shifting their attention to seek financial resources abroad (Cuervo-Cazurra et al., 2015), which could raise costs (Rajan and Zingales, 1998)

related to searching abroad and dealing with potential intermediaries. This kind of redirection – which could occur through OFDI activity – would not be necessary if firms could find resources in the home country. We therefore posit as follows:

> **Hypothesis 2:** Less developed home-country credit markets will (a) discourage internationalization through exports and (b) encourage internationalization through OFDI.

2.4 Home-country corruption and internationalization

Another important consideration for firms is corruption, which can become an expected condition for firms when it is deeply entrenched in a country (see Audretsch et al., 2019; Cuervo-Cazurra, 2008; Li et al., 2008; Rose-Ackerman, 2007). For firms seeking to internationalize, "rules of procedures that actors employ flexibly and reflexively to assure themselves and those around them that their behavior is reasonable" (DiMaggio and Powell, 1991, p. 20) can pose a threat because of the nature and costs of corruption.

Corruption is primarily associated with adverse effects on economic activity (Audretsch et al., 2019; Glaeser and Saks, 2006; Shleifer and Vishny, 1993), although there is a debate that it may "grease the wheels" for businesses in some situations (see Shleifer and Vishny 1993; Méon and Sekkat, 2005). Belitski et al. (2016) argue that corruption is harmful in the long term because access to resources is built through hidden and informal channels, which become institutionalized over time, and this increases the vulnerability of firms and redirects the pool of public resources away from other investments.

When corruption is deeply embedded, it can result in changing behaviour such that it becomes common in business practices (Cuervo-Cazurra, 2008). Firms that need export permits or tax documents to enter foreign markets may be easy targets for public officials during regulatory compliance processes. These firms will have to seek out interactions specific to internationalization that non-exporting firms would not. Where corrupt officials can hinder or delay approvals so as to create an opportunity for bribes (Myrdal, 1986), this increases firms' vulnerability. Firms engaged in export activities may be able to grow by accessing a larger market, but at the same time, this could put them on the radar of corrupt officials. Some firms may have the resources to afford to pay bribes (Tonoyan et al., 2010), access corrupt officials to facilitate their transactions, and seek to build channels or maintain their access. However, these payments or relationship costs still divert resources from productive activities, such as investing in export capability.

When corruption is associated with relative loss of home institutional legitimacy (DiMaggio and Powell, 1983) and firms do not trust the environment in the home country, they may prefer to move their capital abroad in OFDI activity rather than

attempting to export. Thus, OFDI could reduce their vulnerability to corruption associated with production and exporting from the home country. We, therefore, hypothesize as follows:

> **Hypothesis 3:** Home-country corruption will (a) discourage internationalization through exports and (b) encourage internationalization through OFDI.

2.5 The moderating effect of corruption and regulations on internationalization

When complying with export regulations, a firm might be asked to pay bribes if officials use their power to delay or interfere with the paperwork necessary for export permits to seek bribes. This cuts into potential profits and exposes the firm to possible future corruption without recourse (see Belitski et al., 2016; Audretsch et al., 2019). Enforcement of regulations also influences how firms comply with regulations. In an environment with poor or arbitrary enforcement in line with the codified guidance and with high corruption, the rules may be applied to some firms unevenly or differently (Meon and Weill, 2010; Laeven and Woodruff, 2007).

Firms may be uncomfortable or unable to find institutional alignment (Witt and Lewin, 2007) in a difficult or discretionary regulatory environment. Depending on their available resources, they may explore the options available to them and decide on bargaining versus not bargaining with authorities. Bargaining behaviour is likely to occur before avoidance of bargaining, should the export regulations be flexible and potential bribe costs affordable (see Djankov 2002, Méon and Sekkat, 2005; Meon and Weill, 2010). Non-bargaining behaviour may result in non-compliance and avoidance, including looking for ways to reduce visibility to corruption, incentivizing a firm to stay small and not engage in exports or in seeking growth outside the country through OFDI.

Greater corruption combined with extensive export regulations mean more points of interaction where firms could be exploited, encouraging avoidance (Luiz et al., 2017). Furthermore, Djankov (2002) found that more corruption is associated with a highly regulated environment. This kind of environment, marked by high corruption and extensive export regulation, could motivate firms that are interested in exporting to abandon the effort or to look for other internationalization opportunities. Therefore, we posit as follows:

> **Hypothesis 4:** Higher home-country corruption will (a) accentuate the negative relationship between export regulations and exports and (b) accentuate the positive relationship between export regulations and OFDI.

2.6 The moderating effect of corruption and credit markets on internationalization

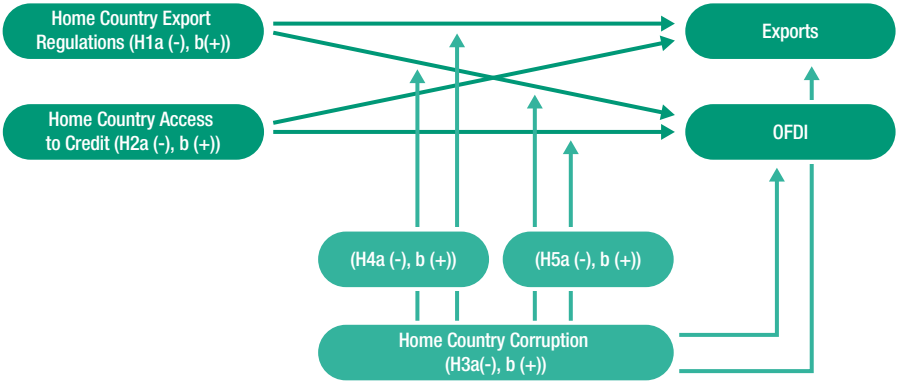
Corruption can affect credit markets and how firms can access them. It distorts the efficient flow of capital resources to productive projects (Khwaja and Mian, 2011). In a corrupt context, lenders may instead redirect financial resources to unproductive projects rather than finding and funding the most competitive and promising projects. Institutional lenders may already view internationalization into new foreign markets as risky or expensive, so diversion of capital can worsen access for potential exporters. Without access to capital, firms are unlikely to invest fully in exporting and, in a highly corrupt context, are also more likely to divert existing funds to pay bribes in other areas. O'Toole and Tarp (2014) test how informal bribe payments affect the marginal return per unit of investment and find that bribery can decrease investment efficiency.

More corruption is likely to accelerate the difficulties that firms face in a weak credit market and create a double constraint, particularly for firms that do not have the means to self-finance or that are new, small or first-time exporters. These constraints could discourage exports and motivate OFDI to more efficient foreign credit markets with less or no corruption (see Witt and Lewin, 2007; Stoian and Mohr, 2016; Cuervo-Cazurra and Ramamurti, 2017). We thus hypothesize as follows:

> **Hypothesis 5:** Higher home-country corruption will (a) accentuate the negative effect of weak credit markets on exports and (b) accentuate the positive effect of weak credit markets on OFDI.

Figure 1 shows the hypothesized relationships.

Figure 1. Conceptual model and hypotheses



Source: Based on authors' estimations.

3. Data and method

3.1 Data and sample

We construct the sample for our analysis by matching data from multiple sources for the period 2000–2018: ILOSTAT, World Bank and OECD (national accounts), Transparency International, the World Bank's Doing Business data, its World Development Indicators, the International Monetary Fund's (IMF) Government Finance Statistics, the World Economic Forum's *Global Competitiveness Report* and the UNSTAT Sustainable Development Goal Indicators. Our sample includes 96 developed and developing countries, offering good coverage of institutional contexts (see Audretsch et al., 2019; Thai and Turkina, 2013).

Our data set is an unbalanced panel covering the 96 countries over the period 2000-2018. Our final sample consists of 1,433 observations of the variables of interest, where data are available.

3.2 Dependent variables

We use two country-level measures for internationalization. Institutional factors have differential effects across industries and types of firms; however, to gain insight into the overall picture for the whole economy, we use country-level measures for internationalization. All variables used in the models and their definitions and measurement are presented in table 1. First, *exports* are measured as a share of GDP, taken from World Bank national accounts data (World Bank, 2019), reflecting direct exporting activity undertaken by businesses (see Krammer et al., 2018). The values in our sample vary from 8.24 to 188 per cent of GDP (where exports significantly overtake GDP, such as in economies that are involved in substantial international trade activity with a little value added to each service or good); the average is 40.68 per cent.

OFDI is measured as net FDI outflow as a share of GDP (Witt and Lewin, 2007), taken from IMF balance-of-payments data (2019). The extent of outward direct investment can be seen as an indication of a mature economy. OFDI has been linked to investment competitiveness and is crucial for long-term, sustained growth (see Asamoah et al., 2019). For example, firms from the United Kingdom, Germany, Japan and the United States have long made extensive investments outside their domestic markets and have high positive OFDI. Other economies receive large amounts of OFDI, as China has for the past two decades, for example, and have negative OFDI. The average OFDI is 1.52, which demonstrates that, on average, countries invest more abroad than they receive (as a per cent of GDP). A negative OFDI value of 89.63 illustrates that the country had net inward FDI equal to 89.63 per cent of GDP (table 2).

3.3 Explanatory variables

We use three measures for *home-country export regulations*. First, we use the *time to export (border compliance)*, the number of hours needed to comply with procedures to export goods and services. It is taken from the World Bank Doing Business data (see Li, 2019). Second, we use customs *procedures*, which measures business executives' perceptions about the efficiency of customs procedures in their country, with ratings ranging from -1 to -7. This is taken from the World Economic Forum's *Global Competitiveness Report* (WEF, 2019). We reverse this indicator in our analysis so that a value of -7 reflects extremely efficient custom procedures and a value of -1 reflects extremely inefficient procedures. Our third measure for home-country export regulations is *tariff regulation*, calculated as the average of effective applied rates, weighted by product import shares, corresponding to each partner country; this is taken from the UNSTAT Sustainable Development Goal Indicators.[1]

We use three measures to capture the scope, accessibility and effectiveness of domestic credit markets in the home country, taken from the IMF and Government Finance Statistics Yearbook. The *disclosure index* measures the extent to which investors are protected through the disclosure of ownership and financial information. *Domestic credit to the private sector*, expressed as a percentage of GDP, reflects financial institutions' financial resources (e.g. loans, purchases of non-equity securities, trade credits and other accounts receivable). The third measure accounts for the breadth of *non-financial investment* as a percentage of GDP, such as investment in government fixed assets, inventories, valuables and non-production assets.

To measure *corruption* (perceived corruption), we use the Corruption Perception Index (CPI) from Transparency International. Corruption is estimated as an aggregate indicator at the country level, in units of a standard normal distribution which was normalized and reversed, i.e., ranging from approximately -1 (highly corrupt) to -100 (very clean) (Cuervo-Cazurra, 2008; Audretsch et al., 2019). In our study, the range is a value of -15 (Botswana) to -99 (Norway).

3.4 Control variables

We also include several control variables that may influence export activities and OFDI, drawing on previous research. Detailed definitions of the control variables and their measurement and sources are listed in table 1. *Economic development* is measured by GDP per capita in purchasing power parity in constant 2010 United States dollars, in logarithms. We control for the size of home-country demand by using *population* (see Cuervo-Cazurra, 2008, 2012). We proxy for *government size*

[1] https://unstats.un.org/sdgs/indicators/database/.

using government expenditures (see Audretsch et al., 2021), including consumption and transfers as a percentage of GDP. Given the importance of industry in market opportunities, we also control for the *industry* in the domestic home economy.

We also use several variables to proxy for the broader business environment in a country, as prior research shows the importance of business regulations in shaping managerial decision-making, firm activities and performance (see Welter et al., 2019). In line with research on the importance of considering multiple dimensions of business regulation, as well as how regulations are implemented through administrative processes or financial costs (Audretsch et al., 2019), our controls include measures for the time, cost or procedures related to specific business regulation focus areas.

We include two measures of entry regulation because it affects the pool of new firms (Klapper et al., 2006) from which future exporters emerge and can affect firm profitability (Cherchye and Verriest, 2016). Changing technologies have affected the speed of scaling and internationalization, with many start-ups now being "born global" firms (Cavusgil and Knight, 2015; Sinkovics and Penz, 2005). *Time to entry* captures the number of days needed to comply with entry regulation, and *entry procedures* reflects the number of separate procedures to start and formally operate a business in the country.

We include two measures related to property registration, as security of property is an important factor in the emergence and nature of the business activity (see Johnson et al., 2002), and the cost and uncertainty of securing property can influence not only whether people start firms, but also which activities they undertake. For example, firms may consider the complexity of property registration if they are considering opening a production facility to produce goods for export. We use the *time to register property,* measured as the number of days needed to register property, and *procedures to register property,* captured as the number of procedures to register a property. These measures are based on a standard case of an entrepreneur who wants to buy land and an already registered building that is free of title dispute.[2] All of the entry regulations and property registration data come from the Doing Business data.

Our controls for the regulatory environment also include measures of tax policy, which affects the ability of firms to make and anticipate profits, shaping strategic decisions about business activities and business growth (see Belitski et al., 2016). We include the *profit tax rate* (World Bank, 2019). Given the heterogeneous nature of the effects of various forms of tax policy (Audretsch et al., 2021; Chowdhury et al., 2015), we also include the *time required to pay taxes* in hours per year, including preparation and filing time (from the Doing Business data).

[2] See doingbusiness.org for detailed description of the underlying data sources.

We also capture potentially relevant labour market trends by including *unemployment* in a country (Audretsch and Thurik, 2000) as well as the *quality of scientific research,* measured using the number of scientific and engineering articles published (in physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth sciences) (Schultz, 1959; Mincer, 1974). We do this because scientific activity is important for economic and innovation activity in a country (Sepehrdoust et al., 2021, 2020; Olavarrieta and Villena, 2014). Investors could have opportunities to profit from the commercialization of science in the home country, but at the same time, new and better products and services that result from scientific discoveries and innovation can be attractive in foreign markets and mean more export opportunities.

Table 1 describes the variables in our study, and table 2 presents the descriptive statistics and the correlation matrix. The majority of our variables are not highly correlated.

Table 1. Variable definition and measurement

Variable	Description	Source
Exports	Exports of goods and services (per cent of GDP)	World Bank, national accounts data, and OECD, National Accounts data
OFDI	Net FDI outflows of investment from the reporting economy to the rest of the world divided by GDP (per cent of GDP)	International Monetary Fund, Balance-of-Payments database
Time to export	Time to export, border compliance (in hours) in logs. Captures the time associated with compliance with the economy's customs regulations and with regulations relating to other inspections that are mandatory in order for the shipment to cross the economy's border, as well as the time for handling that takes place at its port or border.	World Bank, Doing Business Project
Customs procedures	Burden of customs procedure (reversed) Measures business executives' perceptions of their country's efficiency of customs procedures with ratings ranging from -1 to -7, whereby -7 denotes extremely efficient and – 1 denotes extremely inefficient	World Economic Forum, *Executive Opinion Survey* and *Global Competitiveness Report*
Trade tariff	Tariff rate, applied, weighted mean, all products (%) Weighted mean applied tariff: average of effectively applied rates weighted by the product import shares corresponding to each partner country	UNSTAT, Global SDG Indicators Database
Disclosure index	Business extent of disclosure index (0 = less disclosure to 10 = more disclosure) Measures the extent to which investors are protected through disclosure of ownership and financial information	World Bank, Doing Business Project
Corruption	Corruption Perception Index, normalized and reversed (-100 = very clean, -1 = highly corrupt)	Transparency International

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Table 1. Variable definition and measurement (Concluded)

Variable	Description	Source
Non-financial investment	Net investment in government non-financial assets (per cent of GDP) Includes fixed assets, inventories, valuables and non-production assets	International Monetary Fund, Government Finance Statistics Yearbook and data
Domestic credit to private sector	Domestic credit to private sector (per cent of GDP) Refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities and trade credits and other accounts receivable, that establish a claim for repayment; for some countries these claims include credit to public enterprises	International Monetary Fund, International Financial Statistics and data
Economic development	GDP per capita in purchasing power parity (constant 2010 US$)	World Bank, national accounts data
Population	Country population, in logarithms	World Bank, national accounts data
Government size	General government final consumption expenditure (per cent of GDP) (formerly general government consumption).	World Bank, national accounts data
Industry	Manufacturing industry, value added (current US$) as per cent of GDP	World Bank, national accounts data, and OECD, National Accounts data
Time to entry	Time required to start a business (days) = the number of calendar days needed to complete the procedures to legally operate a business	World Bank, Doing Business Project
Entry procedures	Number of procedures required to start a business, including interactions to obtain necessary permits and licenses and to complete all inscriptions, verifications and notifications to start operations	World Bank, Doing Business Project
Time to register property	Number of calendar days needed for businesses to secure rights to property	World Bank, Doing Business Project
Procedures to register property	Number of procedures required for a business to secure rights to property	World Bank, Doing Business Project
Profit tax rate	Amount of taxes on profits paid by the business (per cent of profit)	World Bank, Doing Business Project
Time required to file taxes	Hours per year that it takes to prepare, file and pay (or withhold) three major types of taxes: corporate income tax, value added or sales tax, and labour taxes, including payroll taxes and social security contributions	World Bank, Doing Business Project
Unemployment	Share of the labour force without work but available for and seeking employment (per cent of total labour force)	International Labour Organization, ILOSTAT database
Scientific output	Number of scientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences, normalized by 1,000 domestic scientists (in logs).	World Bank, World Development Indicators

Source: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT Global SDG Indicators Database.

Note: number of observations = 1,433.

Table 2. Descriptives and correlation matrix

Descriptive	Mean	Std. Dev.	Minl	Maxl	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Exports	40.68	27.13	8.24	188.00	1																			
2. OFDI	1.52	8.01	-89.63	44.00	0.25*	1																		
3. Trade tariff	5.42	4.26	0.00	35.00	-0.23*	-0.13*	1																	
4. Time of export	3.47	1.23	0.00	5.74	-0.21*	-0.14*	0.40*	1																
5. Customs procedures	-4.05	0.87	-6.45	-1.80	-0.43*	-0.25*	0.40*	0.40*	1															
6. Domestic credit to private sector	60.12	45.73	3.54	253.26	0.27*	0.22*	-0.38*	-0.41*	-0.62*	1														
7. Non-financial investment	3.22	2.95	-4.83	15.44	0.02	-0.05*	0.28*	0.19*	0.23*	-0.33*	1													
8. Corruption	-44.75	20.58	-99.00	-15.00	0.12*	0.09*	-0.23*	-0.13*	-0.30*	0.30*	-0.19*	1												
9. Disclosure	6.81	2.57	1.00	10.00	-0.36*	-0.26*	0.39*	0.50*	0.80*	-0.72*	0.29*	-0.25*	1											
10. Science	8.91	5.01	2.95	15.30	0.04*	0.12*	-0.42*	-0.30*	-0.44*	0.57*	-0.46*	0.42*	-0.49*	1										
11. Manufacturing	27.47	9.42	5.00	74.81	0.16*	-0.04*	-0.09*	0.12*	0.09*	-0.15*	0.21*	0.11*	0.15*	-0.10*	1									

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Table 2. Descriptives and correlation matrix (Concluded)

Descriptive	Mean	Std. Dev.	Minl	Maxl	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
12. Start-up time	28.94	24.82	0.50	125.00	-0.06*	-0.06*	0.15*	0.16*	0.33*	-0.24*	0.17*	-0.20*	0.23*	-0.05*	0.17*	1								
13. Register property time	48.88	55.76	1.00	389.00	-0.13*	-0.05*	0.14*	0.18*	0.18*	-0.23*	0.12*	-0.20*	0.21*	-0.04*	0.02	0.22*	1							
14. Taxes time	281.88	283.79	12.00	2,600.00	-0.15*	-0.08*	0.10*	0.11*	0.40*	-0.21*	-0.02	-0.11*	0.32*	-0.10*	0.14*	0.16*	0.03	1						
15. Start-up procedures	8.44	3.49	1.00	20.00	-0.18*	-0.15*	0.23*	0.27*	0.50*	-0.41*	0.10*	-0.30*	0.49*	-0.17*	0.27*	0.46*	0.16*	0.3*	1					
16. Register property procedures	6.10	2.14	1.00	13.60	-0.14*	-0.04*	0.12*	0.21*	0.37*	-0.18*	0.05	-0.24*	0.31*	-0.23*	-0.06*	0.06*	0.14*	0.24*	0.33*	1				
17. Profit tax	17.26	8.01	0.00	35.40	-0.16*	-0.10*	0.11*	0.09*	0.16*	0.002	0.02	-0.06*	0.01	-0.19*	-0.06*	0.15*	-0.01	0.05	0.11*	0.03*	1			
18. Population	15.94	1.47	12.53	20.72	-0.28*	-0.02	-0.16*	0.02	0.10*	0.13*	-0.27*	0.28*	0.14*	-0.16*	0.19*	-0.09*	-0.12*	0.23*	0.12*	-0.02	-0.15*	1		
19. Economic development	9.25	1.06	6.74	11.41	0.48*	0.19*	-0.39*	-0.38*	-0.62*	0.61*	-0.33*	0.22*	-0.71*	0.41*	0.21*	-0.14*	-0.23*	-0.17*	-0.25*	-0.18*	-0.12*	0.10*	1	
20. Government size	15.41	4.88	3.46	40.44	0.02	0.03	-0.16*	-0.19*	-0.26*	0.20*	0.05*	-0.05*	-0.34*	0.30*	-0.10*	-0.06*	-0.03	-0.12*	-0.15*	-0.12*	-0.05*	0.28*	0.22*	1
21. Unemployment	8.05	5.82	0.40	33.47	-0.02	-0.06*	-0.02	-0.20*	0.11*	-0.05*	-0.03	-0.09*	0.05	0.08*	0.05*	0.08*	0.01	0.05*	0.08*	0.10*	-0.02	0.07*	0.06*	0.27*

Sources: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; SIPRI yearbooks; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT, Global SDG Indicators Database.

3.5 Model

To test our hypotheses, we start by using pooled ordinary least squares (OLS) estimation, which enables us to capture cross-country differences in factors that affect firm internationalization. We then apply fixed-effects panel estimation to combine country and time effects (see Cumming et al., 2014). Given the time series data for 2000–2018, fixed-effects panel data estimation enables us to control unobserved heterogeneity across countries and time in one model. Following Wallace and Hussain (1969) and Baltagi (2008), we estimate the regression model as follows (1) with two-way error component disturbances (2) where λ_i denotes the unobservable country effect, λ_t denotes the unobservable time effect and e_{it} is the remainder stochastic disturbance term. Note that λ_t is country-invariant and accounts for any time-specific effect not included in the regression. For example, it could account for government programme intervention year effects that disrupt international business and drive the quality of business. λ_i is time-invariant and accounts for country-specific effects, such as culture and informal institutional frameworks. In vector form, our panel data estimation is written as follows:

$$y_{it} = f(\beta x_{it-1,} \Theta z_{it-1,} a_{it-1}, \mu_{it}) \text{ i} = 1,..., \text{N}; t = 1,...,\text{T} \quad (1)$$

$$\text{u}_{\text{it}} = \lambda_i + \lambda_t + \text{e}_{\text{it}} \quad (2)$$

where y_{it} is the export share of GDP (model 1) and OFDI (model 2) in a given country I at time t. β and Θ are parameters to be estimated, x_{it} is a vector of independent explanatory variables lagged one year $(t–1)$, and z_{it} is a vector of exogenous control variables lagged one year $(t–1)$; a_{it} presents the interaction of corruption in the home country $(t–1)$ with the number of export regulations and credit market environment at the time $(t–1)$ by country i. These include the disclosure index, non-financial investment, domestic credit, time to export, customs procedures related to exports, and tariff rate. As mentioned earlier, the error term u_{it} consists of unobserved country and time-specific effects and the remainder disturbance, and e_{it} is assumed to be independent and identically distributed.

Our preference for fixed effects rather than random effects was driven by the results of a Hausman test (Baltagi, 2008).[3] Endogeneity in the model could appear as a

[3] The Hausman test rejects the null at a 1 per cent significance level, suggesting that fixed effects should be used. The fixed-effects estimator concentrates on differences over time, and characterizes a single firm; that is why it is also referred to as the "within" estimator. It also explains to what extent a given firm's change in a variable of interest affects its own internationalization activity. Thus, the fixed-effects estimator does not account for possible differences that exist across firms at a given point in time and thus does not identify the factors capturing why, for instance, the productivity of firm i is different from that of firm j. This is not the case of the random-effects estimator, whose estimates are obtained by weighing the "within" effect with the "between" effect, which allows us to identify the factors that explain the differences between firms in the panel. Thus, the random-effects estimates should provide a more exhaustive scenario of the drivers of internationalization activity in our sample. However, the possibility of a simultaneity bias induced by unobservable factors often suggests that the fixed-effects estimates may be preferred.

result of the correlation between x_{it} with unobserved factors in the error term, time-varying unobservables that affect y_{it}. Using fixed-effects estimation allows us to control for factors that change with time but do not change for the same country over our study period. At the same time, we acknowledge that addressing the potentially endogenous nature of the relationship between corruption and export is important, as corruption is associated with country-specific characteristics (e.g., business culture). Therefore, using fixed-effects estimation will control these country-specific unobservables that affect the relationship between corruption and exports. Using lagged values for control and explanatory variables would enforce the relationship arising from corruption changes affecting changes in exports.

As part of our robustness checks, we calculated model (1) using both fixed and random effects, as each method has different assumptions on two-way error terms.

To address the multicollinearity concern, we used the variance inflation factor in both models, which were between 2 and 5 (Kutner et al., 2004). Thus, the fixed-effects regressions are tested for multicollinearity by calculating the variance inflation factor. As a result, it was found that despite the high pairwise correlation between corruption and economic development, they are not multicollinear in the models and can explain the regression outcome variable. Hence, the models seem to suggest that the predictors in question are reliably associated with the outcome (high estimates, low standard errors) (see McElreath, 2020).

We note that the significance and size of the beta coefficients might not always reflect the size or nature of the relationship if there is possible nonlinearity between export regulations and credit conditions in different economic contexts and internationalization (see Audretsch et al., 2019). We thus calculate post-estimated predictive margins for each institutional dimension using the results of the fixed-effects regression in table 3 with the dependent variables exports (column 4) and OFDI (column 8). First, we calculated the direct effects of home export regulation, credit markets and corruption on internationalization (exports in the left column, OFDI in the right column, figure 2).

We calculated post-estimated predictive margins to capture the nonlinear effects of home-country export regulation and credit market on internationalization in different corruption contexts (figures 3 and 4).[4] The predictive margins enable us to visualize how a change in each of the institutional dimensions contributes to a marginal change in exports and OFDI across a distribution of each institutional dimension and between more and less corrupt contexts. Building on Williams (2012), the beta coefficients in table 3 provide averaged results of model estimation and are limited in capturing nonlinear effects. For example, a one-unit change in the institutional dimension may result in a

[4] The margins are a tool to explain a relationship when the direction of the relationship may be non-linear, rendering the net effect statistically insignificant.

disproportionate change in internationalization at different institutional settings, which the beta coefficient cannot capture. Figures 2–4 illustrate the margins of responses for specified values of covariates. It uses 95 per cent confidence intervals to measure the boundaries of the effect of various institutional contexts on internationalization.

4. Empirical results

We start by presenting our findings using the predictive margins shown in figures 2–4. These were calculated based on the results of fixed-effects estimations (coefficients in base effects and interaction effects), with exports and OFDI as two dependent variables (table 3). Table 3 includes both basic models for fixed effects (columns 1–2, 5–6) and models with interaction terms (columns 3–4 and 7–8, table 3).

Table 3. Fixed-effects (FE) estimation with interactions

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Model	Model 1: Dependent variable exports as % of GDP				Model 2: Dependent variable OFDI as % of GDP			
Time to export (H1)	7.41*** (0.00)	49.91*** (0.00)	39.79*** (0.00)	36.51*** (0.00)	-0.89 (0.56)	-8.38 (0.58)	-14.94 (0.28)	-14.19 (0.23)
Customs procedures (H1)	-0.89 (0.63)	-0.62 (0.60)	2.53* (0.35)	1.16 (0.36)	0.34 (0.60)	0.67 (0.69)	-1.01 (0.58)	-2.29 (0.61)
Trade tariff (H1)	-0.15** (0.04)	-0.44*** (0.00)	-0.63*** (0.00)	-0.90*** (0.00)	0.06 (0.08)	-0.01 (0.10)	0.07 (0.20)	-0.02 (0.20)
Disclosure index (H2)	0.41* (0.08)	0.26 (0.20)	0.39* (0.07)	-0.16 (0.45)	-0.32 (0.21)	-0.18 (0.26)	-0.27 (0.27)	0.55 (0.54)
Domestic credit to private sector (H2)		-0.03** (0.04)	-0.03** (0.04)	0.09*** (0.00)		0.03* (0.07)	0.03* (0.06)	0.08* (0.07)
Non-financial investment (H2)	-0.53*** (0.00)	-0.13 (0.14)	-0.12 (0.14)	0.16 (0.33)	0.28** (0.01)	0.51*** (0.00)	0.51*** (0.00)	-1.13*** (0.00)
Corruption (H3)	0.02 (0.10)	-0.01 (0.12)	-0.14 (0.12)	1.88*** (0.00)	-0.19*** (0.00)	-0.20*** (0.00)	-0.71*** (0.00)	0.58 (0.27)
Economic development		8.79** (0.04)	3.06 (0.39)	-8.49* (0.06)		-5.03 (0.57)	-10.03* (0.08)	-15.10*** (0.00)
Population		-34.08** (0.03)	-34.14** (0.03)	-32.52** (0.04)		3.52 (0.75)	3.97 (0.83)	4.47 (0.84)
Industry		0.91*** (0.00)	0.92*** (0.00)	0.93*** (0.00)		0.22*** (0.00)	0.23*** (0.00)	0.25*** (0.00)
Time to entry		0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)		0.01 (0.12)	0.01 (0.20)	0.01 (0.20)
Entry procedures		-0.05 (0.13)	-0.06 (0.13)	-0.01 (0.13)		-0.03 (0.15)	-0.06 (0.15)	-0.04 (0.15)

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Table 3. Fixed-effects (FE) estimation with interactions (Concluded)

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Model	Model 1: Dependent variable exports as % of GDP				Model 2: Dependent variable OFDI as % of GDP			
Time to register property		0.03*** (0.00)	0.02*** (0.00)	0.02*** (0.00)		-0.01 (0.13)	-0.01 (0.12)	-0.01 (0.11)
Procedures to register property		-0.54* (0.07)	-0.34 (0.12)	-0.72** (0.03)		0.38 (0.37)	0.53 (0.37)	0.43 (0.38)
Profit tax rate		-0.01 (0.16)	-0.01 (0.16)	-0.01 (0.10)		-0.10 (0.17)	-0.09 (0.17)	-0.05 (0.18)
Time required to file taxes		0.01 (0.10)	0.01 (0.12)	0.01 (0.15)		0.01 (0.15)	0.01 (0.16)	0.01 (0.14)
Unemployment		0.22** (0.01)	0.21** (0.01)	0.22** (0.01)		0.12 (0.11)	0.12 (0.11)	0.17 (0.11)
Scientific output		-2.65*** (0.00)	-2.80*** (0.00)	-2.83*** (0.00)		-0.77 (0.47)	-0.78 (0.47)	-0.79 (0.27)
Government size		-0.08 (0.12)	-0.08 (0.12)	-0.09 (0.12)		-0.17 (0.15)	-0.18 (0.15)	-0.13 (0.15)
Trade tariff × Corruption (H4)			-0.01 (0.15)	-0.01** (0.01)			0.01 (0.05)	-0.01 (0.05)
Time to export × Corruption (H4)			0.14*** (0.00)	0.11*** (0.00)			0.09* (0.01)	0.08* (0.03)
Customs procedures x Corrup-tion (H4)			0.07** (0.02)	0.04 (0.13)			-0.04 (0.15)	-0.07** (0.01)
Domestic credit to private sector × Corruption (H5)				0.002*** (0.00)				0.001 (0.10)
Non-financial investment × Corruption (H5)				0.01 (0.12)				-0.041*** (0.00)
Disclosure × Corruption (H5)				-0.01 (0.11)				0.02* (0.06)
Constant	12.41 (0.59)	-65.76* (0.02)	-21.19 (0.51)	81.18* (0.05)	-2.53 (0.31)	39.71 (0.78)	63.36 (0.94)	99.64** (0.01)
Number of observations	1443	1443	1443	1443	1443	1443	1443	1443
R2 within	0.075	0.277	0.291	0.309	0.049	0.062	0.066	0.088
R2 overall	0.005	0.007	0.001	0.006	0.038	0.015	0.007	0.007
R2 between	0.011	0.017	0.005	0.001	0.0525	0.004	0.025	0.001
F-stats	5.26	13.24	13.09	12.94	3.18	2.20	2.15	2.66
Log-likelihood	-5 586.48	-4 579.00	-4 565.30	-4 546.87	-5 296.43	-4 563.79	-4 561.30	-4 544.83
F Test u=0	175.55	169.60	152.51	134.13	4.76	3.73	3.72	4.02
Sigma u	28.39	33.32	32.32	31.84	4.94	5.50	5.90	6.36
Sigma e	7.25	6.06	6.01	5.95	6.89	6.89	6.89	6.82
Rho	0.93	0.96	0.96	0.96	0.33	0.38	0.42	0.46

Source: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT, Global SDG Indicators Database.

Note: Reference year = 2000. Number of observations = 1,433. Number of countries = 96. P-values are in parentheses.

We used the "margin" command in the statistical software STATA 15 to compute the standard errors of the means. The "marginsplot" command was used afterward as it gives a good view of the shape of the relationship (Williams, 2012). It illustrates the strength and direction of the relationship as well as changes in the marginal effect between institutional dimensions and internationalization. For example, predictive margins allow us to ask a question like, what would be the share of exports in GDP as the time to export (border compliance) increases from 10 to 50 days, in a country with more or less corruption? It also allows us to make efficient comparisons between levels of corruption, as well as to measure the size of the effect of each change in institutional dimension (export regulation and credit markets).

We find partial support for Hypothesis 1a (H1a), which predicted that more extensive home-country export regulations would discourage exports (figures 2A and 2C). Customs procedures and tariff rates hamper exports, but time to export (measured in hours) facilitates exports (column 4, table 3). The beta coefficient for customs procedures is not significant, and the relationship turns negative at the high level of customs procedures (figure 2C). Accounting for tariff and non-tariff regulation jointly, we discover that changes in tariff regulation better predict changes in exports. Figure 2A illustrates the negative relationship – for example, an increase in tariff rate from 10 to 30 per cent results in a decrease in exports from 35 to 25 per cent of GDP.

H1b predicted that more extensive home-country export regulations would encourage OFDI (figures 2B, 2D, 2F and column 8, table 3). We do not find support for this (examining customs procedures, tariff rates and time to export).

Turning to our hypotheses on the direct effect of home-country credit markets, we find partial support for H2a, which predicted that less developed home credit markets would discourage exports (figures 2G, 2I, 2K). Investment in non-financial assets has no effect on exporting (figure 2K and column 4 in table 3). Domestic credit to the private sector increases as it moves from zero to 80 and then decreases again (figure 2G), which means its effect on exports is nonlinear. We also find that coefficients in columns 3–4 (table 3) change. Higher disclosure facilitates exports (figure 2I). We do not find support for H2b, which predicted that less developed home credit markets would encourage OFDI (figures 2H, 2J, 2L). An increase in domestic credit to the private sector increases OFDI (figure 2H), and investment in non-financial assets also results in higher OFDI (figure 2L) (column 8, table 3). Disclosure rate is not associated with OFDI.

H3a and H3b predicted that home-country corruption would discourage exports and encourage OFDI, respectively. We find that corruption is not associated with an increase in exports (figure 2M) but is negative and statistically significant for OFDI. When corruption approaches a value of 50, one can say that OFDI turns to zero (figure 2N).

Figure 2. Impact on internationalization of export regulation, credit market environment and corruption (Direct effects)

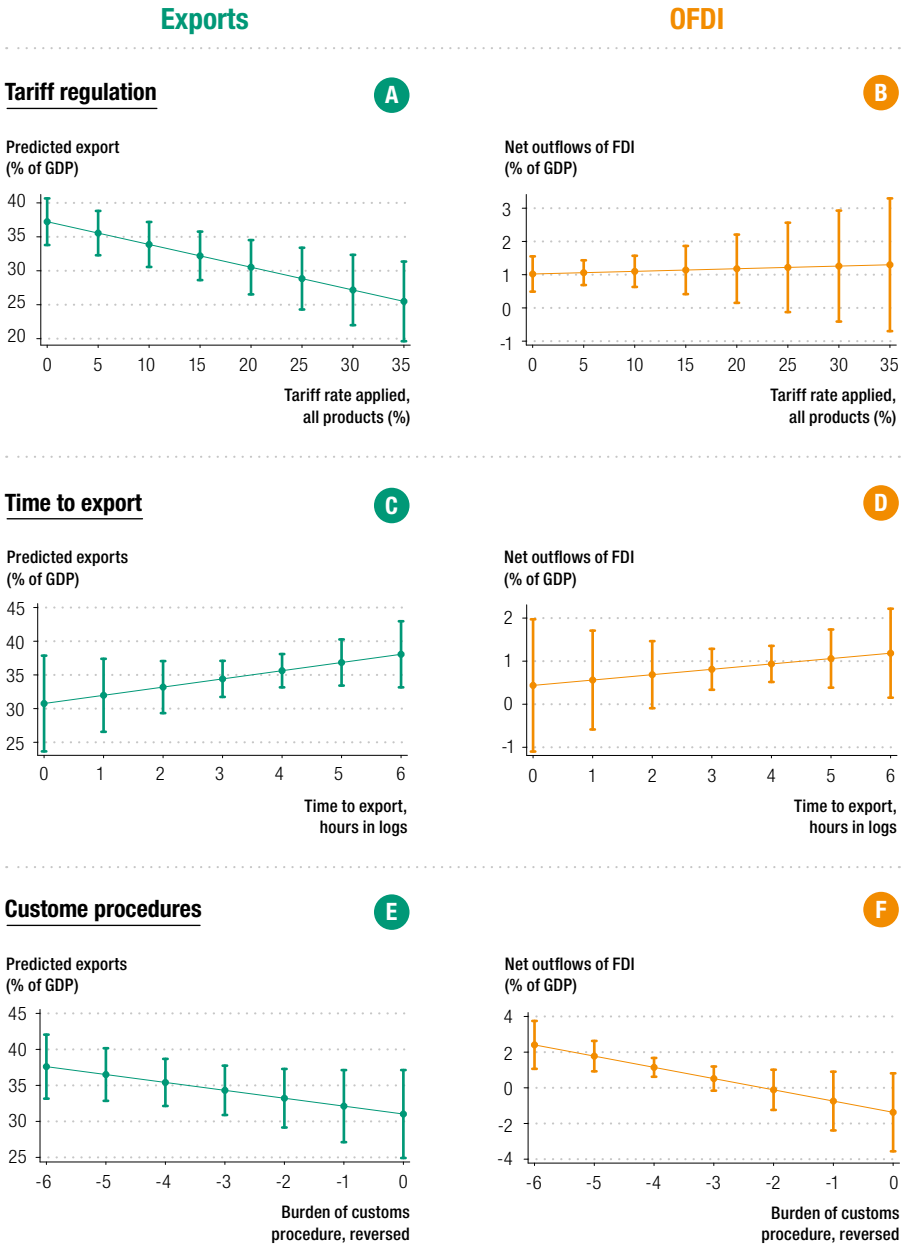

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Figure 2. Impact on internationalization of export regulation, credit market environment and corruption (Direct effects) (Continued)

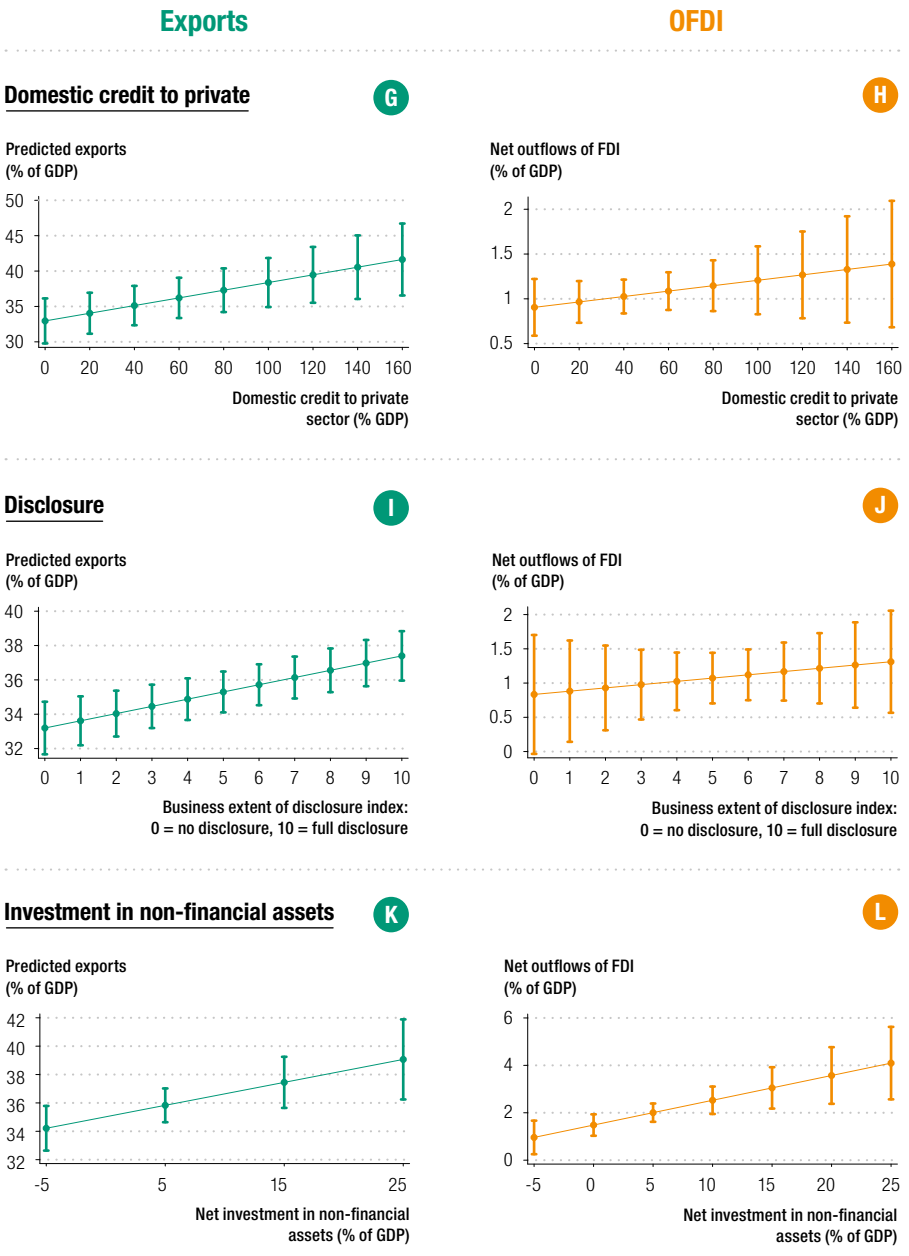

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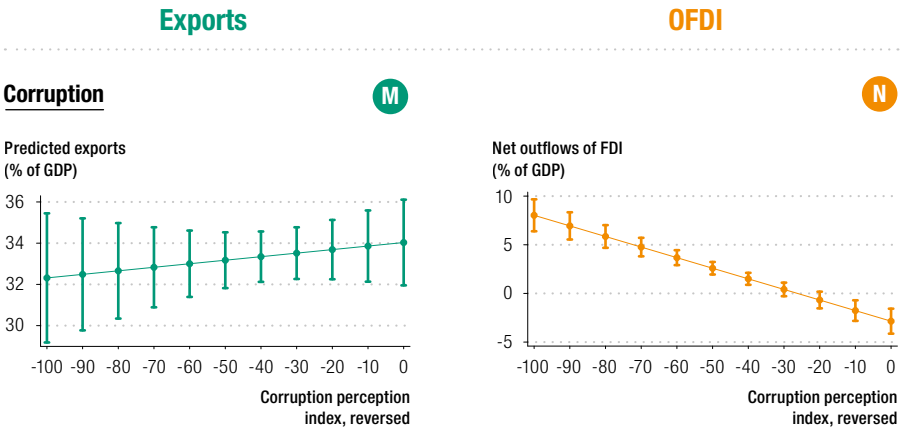
Figure 2. Impact on internationalization of export regulation, credit market environment and corruption (Direct effects) (Concluded)

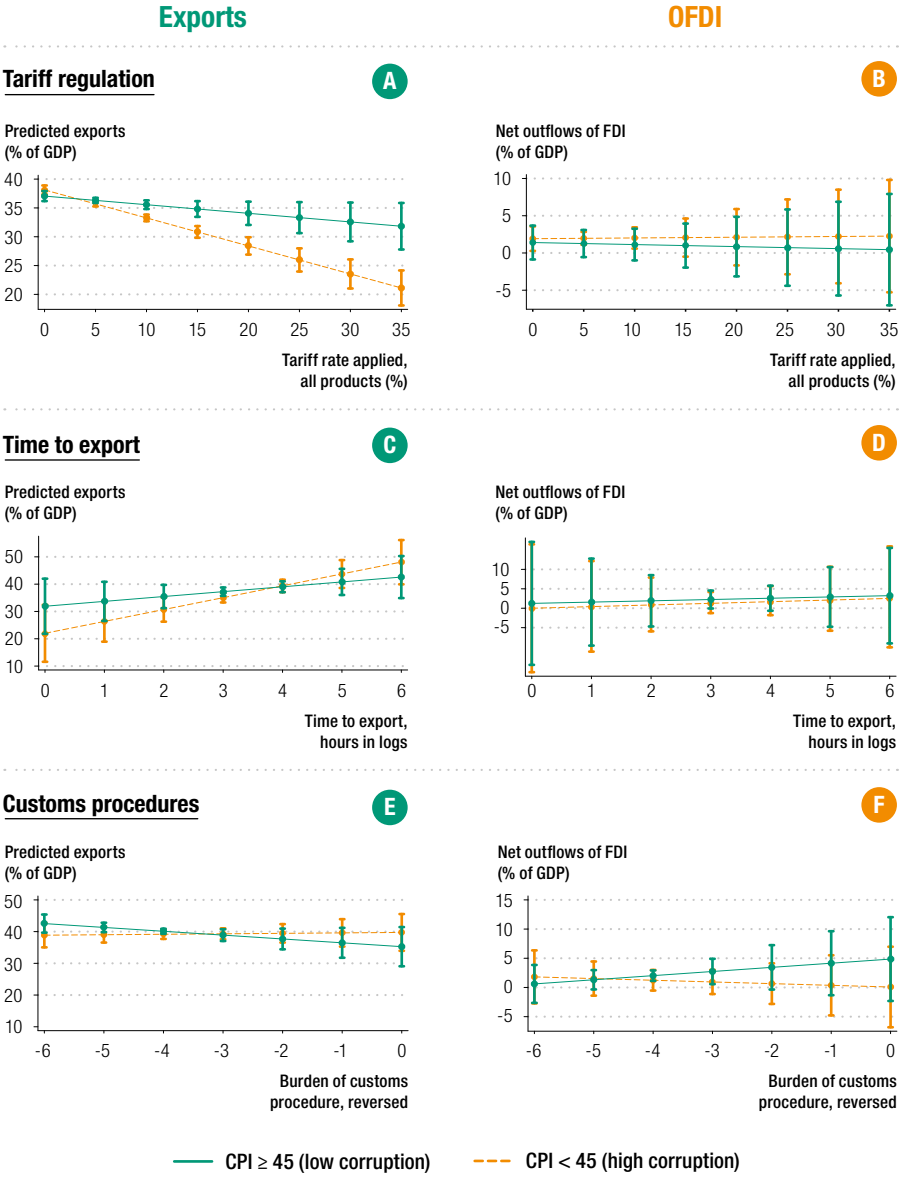


Source: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; SIPRI yearbooks; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT, Global SDG Indicators Database.
Note: Reference year = 2000. Number of observations = 1,433. Number of countries = 96.

For the purpose of testing the moderating effect of corruption, we used the median of the Corruption Perception Index for our countries, splitting the sample into more corrupt (above median) and less corrupt (below median) contexts. We then tested our hypotheses and predictive margins.

H4 posited that home-country corruption would accentuate the negative effect of extensive export regulations on exports (H4a) and the positive effect of export regulations on OFDI (H4b). We find partial support for H4a when it comes to tariff regulation but not our other measures of export regulation. In a zero tariff context, average exports to GDP are 42 per cent for both less and more corrupt contexts. However, an increase in tariff rates in more corrupt contexts (>(-45) of inverted Corruption Perception Index) accentuates a negative effect of tariff regulation on exports, with the difference in the decline in export rates between less and more corrupt contexts becoming more pronounced after tariff rates >10 (figure 3A). When tariffs reach 35 per cent in more corrupt contexts, exports fall to 25 per cent of GDP. The same tariff rate (35 per cent) in less corrupt contexts (≤45 of the inverted Corruption Perception Index) reduces exports to GDP to 35 per cent (Figure 3A). Figures 3B, 3D and 3F illustrate the relationship between corruption and export regulation in their impact on OFDI. We do not find empirical evidence to support H4b: more corruption does not accentuate an effect of export regulation on OFDI. In countries with extensive export regulation, more corruption is not associated with OFDI (figures 3B, 3D, 3F).

Figure 3. Export regulation and internationalization in countries with different levels of corruption (Indirect effects)



Source: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; SIPRI yearbooks; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT, Global SDG Indicators Database.

Note: Reference year = 2000. Number of observations = 1,433. Number of countries = 96.

H5 predicted that home-country corruption would accentuate a negative effect of weak credit market effects on exports (H5a) as well as a positive effect of weak credit market effects on OFDI (H5b). Our results do not provide support for either hypothesis. We find that more corruption reduces the positive effect of disclosure on exports, whereas high levels of disclosure in more corrupt contexts will have lower export rates (figure 4C). The results for other factors are not significant (figures 4A, 4E). We find that more corruption does not accentuate a positive effect of weak credit market effects on OFDI (figures 4B, 4D, 4F) (see Stoian and Mohr, 2016). We find that an increase in non-financial investments in a country increases OFDI (figure 4F). At the same time, in more corrupt contexts, weak credit market institutions reduce OFDI. We find that corruption reduces OFDI (columns (5–7, table 3).

Our findings in figures 3 and 4 line up with previous findings on the negative effect of corruption on exports and OFDI (see Cuervo-Cazurra, 2012, 2016).

Figure 4. Credit market environment and internationalization in countries with different levels of corruption (Indirect effects)

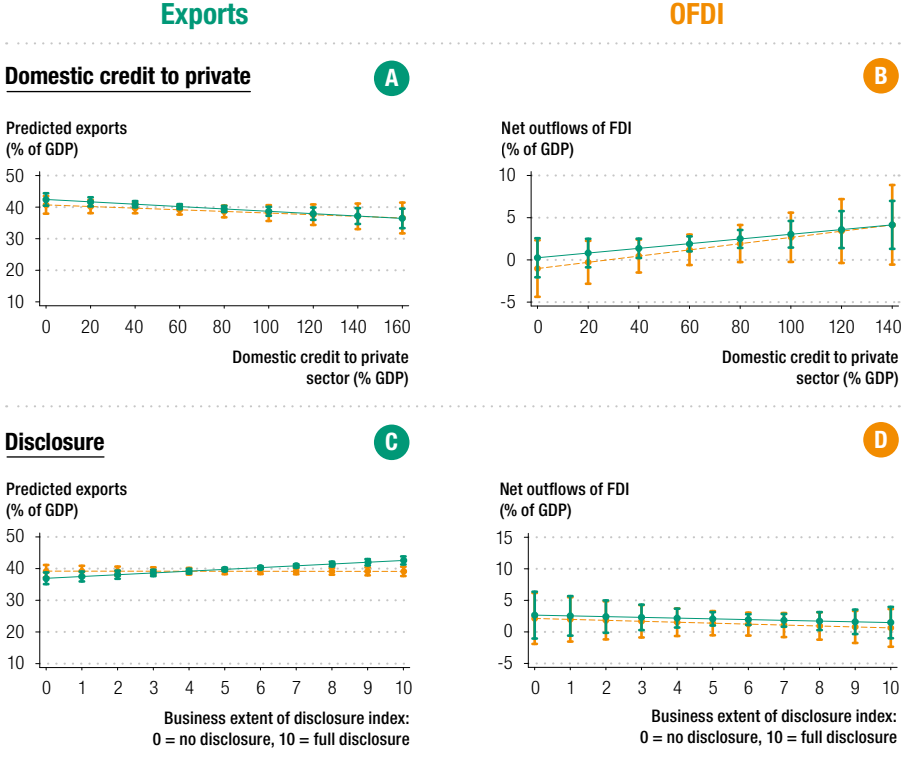


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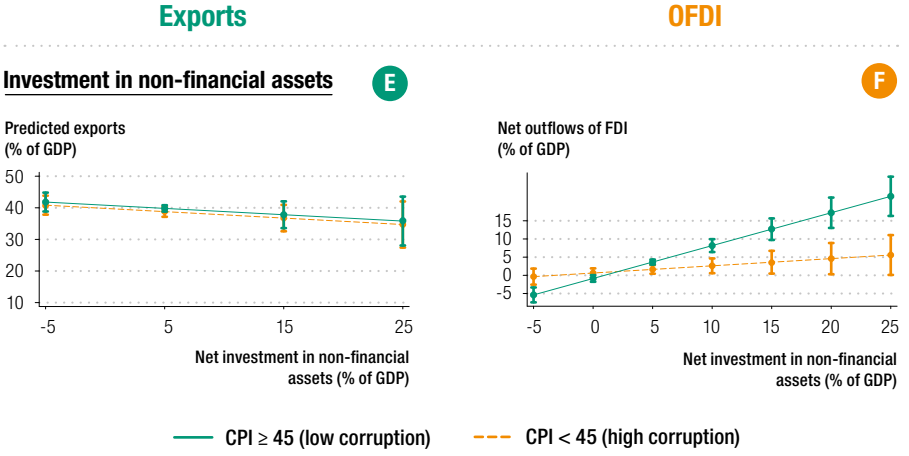
Figure 4. Credit market environment and internationalization in countries with different levels of corruption (Indirect effects) (Concluded)



Source: Based on ILOSTAT database; World Bank national accounts data and OECD National Accounts; SIPRI yearbooks; Transparency International; World Bank, Doing Business Project; International Monetary Fund, Government Finance Statistics; World Bank World Development Indicators; World Economic Forum, *Global Competitiveness Report*; UNSTAT, Global SDG Indicators Database.

Note: Reference year = 2000. Number of observations = 1,433. Number of countries = 96.

When it comes to our control variables, we find that population size is not associated with OFDI, and that countries with large populations and larger markets have on average 32–34 per cent of GDP less in exports than smaller countries. We find that countries with higher GDP per capita have higher exports (columns 2–3, table 3) than those with lower GDP per capita, which has a lower share of OFDI. We also find a positive effect of the unemployment rate on exports and a neutral effect on OFDI, which could be associated with structural changes in the economy. Human capital is negatively associated with exporting and neutral for OFDI. Time to register property has a positive effect on exports.

Table 4 summarizes the results of our hypotheses testing.

Table 4. Summary of hypotheses results

Hypotheses		Results
H1a	More extensive home-country export regulations will discourage internationalization through exports.	Mixed: Partial support
H1b	More extensive home-country export regulations will encourage internationalization through OFDI.	Not supported
H2a	Less developed home-country credit markets will discourage internationalization through exports.	Mixed: Partial support
H2b	Less developed home-country credit markets will encourage internationalization through OFDI.	Not supported
H3a	Home-country corruption will discourage internationalization through export.	Not supported
H3b	Home-country corruption will encourage internationalization through OFDI.	Not supported
H4a	Higher home-country corruption will accentuate the negative relationship between export regulations and exports.	Mixed: Partial support
H4b	Higher home-country corruption will accentuate the positive relationship between export regulations and OFDI.	Not supported
H5a	Higher home-country corruption will accentuate the negative effect of weak credit markets on exports.	Not supported
H5b	Higher home-country corruption will accentuate the positive effect of weak credit markets on OFDI.	Not supported

Source: Authors' estimations.

5. Robustness checks

We did a series of robustness checks to observe the effect of export regulations and credit markets on exports and OFDI. We also estimated pooled OLS regression with year-fixed effects but no country-fixed effects and created predicted margins using OLS data. The signs and range of the coefficients were similar, but standard errors were different, demonstrating the OLS estimation's potential bias.[5]

We performed Arellano-Bond linear dynamic panel-data estimation on our model by adding the first and second lagged values of exports (model 1) and OFDI (model 2) as an independent variable in a model. Neither the first nor second lag of the dependent variable was statistically significant. Furthermore, we examined the

[5] OLS results in table and predictive margins are not reported but are available from the authors on request. Owing to differences in the size of coefficients, we consider that the relationship between institutions and internationalization is dynamic and changes over time, with panel data better for capturing transition.

autocorrelation of the first and second lagged residuals, and neither the first nor the second lag was collinear. We thus included the mixed-effects panel data model, excluding the lagged dependent variable.

Third, as part of the robustness check, we used *bribery incidence*, measured as the share of firms experiencing one or more bribes requests over the last year (Cuervo-Cazurra, 2008; 2012). This is taken from World Bank data. The indicator varies from 0.1 per cent for the least corrupt business environment to 69.6 per cent for the most corrupt. The 50th percentile of the sample refers to, on average, 14.3 times out of 100 when one or more bribes was requested. Signs and ranges of the coefficients and standard errors were similar, demonstrating the robustness of estimation using both bribes demanded and the Corruption Perception Index.[6] In addition, we experimented with the second lag, which provided similar results in terms of coefficient size, the direction of relationship and significance levels.

6. Conclusions and policy considerations

We tested how export regulations, credit markets and corruption affect two types of internationalization activity in a country – one which captures exports and the other OFDI. Our findings underscore the importance of unpacking the institutional context shaping internationalization recognized in earlier literature (e.g. Chetty and Hamilton, 1993; Luiz et al., 2017) and considering multi-dimensionality in the environment for firms (Audretsch et al., 2019).

Our findings add to scholarly debates in the following ways. First, related to the influence of the institutional context on OFDI and exports (Gaur et al., 2014, Cuervo-Cazurra et al., 2019), we show that the home country's institutional context has a different impact on the two types of internationalization. We find that corruption does not have a significant impact on exports, but it significantly hinders OFDI. Second, our study demonstrates that the relationship between some types of institutional contexts (e.g., credit conditions) and internationalization is nonlinear, with tariffs having a more substantial impact on exports than non-tariff regulation. This is in line with recent studies that have argued for the importance of decomposing the complex relationship between institutions and firms and economic outcomes, including considering non-linearities (see Audretsch et al., 2021, 2019). Our finding on time to export is based on our sample of varied institutional contexts and is not in line with previous research in the OECD context (Li, 2019) and could be investigated in future research.

[6] Results available from the authors upon request.

Third, our results show that credit markets can help explain both exports and OFDI, with OFDI being more affected by weak credit markets. This could be because of the resources required to venture into a foreign market (Gaur et al., 2014) as firms incur the costs of searching, developing relationships and learning the new environment. If OFDI is undertaken as a strategic escape response by firms in unfavourable home environments (Shi et al. 2017; Cuervo-Cazurra et al. 2017, 2015; Cuervo-Cazurra and Ramamurti, 2017; Witt and Levin, 2007), our finding on the role of the home credit market suggests that a level of home-country institutional quality may be needed even for FDI undertaken as an escape response. Our study does not directly test firm owner/manager options and strategic decisions, and it is an interesting question for future research.

Our study has implications for policymakers interested in supporting economic growth and improving international competitiveness through firm expansion into foreign markets. Targeted policy instruments on internationalization can include, for example, dedicated programmes or agencies to support exports and FDI (e.g., export and investment promotion agencies), broader firm growth support that can improve opportunities and resources needed to engage in exports, and a wide range of home-country measures that affect FDI flows (e.g.. home-country regulations on capital outflows, technical assistance, information, technology transfer, financial and fiscal incentives, market access regulations and investment insurance) (see UNCTAD, 2001).

Our findings show that not all regulatory settings have a similar impact on exports and OFDI. Our results suggest that customs procedures and tariffs may be appropriate areas to evaluate when the goal is to support exporting. It is also worth considering where and how broader anti-corruption efforts might affect internationalization. We find that higher levels of corruption discourage OFDI; we also find that tariffs affect exports differently in different levels of corruption, with reduced exports becoming more pronounced after higher tariff rates in more corrupt contexts. Note that our measure of corruption is not specific only to exporting or OFDI but reflects corruption perceptions more broadly, suggesting the potential for gains from improving several mutually supporting institutions (IMF, 2019, p. 40), particularly as many countries have pursued anti-corruption measures.

Our results also suggest that strengthening credit markets may support both exports and OFDI. One specific cluster of costs that firms face in internationalization relates to the fixed and sunk costs when exploring and venturing into foreign markets (Desbordes and Wei, 2017). They often rely on credits or capital from external sources to finance their upfront costs. Policymakers could assess if their domestic firms could benefit from measures to reduce search and exploration costs to assess foreign markets and help firms find prospects and partnerships abroad. Given the potential of new “born global” firms and the importance of credit in assisting new firms to access foreign markets (see Aghion et al., 2007), there can be value in helping new firms access foreign markets and access financial resources.

7. Future research

Future research should focus on understanding how specific regulatory changes and policies affect exporting aspirations and outcomes. When it comes to corruption, an interesting question for future research is to understand how corruption, specifically in exporting processes (e.g. when bringing goods across borders), matters in the context of a highly corrupt environment. Our measure examined broader corruption perceptions, so decomposing where corruption occurs and how this affects internationalization can provide useful insight. This could shed light on our findings on time to export, which are based on widely varied institutional contexts.

An important question is also on how reforms in credit markets affect small, new and informal firms that have export potential, compared with State-owned, large and established companies (see O'Toole and Tarp, 2014), as all firms are not affected equally (see Aghion et al., 2007; Roper et al., 2017). Future research can also examine the extent to which firms abandon exporting due to a challenging institutional environment and to what extent firms pursue OFDI as a substitute. Finally, our study may provide a useful base for more differentiated comparative analysis to shed more light on the complex direct and indirect relationships and interplay between regulatory aspects, credit markets and corruption in developed- and developing-country home-country contexts.

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Post-pandemic reconfiguration from global to domestic and regional value chains: the role of industrial policies*

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Abstract

The COVID-19 pandemic is expected to trigger a reconfiguration of global value chains according to four alternative trajectories: reshoring, regionalization, replication and diversification. This paper focuses on the first two scenarios. On the basis of a review of the extant reshoring literature and policies implemented in several major developed and emerging economies, we present a comprehensive framework to classify and analyse the evolution of such policies before and after the pandemic. The paper develops some policy recommendations suggesting that reshoring policies need to be supported by and combined with industrial policies enforcing the competitiveness and sustainability of production systems.

Keywords: COVID-19, global value chains, reconfiguration, back-shoring, near-shoring, industrial policy, reshoring

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1. Introduction

According to the World Health Organization, the COVID-19 pandemic had caused more than 113 million cases of contagion and more than 2.5 million casualties up to the end of February 2021 (World Health Organization, 2021). At the same time, the pandemic had – and continues to have – a high impact on business activities (Economist Intelligence Unit, 2020) due to the "The Great Lockdown", as the International Monetary Fund called the containment initiatives implemented by several national governments (Baldwin and Evenett, 2020). This, in turn, hit global value chains (GVCs) heavily because of the disruption to transportation links, the closing of manufacturing plants due to the scarcity of materials and the impediments to personnel movement (UNCTAD, 2020a, b). In a recent contribution, Strange (2020) stated that the impact of the pandemic on GVCs is likely to be disruptive, since (a) it is a global phenomenon, so its effects are largely diffused, compared with localized natural disasters (e.g. the 2011 tsunami in Japan) or sector-specific events (e.g. financial crises); (b) it obliges policymakers to implement public health policies (e.g. lockdowns) with consequent negative impacts on economic activities (e.g. reduction of trade and gross domestic product (GDP), see Austermann et al., 2020); and (c) it is contagious not only in terms of public health but also in terms of economic effects, as national economies are interconnected and globalized. In this respect, Coveri et al. (2020) stated that GVCs are acting as the main transmission channel of economic contagion. Furthermore, Javorcik (2020) pointed out that the disruptive effects of the pandemic on GVCs' configuration have been reinforced by the increased trade policy frictions, mainly between the United States and China.

The pandemic emerges as a trigger (Benstead et al., 2017; Boffelli and Johansson, 2020) that may induce companies to redesign their production footprint (Barbieri et al., 2020a, b). Therefore, the pandemic may encourage managers to revise and rethink the GVC paradigm. More specifically, four alternative trajectories of international production have been projected by the latest *World Investment Report* (UNCTAD, 2020b): diversification, replication, reshoring and regionalization. The last two trajectories (reshoring and regionalization) imply the shortening of GVCs as well as the relocation of manufacturing activities. Therefore, they are in line with the two so-called "relocations of second degree" phenomena described by Barbieri et al. (2019), namely the relocation of the already internationalized firms into either the home country (i.e. back-shoring, corresponding to the reshoring scenario in UNCTAD (2020b)) or the home macro-region (i.e. near-shoring, corresponding to the regionalization scenario in UNCTAD (2020b)).

In the last 30 years, international production has faced two decades of rapid growth followed by one of stagnation. More specifically, although the worldwide export of goods and services had been growing since the 1990s at more than double the rate of GDP, after the 2009 global financial crisis the growth rate of

international trade slowed down keeping pace with GDP. At the same time, GVC trade as well as the share of total trade declined (UNCTAD, 2020b; Zhan, 2021). Both UNCTAD (2020b) and Enderwick and Buckley (2020) recently investigated the causes of the slowdown of international production trends before the pandemic and found some key political, economic, technological and social factors (for a summary, see the literature review). Such pre-pandemic challenges were recently coupled with the pandemic, after which a huge debate on reconfiguration of GVCs has started to take place. More specifically, a growing number of academics (e.g. Baldwin and Evenett, 2020; Barbieri et al., 2020a, b; Contractor, 2020; Enderwick and Buckley, 2020; Gereffi, 2020; Miroudot, 2020a, b; Panwar, 2020; Strange, 2020; Zhan, 2021), institutions (Betti and Hong, 2020; UNCTAD, 2020b) and practitioners (Rice Jr., 2020; Van den Bossche et al., 2020) are discussing the hypothesis that the pandemic may induce companies to make their GVCs more regional and even more domestic, in order to reduce risks (Ciabuschi et al., 2019) and to adapt the manufacturing networks to the pre-pandemic phenomena that were already weakening the GVC production model. In other words, GVCs are likely to be partially reconfigured and recombined into regional value chains (RVCs) and/or domestic value chains (DVCs).

It is generally accepted that, after the pandemic, governmental decisions are likely to assume a critical role in fostering and boosting such relocation strategies by manufacturing companies. For instance, De Meyer (2020) recently pointed out that the pandemic renewed the primacy of politics over economics. Moreover, the World Economic Forum has specifically recommended managers to "aggressively evaluate near-shore options to shorten supply chains and increase proximity to customers" (Betti and Hong, 2020). Paraphrasing Rodrik (2008), the debate is not about whether governments should be involved, it is about how governments should go about running their post-pandemic policies.

However, until now, scant attention has been paid to the role (if any) that industrial policies may have in boosting the transformation of GVCs into RVCs and/or DVCs (Bailey and De Propris, 2014a, b; De Backer et al., 2016; Fratocchi et al., 2015; Piatanesi and Arauzo-Carod, 2019). This paper has two aims:

a. To map industrial policies designed and implemented worldwide before and after the COVID-19 outbreak to support relocation of production activities

b. To provide a comprehensive framework to classify and compare such industrial policies and to identify innovative trends

In order to reach these research aims, we couple the traditional perspective of back- and near-shoring scholars – who mainly refer to the single firm level – with one focused on the entire value chain – which has rarely been addressed in the extant literature (e.g. Ashby, 2016; Huq et al., 2016). In addition, following Weiss (2011, p. 14),

we rely on the concept of "modern" industrial policies by conceptualizing them "as widely as possible". More specifically, such policies include "myriad objectives beyond conventional industrial development and structural transformation, such as GVC integration and upgrading, development of the knowledge economy, build-up of sectors linked to sustainable development goals and competitive positioning for the new industrial revolution" (UNCTAD, 2018, p. 146). It has been pointed out that such policies are now commonplace among developing and developed countries. However, whereas developing countries implement industrial policies with the aim of triggering a manufacturing-based and export-driven industrialization phase leading to a successful economic growth, developed countries aim both to restore their manufacturing base after the decline experienced during rapid globalization in the 1990s and 2000s and again after the global financial crisis, and to obtain better strategic positioning in technologically advanced industries (UNCTAD, 2018). Almost all the modern industrial policies that have been implemented include some specific measures that may assume a critical role in supporting the transformation of GVCs into RVCs and/or DVCs.

The remainder of the paper is organized in four sections. The first offers a review of the extant literature on GVCs, back-shoring and near-shoring. The next section focuses on a review of relocation policies implemented in several major developed and emerging economies. In the third section, we propose a comprehensive framework for analysing and classifying reshoring policies, by showing how they are changing after the COVID-19 outbreak and how they are more likely to evolve in the near future. The last paragraph presents policy recommendations and concluding remarks.

2. Literature review

2.1 GVC production model: the main levels of analysis

The concept of GVCs was introduced in the early 1990s by Gereffi (1994) to describe the organization of international production that involves spatially dispersed buyers and suppliers having an input-output relationship, or vertically integrated multinational enterprises (MNEs) having their production facilities dispersed all over the world. The main rationales underlying the formation of GVCs are cost reduction, market development, knowledge and resource augmentation, and risk diversification (Kano et al., 2020). Given that GVCs are a complex and multifaceted phenomenon, this topic has attracted the attention of several disciplines such as economic geography, economic sociology, international economics, regional and development studies, operations management, supply chain management and international business (De Marchi et al., 2020).

On the basis of an extensive review of the literature on international business centred on GVCs, Kano et al. (2020) propose a comparative institutional framework of GVC governance. They assume that such a production model is influenced both by micro-level issues that pertain to the individual (e.g. bounded rationality, cognitive biases and entrepreneurial orientation) and macro-level characteristics stemming from GVCs' external environment (e.g. quality and cost of production input, institutional quality, political stability and economic development). In order to be efficient and competitive, actors within a GVC (and the leading firm in particular) are requested to align the governance system to the micro and macro characteristics of the transactions (Antràs and Chor, 2013; Gereffi et al., 2005; Hennart, 1994; Kano et al., 2020). Therefore, the GVC's governance system needs to be periodically adjusted as a function of the evolution of the micro- and macroeconomic environments. Consequently, Kano et al. (2020) suggest carefully investigating, among others, the temporal dynamics of the GVC. Moreover, they state this type of investigation "will likely shed light on the issue of backsourcing, inshoring, and reshoring […] which also is not sufficiently addressed in extant research" (Kano et al., 2020, p. 613).

2.2 Challenging the GVC's production model: the pre-pandemic drivers

As mentioned in the Introduction, UNCTAD (2020b) identified three megatrends shaping the future of international production, namely (i) technology, (ii) policy and economic governance, and (iii) sustainability. Within the first megatrend, attention is mainly focused on some of the technologies enabling the New Industrial Revolution/ Industry 4.0, which, among other benefits, allow companies to (a) reduce production costs and improve productivity (through industrial automation); (b) improve supply chain coordination (through cloud platforms) and traceability (through blockchain applications); and (c) implement mass customization strategies and widespread manufacturing locations close to the final customer (through 3D printing). As regards the policy and economic governance issue, the main trends are the higher interventionism in national policies – often based on a protectionist approach – and the growth of regional or bilateral trade deals – often focused on common-ground issues. Finally, companies increasingly face reputational risks and demand for goods and services that are produced in accordance with environmental and social sustainable criteria. At the same time, major "green" plans are implemented by national and macroregional governments.

Enderwick and Buckley (2020) identified six pre-pandemic phenomena that weakened and challenged the GVs production model. All of them refer to the three megatrends discussed earlier. More specifically, referring to the technology aspect, Enderwick and Buckle (2020) point out that although digitalization facilitates the connection among the different actors – thus favouring this production model (Coviello et al., 2017; Stallkamp and Schotter, 2019) – it also allows companies

to change their business model quickly and to substitute a human workforce with technology, thus easily excluding companies from production networks, especially when they do not belong to innovation hubs (Kano et al., 2020; Nambisan et al., 2019).

Referring to the policy and economic governance megatrend, Enderwick and Buckley (2020) first cite the weakening of the international institutions and agreements that were responsible for designing and enforcing the rules of globalization (e.g., the World Trade Organization, Trans-Pacific Partnership and North American Free Trade Agreement), and whose main consequence has been a general increase in global protectionism that is undermining the existence and nature of the GVC production model (Lawder and Freifeld 2018; Yacoub and El-Zomor 2020). Second, Enderwick and Buckley (2020) also refer to the battle for global leadership, which juxtaposes the United States and China, as shown by the trade wars – which further contribute to increase protectionism – and the race for technological standards. The main consequence is likely to be the polarization of global power between the two main contenders, thus making it difficult to organize value chains across these two geographic areas. Finally, Enderwick and Buckley (2020) mention the growth of nationalism and populism, which not only further challenges the leadership of the United States, but also pushes governments to adopt some specific measures favouring domestic products and the "made-in" effect, thus reducing the appeal of those products which are made across different countries (Walt, 2020).

Finally, considering the sustainability megatrend, Enderwick and Buckley (2020) also refer to the rising concern about social inequalities and environmental changes. Both issues have been identified as consequences of globalization waves, since GVCs imply long-distance transportation – hence, high pollution and carbon emissions – and do not allow a tight control over suppliers, thus increasing the opportunity to take advantage of the poor conditions and less stringent rules regarding workers' health and environmental protection in peripheral countries.

2.3 The future of GVCs: the post-pandemic trajectories

The *diversification* of GVCs is the first alternative trajectory proposed by UNCTAD (2020b) with regard to the future of international production after the pandemic. It is based on a partial redundancy perspective to ensure GVC resilience. More specifically, companies will maintain their international network of production but will rely more on local companies within host countries to better customize products and to take advantage of the national policies that governments will adopt to recover from the economic crisis caused by the pandemics. In addition, the leading firms will leverage digital technologies (internet of things, blockchain, artificial intelligence) to improve coordination and control of partners, as well as exploiting teleworking and cloud computing technologies to manage activities from a distance.

The second trajectory is the *replication* of the GVCs, which is implemented through multiple facilities located in many countries, while the high value added activities (e.g. R&D) will be concentrated in just a few locations. This trajectory, however, is considered less likely by UNCTAD (2020b) owing to the high cost of replicating and dispersing activities across countries.

A third trajectory is the *reshoring* of the GVCs, which implies the relocation of production activities back to the home country (Fratocchi et al., 2014). This production model is alternative and opposite to GVCs, since it makes them both shorter and less fragmented, thus giving birth to DVCs. Also, in this trajectory, technology plays a crucial role since robotics-driven automation allows companies to substitute labour with technology, thus reducing the importance of cost arbitrage advantages. The concentration of production activities in the home country also allows companies to exploit economies of scale, to avoid trade barriers and tariffs when re-importing intermediate or final goods, to take advantage of nationalist and populist policies and of the made-in effect, and to leverage sustainability-related advantages, making the value chain all domestic and easier to control.

Finally, the fourth trajectory is the *regionalization*, which implies a geographic reconfiguration of the GVCs that would be shortened in the macro-regions, thus giving birth to RVCs. Technology still plays a crucial role, as it allows companies to improve coordination and control and to substitute labor with technology, thus making the role of emerging countries less relevant, including in advanced macro-regions such as the European Union (EU) and North America. RVCs can avoid the risks associated with the lack of free trade, and global leadership (e.g. because they are confined within the EU), can help to mitigate nationalistic and populistic tensions (e.g. by distributing those activities of the value chain that were previously located overseas across the different countries of the macro-region) and can also partially meet the sustainability requirements (as they imply shorter transport and tighter control over suppliers; Fratocchi and Di Stefano, 2019).

Table 1 summarizes the interconnections between the four trajectories of international production identified by UNCTAD (2020b) and the pre-pandemic trends affecting the GVC production model (Enderwick and Buckley, 2020; UNCTAD, 2020b). According to Kano et al. (2020), these trends call either for an adjustment of the GVC governance structure or for a redesign and rethinking of the GVC production model itself. However, while digital technologies can potentially foster all four trajectories, the other megatrends (policy and economic governance and sustainability) can be mostly accommodated through the reshoring and regionalization trajectories. In addition, the pandemic is expected to further exacerbate the role of the pre-pandemic drivers, thus accelerating the reconfiguration of GVCs into DVCs and, above all, RVCs (as suggested also by Enderwick and Buckley, 2020; Pla-Barber, Villar and Narula, 2021; Zhan, 2021).

Table 1. Impact of pre-pandemic megatrends on international production trajectories

Megatrend	Trend/Pre-pandemic phenomena	Diversification	Replication	Reshoring	Regionalization
Technology	New Industrial Revolution/ Industry 4.0 enabling technologies	✓	✓	✓	✓
Policy and economic governance	More interventionism in national policies		✓ (only for home-country locations)	✓	✓ (only for home-country locations)
	Weakening of international institutions and agreements			✓	
	Return of protectionism			✓	✓
	More regional/ bilateral and ad hoc economic cooperation				✓
	United States–China war for global leadership			✓	✓
	Growth in nationalism and populism			✓	✓ (at least partially)
Sustainability	More green policies			✓	✓
	Market-driven changes in product and processes			✓	✓
	Rising concern for social inequalities			✓	✓
	Rising concern for environmental changes			✓	✓

Source: Authors' elaborations based on Enderwick and Buckley (2020); and UNCTAD (2020b).

The reshoring trajectory has also been supported by ad hoc policies in recent years and could even be accelerated by new policies that might be implemented after the COVID-19 pandemic. However, policies at a macroregional level might also contribute to the creation of RVCs. In the next section, we discuss the relocation policies designed and implemented before and during the pandemic.

3. Reshoring policies: a review

3.1 Pre-pandemic policy initiatives

The back- and near-shoring scholars have rarely paid attention to the role of industrial policies as boosters of relocation decisions. Moreover, Srai and Ané (2016) and Zhai et al. (2016) stated that industrial policies are rarely the drivers of back-shoring strategies. At the same time, Fratocchi et al. (2016) found that only 28 out of 377 relocations were boosted by (host-country) governmental incentives and only 3 were encouraged by customs duties for re-import. Finally, the very small number of authors who have investigated the role of industrial policies in supporting back- and near-shoring initiatives mainly describe policies at a national level (Bailey and De Propris, 2014a, b; De Backer et al., 2016; Fratocchi et al., 2015; Piatanesi and Arauzo-Carod, 2019). To the best of our knowledge, no previous authors have conducted an extensive analysis of the reshoring policies adopted by governments or evaluated their pros and cons and their connection with industrial policies. In this section, policy evidence regarding a group of major developed and emerging economies is summarized by separately analysing the pre- and post-pandemic initiatives, in order to define differences (if any) between the two time periods. Based on the collected evidence, in the next section, a comprehensive framework is proposed for classifying and analysing pro-reshoring (and industrial) policies.[1]

The "Blueprint for an America Built to Last" (White House, 2012) is generally recognized as the first political decision regarding back-shoring (De Backer et al., 2016; Fratocchi et al., 2015). In that document, the Obama Administration defined four pillars (manufacturing, skills, energy and values) that should support the renaissance of the United States economy (Barrentine and Whelan, 2014). Among them, five aimed to attract relocation decisions:

a. reduction of tax rates (especially related to high-tech), introduction of tax deductions for reshoring costs and elimination of the ones previously recognized for costs related to offshoring strategies;

b. investment in infrastructure;

c. creation of 25 "manufacturing universities", offering engineering curricula specifically aimed at the manufacturing sector;

[1] Policies were sampled using appropriate keywords on internet search engines and checking the internet sites of governmental agencies for communications about attracting foreign investment from the most relevant developed countries. In general such agencies are requested to manage the implementation of reshoring policies.

d. creation of 40 "manufacturing hubs" specialized in specific production technology and/or industries and aimed at promoting innovation-oriented collaboration among companies, universities and public administrations (Piatanesi and Arauzo-Carod, 2019); and

e. reduction of energy costs.

Moreover, in 2012–2013 single states within the United States financed about 1,800 projects regarding relocation (mainly of manufacturing activities) within their borders, investing about US$80 billion (Valsania, 2013).

More recently, the Trump Administration further underscored the widespread perception of a causal relationship between back-shoring initiatives and job creation (Vanchan et al., 2018), but it focused more on cutting production costs, rather than on providing incentives to innovate on products and production processes (Piatanesi and Arauzo-Carod, 2019). Moreover, President Trump implemented an aggressive trade policy, imposing duties on imports mainly from China, making it more competitive to manufacture in the United States.

In 2013, policy initiatives aiming to boost reshoring initiatives by manufacturing companies were also implemented by France and the Republic of Korea. The French policy was primarily based on a software-based questionnaire (Colbert 2.0) developed to allow small- and medium-sized enterprises (SMEs) to self-evaluate their readiness in terms of relocation strategies. After completing the document, potential candidates for back-shoring were supported through a customized support service including a single contact person for all the bureaucratic fulfillments. Moreover, financial aid was provided by a national fund financed through contributions requested from companies that have offshored their production activities. At the same time, huge attention was devoted to the creation of a positive "Made in France" effect, through the development of the "Origine France Garantie" brand. Finally, a national data set was developed to collect and show the advantages (e.g. availability of industrial areas and/or plants) offered by different French regions (Bellego, 2014). Some years later, however, the Colbert 2.0 software and the single-contact service were deactivated.

In August 2013, the Government of the Republic of Korea decided to support manufacturing by offering subsidies and tax reduction (Chang-Gyun, 2020). Apparently, however, this policy was not regarded as attractive enough, since only 68 firms relocated their production activities between 2014 and 2018. Moreover, only 38 of them are still in business. Such a poor performance has been explained on the basis of several criticalities (Chang-Gyun, 2020; Choi, 2019; Kyung-ho, 2017; Lim and Yeo, 2015):

a. The national minimum wage was still much higher with respect to the Chinese labor market.

b. Large companies were not adequately involved in the reshoring initiative; at the same time, Korean SMEs that offshored (mainly in China) to follow their large national customers were not motivated to return to the home country.

c. The policy did not include subsidies for innovation and collaboration with universities and research centres.

d. The policy was general purpose, meaning that it was not addressed to specific industries (e.g. the high-tech ones).

e. Companies were requested to close all manufacturing activities earlier located in China, meaning that slicing reshoring initiatives (Baraldi et al., 2018) was not allowed.

f. Reshoring incentives were not adequately communicated to Korean companies operating in China; moreover, the law contents were considered too complex.

In June 2016, the Government partially amended the initial policy scheme by introducing a five-year tax exemption for partial reshoring. Moreover, 11 sectors were defined as priority, including robotics, self-driving cars, biotech and health-related products. However, in the first six months after enactment of the law, only two companies took advantage of the new incentives (Chang-Gyun, 2020; Kyung-ho, 2017; Lim and Yeo, 2015). A survey implemented in July–August 2020 by the Korea Institute for International Economic Policy provided evidence that local companies had recommended that the Government lower the exit barriers for companies aiming to relocate their activities back from the "ASEAN Plus Three" countries (China, Japan and the Republic of Korea).

The United Kingdom was the fourth country to implement a reshoring policy in 2014 after Prime Minister Cameron's speech at the World Economic Forum, in which he stated the following: "I think there is a chance for Britain to become the 're-shored' nation" (United Kingdom Government, 2014, p. 67). More specifically, the "Reshore UK" policy asked the United Kingdom Trade and Investment (UKTI) Agency to support United Kingdom companies that were relocating in identifying local suppliers so as to (re-)develop a national supply chain. At the same time, the Manufacturing Advisory Service – an organization funded by the United Kingdom Government Department for Business, Innovation and Skills – offered advice on business strategies, innovative practices, efficiency of production processes and supply chain services to domestic SMEs aiming to become suppliers of reshoring companies. However, the Manufacturing Advisory Service was closed in 2015 and the UKTI service ended in 2016; since then, initiatives aimed at boosting reshoring initiatives have been partially included in the broader programme of the Innovate UK agency. Finally, support for suppliers' selection has actually been promoted by the "Reshoring UK" initiative, which has been established as a private league of industrial associations.

Taiwan Province of China was the last economy to introduce industrial policies aimed at attracting reshoring companies just before the COVID-19 pandemic. More specifically, in 2019, it enacted a scheme addressing Taiwanese companies that were affected by the United States-China trade conflict and that have been investing in China for at least two years (National Development Council, 2021). More specifically, to be eligible, companies needed to meet at least one of the following requirements: (a) fall into sectors of the 5+2 Industrial Innovation Plan (i.e. intelligent machinery, Asia Silicon Valley, green energy, biomedicine, national defence and aerospace, new agriculture and the circular economy), (b) belong to industries involving high value added products and/or key components; (c) playing a critical role in the international supply chain; (d) promoting global marketing in private-label brands; and (e) relating the investment project to national key industrial policies (Invest Taiwan, 2021). The scheme offers 10-year financial loans at a subsidized interest rate, a single contact person at the Ministry of Economic Affairs to facilitate paperwork management, availability of industrial areas and further development of industrial parks and scientific parks, support in searching for local skilled workers and facilitation of immigration for foreign talent, and immediate and safe supply of industrial water and power. The proposed incentives and subsidies have been regarded as very appealing for Taiwanese companies, since 204 relocation requests have been accepted, as of October 2020, for a total amount of more than €250 billion and the creation of more than 65,000 new jobs (Invest Taiwan, 2021).

3.4 Post-pandemic policy initiative

As noted by Policy Links (2020), governments have implemented three main "manufacturing policies" to cope with the COVID-19 pandemic, aiming to (a) ensure the continuing operation of manufacturing businesses, (b) mobilize manufacturing towards critical supplies, and (c) support post-crisis manufacturing growth. Among the third type of policies, some countries are implementing – or at least are designing – policies specifically addressed to stimulating the transformation of GVCs into either RVCs or DVCs. In this respect, specific attention has been reserved for health-related industries (e.g. drugs, ventilators, individual protection devices), given their relevance for the management of the pandemic response (Baldwin and Evenett, 2020; UNCTAD, 2020b). Drug production is articulated in several stages, most of which (i.e. starting materials and active pharmaceutical ingredients (APIs)) have been heavily offshored and outsourced to China and India in recent decades. Consequently, European countries and the United States depend heavily on Asia-based pharmaceutical GVCs. Within this scenario, it is interesting to note that India – which is the third-largest producer in the world by volume – was the first country to enact an industrial policy aimed at reducing the dependence of the national drug industry on imports of basic raw materials from China.

More specifically, in March 2020, the Government decided to approve two schemes (Government of India, Press Information Bureau 2020):

1. the promotion of three Bulk Drug Parks (the scheme finances common infrastructure facilities, such as solvent recovery plants, distillation plants, power and steam units and common effluent treatment plants)
2. support for six years to firms ensuring home-country manufacturing of critical starting materials and APIs.

In April 2020, the Japanese Government decided to support the relocation of manufacturing activities earlier offshored to China either to the home country or to other Asian countries (Sim, 2020). More specifically, the policy finances the relocation costs to transfer production to the home country or region; in particular, for SMEs operating in health-related businesses and willing to relocate to Japan, incentives are up to 70 per cent. Therefore, it is more likely that low-cost products (e.g. surgical masks) will be transferred to South-East Asian countries, while more high-value products (e.g. ventilators, drugs) will be relocated to Japan. Despite some criticism based on the absence of incentives for R&D activities (Tajitsu et al., 2020), by July 2020, applications had been received for 87 projects (57 regarding back-shoring initiatives and 30 near-shoring ones) for a total amount of €535 million, about one third of the total budget approved in April (Denyer, 2020).

In June 2020, the French Government launched a three-year project to back-shore the entire paracetamol supply chain, a drug heavily requested during the COVID-19 pandemic (Le Figaro, 2020). Also, the European Commission is expected to define a new Pharmaceutical Strategy. As stated by EU officials, "[T]he initiative is to help ensure Europe's supply of safe and affordable medicines to meet patients' needs, also through relocations of offshored production activities" (Sarantis, 2020). In the United States, debate continues on the need to make the national drug industry (and others) independent from China and India exports (Wiley, 2020).

However, the health-related industry is not the only one supported by reshoring policies. For instance, in June 2020, the Government of the Republic of Korea decided to focus its efforts on high-tech companies by offering them these incentives (Chang-Gyun, 2020; Eun-Jee, 2020; Jung-a, 2020; Strangarone, 2020):

a. subsidies for relocation expenses;
b. further subsidies for reshoring companies investing in robotization and automation of the production processes;
c. four years of total tax exemption plus a 50 per cent tax discount for the next two years (at the moment, the Parliament is discussing extending the exemption to five years and the tax reduction to the following three years); and
d. facilitation of visa requests for highly skilled foreign workers.

At the same time, in September 2020, the French Government presented an articulated economic programme to boost the manufacturing sector, in which specific policy tools addressed reshoring companies:

a. incentives addressed to specific value chains (drugs, aerospace, food, automotive, electronics, critical raw materials heavily adopted in the industry, industrial applications of 5G technology);

b. tax reduction for micro and SMEs;

c. administrative support for reshoring-related paperwork;

d. a €150 million fund to support industrial investment (including the ones belonging to back-shoring initiatives) in different regions, on the basis of comparative advantages specifically owned by geographical areas; and

e. a list of industrial plants available for new production activities.

According to the most updated data, the French Government has received applications for up to 3,600 projects for relocating production activities in the chosen industries; they refer to both back-shoring and "kept from offshoring" decisions (Les Echos, 2020). This performance may be, at least partially, explained by the simplification of procedures requested to access the subsidies implemented by the Minister of Economy after criticism by the Mouvement des Entreprises de France, the largest French association of entrepreneurs. Finally, it is worth nothing that only 180 relocations have been implemented in France in the last 15 years (Vittori and Hyppolite, 2020).

Further initiatives are under evaluation by other governments, for instance Australia (Smyth, 2020) and Italy (Fotina, 2020). Finally, the United States President Biden seems to be oriented to making supply chains less dependent on China imports, at least for the one involving products that are critical for key military technologies (e.g. semiconductors and rare earth elements) (Eversden, 2021).

4. Towards a framework for GVCs reconfiguration policies

4.1 A comparison between pre- and post-pandemic reshoring policies

The policies reviewed earlier allow us to compare pre- and post-pandemic reshoring policies implemented at a global level. In this respect, table 2 summarizes the most relevant characteristics of the sampled initiatives according to policy targets (e.g. type of industry or company, type of relocation) and benefits (e.g. economic and financial versus human capital).

Table 2. Characterization of sampled reshoring policies

		Pre-pandemic policies							Post-pandemic policies			
Year/Period		**2012–2016**	**2013**	**2013**	**2014**	**2016**	**2016–2020**	**2019**	**2020**			
Country		**United States**	**France**	**Republic of Korea**	**United Kingdom**	**Republic of Korea**	**United States**	**Taiwan Province of China**	**India**	**Japan**	**France**	**Republic of Korea**
Policy targets	Typology of beneficiary (single company versus supply chain)	Single companies	Single companies	Single companies	Single companies	Single companies	Single companies	Single companies	Single companies	Single companies	Single companies and consortia	Single companies
	Main/exclusive targets (e.g. industries, SMEs)					Selected industries		Selected industries	Selected industries	Selected industries	Selected industries	Selected industries
	Back- versus near- shoring	Back-shoring	Back-shoring	Back-shoring	Back-shoring	Back-shoring	Back-shoring	Back-shoring	Back-shoring	Back- and near-shoring	Back-shoring	Back-shoring
Cost and financial issues	Financial aids		✓	✓				✓	✓	✓	✓	
	Fiscal incentives (e.g. tax reduction and exemptions)	✓		✓							✓	✓
	Subsidies for reshoring costs	✓								✓	✓	✓
Supply chain	Support for suppliers' research				✓							
	Development of suppliers' capabilities (especially SMEs)				✓							
Public administration	Single contact person		✓		✓			✓			✓	
	Reduction of bureaucracy		✓								✓	

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Table 2. Characterization of sampled reshoring policies (Concluded)

		Pre-pandemic policies							Post-pandemic policies			
Year/Period		2012–2016	2013	2013	2014	2016	2016–2020	2019	2020			
Country		United States	France	Republic of Korea	United Kingdom	Republic of Korea	United States	Taiwan Province of China	India	Japan	France	Republic of Korea
Infrastructure	Development of production infrastructure (e.g. industrial areas, scientific parks)							✓	✓			
	Other infrastructure (e.g. railways, motorways)	✓										
	Information on availability of plants		✓					✓			✓	
	Plant utilities continuity							✓				
Innovation	Innovation policy (e.g. collaboration with universities, support service for innovation technology)	✓			✓							
Human capital	Human capital development (e.g. academic curricula)	✓										
	Human capital availability (home-country residents and foreigners)	✓						✓				✓
Home-country image	Home-country "made in" brand		✓									
Protectionism	Duties and tariffs on imports						✓					

Source: Authors' elaboration based on multiple sources.

It emerges immediately that the pandemic has pushed policymakers to design and implement reshoring initiatives; more specifically, while five countries developed national policies in the eight years before the pandemic, four have developed new policies within only seven months of the pandemic outbreak. This evidence confirms the idea that with the pandemic a renewed primacy of politics over economics has emerged (De Meyer, 2020).

At the same time, it is worth noting that post-pandemic initiatives have been enacted both by nations that already experienced reshoring policies (France and the Republic of Korea) and by countries that never developed them (Japan and India). Moreover, the initiatives considered all address specific industries, mainly health-related and high-tech ones. In this respect, the decision to focus on specific target industries was implemented for the first time in 2016 by the Government of the Republic of Korea when it redesigned its initial 2013 policy in the face of the poor effects in terms of the number of back-shored companies. Subsequently, the policy focalization was implemented by the Taiwanese Government, which was the last government to implement a reshoring policy before the pandemic.

In terms of benefits, no relevant differences emerge between pre- and post-pandemic policies, the effects related to cost and financial aid being more diffused – as is usual in industrial policies (UNCTAD, 2018) – followed by the ones regarding infrastructure and relationships with public administration. It is worth noting that the majority of the policies considered include a variety of tools, spanning two or more of the categories proposed in table 2. This seems to reflect the need for a broad perspective in designing a reshoring policy, in order to account for the vast array of reshoring motivations (Barbieri et al., 2018; Boffelli and Johansson, 2020; Fratocchi et al., 2016), and to tackle the barriers hindering relocation initiatives (Engström et al., 2018a, b). Concerning the latter, scholars have devoted specific attention to the lack of skilled human resources (e.g. Bailey and De Propris, 2014a, b; Engström et al., 2018a, b; Nujen et al., 2018; 2019) and the availability of specialized suppliers (Ashby, 2016; Robinson and Hsieh, 2016). In this respect, the experience of the United Kingdom deserves a special note, as British companies aiming to reshore were supported in finding national suppliers. Moreover, local SMEs were specifically supported in implementing process and managerial innovations in order to become more attractive to relocating companies. At the same time, the presence of incentives related to human capital appears noteworthy (i.e., policies of the United States and Taiwan Province of China before the pandemic and the Republic of Korea since the outbreak). All this evidence is consistent with Srai and Ané's (2016) expectations of better comprehension of relocating companies' needs by policymakers.

When considering the role of reshoring policies for post-pandemic reconfiguration of GVCs, two main and relevant elements emerge as evolutionary with respect to previous policies. The first one is with regard to the "geographic horizon" of the

policies analysed, as shown by the Japanese initiative, which specifically addresses the near-shoring alternative by offering economic support for companies aiming to relocate in other Asian countries those manufacturing activities they earlier offshored to China. Generally, policies implemented by single countries aim to relocate manufacturing activities to the home country, in order to both make the (domestic) value chain stronger and positively affect employment and GDP growth. Therefore, the creation of RVCs through support for near-shoring firms' strategies would be more likely to be supported by supranational (i.e. macroregional) institutions, such as the EU, than from single countries.

However, the pandemic also induced a single country, namely Japan, to design industrial policies that also incorporate international relations within the home region. The interconnection between reshoring and foreign policies' aims was already at the basis of the 2019 Taiwanese Government's decision to specifically address manufacturing companies offshored in China that were negatively impacted by the trade war between the United States and China. Moreover, it was also the basis of the 2020 initiative by the Republic of Korea that aimed to reduce the dependency of national manufacturers on both Chinese and Japanese exports (Eun-Jee, 2020). All this evidence has prompted some experts to conceptualize the back-shoring initiatives as a form of protectionism, inducing a growing negative judgment on reshoring policies (see, for instance, Stellinger et al., 2020), as they are likely to create difficulties in political relationships at the worldwide level (Oxford Analytics, 2020), and increase costs when compared with offshored production (Guinea and Forsthuber, 2020).

The second main evidence arising from the analysis of post-pandemic policies is regarding their "reshoring targets". As already noted, since the 2016 Korean initiative and the 2019 Taiwanese initiative, policymakers have focused their efforts on specific industries, mainly the most technological and innovative ones. The "verticalization" of industrial policy is consistent with Rodrik's (2008) advice and with evidence collected by UNCTAD, which found that 40 per cent of sampled industrial policies contain "vertical policies for the build-up of specific industries" (2018, p. xiv).

However, the post-pandemic policy enacted by France provides evidence of a further focalization of the policy targets. More specifically, the French initiative initiated a shift from the traditional single company target to the consortia and the entire supply chain. For instance, Salomon, Millet and Babolat, three competitors in the sports footwear industry, decided to build a joint production facility (Advanced Shoe Factory 4.0) in the Auvergne-Rhône-Alpes region to manufacture up to 500,000 pairs of shoes per year by mid-2025. The facility was expected to start production by mid-2021 and will offer several benefits to founding companies, such as (a) greater speed to market and

reaction to demand changes; (b) greater flexibility in the development of brands' product lines (e.g. small-volume models); (c) reduced carbon footprint of production activities; and (d) reduced production costs, thanks to a streamlined assembly process with the use of robotics in the factory (Snow Industry News, 2020).

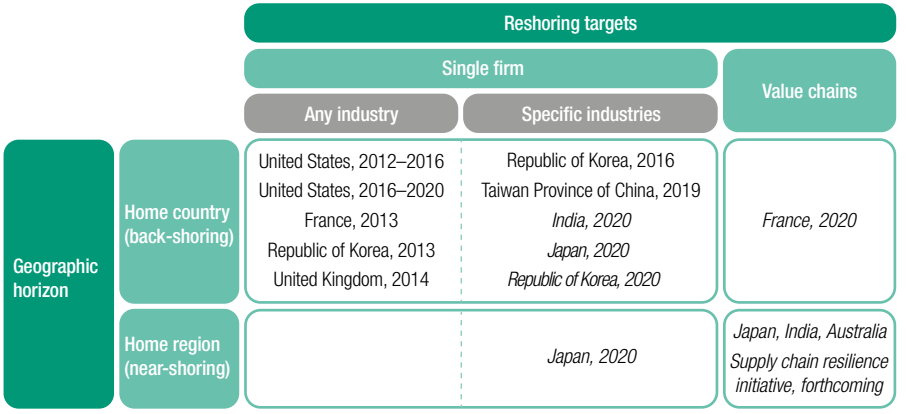
In other words, it seems that the pandemic has made it clear that the relocation of a specific product (e.g. paracetamol) often requires a broader (re)construction of the entire value chain and it is not limited to a single company. This is also consistent with one of the criticisms of the pre-pandemic policy in the Republic of Korea, which did not pay enough attention to the leading company, whose reshoring decision would activate the same decision by all the SMEs in its supply chain. In turn, such a value chain-based approach calls for an "orchestrator" who carefully manages the complex set of interdependencies among different actors. In this respect, it is more likely that this coordination will require a longer timespan if managed only by companies, while it would be speeded up if boosted by industrial policy initiatives. Once again, the renewed primacy of politics over economics after the COVID-19 pandemic clearly emerges (De Meyer, 2020).

4.2 A framework for GVCs' reconfiguration policies

Based on the earlier discussion, we propose to classify reshoring policies according to two original insights that emerged when comparing pre- and post-pandemic reshoring policies: geographic horizon and reshoring target. More specifically, the geographic horizon regards the destination of the relocation strategy, namely either the home country (back-shoring) or the home region (near-shoring). In contrast, the reshoring target regards either single companies or the value chains; however, it seems useful to further articulate the former alternative within two sub-aggregates, according to the policy focus (if any) on specific industries. Combining these two dimensions in a 2 by 2 matrix, it is possible to characterize and compare all the sampled reshoring policies (figure 1).

As shown in figure 1, currently no policy addresses the lower right quadrant, the one referring to policies aimed at relocating entire value chains in the home region. However, in the very near future this gap could be filled either by agreements among single countries or by supranational (i.e. macroregional) institutions. As far as the former is concerned (agreements among single countries), in September 2020 the trade ministers of Japan, India and Australia agreed to develop a "Supply Chain Resilience Initiative". The project – which in perspective could be enlarged to other Indo-Pacific countries – aims to reduce the dependency of industries in the three countries on China by creating alternate supply chains "based on trust and stability", as recently stated by Indian Prime Minister Modi (Rajagopalan, 2020).

Figure 1. Proposed framework for reshoring policies classification



Sources: Authors' elaboration.
Note: Data in italics refer to post-pandemic industrial policies.

Moreover, within an integrated area (such as the EU), a macroregional industrial policy (or at least, the coordination of the national ones) is likely to be even more effective in re-attracting multiple firms in complex value chains articulated in several production stages. By adopting a regional perspective, it is possible to leverage cross-country heterogeneity in terms of owned manufacturing competences and production capabilities to recreate the GVCs within the home region, thus giving birth to RVCs. In this respect, two initiatives deserve a special note within the EU context. The first one concerns the EU-financed Tex-Med Alliances, which involves textile and fashion industrial districts located in the Mediterranean countries (Spain, Italy, Greece, Tunisia, Egypt, Jordan and Palestine). The project – started in February 2020, just before the pandemic explosion in Europe – may have a major role in supporting back-shoring and near-shoring strategies based on higher product quality and shorter delivery times compared with imports from Asia. The second initiative has been recently proposed by the chair of Fondazione Altagamma (an Italian association of 107 brands operating in the high-end fashion and luxury industries). He recently suggested developing a relocation project aimed at creating a pan-European RVC for technical fabrics (Crivelli, 2020). Both initiatives involve interplay among a plurality of actors; therefore, their implementation entails some barriers that need to be addressed by firms, policymakers and companies' networks. Indeed, the near-shoring of entire value chains requires coordination and integration efforts that are likely to be significant, as this process involves not only multiple firms but also different countries, which might exercise opportunistic behaviours and create a race for hosting as many relocation initiatives as possible.

Therefore, supranational institutions belonging to macro-regions emerge as the natural leading actors for such complex projects. This is the reason why, in March 2021, the European Parliament published an extensive study analysing the GVC reshoring scenario and policies supporting the return of production back to Europe, with a focus on four strategic industries, i.e. pharmaceuticals, medical products, semiconductors and solar energy (Raza et al., 2021).

5. Conclusions, policy implications and recommendations

The COVID-19 pandemic is likely to act more as an accelerator than as a driver of those pre-pandemic forces that were already changing the macroeconomic context, thus inducing companies to shorten their GVCs through either near-shoring or back-shoring initiatives, corresponding to the regionalization and reshoring scenarios proposed by UNCTAD (2020b). Based on such a conceptualization, in this paper, policies supporting such firms' strategies at the worldwide level were identified, analysed and compared. In this respect, it clearly emerges that these policies, whether implemented before or after the pandemic, are consistent with a modern perspective, since they also cover topics such as innovation (e.g. the United Kingdom and the United States under President Obama's Administration), transportation infrastructure (United States) and human capital (United States and Taiwan Province of China). However, the COVID-19 crisis motivated national governments to further develop such policies by introducing some novelties with respect to the ones enacted before the pandemic. First, the new policies are all focused on specific industries, whether related to health needs or high-tech. At the same time, evidence was found of an enlargement of the policy targets, including consortia of firms and even entire value chains. Moreover, the post-pandemic policies considered provide evidence that single countries decided to support not only relocations to those home countries but also to the home region, enlarging the geographic horizons of policies.

From this evidence, we developed a framework for the classification of reshoring policies, which also offers some insights on the possible evolution of the reshoring policies, i.e. the near-shoring of the entire value chain in the home region. While no evidence of such policies is currently available, future implementations are likely to occur in very soon. In this respect, policymakers should carefully evaluate the set of tools to be made available for (groups of) firms involved in the relocation initiative, to boost their willingness to relocate to the home region.[2] Until now, governments have offered mainly financial and fiscal incentives,

[2] Some of the policy instruments proposed in this section can be part of wider investment promotion activities.

since these are the most attractive and easiest tools to be applied in the short term. However, such subsidies might not be enough to boost a real wave of second-degree relocations, as in the case of the Korean policy initiatives (Choi, 2019). Therefore, following UNCTAD (2020b), policymakers aiming to develop pro-reshoring initiatives should carefully evaluate how to improve the success rates of their initiatives by matching reshoring policies with others aimed at re-establishing manufacturing skills and infrastructure. In this respect, as pointed out by Srai and Ané (2016, 7209), "[F]uture policy initiatives of developed countries should align with firm strategies for responsive supply, emphasising local brand and quality attributes and actively engaging with firms considering restructuring projects". Moreover, policymakers should carefully evaluate barriers (Engström et al., 2018a, b) and risks (UNCTAD, 2020b) that might characterize the implementation of back- and near-shoring initiatives. Among these, specific attention should be given to the lack of skilled human resources (Bailey and De Propris, 2014a, b; Engström et al., 2018a, b; Nujen et al., 2018; 2019) resulting from previous decades of offshoring, which gave rise to de-industrialization phenomena in several Western countries. Therefore, policymakers should support the training and education sector in revising curricula, thus stimulating collaboration between universities, educational institutions and companies.

Furthermore, relocation policies need to be supported by and combined with industrial policies that enforce the competitiveness of the home country's or macro-region's production system, by boosting innovations aimed at improving product value (differentiation strategy) and/or reduce production costs (efficiency-seeking strategy). In this respect, specific attention should be given to technologies enabling the Industry 4.0 phenomenon (UNCTAD, 2020b), since they may support both differentiation (e.g. through the internet of things) and efficiency-seeking (e.g. through automation) strategies; furthermore, it has recently been shown that they may support back- and near-shoring strategies (Fratocchi and Di Stefano, 2020).

Finally, as recently pointed out by Aernoudt (2020), reshoring policies should be based on both an evidence-based approach – which involves a combination of scientific, pragmatic and value-led knowledge (Ehrenberg, 1999; Flyvbjerg, 2001) – and a foresight-based perspective – which implicates the aim to reshape the future. Consequently, relocation policies should link tangible (e.g. infrastructure) and intangible (e.g. mindset towards industry and vocational training) aspects. In this respect, the role of supra-national policymakers (e.g. the EU) deserves a special note. Indeed, these actors should pay attention to matching reshoring initiatives with other industrial policies aimed at re-establishing manufacturing skills and infrastructure. This requires a careful selection of industries worthy of being relocated within the European macro-region (Damen, 2020). In this respect, APIs and medical devices seem to be two of the most promising options.

Other relevant industries should be solar energy and electric car batteries, since the EU Commission aims "to establish a competitive and sustainable European battery value chain" (European Commission, 2018). It is worth noting that this policy simultaneously aims to create RVCs and promote environmental sustainability issues addressed by the EU Commission project called the Green New Deal. A final value chain that the EU Parliament is considering to back-shore to Europe is the semiconductor industry, in order to decrease the technological dependence of the EU on other geographic areas. However, as pointed out by UNCTAD (2020b, p. 162), "regional value chains are not easy to establish … [therefore] while the political momentum for a shift to regionalism is mature, the implementation will not be immediate". Moreover, a completely European strategic autonomy is unlikely to be possible; therefore, the EU should adopt an "open" strategic or "smart" reshoring perspective (Damen, 2020).

This paper also offers a stimulus for future research. In this respect, scholars should develop theoretical and empirical evidence that can be useful in evaluating the outcomes of the relocation policies implemented by different countries and by supranational policymakers (if any) after the COVID-19 pandemic. More specifically, they should verify whether the initiatives supported by and combined with industrial policies (e.g. Industry 4.0, environmental and training policies) are more effective than those that are merely reshoring-oriented, and whether those that aim to foster the switch from a production model based on GVCs to a new one based on RVCs and DVCs are more effective than reshoring policies that target single firms. Future research should include analysis of reshoring policies of a broader population of emerging economies, as well as policy responses in developing countries in the wake of reconfigurations of GVCs in the post-pandemic world.

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The relationship between perceived corruption and FDI: a longitudinal study in the context of Egypt*

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Abstract

This paper investigates the dynamic relationship between perceived corruption and foreign direct investment (FDI) in Egypt during the period 1970–2019. Using a novel back-casting methodology, it extrapolates perceived corruption time series between 1970 and 1980. The results of the Johansen cointegration technique and the multivariate vector error correction model show a positive relationship between perceived corruption and FDI, supporting the "greasing the wheels" effect of corruption. This positive association can be explained by several factors, such as the cross-interdependence of rent-generating assets with perceived corruption and FDI, and the use of FDI data based on the balance of payments that has growing financial-flows and phantom-FDI components. The findings of this paper have important policy implications. Improving the fundamental governance structure in Egypt should be accompanied by a comprehensive investment facilitation strategy to compensate for the removal of "grease" from the "wheels".

Keywords: perceived corruption, FDI, VECM, back-casting, Egypt

JEL classification numbers: F21, D73, O20, H54

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1. Introduction

Since the 1980s, the globalization of foreign capital, particularly foreign direct investment (FDI) inflows, has increased significantly in developing countries (UNCTAD, 2020). Over the last 50 years, FDI has dominated economic literature and policymaking circles and has been widely identified as a growth-enhancing factor. Its effects range from influencing production, employment, income, prices, exports, imports and the balance of payments to affecting the economic growth and general welfare of the host countries. Many factors can affect FDI inflows in developing countries. One factor identified as important in determining FDI location choice is the level of rent-seeking and/or corruption in the host economy.

Egypt is a developing economy characterized by low per capita income, low levels of savings, high levels of unemployment, inefficient financial intermediation and high external debt. Like many developing countries, Egypt also suffers from weak public corporate governance, the lack of a well-structured public sector and perceived corruption, which are regarded as crowding out the development of private investment (Pfeifer, 2012).

Between 1974 and 1985, economic growth in Egypt reached an average rate of 8 per cent a year. This was encouraged by a series of windfall rents: high oil prices, Israel returning the Sinai oil fields, the reopening of the Suez Canal and remittances from Egyptian workers in Arab countries. In 1991, the Economic Reform and Structural Adjustment Programme (ERSAP) started in order to address the economic imbalances and to revive economic growth, aiming to reach 7 per cent by 2000. The ERSAP placed special emphasis on the key role of FDI in generating economic growth. Over the 1990s, FDI inflows represented only 1 per cent of gross domestic product (GDP), while domestic investment reached 20 per cent of GDP. The relative decrease of FDI inflows to Egypt during the first half of the decade can be explained by the Gulf War crisis, macroeconomic imbalances and a fall in windfall rents and, hence, economic growth from 7.4 per cent in 1983 to 5.7 per cent in 1990 (table 1).

From 2004 to 2008, FDI inflows to Egypt increased, reaching a peak of 9 per cent of GDP in 2006. This outstanding performance was attributed to the success of the economic reform programme, the enactment of aggressive market reform policies by a newly appointed cabinet of reformists, a decreasing inflation rate, stable exchange and interest rates, and an accelerated privatization process (Pfeifer, 2012). However, the process of privatizing non-competitive industries (that is, of rent-generating sectors) was characterized during 2004–2010 by a prevalence of rent-seeking opportunities (King, 2010).

In 2008, the financial crisis hit the global economy and FDI inflows to Egypt started to slow down, reversing the surge of the preceding four years. The full impact of the crisis was felt in 2009 as global FDI went down by 37 per cent (El-Shal, 2012).

Table 1. Macroeconomic statistics: Egypt (1970–2019)

Period/ Series	1970–1979	1980–1989	1990–1999	2000–2009	2010–2019
FDI, net inflows (current million US$ million)	171	860	805	4 799	6 039
FDI, net inflows (% GDP)	1.1	2.6	1.2	3.8	2.1
Real GDP growth (%)	6	6	4	5	4
GDP per capita (constant 2015 US$)	910	1 402	1 707	3 217	3 483
Gross domestic savings (% GDP)	12	16	14	15	14
Gross capital formation (% GDP)	19	28	20	19	18
Trade (% GDP)	50	58	50	54	48

Source: UNCTAD data.

FDI in Egypt dropped less sharply, though still by 30 per cent. In 2011, the political uncertainty, unprecedented security challenges and widespread labour protests that accompanied the January 25th Revolution exacerbated the trend of FDI. FDI inflows to Egypt were negative $483 million at the end of 2011; however, they turned positive in 2012, to reach about $3 billion by the end of the year.

Over the period 2010–2019, Egypt has made considerable progress in liberalizing its business environment and attracting FDI inflows, to reach $6 billion (see table 1). However, the country still suffers from excessive bureaucracy, corruption, and unstable political and macroeconomic conditions (Springborg, 2017; El-Mikawy and Handoussa, 2001). According to the World Bank's 2019 Ease of Doing Business report, the relative ranking of Egypt as a recipient of FDI deteriorated somewhat during the period, from 110 of 190 countries in 2010 to 114 in 2019. Perceived corruption is often cited by investors as the main impediment to further investment reforms (IMF, 2018). According to the widely used and authoritative Corruption Perception Index of Transparency International, Egypt was positioned in the middle quintile globally in 2019, notwithstanding a somewhat more unfavourable score than in previous periods. Similarly, Egypt's rank in the index is at the midpoint among North African countries, as well as within the Middle East and North Africa region. Notwithstanding that legislation since the 1970s has aimed to encourage private investment, the predominance of the public sector and the growing partnerships between the government and the private sector gave rise to rent-seeking opportunities and, hence, corruption (Bromley and Bush, 1994).

The determinants and the impact of institutional distortions and perceived corruption on FDI in Egypt have not yet been investigated. This type of country-level study is crucial to introducing efficient policies to attract FDI. This paper contributes to the literature by providing fresh evidence on the effect of perceived corruption on FDI using time series data. Past studies on country-level FDI have

inconclusive results about effects that arise from social and institutional factors – factors that are included in this study. Most notably, this is the first study to use a back-casting technique to provide historical annual estimates. The back-casting methodology extrapolates recent perceived corruption data into the past based on its historical relationship with data on democracy, to overcome the shortage in perceived corruption estimates. Along with the academic contributions, the findings of this paper provide a source of relevant and reliable information for both investors and policymakers.

After briefly providing background information on the relevant socioeconomic policy in Egypt, section 2 reviews the literature on FDI and perceived corruption. Sections 3 to 5 explain the model specifications, the methodology and the data, respectively. Section 6 reports and analyses the main results. The final section draws conclusions and sets out the policy implications.

2. Perceived corruption and FDI determinants: a literature review

Political determinants of FDI mainly include political stability, risk of expropriation and corruption in host countries. Some countries may consider FDI and dependence on foreign countries as a threat to their sovereignty. In such cases, their political orientation affects FDI inflows (Habib and Zurawicki, 2001). Empirical studies on the political determinants of FDI have increased over recent years but they remain less investigated than economic determinants, as the former are harder to statistically measure – especially in developing countries.

The empirical studies assessing the impact of corruption on FDI are inconclusive as to whether corruption hinders or enhances FDI. However, there is a fair amount of theoretical research looking at the relationship between FDI and perceived corruption. From a theoretical perspective, perceived corruption may act either as a "grabbing hand" or as a "helping hand" for FDI inflows (Jain, 2001; Aidt, 2003). The grabbing hand image of the State is proposed and developed by Murphy et al. (1993). Corruption can increase the cost of doing business to the point of making it unprofitable, which reduces FDI. Corruption in that sense falls within the broader negative effects of being a rent-seeking activity that increases transaction costs in the economy. Such costs may be spent instead of on collecting information on partners and market conditions. In addition to transaction costs, corruption entails much higher costs in the form of distortions to the aggregate economy created by corrupt officials to generate payoffs. Distortions to the economy may take the form of inefficient privatization and government contracts, delaying production, giving licences to low-quality goods and services, and illegal activities. In addition, corruption may lead to the distribution of a large share of a country's

wealth to corrupt officials in the form of inflated contract prices. Such high costs should be collected later through raising taxes and cutting spending (Rose-Ackerman and Palifka, 2016).

Furthermore, corruption sways capital inflows towards bank loans and portfolio investment at the expense of FDI (Mauro, 1995). Two possible reasons explain this finding. First, local officials in countries with a higher prevalence of corruption may have a greater tendency than foreign bank lenders to exploit and manipulate international investors to pay bribes so as not to create obstacles. Second, foreign bank lenders have a greater level of protection for their loans through international institutions than international investors who face the possibility of having their investment extorted or nationalized by a country without good governance. This makes a country more vulnerable to currency crisis as bank loans and other portfolio flows can be withdrawn with ease if there are signs of economic problems (Wei and Wu, 2002). Corruption may also have an indirect impact on FDI by deterring domestic investment. Mauro (1995) and Pellegrini and Gerlagh (2004) found evidence that perceived corruption affects the economic activity of a country by lowering investment.

Yet, corruption can also act as a "helping hand" to foster FDI inflows. If corruption substitutes for poor governance, it can lead to economic expansion (Houston, 2007). This argument is based on the efficient grease hypothesis. Through "greasing the wheels" of economic activity, corruption may overcome the obstacles that bureaucracy tends to create. Although most of the studies pinpoint the negative effects of corruption, some studies have proved the validity of the hypothesis (Sadig, 2009). Such studies do not call for retaining corruption but rather strengthening the legal and institutional frameworks of the countries in question.

The literature abounds with numerous studies assessing the determinants of FDI in general, yet empirical research on the relationship between FDI and corruption is relatively limited as data on perceived corruption have been available for only a short time. The empirical literature also tends to focus on cross-country rather than intercountry perceived corruption. Several empirical studies have found a negative relationship between perceived corruption and FDI inflows (Busse and Hefeker, 2007; Asiedu, 2006; Mathur and Singh, 2013). Tosun et al. (2014) report that perceived corruption has a distortive effect on FDI in Turkey for both short- and long-run periods which indicates that "helping hand" perceived corruption does not exist in Turkey. A cross-sectional study in this regard, conducted by Sadig (2009), finds a negative relationship between perceived corruption and FDI in 117 countries. In addition, Habib and Zurawicki (2001) analyse the effect of perceived corruption on FDI in 111 countries and find that the negative effect of perceived corruption on FDI is more significant than its impact on domestic investment. Furthermore, the degree of international openness and political stability of the host country moderated

the influence of perceived corruption. Abed and Davoodi (2000) focused on the role of perceived corruption in explaining key measures of economic performance in the transition economies and find that perceived corruption is negatively related to FDI.

In contrast, the second group of studies proposes that perceived corruption could have a positive impact in an economy suffering from a weak level of protection and property rights. There is a point of view that perceived corruption can benefit multinational corporations (MNC) operations in some situations (Zhou, 2007). Some economists show a useful side of perceived corruption, arguing that perceived corruption is the much-needed grease for the squeaking wheel of a rigid administration (Kardesler and Yetkiner, 2009; Jensen et al., 2010; Helmy, 2013).

Egger and Winner (2005) find a positive relationship between perceived corruption and FDI in a sample of 73 developed and developing countries over the period 1995–1999. Their result suggests that administrative controls and bureaucratic discretion are used to allow government officials to share in the profits from FDI. Later, however, Egger and Winner (2006) consider a longer period (1983–1999) and find that the negative impact of perceived corruption on FDI outweighs its positive impact. The empirical work by Bellos and Subasat (2012) suggests that perceived corruption has not deterred, but rather encouraged MNCs to enter selected transition countries over the period 1990–2003.[I]

Contrary to these findings, some studies find either an insignificant or an inclusive relationship between FDI and perceived corruption. Wheeler and Mody's (1992) study of United States firms finds a negative relationship between FDI and the risk factor of the host country, concluding that perceived corruption and all types of judicial and bureaucratic impediments were insignificant. Sadig (2009), Hakkalar et al. (2005) and Dreher and Herzfeld (2005) assert that the evidence on the effect of perceived corruption on FDI is inconclusive depending upon other variables.

3. Model specification

In order to examine the effects of perceived corruption on FDI inflows in Egypt, the paper draws from the following model by Li and Liu (2005):

$$\mathrm{FDI}_{it}=a_o+a_1\,g_{it}+a_2\,\mathrm{lny}_{it}+a_3\,\mathrm{SCH}_{i,65}+a_4\,\mathrm{Trade}_{it}+\mathrm{AX}_{it}+\varepsilon \qquad (1)$$

where FDI is FDI inflows as a percentage of GDP, g is the per capita GDP growth rate, lny is the market size measured by log of real GDP, SCH_{65} is the level of secondary school attainment in 1965 as a proxy for human capital, Trade is the ratio of total trade to GDP, and AX_{it} is a vector of macroeconomic variables such as infrastructure, as proxied by mobile cellular subscriptions per 100 people, and inflation, as proxied by percentage changes in consumer prices.

To investigate the effects of perceived corruption on FDI in Egypt, perceived corruption (cor_t) is added to equation (1). Furthermore, SCH_{65} cannot be used for time series as it is a constant figure, which creates multicollinearity. Instead, secondary school enrolment as a percentage of gross enrolment (hk_t) is used to proxy for human capital in Egypt.[1] The ratio of domestic investment to GDP (inv_t) is another economic determinant of FDI inflows that is highlighted by some empirical studies (e.g., Sader, 1993, Ndikumana and Verick, 2008). The ratio of domestic investment to GDP is used as an indicator of the general investment climate in Egypt. Adding these three variables to the Li and Liu (2005) model and estimating the model over a period of 50 years (1970–2019) yields the following equation:

$$fdi_t = a_o + a_1\, cor_t + a_2\, g_t + a_3\, y_t + a_4\, hk_t + a_5\, trade_t + a_6\, inv_t + a_7\, X_t + \varepsilon \qquad (2)$$

In Egypt, FDI is concentrated in the oil and gas industry, which receives about two thirds of total investment (UNCTAD, 2020), followed by construction, manufacturing, real estate and financial services. Hence, in order to assure a reliable result, the model in equation (2) for non-oil FDI inflows is re-estimated, as follows:

$$\text{non-oil } fdi_t = a_o + a_1\, cor_t + a_2\, g_t + a_3\, y_t + a_4\, hk_t + a_5\, trade_t + a_6\, inv_t + a_7\, X_t + \varepsilon \qquad (3)$$

with

$$a_1 \lessgtr 0;\ a_2 \lessgtr 0;\ a_3 > 0;\ +a_4 > 0 \ \ or\ \ < 0;\ a_5 < 0;\ a_6 > 0 > a_7 > 0$$

The dependent variable is fdi_t and $\text{non-oil } fdi_t$ – the amount of non-oil FDI inflows[2] in United States dollars received by Egypt at time t.

4. Empirical methodology

The empirical literature use either cross-sectional or panel data, which might suffer from problems of data comparability and heterogeneity (Tang et al., 2008). This paper uses pure time series data to overcome these problems. The time series approaches deal with the specificity of an individual country and offer an opportunity to show and analyse the causality pattern between variables. To this end, the investigation follows several steps. It begins by testing stationarity.

[1] Two other measures of human capital (literacy ratio and total enrolment of secondary schools) have been used and yielded the same results. The model specification uses hk_t with only 6 missing observations out of 50 observations, as literacy ratio and total net enrolment of secondary schools have 18 and 10 missing ones, respectively.

[2] Most of the empirical literature on FDI uses inflows rather than stock. An attempt to estimate the model for FDI stock was carried out; however, the results yielded more diagnostic problems than using FDI inflows.

First, the Augmented Dickey-Fuller (ADF) (1981) unit root test and the Phillips-Perron (PP) test (1988) are employed to identify whether the variables contain a unit root and to confirm the stationarity of each variable. As discussed earlier, the Egyptian economy has been subject to major economic policy orientation and political change during the period of this study. In this case, the common ADF and PP unit root tests could not provide reliable results reflecting such structural breaks. To overcome this, many economists insist on the necessity of including a breakpoint that can be determined from the data. In this paper the Zivot and Andrews (1992) unit root test[3] is used as it that allows for endogenous structural breaks, which is important since it prevents a data-dependent arbitrary choice of the break point. The test allows for a one-time structural break in the slope of the trend function.

Second, a cointegration technique developed by Johansen and Juselius (1990) is used for the sake of testing a long-run cointegration relationship between FDI and perceived corruption, as well as other variables defined in equations (2) and (3). A vector error correction (VEC) model is used to uncover the short-run and long-run causality in the relationship in the final step of our estimation, given the evidence of cointegration in the long-run relationship. Equations (2) and (3) are also re-estimated, using an autoregressive-distributed lag (ARDL) model and Stock-Watson dynamic OLS (DOLS) as robustness checks.

5. Data

This paper is based on annual time series data over a period of 50 years from 1970 to 2019. Data sources and descriptions appear in table A.1.

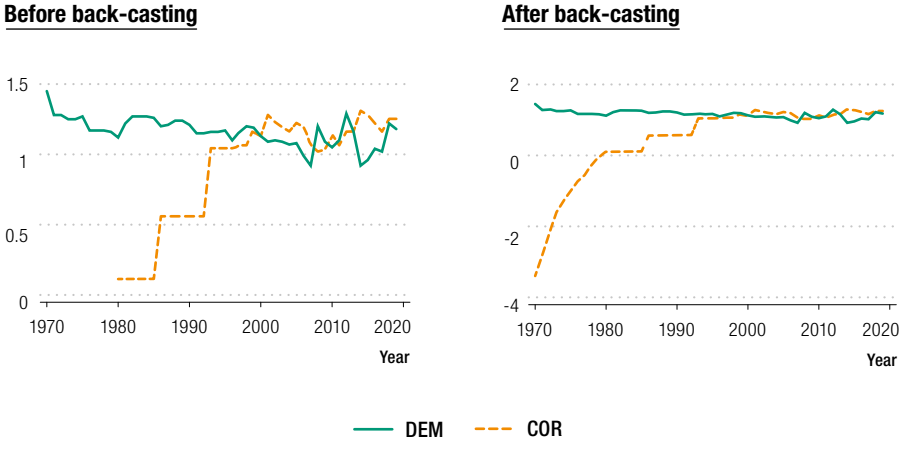
There is no consensus in the literature on the measurement of corruption (Habib and Zurawicki, 2001). Objective measures are hardly available because of the difficulties in quantifying corruption-related activities, but subjective or perception-based measures represent an acceptable alternative. Transparency International, Political Risk Services and the World Economic Forum measure the perception of corruption by relying on questionnaire-based surveys. Interestingly, the three indices are highly correlated (Tanzi, 1998). In this paper, the perceived corruption measure collected by Transparency International is used with annual back runs to 1980.

[3] The null hypothesis of a unit root test is that the model has a unit root with a break, as a dummy variable is incorporated in the regression under the null. The alternative hypothesis is a broken trend stationary process.

Back-casting perceived corruption. Following Transparency International, backward extrapolation (back-casting) of the unavailable corruption (COR) data is done from 1970 to 1980 using the Democracy Index (DEM) from the Quality of Government Institute[4] and the Economist Intelligence Unit,[5] with annual back runs to 1946. The back-casting methodology is designed to provide historical annual estimates that are consistent over time. This methodology preserves the broad patterns observed in the published COR estimates.

Figure 1 shows that both COR and DEM are highly correlated (66.8 per cent) over the period 1980–2019. Therefore, DEM is used to predict the perceived corruption index values over the period 1970–1980. The COR values from 1970 to 1980 are estimated by extrapolating and back-casting COR-based estimates from the DEM (the benchmark). Clear documentation on how DEM is used to predict COR prior to 1980 is provided in appendix C.[6]

Figure 1. Correlation, perceived corruption and democracy



Source: Author's estimations.

[4] The Quality of Government Institute is an independent research institute at the University of Gothenburg, Sweden.

[5] The Economist Intelligence Unit is a business within the Economist Group providing forecasting and advisory services through research and analysis, such as monthly country reports, five-year country economic forecasts, country risk service reports and industry reports.

[6] An attempt to estimate the models in equations (2) and (3) with Corruption Perception Index data from 1980 to 2019 is carried out; however, the results yielded more diagnostic problems than with back-casted data from 1970 to 2019.

6. Empirical results

6.1 Unit root tests and integration order

Table 2 reports the results of the Augmented Dickey-Fuller (ADF) as well as the Phillips-Perron (PP) tests for various specifications. The results reveal that the order of integration is not the same for all variables.

Table 2. ADF and PP test results

Variable	τ_μ		τ_T	
	ADF	PP	ADF	PP
Level				
fdi	-2.740*	-2.354	-2.725	-2.725
non-oil fdi	-3.534***	-3.592**	-3.291*	-3.275*
cor	-1.165	-1.159	-2.066	-2.021
g	-3.621***	-3.621***	-3.814***	-3.814***
y	-0.492	-0.118	-3.071	-2.234
hk	-1.836	-1.836	-1.941	-1.940
trade	-2.284	-2.489	-2.352	-2.364
inv	-1.851	-1.972	-2.931	-2.123
infra	2.639	0.960	2.527	-0.570
inflation	-2.056	-2.547	-2.214	-2.878
1st Difference				
fdi	-4.189***	-8.238***	-4.211***	-8.243***
non-oil fdi	-3.092**	-3.497**	-2.952**	-3.333**
cor	-7.966***	-4.125***	-7.937***	-4.890***
g	-7.615***	-10.675***	-7.554***	-11.826***
y	-4.026***	-3.478**	-3.812**	-3.381*
hk	-5.565***	-4.913***	-6.187***	-6.662***
trade	-5.769***	-5.769***	-5.877***	-5.877***
inv	-5.374***	-5.272***	-5.626***	-5.648***
infra	-4.615***	16.073***	-4.104**	5.591***
inflation	-10.902***	-11.481***	-10.868***	-11.115***

Note: ADF = Augmented Dickey-Fuller unit root test, PP = Phillips-Perron test. τ_μ represents the model with an intercept and without trend; τ_T is the model with a drift and trend. *, ** and *** denote rejection of the null hypothesis at the 10 per cent, 5 per cent and 1 per cent levels, respectively.

Table 3. Zivot-Andrews structural break unit root test

Variable	T-statistic	Time break
fdi	-4.224 (2)	1979
non-oil fdi	-3.088 (0)	2008
cor	-4.153 (0)	2000
g	-4.425 (2)	1995
y	-3.780 (1)	2003
hk	-3.179 (2)	1991
trade	-3.362 (1)	1978
inv	-4.326 (0)	1979
infra	-3.277 (1)	1988
inflation	-2.384 (1)	2006

Note: Critical values for rejection of the null hypothesis of a unit root with a structural break.

Macroeconomic variables, such as perceived corruption, might be trended – that is non-stationary – and exhibit unit roots over time. Perceived corruption in Egypt appears to be independent of time for the whole life of the series. Consequently, perceived corruption in Egypt is expected to exhibit a non-stationary trend. At first differences, the ADF and the PP test statistics exceed their corresponding critical values for all variables. Consequently, the null hypothesis of the unit root in the first differences of all variables is rejected. This result implies that those variables are stationary in first differences.

The results of the Zivot-Andrews unit root test are reported in table 3. The Zivot-Andrews test with one structural break finds no additional evidence against the unit root null hypothesis relative to the unit root tests without a structural break. In other words, the null hypothesis is not rejected for the variables. This result is consistent with the ADF and PP test results. Overall, the results show that all of the series have the same level of integration, i.e. I (1). As stationarity in series is not achieved and our variables are integrated with the same order I (1), the results from the unit root tests facilitated proceeding to the Johansen cointegration test and VEC model rather than a vector autoregressive (VAR) model.

6.2 Cointegration and long-run relationship

Table 4 reports the results of the lag-length selection criteria in the levels of all variables. We usually rely on the Schwarz Criterion (SC) with lag order one, which is more stable. The SC allows for losing less observations. Table 5 reports the Johansen cointegration test results, which reveal that there exists only one cointegrating vector, i.e. that there is a long-run cointegrating relationship among variables. The estimated model is reported in tables 6 and 7, normalized on fdi and non-oil fdi, respectively.

The results in tables 6 and 7 are consistent with Helmy (2013) and the efficient grease hypothesis, discussed earlier, in the sense that a high level of perceived corruption is associated with a higher level of FDI and non-oil FDI inflows in the long run. The results are also consistent with Houston (2007), Zhou (2007), and Kardesler and Yetkiner (2009), who suggest that particularly in relatively less democratic and less developed countries a rise in FDI inflows is associated with a higher level of perceived corruption. They argue that in such countries, foreign and domestic firms compete to pay bribes to get business contracts. If foreign firms have the flexibility to adjust the local investment environment and get business contracts, the host governments may have weak incentives to eradicate perceived corruption. Therefore, foreign firms can magnify perceived corruption problems.

The results also reveal that economic growth, the market size of Egypt (proxied by y), human capital, domestic investment and infrastructure have statistically significant and positive impacts on FDI and non-oil FDI inflows in the long run. Inflation is significant and negatively affects FDI. The market size of the recipient country is crucial, as the target economies can provide greater economies of scale and spillover effects. Market-oriented FDI establishes or facilitates enterprises that can supply goods and services to local markets (Kinoshita and Campos, 2008; Li and Liu, 2005; Brada et al., 2006; Jabri and Brahim, 2015; Mottaleb and Kalirajan, 2010). Human capital is positively and significantly associated with inward FDI, reflecting that the country's human capital indicators compare very favourably, particularly for a developing country with less achievement in other facets. Egypt has a high rating in the human capital index in terms of literacy rate and schooling rates (Duma, 2007; World Bank, 2011). FDI apparently complements existing domestic investment in Egypt and incentivizes domestic investors to shift their production towards a capital-intensive mode.

The existence of adequate physical infrastructure positively and significantly affects inward FDI performance. Infrastructure in Egypt has experienced a remarkable improvement over the last five decades, which helped to increase FDI inflows. As expected, inflation as a proxy for macroeconomic stability is negatively related to FDI inflows.

Table 4. VAR lag-length selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1191.733	NA	54900000	57.17775	57.55011	57.31424
1	-802.9634	592.4106	25777896	42.52207	46.24564*	43.88690
2	-714.5680	96.81401	31470772	42.16990	49.24470	44.76310
3	-518.0202	131.0318*	815597.6*	36.66763*	47.09365	40.48918*

Note: * indicates lag order selected by criterion. LR = sequential modified likelihood ratio, FPE = final prediction error, AIC = Akaike information criterion, SC = Schwarz criterion, and HQ = Hannan-Quinn information criterion.

Table 5. Johansen cointegration tests

Null	Alternative	Statistic	95 per cent C.V.	Eigenvalue
Part A: LR test based on maximal Eigenvalue of the stochastic matrix (λ_{max})				
r = 0	r = 1	229.644*	197.371	0.821
r ≤ 1	r = 2	155.454	159.531	0.636
r ≤ 2	r = 3	111.966	125.615	0.531
r ≤ 3	r = 4	79.445	95.754	0.438
r ≤ 4	r = 5	54.632	69.819	0.407
r ≤ 5	r = 6	32.162	47.856	0.333
r ≤ 6	r = 7	14.727	29.797	0.171
r ≤ 7	r = 8	6.685	15.495	0.115
r ≤ 8	r = 9	1.438	3.841	0.033
Part B: LR test based on trace of the stochastic matrix (λ_{trace})				
r = 0	r ≥ 1	73.933*	58.434	0.821
r ≤ 1	r ≥ 2	43.488	52.363	0.636
r ≤ 2	r ≥ 3	32.521	46.231	0.531
r ≤ 3	r ≥ 4	24.813	40.078	0.438
r ≤ 4	r ≥ 5	22.471	33.877	0.407
r ≤ 5	r ≥ 6	17.435	27.584	0.333
r ≤ 6	r ≥ 7	8.042	21.132	0.171
r ≤ 7	r = 8	5.247	14.265	0.115
r ≤ 8	r = 9	1.438	3.841	0.033

Note: * indicates rejection of the null hypothesis at the 5 per cent level. H_0, and H_1 are the null and alternative hypotheses, respectively. C.V. is the critical values of the λ_{max} and λ_{trace} at the 5 per cent level.

Table 6. Normalized cointegrating vector, coefficients normalized on fdi

fdi	cor	g	y	hk	trade	inv	infra	inflation
-1.000	3.371	0.679	8.084	0.711	-0.027	0.107	0.608	-0.353
	(1.332)**	(0.170)***	(3.545)**	(0.092)***	(0.046)	(0.121)	(0.221)**	(0.093)***

Note: Standard error in parentheses. *, ** and *** denote rejection of the null hypothesis at the 10 per cent, 5 per cent and 1 per cent levels, respectively.

Table 7. Normalized cointegrating vector, coefficients normalized on non-oil fdi

non-oil fdi	cor	g	y	hk	trade	inv	infra	inflation
-1.000	13.817	1.012	-0. 571	1.696	-0.248	1.324	2.287	-2.000
	(5.793)**	(0.741)*	(15.413)	(0.402)***	(0.201)	(0.526)**	(0.959)**	(0.404)***

Note: Standard error in parentheses. *, ** and *** denote rejection of the null hypothesis at the 10 per cent, 5 per cent and 1 per cent levels, respectively.

In appendix B, further experiments are added to the cointegration modelling. These experiments provide comparisons and robustness checks to the main model as well as improving its degrees of freedom. Fortunately, the information on causation is embodied in the VEC model. Thus, the VEC model for equations (2) and (3) is estimated, after determining the optimal number of lags, the suitable mode for testing the models and the number of cointegrating vectors the model should have.

6.3 Vector error correction model

The VEC model is applied in tables 8 and 9 with one lag, a deterministic intercept and no trend. The results in tables 8 and 9 are consistent with the results in tables 6 and 7 in the sense that a higher level of perceived corruption is associated with a higher level of FDI inflows in the short run as in the long run for both FDI inflows and non-oil FDI inflows.

In tables 8 and 9, we can see the existence of a long-term equilibrium connection between FDI in Egypt and all the control variables. The empirical results of the estimated VEC model indicate the significance of the error correction term ($\mathbf{ECT}_1$), which assures the long-run relationship. From both tables, the value of the $\mathbf{ECT}_1$ coefficient indicates that the adjustment speed is slow in the case of Egypt. The deviation between current FDI and the long-run relationship will be corrected by about 30 per cent in the following year. In other words, adjustment to the long-run relationship takes a relatively long time in Egypt.

Table 8. VECM, dependent variable, fdi

Variable	Coefficient	Std. Error
Constant	-0.640	0.770
Δ fdi (-1)	-0.468**	0.151
Δ cor (-1)	0.007*	0.008
Δ g (-1)	0.042	0.089
Δ y (-1)	0.004*	0.003
Δ hk (-1)	-0.100	0.091
Δ trade (-1)	-0.192	0.238
Δ inv (-1)	-0.007	0.099
Δ infra (-1)	-0.124***	0.018
Δ inflation (-1)	-0.096	0.159
ECT_1	-0.290**	0.148
R-squared	0.810	
Adjusted R-squared	0.400	
F-statistic	2.460***	
Prob. (F-statistic)	0.008	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC). The EC_{t-1} were generated from the Johansen cointegration test.

Table 9. VECM, dependent variable, non-oil fdi

Variable	Coefficient	Std. Error
Constant	-0.646	0.783
Δ non-oil fdi(-1)	-0.002	0.006
Δ cor (-1)	0.003*	0.002
Δ g (-1)	-0.000	0.022
Δ y (-1)	0.001	0.001
Δ hk (-1)	0.018	0.023
Δ trade (-1)	-0.083	0.059
Δ inv (-1)	0.007	0.025
Δ infra (-1)	-0.032***	0.004
Δ inflation (-1)	-0.075**	0.038
ECT_1	-0.298**	0.149
R-squared	0.722	
Adjusted R-squared	0.464	
F-statistic	2.865***	
Prob. (F-statistic)	0.009	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC). The EC_{t-1} were generated from the Johansen cointegration test.

7. Conclusions and policy implications

The effect of perceived corruption on economic activity has received significant attention in the recent literature. The level of perceived corruption in the host country has been introduced as one factor among the determinants of FDI location. The empirical studies assessing the impact of corruption on FDI show inconclusive results: some studies provide evidence of a negative relationship between corruption and FDI, some studies find a positive relationship between the two variables and others fail to detect a relationship. Most studies are largely based on a cross-sectional analysis that does not account for unobserved country-specific characteristics, with which corruption is correlated. In addition, the simultaneity between corruption and FDI is overlooked. This paper fills the gap in the empirical literature by estimating the effects of perceived corruption on FDI inflows to Egypt while controlling for other FDI determinants.

The main finding of this study is that perceived corruption in Egypt is positively associated with total FDI and non-oil FDI inflows in both the short and long run. Institutionally, this finding is counter-intuitive and challenges the mainstream policy advice that weak governance and, hence, corruption put FDI at risk. On the investment policy front, this observed positive correlation undermines the edifice upon which the investment policy is based at the global, regional and national levels and questions the logic of financial risk ratings for countries. But interestingly, this study is not the first to detect such a positive correlation. A considerable strand of the literature reports a positive association between corruption and FDI and discusses some explanations (Ledyaeva et al., 2015; Quazi et al., 2014; Helmy, 2013; Kolstad and Wiig, 2013; Bellos and Subasat, 2012; Egger and Winner, 2005; Wheeler and Mody, 1992). One possible explanation, for instance, is the efficient grease hypothesis. Nonetheless, it is critical to acknowledge that the findings of such studies are opposed and even dominated by the majority, which typically report that weak governance and, hence, corruption deters FDI.

The positive correlation between FDI and perceived corruption can be justified on two grounds. First, a third factor is at play: the rent-generating assets. The presence of certain rent-generating assets in a country can be positively correlated with both FDI and corruption. The bias in the investment policy in favour of large rent-generating projects implies that corruption may lead to higher (though inefficient), not lower FDI inflows. Moreover, in the presence of pre-existing government and/or bureaucratic failures, corruption may act as a backdoor to generate rents, which can drive FDI figures up (Bardhan, 1997; Aidt, 2003). Second, the use of FDI data based on balance of payments can further explain the positive FDI-perceived corruption correlation. The issue with such data is the growing financial-flows

component and the phantom-FDI component (i.e. the unproductive investment when compared with typical greenfield foreign investment). The ability of statistical agencies to track capital flows rather than financial flows in a globally integrated system is complicated by daunting technical difficulties. The result is FDI data that are less reflective of real FDI flows and investment in real productive assets. Intuitively, problematic financial components, such as intra-firm financial flows, transactions and conduit flows, respond to perceived corruption in a different way than real FDI flows.

Apart from corruption, the findings support the importance of economic fundamentals, namely market size, domestic agglomeration, and income or wealth (per capita GDP), as determinants of FDI inflows. The evidence also provides strong support for the view that FDI could be a key source of capital accumulation in Egypt.

The findings suggest several policy recommendations. First, the detected positive correlation and the possible existence of the "grease the wheels" effect do suggest that improving the fundamental governance structure, with particular emphasis on property and contract laws, is a more appropriate target even than directly attacking corruption. As Aidt (2003) points out, the socially most beneficial policy is eliminating corruption rather than circumventing it. Egypt needs to develop new institutional capacities and to create a shift in the culture of the public sector from one of rent-seeking, control and lethargy to one of efficiency, transparency and a results-driven orientation. The Government of Egypt should strengthen the role of anti-corruption agencies. Egypt has a relatively strong legal framework to prevent and stifle corruption, despite the notable lack of a comprehensive anti-corruption law. The most important problem lies in the implementation of existing legislation. Numerous institutions play a role in fighting corruption, but their lack of coordination creates confusion and overlapping responsibilities. The economic courts, started in 2009, should be given priority in the restructuring process in order to absorb the backlog of economic and business-related cases.

Second, the efforts to improve good governance, while a crucial part of economic reforms and promoting productive investment, could be usefully accompanied by an investment facilitation strategy to compensate for the "removal of grease from the wheels". Such a strategy could include streamlining administrative procedures, reducing the discretion of public officials, facilitating procedures through one-stop shops and single windows, and establishing an organizational ombudsman and dispute resolution system to provide confidential, informal, independent and impartial assistance to investors.

Third, as greater market size and domestic agglomeration are found to attract more FDI in Egypt, government strategies to attract FDI should include pro-growth economic policies and take them into account when designing long-term strategies

to enhance the locational appeal of the country to foreign investors. A better knowledge of these economic fundamentals is crucial for devising strategies to not only attract more FDI in the short run, but also promote long-term and sustainable economic development.

The study is not free of limitations, which might constitute a path for future research. First, it does not investigate the specific impact of perceived corruption on FDI driven by contrasting motives (market- and asset-seeking FDI). Project-based FDI data will be required to address this issue. Second, it would be worthwhile to examine the impact of perceived corruption on FDI by the size of the company or project or by the nature of the industry in question.

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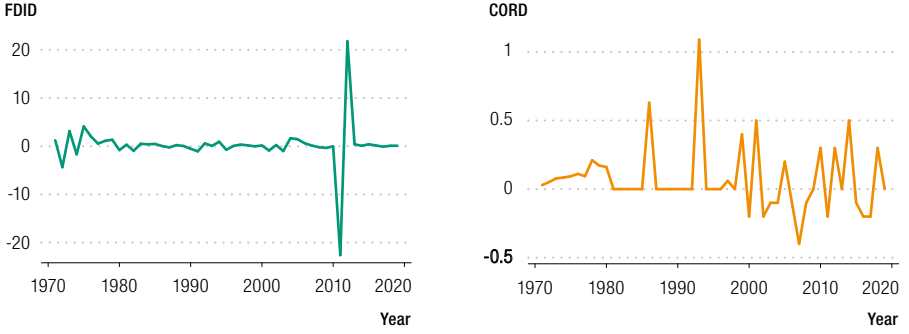
APPENDIX A

Table A.1. Description and sources of data

Variable	Description	Measure	Unit	Source
fdi_t	Natural logarithm of FDI net inflows (BoP, current US$)	FDI	Rate	UNCTAD
non-oil fdi_t	Natural logarithm of non-oil FDI net inflows (BoP, current US$)	FDI	Rate	GAFI
cor_t	Corruption Perception Index (CPI)	Corruption	Index – ranges from 0 to 10	Transparency International
g_t	Real GDP growth rate (GDP deflator with base year 2005 is used)	Market dynamics	Percentage per annum	World Development Indicators, World Bank
y_t	Natural log of per capita real GDP	Market size	US$	World Development Indicators, World Bank
hk_t	Natural logarithm of secondary school enrolment to gross enrolment ratio	Human capital	Percentage per annum	World Development Indicators, World Bank
$trade_t$	Exports and imports of goods and services to real GDP	Openness	Percentage per annum	World Development Indicators, World Bank
inv_t	Gross fixed capital stock to real GDP	Private domestic investment	Percentage per annum	World Development Indicators, World Bank
X_t	Mobile cellular subscriptions per 100 people ($infra_t$) Percentage changes in consumer prices ($inflation_t$)	Infrastructure Inflation rate	Percentage per annum	World Development Indicators, World Bank

Figure A.1. Plots of first difference series of variables



Source: Author's estimations.

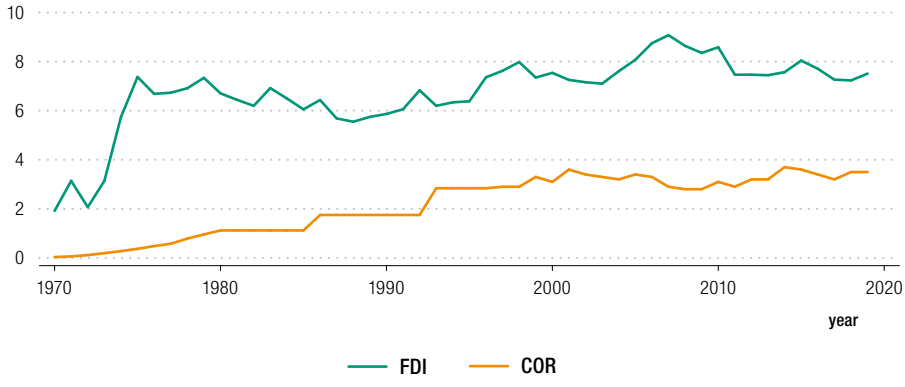
A.1 Descriptive statistics

Figure A.2 shows the trends of fdi and cor over the period 1970–2019. Both series appear to have an increasing trend over the period of study with lesser fluctuations in the Corruption Perception Index. This result is consistent with the earlier discussion on the deeply embedded perceived corruption networks in Egypt which follow the same pattern over time. In addition, these weak fluctuations in the cor series is expected given the nature of the variable itself (an index ranging between 0 and 10) compared with fdi (percentage of real GDP).

Figure A.2 shows that FDI inflows as a percentage of real GDP increased slowly during the period from 1980 to 2003. As discussed earlier, FDI inflows increased significantly after 2003, owing to the adoption of the openness policy and the ERSAP. There is an increase of about 64 per cent per yer in FDI inflows to Egypt from 1980 to 2006. Figures A.1 and A.2 also expect a positive relationship between fdi and cor in the long run. The cor series in figure A.2 gives the impression of the non-stationarity.

Table A.2 summarizes the descriptive statistics for the variables used in this study. The first look at the data set reveals considerable variation over time in all the variables. The high standard deviation observed for all variables with respect to their means emphasizes the high volatility of the economy over the studied period. This result is consistent with the earlier discussion of strong pro-cyclicality of the economy. Table A.2 also shows that all the variables are positively skewed, except for cor and hk. This result indicates that perceived corruption and human capital are asymmetrical variables. Values of kurtosis are deviated from 3. This result indicates that the variables are not normally distributed.

Figure A.2. Trends of fdi and cor in Egypt



Source: Author's calculations based on table 1.

Table A.2. Descriptive statistics

Statistical Indicator	fdi	cor	g	y	hk	trade	inv	infra	inflation
Mean	2.403	2.026	5.052	929.445	67.050	51.838	20.701	5.527	10.662
Median	1.694	1.750	4.685	887.316	74.893	51.956	19.429	3.474	10.146
Maximum	9.321	3.700	14.627	1475.130	87.697	82.177	34.433	15.700	23.864
Minimum	0.000	0.033	0.705	440.541	28.436	32.482	11.160	0.645	2.102
Std. Dev.	2.369	1.173	2.876	325.291	18.239	12.563	5.705	5.041	5.827
Skewness	1.277	-0.284	1.271	0.189	-0.687	0.349	0.299	0.718	0.352
Kurtosis	4.087	1.624	5.023	2.037	2.151	2.497	2.480	2.031	2.266

Table A.3 presents the correlation matrix for all the explanatory variables and FDI as the dependent variable. The correlation matrix provides a first crude expectation of the relationship between the variables. Table A.3 shows that fdi has a positive correlation with cor, as anticipated in some of the empirical literature discussed earlier. This positive correlation is confirmed by the earlier analysis of FDI and perceived corruption trends in Egypt.

Table A.3. Correlation matrix

	fdi	cor	g	y	hk	trade	inv	infra	inflation
fdi	1								
cor	0.200	1							
g	0.137	-0.303	1						
y	0.283	0.900	-0.265	1					
hk	0.314	0.949	-0.272	0.890	1				
trade	0.534	-0.138	0.453	-0.074	-0.007	1			
inv	0.400	-0.222	0.439	-0.219	-0.045	0.581	1		
infra	0.335	0.818	-0.189	0.872	0.785	-0.013	-0.336	1	
inflation	0.293	-0.192	0.187	-0.073	0.016	0.434	0.638	-0.270	1

APPENDIX B

B.1 Robustness checks

In this subsection, further experiments to the cointegration modelling are added. These experiments provide comparisons and robustness checks to our main model as well as improving its degrees of freedom.

B.1.1 ARDL model

The ADF and PP unit root tests show that all variables are non-stationary at level and stationary at first difference, except the economic growth, denoted g, which is stationary at level. Thus, all variables are I (1), while g is I (0). The combination of I (0) and I (1) gives us a chance to apply the ARDL approach of cointegration, as suggested by Pesaran et al. (2001). The ARDL test results reveal that the calculated F-statistic (1.05) is less than the upper critical bound as indicated in the Narayan (2005) table. Thus, one cannot conclude that the variables have a long-run relationship. Yet, the paper relies on Johansen cointegration results, as the ARDL model comes with an insignificant F-statistic, a small R^2 (38 per cent) and a serial correlation problem.

B.1.2 Johansen cointegration tests

First, the cointegration analysis applied to all specified variables is repeated, with the economic growth variable, denoted g, excluded because this variable is stationary at level I (0). Table B.1 reports the Johansen cointegration test results and critical values of the maximum eigenvalue (λ_{max}) and trace statistics (λ_{trace}). The Johansen cointegration test is applied with one lag and with the deterministic terms (intercept and no trend in cointegration equation and test VAR). The Johansen cointegration results indicate that the null hypothesis of no cointegration can be rejected at a 5 per cent significance level. There exists only one cointegrating vector, and there is a long-run cointegrating relationship among all the variables in our model, with g excluded.

Table B.2 presents the normalized coefficients of the cointegrating vector and their statistical significance, with g excluded. The estimated cointegrated vector, with g excluded, indicates the same results as shown in table 6. All the variables have significant effects on FDI in Egypt in the long run, except for perceived corruption. Given that the estimates of both models in tables 6 and B.2 yield the same results, this supports the reliability of the econometric methods used and the fact that our estimates are robust.

Table B.1. Johansen cointegration tests, with g excluded

Null	Alternative	Statistic	95 per cent C.V.	Eigenvalue
Part A: LR test based on Maximal Eigenvalue of the stochastic matrix (λ_{max})				
r = 0	r = 1	65.112	52.363	0.780
r ≤ 1	r = 2	33.240	46.231	0.538
r ≤ 2	r = 3	31.090	40.078	0.515
r ≤ 3	r = 4	18.021	33.877	0.342
r ≤ 4	r = 5	16.015	27.584	0.311
r ≤ 5	r = 6	10.943	21.132	0.225
r ≤ 6	r = 7	4.757	14.265	0.105
r ≤ 7	r = 8	1.205	3.841	0.028
Part B: LR test based on Trace of the stochastic matrix (λ_{trace})				
r = 0	r ≥ 1	180.384*	159.530	0.780
r ≤ 1	r ≥ 2	115.272	125.615	0.538
r ≤ 2	r ≥ 3	82.031	95.754	0.515
r ≤ 3	r ≥ 4	50.941	69.819	0.342
r ≤ 4	r ≥ 5	32.920	47.856	0.311
r ≤ 5	r ≥ 6	16.905	29.797	0.225
r ≤ 6	r ≥ 7	5.961	15.495	0.105
r ≤ 7	r = 8	1.205	3.841	0.028

Note: * indicates rejection of the null hypothesis at the 5 per cent level. H_0, and H_1 are the null and alternative hypotheses, respectively. C.V. is the critical values of the λ_{max} and λ_{trace} at the 5 per cent level.

Table B.2. Normalized cointegrating vector, with g excluded

fdi	cor	y	hk	trade	inv	infra	inflation
-1.0000	4.6272	0.1266	1.1857	-0.0981	1.4173	0.4280	-1.4694
	(2.3530)	(0.0143)	(0.1604)	(0.0527)	(0.1677)	(0.0509)	(0.1942)

Note: Standard error in parentheses.

Second, further cointegration analysis to all specified variables is applied, with both economic growth and per capita real GDP excluded. The level of GDP can be excluded because it is usually used to proxy market size in models applied to cross-sectional data for comparison reasons.

Table B.3 reports the Johansen cointegration test results and critical values of the maximum eigenvalue (λ_{max}) and trace statistics (λ_{trace}). The Johansen cointegration test is applied with one lag and with the deterministic terms (intercept and no trend in the cointegration equation and test VAR). The Johansen cointegration results indicate that the null hypothesis of no cointegration cannot be rejected at a 5 per cent significance level. There is no long-run cointegrating relationship among all the variables in our model, with **g** and **y** excluded.

Table B.3. Johansen cointegration tests, with g and y excluded

Null	Alternative	Statistic	95 per cent C.V.	Eigenvalue
Part A: LR test based on Maximal Eigenvalue of the stochastic matrix (λ_{max})				
r = 0	r = 1	36.413	46.231	0.571
r ≤ 1	r = 2	31.748	40.078	0.522
r ≤ 2	r = 3	24.899	33.877	0.440
r ≤ 3	r = 4	15.462	27.584	0.302
r ≤ 4	r = 5	8.1715	21.132	0.173
r ≤ 5	r = 6	4.918	14.265	0.108
r ≤ 6	r = 7	1.681	3.841	0.038
Part B: LR test based on Trace of the stochastic matrix (λ_{trace})				
r = 0	r ≥ 1	123.292	125.615	0.571
r ≤ 1	r ≥ 2	86.879	95.754	0.522
r ≤ 2	r ≥ 3	55.132	69.819	0.440
r ≤ 3	r ≥ 4	30.233	47.856	0.302
r ≤ 4	r ≥ 5	14.771	29.797	0.173
r ≤ 5	r ≥ 6	6.540	15.495	0.108
r ≤ 6	r ≥ 7	1.681	3.841	0.038

Note: * indicates rejection of the null hypothesis at the 5 per cent level. H_0, and H_1 are the null and alternative hypotheses, respectively. C.V. is the critical values of the λ_{max} and λ_{trace} at the 5 per cent level.

B.1.3 DOLS model

The DOLS model is utilized to estimate equations (2) and (3). The DOLS estimates have better small sample properties and provide superior approximation to normal distribution. The maximum lag length for DOLS model is one based on table 6.

The DOLS results of the long-run coefficient of cor match the results of Johansen cointegration in tables 6 and B.2. Given that the estimates of our three models (Johansen cointegration, ARDL and DOLS) yield the same results, this supports the reliability of the econometric methods used and the fact that our estimates are robust. Fortunately, the information on causation is embodied in the VEC model. Thus, the VEC model for equations (2) and (3) is estimated, after determining the optimal number of lags, the suitable mode for testing the VAR models and the number of cointegrating vectors the VECM should have.

Table B.4. DOLS estimation

Variable	Coefficient	Std. Error
cor	1.247835	0.764900
g	0.783110***	0.212112
y	0.045715***	0.011986
hk	0.652019***	0.143270
trade	0.006666	0.024015
inv	0.346977***	0.150867
infra	0.177114***	0.054862
inflation	-0.815154***	0.152969
R-squared	0.958107	
Adjusted R-squared	0.828237	
Stability tests:[a]	Stable	

Note: *, ** and *** denote rejection of the null hypothesis at the 10 per cent, 5 per cent and 1 per cent levels respectively.
[a] Stability tests refer to the CUSUM test and CUSUM of Squares test.

APPENDIX C

C.1 Back-casting procedures

Following Ellis and Price (2003), the paper uses from the Quality of Government Institute with annual back runs to 1946 to back-cast for the missing COR data from 1970 to 1980. Recent COR data points are extrapolated into the past on the basis of the correlation between DEM and COR. As shown in figure 1, both COR and DEM are highly correlated over the period 1980–2019. Both COR and DEM are upward trended, and their rates of increase are approximately equal. Unit root tests for COR and DEM indicate that both variables are I (1) at standard significance levels. The levels regression or COR versus DEM has residuals that are I (0)- testing without intercept or trend, so the series appear to cointegrate. This implies that the ECM is appropriate.

Table C.1. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.166216***	0.065815
ECT_1	-0.322229***	0.118884
DCOR (-1)	-0.039532	0.193981
DCOR (-2)	-0.041540	0.194123
DCOR (-3)	-0.074843	0.192299
DCOR (-4)	-0.119853	0.191307
DCOR (-5)	-0.148068	0.189305
DDEM (-1)	-0.203130**	0.109516
DDEM (-2)	-0.045233	0.113707
DDEM (-3)	-0.079318	0.113096
DDEM (-4)	-0.068449	0.107010
DDEM (-5)	-0.211770***	0.096965
R-squared	0.496770	
Adjusted R-squared	0.189240	
F-statistic	1.615355*	
Prob. (F-statistic)	0.100000	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.

[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC). The EC_{t-1} were generated from the Johansen cointegration test.

Lagged differences in COR are not significant and removed, as shown in table C.2.

Table C.2. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.138966***	0.052862
ECT_1	-0.311682***	0.103712
DDEM (-1)	-0.195745***	0.095553
DDEM (-2)	-0.045758	0.102066
DDEM (-3)	-0.088344	0.095350
DDEM (-4)	-0.072466	0.090513
DDEM (-5)	-0.223141***	0.080202
R-squared	0.469034	
Adjusted R-squared	0.330521	
F-statistic	3.386216***	
Prob. (F-statistic)	0.015301	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC).

Then, the insignificant lags are removed, as shown in table C.3.

Table C.3. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.115229***	0.043544
ECT_1	-0.264013***	0.072421
DDEM (-1)	-0.166174***	0.069743
DDEM (-5)	-0.195808***	0.068380
R-squared	0.469034	
Adjusted R-squared	0.330521	
F-statistic	6.952468***	
Prob. (F-statistic)	0.001376	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC).

Although DDEM (-5) is statistically significant, it is removed because this five-year lag will restrict the applicability of a predictor of COR in 1970–1980. Hence, the ECM will be as shown in table C.4.

Table C.4. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.079837***	0.043880
ECT_1	-0.205721***	0.074064
DDEM (-1)	-0.168916***	0.073164
R-squared	0.469034	
Adjusted R-squared	0.330521	
F-statistic	4.630245***	
Prob. (F-statistic)	0.017397	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC).

The significance of the model increases when it is estimated in in levels, as shown in table C.5.

Table C.5. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.041467***	0.176347
ECT_1	-0.264013***	0.072421
COR (-1)	0.785084***	0.074708
DEM (-1)	0.009572	0.078355
DEM (-2)	0.199178***	0.079477
R-squared	0.911325	
Adjusted R-squared	0.902458	
F-statistic	102.7717***	
Prob. (F-statistic)	0.000000	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.
[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC).

Then, the insignificant lags are removed in table C.6.

Table C.6. Error correction estimation, dependent variable, DCOR

Variable	Coefficient	Std. Error
Constant	0.049839***	0.159885
COR (-1)	0.787950***	0.069794
DEM (-2)	0.203266***	0.070935
R-squared	0.911281	
Adjusted R-squared	0.905557	
F-statistic	159.2092***	
Prob. (F-statistic)	0.000000	
Diagnostic problems:[a]	None	

Note: *, ** and *** signify 10 per cent, 5 per cent and 1 per cent significance levels, respectively.

[a] Diagnostic problems refer to the four diagnostic tests for serial correlation (SC), functional Form (FF), normality (NM), and heteroscedasticity (HSC).

Consequently, a back series is constructed for $\mathbf{COR}$ to 1970. $\mathbf{COR}$ over the period 1970–1979 is calculated based on the following equation:

$$\widehat{\mathrm{COR}}_t = 0.050 + 0.788\mathrm{COR}_{t-1} + 0.203\mathrm{DEM}_{t-2}$$

The above equation indicates that $\mathbf{COR\ (-1)}$ and $\mathbf{DEM\ (-2)}$ are good in-sample predictors of $\mathbf{COR}$. Nevertheless, out-of-sample predictions breach the (0-1) limits; consequently, logistic regression is used to predict probabilities because it respects the (0-1) limits. The $\mathbf{COR}$ values are transformed so that they have 0-1 limits according to the following equation:

$$\mathrm{COR01} = \frac{\mathrm{COR}}{10}$$

And perform the logistic transformation as follows:

$$\mathrm{CORlogit} = \log\left(\frac{\mathrm{COR01}}{1 - \mathrm{COR01}}\right)$$

Then, the following regression model is estimated over the period 1980–2019:

$$\mathrm{CORlogitdem.LS\ CORlogit\ c\ CORlogit}(-1)\ \mathrm{dem}(-2)$$

The fitted equation: $\mathrm{CORlogit} = \mathrm{b0} + \mathrm{b1} * \mathrm{CORlogit}(-1) + \mathrm{b2} * \mathrm{DEM}(-2)$ is used and converted to an equation for **CORlogit (-1)**, as follows:

$$\mathrm{CORlogit}(-1) = \frac{\mathrm{CORlogit} - \mathrm{b0} - \mathrm{b2} * \mathrm{DEM}(-1)}{\mathrm{b1}}$$

The time index is shifted by +1: $\mathrm{CORlogit} = \frac{\mathrm{CORlogit}\,(+1) - \mathrm{b0} - \mathrm{b2} * \mathrm{DEM}(-1)}{\mathrm{b1}}$, then used to back-cast the **CPIlogit** values, as follows:

$\mathrm{CORlogitfit} = \mathrm{CORlogit}$; and

$$\mathrm{CORlogitfit} = \frac{\mathrm{CORlogfit}(+1) - \mathrm{b0} - \mathrm{b2} * \mathrm{DEM}(-1)}{\mathrm{b1}}$$

The previous steps of logistic transformation are undone and the division by 10 gives the following:

$$\mathrm{CORfit} = \frac{10\ \mathrm{e}^{\mathrm{CORlogitfit}}}{(1 + \mathrm{e}^{\mathrm{CORlogitfit}})}$$

Then fill the rest of the series from observed values according to:

$$\mathrm{CORfit} = \mathrm{COR}$$

The global governance of FDI and the non-market strategies of TNCs: explaining the "backlash" against bilateral investment treaties*

Stephen R. Buzdugan[a]

Abstract

This article seeks to explain recent decisions by countries to terminate their existing bilateral investment treaties (BITs) and revisit their commitment to future international investment agreements (IIAs). It argues that BITs, transnational corporations (TNCs), host States and international arbitration institutions form a decentralized system of global governance of foreign direct investment (FDI), based on insights from the fields of international political economy and international law, and that the non-market strategies of these TNCs have not only shaped the contours of this system but have also prompted host States to reform this system, from the perspective of a "political bargaining model". The article illustrates this argument through the case of South Africa, which terminated its BITs with several European countries as a response to cases of investor–State dispute settlement (ISDS) and has sought to redefine its engagement with this system of global governance as a result.

Keywords: global governance, international investment agreements, bilateral investment treaties, non-market strategy, investor-state dispute settlement, globalization

JEL classification numbers: F01, F02, F23, F53, K33, L21

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1. Introduction

In the current global political economy, populism, climate change and the global COVID-19 pandemic, among other phenomena, have fuelled a backlash against globalization and rendered the future of the liberal international order uncertain. It has been long understood that transnational corporations (TNCs) are an integral part of the "complex interdependence" (Keohane and Nye, 1989, p. 26) that shapes the international order. The recent sense that globalization may be "fracturing" and that the global project may be "dead" (Buckley, Doh and Benischke, 2017, p. 1057) has propelled a new interdisciplinary agenda for research in international business (IB) to better understand the manner in which TNCs, governments and societies interact. Specifically, in one area of IB research, attention has turned to the role that non-market strategies and non-market activities of TNCs play in navigating across the "strains and fissures" increasingly appearing in the system of global economic governance and indeed in "influencing the systems [of global governance] that are emerging" (Doh et al., 2015, pp. 257–258). In this regard, there is scope within current IB research to examine the manner in which the non-market strategies and activities of TNCs may be *contributing* to the backlash against globalization and precipitating a shift towards a less liberal international economic order, particularly within areas of global economic governance. Such areas are typically understood as including the governance of global trade, finance and development through multilateral institutions such as the World Trade Organization (WTO), the International Monetary Fund and the World Bank, respectively.

However, this typical image of global economic governance contains an important blind spot that covers the manner in which foreign direct investment (FDI) is governed globally and the manner in which TNCs participate and engage in this form of global governance. Until recently, the consensus has been that "no agreed upon international regime for FDI exist" (Kobrin, 2015, p. 269). The more than 3,000 bilateral investment treaties (BITs) and international investment agreements (IIAs) in force across the world have been considered as discrete and disparate entities within IB research, acting to establish rules for the behaviour of *individual* host States in order reduce the risks of investment from other *individual* home States. Arguably, the absence of a formal multilateral investment agreement and the absence of an accompanying multilateral organization for international investment akin to the WTO has contributed to this view. As Weiss and Wilkinson observe, contemporary scholarship has had a misplaced tendency to view global governance as "an alternative moniker for international organizations" (2014, p. 210) comprising States and a multilateral set of rules with which to govern. Such a tendency, they argue, has obscured the myriad forms that global governance can assume in the international economy.

This article makes two arguments. The first is that the 2,844 BITs across the world (at the time of this writing), along with international arbitration bodies such as the International Centre for the Settlement of Investment Disputes (ICSID), function as a form of global economic governance. The second is that the non-market activities of TNCs – in the form of suing host States for violations of these treaties through investor–State dispute settlement (ISDS) mechanisms – have provoked a *systemic* change in the global governance of FDI through a so-called backlash against it (Peinhardt and Wellhausen 2016; Langford and Behn 2018; Thompson et al., 2019). The article does so by drawing on recent research in the fields of international law, international political economy and IB, as well as original data from interviews and archival research. The argument that there exists a functioning form of global governance of FDI in the global political economy follows from the insights of Schill (2009), Salacuse (2010) and Alschner and Skougarevskiy (2016) in the field of international law. They show persuasively that BITs are not discrete, bilateral entities as once thought, but together form a global set of rules, norms and practices involved in the global governance of FDI. As Schill (2009, p. 15) puts it: "[U]nlike genuine bilateral treaties, that is treaties that are bilateral in form and substance, BITs do not stand isolated in governing the relation between the two contracting States [i.e. the home and host States] only; they rather develop multiple overlaps and structural interconnections that, it is argued, create a uniform and treaty-overarching regime for international investments".

Recently, however, the global governance of FDI has been undergoing a transformation through the efforts of a number of both developed and developing countries. In many instances, countries have sought to preserve greater public policy space and to protect their governments from further ISDS claims from foreign investors by terminating many of their existing BITs and, in some cases, attempting to replace them with renegotiated BITs (UNCTAD, 2020). This process arguably began in the early 2000s through changes in the United States Model BIT in 2004, as a result of arbitration cases against the United States, Canada and Mexico through the North American Free Trade Agreement. It then continued through to what many scholars considered a "legitimacy crisis" (Langford and Behn, 2018) in the late 2000s, which featured the beginnings of a backlash against this system from countries such as the Plurinational State of Bolivia, Ecuador, the Bolivarian Republic of Venezuela and South Africa as a result of ISDS events. More recently, this process of transformation has become more widespread, involving the terminations or renegotiations of at least 42 BITs in 2020, most of which have been the result of the termination of intra-European Union (EU) BITs, along with the termination of BITs by Australia, India, Italy and Poland (UNCTAD, 2021).

This article proceeds as follows. First, section 2 sets out the concept of global governance from a critical international political economy perspective. This offers a framework for explaining how the current landscape of BITs together form a

system of global economic governance in section 3, building on insights from the field of international law that have identified BITs as a form of international regime (Schill, 2009; Salacuse, 2010; Simmons, 2014; Bonnitcha, Skovgaard and Waibel, 2017). Next, section 4 explains how the system of global governance of FDI is a non-market environment for firms such as TNCs and how the non-market strategies of TNCs, such as ISDS in this context, act as a "buffering mechanism" (Mellahi et al., 2016, p. 155) that influence this non-market environment and secure rents in the host country of their investment. The non-market environment and strategies of firms associated with the global governance of FDI are explained in terms of a political bargaining model (PBM), proposed by Eden, Lenway and Schuler (2004), which advances the concepts in the obsolescing bargain model (OBM) developed by Raymond Vernon (1971) and offers a more dynamic perspective of relations between investors and host States in the contemporary global political economy.

Section 5 then examines the case of South Africa to show how the ISDS activities of a number of Italian investors caused South Africa to re-examine and ultimately terminate its BITs with a number of European countries. This case of backlash is based on an analysis of meeting transcripts of the South African Parliamentary Committee on Trade and Industry, provided by the Parliamentary Monitoring Group, a South African parliamentary monitoring organization (Mandelbaum, 2011) that records and publishes the proceedings of Parliamentary Committees of the South African government. The analysis is further supported by interviews conducted by the author with officials at UNCTAD and the WTO, with developing-country BIT negotiators and with international lawyers who have represented both TNCs and States in international investment disputes.

Finally, by way of discussion and conclusion, section 6 explains how ISDS has evoked processes of systemic reform in the global governance of FDI by a number of developed and developing countries. These changes are not occurring BIT by BIT, but across countries, thereby changing the nature of the decentralized system of global governance, with implications for the way that we think about non-market strategies, power and inequality. Furthermore, reform of the system has involved a new generation of investment treaties oriented more towards the achievement of the United Nations Sustainable Development Goals through promoting greater space for development policy in host countries and promoting more responsible investor behaviour, than simply investment protection alone (UNCTAD, 2015; UNCTAD, 2016; Amaral and Jaller, 2020). This transformation of the global governance of FDI opens up avenues for further research on how systemic change may occur within decentralized forms of global governance and how such changes intersect with the non-market strategies of firms in this instance.

2. Recent advances in the concept of global governance

Scholars in the field of international law have made headway in terms of identifying that the nearly 3,000 BITs across the world are in essence a type of international regime (Schill, 2009; Salacuse, 2010; Simmons, 2014; Bonnitcha, Skovgaard and Waibel, 2017). The term emanates from the fields of international relations and international political economy and denotes the existence of an international institution that facilitates cooperation and constrains behaviour of international actors on a particular issue (Drezner, 2009; for an in-depth survey of regime theory, see also Haggard and Simmons, 1987). The transformation of an essentially *bilateral* mechanism for investment protection into one that is effectively *multilateral* in nature, which will be discussed in more detail in section 3, has come about through the convergence in the set of "implicit or explicit principles, norms, rules and decision-making procedures" – according to Krasner's (1982, p. 186) widely accepted definition – that are associated with the protection of investment through BITs and IIAs that comprise a regime.

However, the concept of an international regime, as Weiss and Wilkinson (2014) have rightly pointed out, tends to stop short of explaining the myriad ways in which a variety of actors, from States to non-governmental organizations to TNCs, interact to set the agenda and govern issues across the world – thereby prompting the need for a concept of *global governance* instead. The term "global governance", though, has been criticized since its introduction in the 1990s for its lack of clarity and precision (Finkelstein, 1995; Murphy, 2000; Dingwerth and Patterberg, 2006; Weiss and Wilkinson, 2014; Payne and Phillips, 2014). Yet, as Payne argues (2005), these critiques have together identified a common, core set of elements to more clearly define and identify instances of global governance. These mainly rest on James Rosenau's earliest formulations of the concept (Rosenau and Czempiel, 1992; Rosenau, 1995), which sees "global governance" as "systems of rule… in which the pursuit of goals through the exercise of control has transnational repercussions at all levels of human interaction" (1995, p. 13).

Starting with systems of rule through which control is exercised, global governance has an underlying institutional structure, which requires a set of globally established rules. It does not require, however, a formal organization to exercise control. Put differently, although organizations with formal rules and formal decision-making processes such as the WTO and the United Nations (UN) are clearly associated with global governance, they in no way exclude less formal, less centralized systems of rule and control from being instances of global governance as well (Weiss and Wilkinson, 2014). In this way, global governance deviates somewhat from the concept of a regime, as it seeks to explain the ways in which a range of different actors across the global political economy engage in shaping and administering systems of rule across the globe (Buzdugan and Payne, 2016).

Rosenau's definition is only a starting point for conceptualizing global governance, as more recent scholarship has sought to explain the role of structure in the formation and transformation of global governance systems. This scholarship emphasizes the role that ideas play in informing the norms and rules upon which global governance is based (Weiss and Wilkinson, 2014; Payne and Phillips, 2014). Weiss and Wilkinson (2014) for instance, call for a greater understanding of how ideas come to fundamentally define the values, aims and outcomes of the institutions of governance. Payne and Phillips (2014, p. 3) go further in emphasizing the importance of ideas within the concept of global governance: "ideology is, in short, a governance structure in itself… the 'constitution' which itself 'governs' world politics and development". From this point, Weiss and Wilkinson present a more current formulation of the concept of global governance, which embeds ideas into the institutional framework outlined earlier: "We understand global governance as the sum of the informal and formal ideas, values, norms, procedures, and institutions that help all actors – states, intergovernmental organizations, civil society, and TNCs – identify, understand, and address trans-boundary problems" (2014, p. 211). Conceptualizing global governance in this way not only assists in identifying and analysing the global governance of FDI, but also helps to explain the manner in which a number of both developed and developing countries are seeking to change it.

3. A broad brush explanation of the global governance of FDI

The global governance of FDI involves, inter alia, a complex web of BITs, IIAs, States, TNCs and international organizations. It is beyond the scope of this article to explain the complete evolution, interrelationships and dynamics of this system. However, a broad sketch is presented in order to make inroads into explaining the contours of the global governance of FDI and its link with the non-market environment of a TNC. This sketch examines the core elements of global governance, according to Weiss and Wilkinson (2014) and Payne and Phillips (2014) – the overarching ideas, norms, rules and procedures that frame the understanding of an issue area and its governance among the various actors involved.

3.1 Overarching ideas

At the core of this system of global governance lies the tension between the idea of the protection of foreign investment and the idea of national sovereignty of host States; or as Schill (2009, p. 7) puts it, the "opposing views on State sovereignty and societal self-determination versus the protection of property, in particular foreign property". In this regard, it is useful to chart out the shifts in ideas that have occurred since the early post-World War II period, as it assists in explain

why the global governance of FDI arose, how it changed and what ideas are motivating the current move towards its transformation by developing countries especially. Boddewyn's (2016) excellent classification of three distinct eras in TNC–State relations since the post-war period provides a useful starting point in mapping these shifts: (1) a period of confrontation between international business actors and States in the years immediately following the end of World War II through the late 1970s; followed by (2) a period of accommodation of States to international business actors and activities from the start of the 1980s to 2000; to (3) the contemporary period of competition, in which TNCs or other investors, States and NGO vie for influence over and control of various dimensions of the global economy.

The first period of confrontation saw a clash of two opposing viewpoints between capital-exporting countries, such as the United States, and capital-importing countries, many of which were newly independent former colonies. Throughout this period, the United States and other industrialized countries maintained the Hull rule. The rule was named after former United States Secretary of State Cordell Hull's riposte to Mexican expropriation efforts in 1938: "[U]nder every rule of law and equity, no government is entitled to expropriate private property, for whatever purpose, without provision for prompt, adequate, and effective payment therefor" (Guzman, 1998, p. 645). At first, the developing countries' opposition to this rule centred on the stringency of "prompt, adequate and effective payment", but after a wave of independence in the 1960s, they now formed a two-thirds majority in the UN (Jacobson, 1962) and began to assert what was seen as a sovereign right to control any and all aspects of the economies within their territories (Guzman, 1998). As Vernon saw it (1971; 1977), the prevailing attitudes held by governments across the developing and the developed countries was one of caution or even, in some cases, hostility towards TNCs and inward investment.

During the second period of accommodation beginning in the 1980s, the ideological battle between sovereignty to expropriate foreign private property, on the one hand, and support for the protection of foreign property, one the other, swung in favour of the latter particularly as the power of the developing countries ebbed during the 1980s and the Soviet Union collapsed by the end of that decade (Boddewyn, 2016). As Boddewyn rightly points out, the ideas of neoliberalism structured the opening of markets across the world, "while [multinational enterprises] came to be seen as the main drivers in the globalization of capitalism, regional integration (e.g., the European Union) and responsive corporate governance" (2016, p. 13). It is within this neoliberal ideological setting that the systems of rule of the contemporary global governance of FDI came into existence: governments throughout the world adopted to a great degree a more favourable set of policies on the attraction and protection of inward foreign investment (Dolzer and Stevens, 1995; Guzman, 1998; Ramamurti, 2001; Boddewyn, 2016).

Concomitantly, there was an explosion in the number of BITs signed between countries – quintupling during the 1990s to reach 1,857 by the end of 1999 (UNCTAD, 2000) – enabled by a diffusion of neoliberal ideology (Simmons, Dobbin and Garrett, 2006).

Within this neoliberal ideational environment, the pressure to conform to "what had become a global standard or norm about the treatment of FDI by host countries" (Jandhyala, Henisz and Mansfield, 2011, p. 1049) greatly explains not only the large number of similar BITs that developing countries signed in the 1990s but also why capital-poor developing countries signed BITs with each other. Thus, by the end of the 1990s, the global spread of mainly similar BITs provided States – particularly capital exporting countries – with a form of governance that achieved the broad aims of a multilateral institution such as the failed Multilateral Agreement on Investment in that era, but at a lower cost in terms of investment protection, as Bubb and Rose-Ackerman (2007) show persuasively through a game theoretic model.

Thus, the rapid increase in the number of BITs being signed from 1991 prompted Dolzer and Stevens at this early point to observe that BITs were evolving from an individual definition of "the legal framework for foreign investment in a particular host State" into an "emerging, normative framework found in the body of international BIT practice" (1995, p. xii), thereby laying the foundations of an emerging global governance system.

3.2 Norms, rules and decision-making procedures

The overarching ideas in section 3.1 have fed directly into the principles, norms, rules and decision-making procedures underpinning the global governance of FDI. Beginning with its core principles, Salacuse (2010) identified five main principles that explain the deliberate, uniform development of BITs across the world. The first four of these all relate to BITs (and IIAs) being necessary instruments for the attraction of foreign investment through its protection (Salacuse, 2010). As Poulsen (2015) persuasively shows, developing countries signed the earliest BITs in the late 1950s to the mid-1970s simply as a result of holding these principles to be true, without evidence to substantiate them. The fifth principle that Salacuse identifies relates to international enforcement mechanisms, such as ISDS, and international organizations such as the ICSID, housed within the World Bank, as necessary to protect, and therefore seen to attract, foreign investment by curtailing credible commitment problems. As St. John (2018) has outlined in empirical detail, the World Bank based its arguments for developing countries to join ICSID, and promoted the inclusion of ICSID within early BITs, through the argument that ICSID would lead to a more favourable "investment climate" to attract much-needed foreign investment.

This fifth principle has arguably been most influential in the process of norm-setting across the global governance of FDI, as ISDS has acted as the dominant mechanism by which accepted standards are generated, to which host States, foreign investors and adjudication bodies conform (Schill, 2009). Although the roots of these standards lie in the nearly identical language on the issue of the "treatment" of investors and their investments in host States, which appears in every BIT, this language is too vague for actors to have based their behaviours on it (Schill, 2009; Salacuse, 2010). For example, the terms fair and equitable treatment, full protection and security, most-favoured-nation treatment and national treatment lack inherent, concrete meanings (Salacuse, 2010). Therefore, investor–State tribunals, which in most cases means ICSID (Peterson, 2005), as it has presided over 70 per cent of all known international investment proceedings (ICSID, 2017), act as norm-setting bodies, setting the standards which these norms embody through their power to interpret and make concrete such fundamental language (Schill, 2009). Put differently, it is through ISDS that norms develop around fair and equitable treatment, and so forth, as bodies such as ICSID in effect define the contours of this treaty language and shape behaviours related to it. Indeed as Reinisch (2008, p. 500) has pointed out, although ICSID tribunals are not formally bound by earlier decisions,

> As a matter of practice, ICSID tribunals have started to routinely invoke previous decisions in order to support their reasoning. Empirical studies have demonstrated that with the increase of investment arbitration since the mid-1990s reliance on 'precedents' has considerably increased.

Common principles and shared norms have influenced the detailed rules involved in the global governance of FDI. Whereas on a case-by-case basis, studies have shown that the specific rights and obligations within BITs differ according to the nature of relations between each home and host state, they nonetheless differ within a largely uniform set of parameters found across the BITs landscape (Manger, 2013; Chaisse and Bellak, 2015; Alschner and Skougarevskiy, 2016). Chaisse and Bellak (2015) found 11 key points of similarity present across these agreements. These include rules related to the duration of the agreement, which is typically 10 years; the restrictions on direct and indirect expropriation of investors' assets by host States; and, controversially, access by investors to international dispute settlement, which grants investors the right to sue host States in international forums for violations of their investment agreement. This latter rule, which is present in nearly all BITs (OECD, 2012), is unique in international law and places investors on equal footing with States with regard to their power to raise disputes (Simmons, 2014). Furthermore, as most BITs grant ICSID the jurisdiction to arbitrate in the event that an investor raises a dispute (Reed, Paulsson and Blackaby, 2011), most BITs are then inextricably linked to the inherently multilateral rules of the ICSID Convention, which grants any investor from any home state access to

the same rules guiding investor-State arbitration. As Schill (2009, p. 258) observes, this "reflects the fundamental concept, inherent in the idea of a uniform international economic order for the global economy, to establish equal rules in order to enable equal competition among investors from different home States, which, in turn, enables investments to be used as efficiently as possible".

Finally, the decision-making procedures guide the actual act of governance by actors in the global governance of FDI. With regard to ISDS, nearly 90 per cent of all investment treaties (Gaukrodger and Gordon, 2012) between States allow for, or even encourage, both parties to settle disagreements amicably and by diplomatic means (Salacuse, 2010), as discussed later in the case study of a dispute between a number of Italian investors and the South African Government. Furthermore, as stated earlier, in the event of a dispute, a nearly universal feature of investment treaty rules allows foreign investors to invoke the procedure of international arbitration. This procedure has had the significant effect of both reinforcing the principles of the FDI regime and, through the de facto reliance on precedence of past arbitration tribunal decisions (Reinisch 2008; Reed, 2010), acting as a mechanism for change in the regime – both in terms of how rules across the BITs landscape are interpreted and in terms of how host States react to these decisions by altering current and future rules for accepting international investment.

4. The global governance of FDI and the non-market strategies of international investors

TNCs, host States and international organizations such as ICSID interact in the global governance of FDI, as outlined above. Yet, to better understand the motivations and actions of TNCs, it is useful to draw on the important contributions made to the IB literature on non-market environments and non-market activities. The so-called "non-market" literature in IB and related fields has sought to explain the behaviours of firms that are outside the traditional "market" realm of analysis (location choice, entry mode and so forth).

Baron (1995) established an early conceptual foundation for non-market environments and strategies, arguing that non-market environments consist of a range of public actors and institutions that firms engage with through non-market strategies to enhance overall firm performance. However, as Boddewyn (2003) has rightly pointed out, the distinction between market and non-market is manifestly artificial, as they are inherently intertwined. More recently, Doh, Lawton and Rajwani (2012) have shown that institutional perspectives, delineated by Hotho and Pedersen's (2012) categories of institutional IB research, may be used to bring together, and indeed inform, various strands of research on non-market environments and non-market strategy. Therefore, from an institutional perspective,

non-market strategies and activities may be considered as couched within their respective social environments, informed and often constrained by their formal and informal rules, beliefs and norms (Doh, Lawton and Rajwani, 2012). It follows, therefore, that the global governance of FDI, with its associated ideas, principles, norms, rules and decision-making procedures, may be considered a non-market environment within which the non-market strategies and activities of TNCs involve interactions with, inter alia, host-country governments and international investment dispute settlement bodies such as ICSID.

The non-market strategies and activities focused on in the remainder of this article relate to ISDS between TNCs and host countries. From the perspective of the firm, such activities fit within an initiative to protect property rights (Bach and Allen, 2010), and such litigation, therefore, is part of a firm's non-market strategy to protect its rents within the host country (Baron, 1995). However, from the perspective of a number of developing host-country governments, the potential losses associated with ISDS have been viewed as a constraint on public policy space and such arbitration and their awards as excessive and unjust forms of rent-seeking behaviour.

4.1 Non-market strategies, ISDS and the PBM

From the standpoint of non-market strategy, why and how do firms engage in ISDS, and what role do BITs (and other IIAs) play in the process? For four decades, Vernon's (1971) OBM (obsolescing bargain model) has been the dominant paradigm influencing our understanding of the relationship between foreign investors and host-country governments. The OBM suggests that host-country governments, particularly in developing countries, acquire greater bargaining leverage after a foreign investor commits resources to the host country – leverage which can be used to renegotiate the terms of the investment with the foreign investor or engage in the expropriation of those resources outright. As Vernon (1971, p. 54) put it:

> Both parties, foreign investor and national government, approach these agreements [to invest] with a long-term perspective… Yet, almost from the moment that the signatures have dried on the document, powerful forces go to work that quickly render the agreements obsolete in the eyes of the government.

Within the context of the OBM, BITs may be considered an institutional innovation that seeks to address this credible commitment problem and provide foreign investors with the power (vis-á-vis host States) to enforce their investment agreements with host States (Simmons, 2014).

Therefore, according to the logic of the OBM, the non-market strategies and activities of foreign investors entering into bargains with host States are situated within an institutional environment defined by BITs. Indeed, Ramamurti (2001) sought to

update the OBM by introducing a two-tiered model of investor-state bargaining, in which investor–State bargains at a "Tier 2" level, occur within a higher "Tier 1" level of multilateral trade agreements and bilateral investment agreements. At this Tier 1 level, Ramamurti focused particularly on the influence of BITs as instruments to secure sets of rights to international investors in host States, thereby arguing that they "remov[e] from the negotiation agenda most of the issues on which MNCs and host governments used to haggle earlier" (Ramamurti, 2001, p. 30) – facilitating "traditional" Tier 2 level bargains.

However, Ramamurti's two-level model depicts BITs at the Tier 1 level as discrete, independent agreements with respect to any particular investor–State bargain, rather than a global institutional environment for the governance of FDI – arguing that bilateral investment agreements are in place, "since there is no 'GATT for FDI'" (Ramamurti, 2001, p. 28). While acknowledging the utility of Ramamurti's two-tiered model, Eden, Lenway and Schuler (2005) recognize that at the Tier 1 level, investment agreements have achieved "regulatory convergence" and that therefore, there exists an "investment regime" at this global level, echoing the findings from the field of international law, discussed earlier. More importantly, though, Eden et al. (2005, p.266) argue that this investment regime has offered "more protection, and bargaining leverage, to multinationals". Put differently, the power of TNCs is asymmetrical with regard to host States due to BITs and other IIAs. BITs and IIAs, according to Simmons (2014, p. 33), "[give] investors the right to sue, but [do] not give States a similar right" and thus, TNCs have been accorded "extraordinary agenda-setting power in future law development" in the global governance of FDI. Therefore, Eden et al. (2005) argue that the political calculus underpinning the OBM has changed dramatically since it was introduced: the more distributed nature of TNC operations through global value chains, the greater number of investors and the greater number of locations to invest, have, among other factors, altered the bargaining dynamics between investors and host States beyond the capability of the OBM to explain them.

Therefore, Eden et al. (2005) have introduced the PBM (political bargaining model) to account for these shifts in the global political economy, and to incorporate recent insights from the fields of IB and international management to explain the more complex and dynamic set of bargains that investors and host States enter into over time (Eden et al., 2005). Several relevant elements of the model are worth drawing out briefly. First, the PBM conceptualizes bargains by investors and host States occurring iteratively over time and involving more actors than simply investor-host State pairs. It recognizes that "the real world is much more likely to be characterized by negotiations among multiple TNCs, domestics firms, and the government over a particular policy issue" (Eden et al., 2005, p. 267). Next, the PBM is designed to accommodate a broader range of policy issues between investors and host States than is the OBM with its narrow focus on the initial

investment into the host country and the subsequent obsolescence of the bargain surrounding it. In this way, the PBM is non-market-oriented at its core, seeking to explain why and how "[multinational enterprises] and nation-States engage in political bargaining over a government policy that affects either [multinational enterprises] directly or the industry of which it is a part" (Eden et al., 2005, p. 266). Finally, the PBM recognizes the political, institutional and economic constraints that both investors and host States may place on the other party to exert power to realize their objectives. As Eden et al. explain, actual bargaining power stems from, inter alia, "the ability of either party to limit the behaviour of the other party directly through economic or political coercion" (2005, p. 267). Yet, in this respect, the PBM also contains some elements which begin to accommodate an understanding of how States and foreign investors may achieve mutually beneficial results in their iterative bargains (as discussed in section 6). As Eden et al. (2005, p. 267) write:

> The final outcome of the policy negotiations should tip in favour of the party with the strongest actual bargaining power. The "winner" in the negotiations is defined by comparing the final outcome to the goals of each party; the one whose goals are most closely achieved is the winner. *Both parties win if they believe the policy outcome will be ultimately beneficial for them* [emphasis added].

In applying a number of these core tenets of the PBM, we can first focus on the political and institutional constraints imposed on host States through BITs at the global Tier 1 level, particularly with regard to the language on ISDS. The Organisation for Economic Co-operation and Development (OECD) (2012) found that 93 per cent of BITs contained language on ISDS in general, with specific variations across BITs. For instance, differences exist from treaty to treaty with regard to the degree of access to ISDS accorded to investors and the ability of investors to access international arbitration forums (OECD, 2012). Yet, interestingly and importantly, Allee and Peinhardt in a wide-scale study found that there was no correspondence between the "strongest enforcement provisions" within BITs, in terms of ISDS, and "host States with the greatest commitment problems" (2014, p. 74) – contradicting the predictions of the OBM. Instead, Allee and Peinhardt found that variations in enforcement provisions, including ISDS, were strongly associated with the *power differentials* between home and host States – as the PBM, instead, would suggest. As they explain, "States that have significant leverage over the treaty partner are more likely to get all of the features they and their investors desire included in the treaty: preconsent to international arbitration, a greater number of venues through which investors can pursue grievances, and at least one institutionalized arbitration option—all of which enhance overall treaty enforceability" (Allee and Peinhardt, 2014, pp. 72–73).

Allee and Peinhardt (2014) attribute these inequalities to home States possessing greater bargaining power (in terms of, for instance, the size of their economies and their share of the world's largest TNCs) over host States, which is used to secure greater ISDS provisions for their investors, regardless of the level of credibility of the host States. Simmons (2014), using Allee and Peinhardt's data set, goes further to find that the timing of the negotiation and signing of a BIT, in terms of economic downturns, matters significantly for whether the host State accepts greater degrees of ISDS enforcement provisions. As she states, the "results support the general tendency for developing countries with strong positive growth to maintain somewhat greater national control over how investment disputes will be settled. Downturns in the business cycle, by contrast, are consistently associated with much greater delegation to international tribunals in the event of a dispute" (Simmons, 2014, p. 27).

In an interview with the lead IIA negotiator of a so-called "Next 11" developing country (for a discussion of this group, see O'Neill, 2005), the negotiator highlighted the systemic inequalities across BITs brought about by power differentials between home and host States as the greatest issue facing the global governance of FDI (Interview 1, 2012). The negotiator stated that the country that he represented had signed a number of "bad deals" under political and economic pressure from large home States such as the United States and Germany, and their large TNCs, which had subsequently exposed this country to large ICSID tribunal awards against it.

5. ISDS, South Africa and the developing-country challenge to the global governance of FDI

This section examines how the non-market strategy of several Italian investors in South Africa set in motion both the South African Government's termination of a number of its BITs and a reconsideration of its stance towards the regulation of inward FDI through its recent Protection of Investment Act. The case is useful for two reasons. First, it illustrates the non-market strategy employed by a number of predominantly Italian investors in the mining sector in first seeking to protect rents associated with their investments through ISDS, then reneging on this process to protect long-term access to minerals associated with its resource-seeking investments. Second, it offers insight into the intersections of this strategy with the global governance of FDI, illustrating not only how the structure of the global governance of FDI influenced the strategy of these investors but also how this strategy influenced the South African Government to re-evaluate its BITs, contributing to a cascading effect across a number of developing countries in altering the fabric of the global governance of FDI.

The investors, Finstone and RED Graniti, together the largest producers of natural stone and granite in South Africa, sought to protect their mineral rents in the face of sweeping changes enacted by the South African Government to redistribute land and minerals to "historically disadvantaged South Africans (HDSAs) within a broad-based Black Economic Empowerment" (BEE) strategy, in order to redress economic inequalities brought forth by the preceding apartheid regime. As part of this strategy, the South African Government had enacted the Broad-Based Socio-Economic Empowerment Charter for the South African Mining and Minerals Industry (the Mining Charter) in 2004, within the Mineral and Petroleum Resources Development Act (MPRDA). The Mining Charter granted legal authority over all mineral resources to the South African State, to which the holders of "old order rights" under the previous regime, could acquire "new order rights" only if "they divested a considerable percentage of their shareholdings to HDSA" (26 per cent of HDSA ownership within 10 years) and included HDSA employees with 40 per cent of the firm's management, among a broader set of HDSA employee rights (Poulsen, 2015, p. 165). These "new order rights" also differed significantly from "old order rights" in that they were time limited — thereby introducing an additional level of risk to foreign investors in the mining sector (for an examination of the Mining Charter within South Africa's BEE strategy, see Ponte, Roberts and van Sittert, 2007).

Finstone and RED Graniti sought to challenge the South African Government through diplomatic channels at first. This non-market activity was enabled by the Italy–South Africa BIT (1997), in which Article 9(1) advocated a first attempt at resolving disputes through friendly diplomacy. The Italian embassy sent an aide memoire, a diplomatic memorandum, to the South African Government stating in no uncertain terms that "the [MPRDA] Act has a significant and deleterious effect on Italian investors' investments in the South African mining industry" (Embassy of Italy, 2005). The aide memoire further stated the areas that might have breached the Italy–South Africa BIT, listing several counts of possible expropriation associated with the Charter and the Act, particularly the replacement of the property held under "older order rights" with property of lesser value (considering the transfer of assets to HDSAs) under the new order rights without full compensation, as stipulated in the BIT (Embassy of Italy, 2005).

The Italian Government failed to reach a compromise with the Government of South Africa, and in the following year, the investors filed for arbitration with ICSID (Foresti v. South Africa, ICSID Case No. ARB(AF)/07/1), claiming damages of US$350 million due to alleged discrimination and lack of compensation. Although the investors withdrew the claim in 2010 in the face of public pressure and because it reached a satisfactory agreement with the South African Government (ICSID, 2010), the claim was alarming to the South African Government not only for its remarkable amount but more importantly because its possible success "had [the] potential to open the floodgates for similar claims questioning the redistributive efforts of the post-apartheid regime" (Poulsen, 2015, p. 167).

The Foresti claim acted as an important impetus for the South African Government to review its BITs and formulate a new inward investment policy in order to guard against any further claims, based manifestly on its desired autonomy to enact and implement social development policies such as the BEE strategy.

5.1 South Africa's reaction to the Foresti case

At a global Tier 1 level, the South African Government – specifically, the Department of Trade and Industry (DTI) – had been cautiously observing the increasing submission rate and substantial size of ISDS claims against developing countries (for example, Argentina following the financial crises of the late-1990s and early 2000s (Parliamentary Monitoring Group, 2009); for detail on claims resulting from measures to stem the effects of financial crisis in Argentina, see Lavopa (2015)). As such, it began a process of reviewing BITs in 2002 to examine the vulnerability of South Africa to expropriation claims, the immediacy of which was compounded in the late 2000s by "the impacts of BITs [having] become a reality" as a result of the Italian investors challenging the MPRDA (Parliamentary Monitoring Group, 2009). One of the key impetuses for this review, according to testimony by Xavier Carim, former Deputy Director General of Trade and Industry of South Africa and its former Ambassador to the WTO, and by Sureiya Adam, a DTI official, to the South African Parliamentary Committee on Trade and Industry (Parliamentary Monitoring Group, 2009), was to determine the level of vulnerability of the South African Government to ISDS claims through its signed BITs and the reasons such BITs had been signed in the 1990s. In the words of Xavier Carim:

> South Africa was particularly concerned with investor-state dispute provisions that open the door for narrow commercial interests to subject matters of vital national interest to unpredictable international arbitration outcomes and that may constitute a direct challenge to constitutional and democratic policymaking (Carim, 2015, p. 4).

The results of the internal review showed that the South African Government had signed BITs with countries such as the United Kingdom and Italy in the 1990s under a position of relative weakness, and had therefore signed BITs that granted rights to investors which were over and above what the South African Government was prepared to accept during a period of greater economic strength, as explained by Allee and Peinhardt (2014) and Simmons (2014) earlier. As the transcript of Adam's testimony states, during the 1990s the BITs signed by South Africa "were often concluded as part of state visits. There had been no clear policy…The outside world perceived Africa as being a risky environment for investment and a BIT was regarded as a mitigating factor" (Parliamentary Monitoring Group, 2009, p. 2). Mr. Carim added that:

> developing countries were forced to sign these agreements, guaranteeing compensation in the event of expropriation… One of the factors was that BITs arose at the request of European countries. They wished to have investment protection in case their assets were nationalized. South Africa had understood this and accepted the concept of the BIT as an effort to re-enter the global economy. It had been presented as an unproblematic situation. Some bad treaties had been couched as friendship agreements (Parliamentary Monitoring Group, 2009, p. 3).

Indeed, in the published review of its BITs in 2009, the South African Government concluded that "the Executive entered into agreements that were heavily stacked in favour of investors without the necessary safeguards to preserve flexibility in a number of critical policy areas", such as BEE (Republic of South Africa, 2009). Furthermore, it criticized the ISDS provisions that had been included within its existing BITs, arguing that "existing dispute settlement institutions were not designed to address complex issues of public policy that now routinely come into play in investor-state disputes", and thus advocating a future policy of supporting "proper deference to domestic dispute settlement procedures" over international ones (Republic of South Africa, 2009, pp. 45-46). Subsequently, according to Xolelwa Mlumbi-Peter, the acting Deputy Director General of DTI in 2015, the South African Government proceeded on the basis of these arguments to terminate its BITs with Austria, Belgium and Luxembourg, Denmark, France, Germany, the Netherlands, Spain, Switzerland and the United Kingdom by the end of 2014 (for specific termination dates, see UNCTAD, 2018), and develop a new legal framework through the passing of the Protection of Investment Act in 2015 (Republic of South Africa, 2015), which would henceforth regulate inward FDI (Parliamentary Monitoring Group, 2015a).

The Act is notable for setting out the features of a new set of relationships with foreign investors based on the Government's concerns following the experiences of other developing countries with ISDS and its own experience with the Foresti claim. Specifically, the Act in its Preamble explicitly calls for the "responsibility of the government to provide a sound legislative framework for the protection of all investments, including foreign investments, pursuant to constitutional obligations" while also "[recognizing] the obligation to take measures to protect or advance persons, or categories of persons, historically disadvantaged in the Republic due to discrimination" and "[reaffirming] the government's right to regulate in the public interest in accordance with the law"' (Republic of South Africa, 2015, p. 2). With regard to ISDS, therefore, South Africa has, through the Act, asserted a greater degree of autonomy by directing investor disputes to the domestic legal system and then, if there is no resolution, to international arbitration but only if it is consented to by the South African Government (Republic of South Africa, 2015). Even if such arbitration is consented to, the Act states that "arbitration will be

conducted between the Republic and the home state of the applicable investor" (Republic of South Africa, 2015, p. 12), rather than the foreign investor itself, which is a notable divergence from the international norm of foreign investors engaging with host governments in international arbitration.

At the bill stage of the South African Protection of Investment Act (the Promotion and Protection of Investment Bill), non-governmental bodies such as the European Chamber of Commerce in South Africa had been brought forth to public hearings in the Parliament in order for the government to understand their views and concerns. At one hearing in 2015, the representative for the European Chamber stated that "some [European] firms are already reconsidering investment. Most are waiting to see the impact of this and other bills" (Parliamentary Monitoring Group, 2015b, p. 4). Nonetheless, the passing of the bill into the Act confirmed the DTI's view that "[t]he South African government recognised that it has an investment protection legal framework in place that matches world standards and that the risks posed by BITs vastly outweigh their purported benefits" (Green, 2012, p. 2). Put differently, the South African Government had not attributed increases in inward FDI, the market activities of foreign firms, to increased investment protection and found the negative consequences of such protections, through the non-market activities of foreign firms, too costly economically, socially and politically to sustain. Thus, the changes occurring to the principles, norms, rules and decision-making procedures of the global governance of FDI are likely to have an impact on not only the market-oriented strategies of foreign investors but also their non-market strategies, particularly as countries such as South Africa are seeking greater autonomy over investors to pursue development objectives and greater autonomy over dispute settlement over international organizations such as ICSID.

5.2 Developing- and developed-country challenges to the global governance of FDI and the changing norm of investment protection

South Africa is not alone in taking such measures in its efforts to redefine the relationship between foreign investors and the powers of the State to pursue domestic policy objectives, in the face of previous ISDS claims. In the cases of Argentina (Lavopa, 2015), Ecuador (Aráuz Galarza, 2015), India (Dhar, 2015) and Indonesia (Jailani, 2015), for example, there has been a near unanimous call for such a redefinition, granting less power to foreign investors to raise ISDS claims. According to Abdulkadir Jailani, the Director for Treaties of Economic, Social and Cultural Affairs, in the Indonesian Ministry of Foreign Affairs, the Indonesian Government went through a very similar process of reviewing existing BITs to that of South Africa, under nearly identical conditions: it "was mainly triggered by the increased exposure to investor claims in international arbitration"

(Jailani, 2015, p. 5). Furthermore, the review led to nearly identical outcomes, "such as IIA discontinuation, reassessment of existing provisions and the development of a new IIA model" (Jailani, 2015, p. 5).

Indeed, such redefinitions are emblematic of a global shift towards greater regulation in the norms associated with the global governance of FDI. According to the 2017 UNCTAD *World Investment Report* (UNCTAD, 2017, pp. 119–122), "sustainable development-oriented IIA reform has entered the mainstream of international investment policymaking", with strong evidence that a new generation of BITs have emerged which "refer to the protection of health and safety, labour rights, environment or sustainable development" in their preambles and create policy space for host governments to pursue the "protection of human, animal or plant life, or health; or the conservation of exhaustible natural resources". Johnson, Sachs and Coleman (2016, p. 16) point to the more than 50 countries and regions which have sought to revise their BITs or IIAs in order to assess "whether these agreements are either necessary for or effective in attracting investment, and how the risks for and impacts on domestic policy space can be better addressed". Furthermore, the Group of Twenty (G20), which includes countries such as Argentina, India, Indonesia and South Africa along with leading developed countries, has recently adopted the Guiding Principles for Global Investment Policymaking, based on UNCTAD's Investment Policy Framework for Sustainable Development (IPFSD), calling for governments to "reaffirm the right to regulate investment for legitimate public policy purposes" (UNCTAD, 2017, p. 118).

More recently, UNCTAD tracked developments in ISDS reform in 2018 and found that nearly all IIAs signed in that year contained at least one reform to ISDS (UNCTAD, 2019). At one extreme, IIAs omitted ISDS altogether, but more frequently, they included elements to circumscribe the power of investors and international tribunals by, for instance, limiting the scope of issues under which ISDS may be invoked, increasing the use of local remedies prior to invoking ISDS claims and increasing the participation of State entities in ISDS tribunals (UNCTAD, 2019). Finally, on a different tack, a group of 105 States in the WTO are currently developing a multilateral agreement on investment facilitation for development, which excludes investment protection and ISDS altogether. The effort, launched at the 11th Ministerial Conference in December 2017 in Buenos Aires, seeks instead to promote global flows of inward FDI through a multilateral framework which aims to "improve the transparency and predictability of investment measures; streamline and speed up administrative procedures and requirements; and enhance international cooperation, information sharing, the exchange of best practices, and relations with relevant stakeholders, including dispute prevention" (WTO, 2017, p. 1). While at the moment it is unclear how such a framework may intersect with the current global system of governance of FDI involving BITs and IIAs, preliminary analysis shows that a significant degree of overlap may exist in areas such as

most-favoured nation and fair and equitable treatment provisions (Bernasconi-Osterwalder et al., 2020, p. 49), raising important questions regarding how such a multilateral framework may change the manner in which FDI is governed globally if it is adopted and ratified by all WTO members.

In sum, the efforts by a number developing countries, but also some developed countries, to reconfigure the global governance of FDI, by either withdrawing from existing treaties or attempting to rewrite the rules of future ones, are indicative of what Oetzel and Doh (2009, p. 115) argued with regard to the role of TNCs in development: "should policy makers begin to believe that [multinational enterprises] are not generating benefits in the host country, their attitudes toward FDI could (and many already have) become decidedly pessimistic, leading to increased barriers to entry and greater host country regulation on FDI". The ISDS process and the size of the compensation claimed and awards by organizations such as ICSID has indeed been perceived by a number of developing countries as unjust, unequal and counterproductive to development agendas and efforts, especially as the total number of ISDS up to January 2020 has surpassed 1,000, with developing countries comprising the majority of respondent States (UNCTAD, 2020). As the Group of 77 developing countries and China stated at a recent meeting of the United Nations Commission on International Trade Law (UNCITRAL):

> A discussion on the concerns relating to the existing ISDS system and possible reforms are of central importance to the developing states that adopt such regime, given the impact of ISDS on the development process. Many of the group's members are already actively taking part in this process through, inter alia, refining the existing ISDS system, revising or in some cases terminating existing bilateral treaties, developing new models for future agreements, and engaging in multilateral processes (Group of 77, 2018, p. 1).

It is clear from this statement and from the actions of a number of developing countries, as well as some developed ones, to reform BITs and IIAs, that a new set of overarching ideas and norms are developing which are altering the fabric of the global governance of FDI. These ideas and norms have shifted as a result of the interaction of host States, TNCs and international organizations such as ICSID through the non-market activities associated with ISDS.

6. Conclusion

On the surface and seen through the older lenses of the OBM and the credible commitment problem, ISDS is a rational, non-market strategy employed by TNCs to protect their investments in host countries that have breached their treaty obligations. However, delving more deeply into the structure of the global governance of FDI shows that such non-market strategies are related to a set of unequal power relationships between TNCs and host States, which are embedded within its institutional dimensions. In particular, the power of TNCs to sue host States for alleged breaches of BIT and IIA obligations, which is unique in international law (Simmons, 2014), and to shape future norms and rules through the process of ISDS have been considered excessive by a growing number of developing countries. This inequality of power is compounded by the relatively weak position that many countries were in when they signed BITs, resulting in more stringent treaty language included in such agreements. Therefore, non-market strategies and activities associated with ISDS are not 'value free', as the non-market environment in which they are embedded is infused with political and institutional inequalities.

The developing country backlash against the global governance of FDI is emblematic of a broader set of political, institutional and economic inequalities that these countries have experienced throughout the course of the process of globalization. Yet, in nearly all cases among developing countries, there has not been a wholesale rejection of the global governance of FDI. Rather, the apparent backlash may instead be characterized, in terms of the overarching ideas of this system of global governance, as a "swing of the pendulum toward greater regulation, rather than protectionism", in the view of one senior UNCTAD official (Interview 2, 2012). Indeed, as withdrawal from BITs and significant changes to new IIAs, which include greater autonomy to pursue domestic development objectives, have cascaded across countries, they have resulted in a requisite change in the principles, norms, rules and decision-making procedures that constitute the global governance of FDI. The intention behind such reform initiatives on the part of the developing and also the developed countries is, at its root, to be able to exert more institutional power over their foreign investors through more equal political relations, and recapture greater domestic policy space to satisfy developmental objectives (UNCTAD, 2020).

Therefore, with regard to the non-market literature there is an opportunity to revisit both the OBM and the PBM, as well as the broader literature on non-market strategy, to address questions of power and unequal relations between TNCs and political organizations such as host States. TNC-host State investment relations were considered conflictual in Vernon's original formulations of the OBM – with the assumption that a host State would experience a rise in bargaining power once its foreign investors had committed resources to it. Since that period,

the global governance of FDI and ISDS have significantly reversed that dynamic. However, in either case, non-market strategies and activities associated with ISDS between TNCs and host States are often guided by the zero-sum framing of the OBM, leaving little strategic room for TNCs and host States to achieve mutually beneficial outcomes. This need not be the case. A shift in the global governance of FDI towards a greater degree of institutional equanimity between host States and their foreign investors may act to introduce a more favourable political balance in the iterative bargains between both parties and other related actors, as the PBM theorizes (Eden et al. 2005).

The current system of global governance of FDI is undergoing transformation, and among the developing countries in particular, the benefits of bargains negotiated with TNCs within that system have been considered one-sided and exploitative (Economist, 2014). In this regard, such inequalities in the global governance of FDI between capital-exporting States and capital-importing States mimics a range of inequalities inherent in the global governance of trade and finance, whereby developing countries have historically lacked political power to shape the rules more towards their interests and objectives (Buzdugan and Payne, 2016). These historical inequalities have thus acted to undermine the legitimacy of global governance in these cases, resulting in a number of stalemates such as the lack of conclusion of the Doha Round of trade negotiations in the WTO (Buzdugan and Payne, 2016).

The global governance of FDI, in contrast, has proven to be more flexible to change than other forms of global economic governance, owing to its decentralized structure. The confluence of ideas, actors and institutions involved in this system have driven *system-wide* reforms of the global governance of FDI that extends beyond issues associated with ISDS. The contemporary wave of reforms also involves a new generation of BITs and IIAs designed to promote sustainable development through the introduction of new sets of principles that seek to influence norms, policies and procedures in the global governance of inward foreign investment. These principles and their associated policies and procedures, such as those found within UNCTAD's IPFSD, have sought to balance investment protection with greater legitimate policy space for social and environmental regulation on the part of host States, and with greater responsibility for the achievement of sustainable development outcomes on the part of foreign investors (UNCTAD, 2015). Although these principles are increasingly being adopted in new IIAs and model BITs across the developed and developing countries alike (UNCTAD 2016), the majority of the nearly 3,000 BITs across the world do not reflect them, and scope remains for further transformation. For instance, Amaral and Jaller (2020) find that as of 2020, only six signed BITs of the nearly 3,000 and six model BITs out of 80 contain language on gender in the text of the agreements, leaving much progress to be made on promoting gender equality through investment treaties (UNCTAD, 2021).

Given the extent to which these transformative processes are occurring, fertile ground exists for further research into the evolving structure of the global governance of FDI and the degree to which new norms have been adopted, resisted and/or innovated by TNCs within this non-market environment. Furthermore, given the recent movements in the WTO towards a multilateral agreement on investment facilitation for development at the global Tier 1 level, as discussed in section 5.2, and the rise of so-called megaregional IIAs, such as the recently- signed Sustainable Investment Protocol of the African Continental Free Trade Area, the United States–Mexico–Canada Agreement and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (UNCTAD, 2021), questions exist as to if and how regional and global processes of governance may overlap or intersect with the decentralized form of global governance of FDI as explained in this article, and whether such processes will act to reinforce, reverse or transform it.

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Implications of rising trade tensions for FDI projects*

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Abstract

This paper offers preliminary evidence of the extent to which global FDI patterns have responded to the sharp increase in trade barriers since 2018, focusing in particular on the impact of new United States tariffs imposed on imports from China. Using detailed project-level data on new greenfield FDI as well as complementary research, this paper tracks the differential changes in FDI across countries and industries most affected by the trade tensions. There is some evidence of diversion to South-East Asia in specific industries, confirming findings of other research, but the aggregate effect on investment in China is limited and the overall effect on investment in South-East Asia is actually negative. A possible explanation lies in the importance of global value chain linkages as key determinants of firms' investment decisions.

Keywords: trade tension, FDI, greenfield investment, global value chains, GVCs, international production, tariffs, barriers to trade

JEL classification numbers: F13, F15, F21, F23

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1. Introduction

The COVID-19 challenge to an open global trading system arrives on top of trade and investment environment already under strain. Tariffs and other trade restrictions escalated in 2018, particularly between the United States and China, which raised average tariffs against each other nearly six-fold over the course of two years.[1] The increase in trade barriers has immediate and costly implications for all countries, given the deep economic linkages embedded in global value chains (GVCs). There is good reason to worry that the 2018 trade tension will continue to affect foreign direct investment (FDI) flows now and in the future (UNCTAD 2020a).

Building on complementary research (Blanchard et al., 2021a), this paper offers preliminary evidence on the extent to which the recent escalation of trade tensions threaten the profitability of trade-oriented investments, especially the FDI projects that are most integrated in GVC production and trade. New trade restrictions could also increase the potential returns for other investments, including "tariff-jumping" projects that produce goods for the local markets in which they operate. It is ultimately an empirical question whether trade tensions affect the overall magnitude of FDI flows, the composition of these flows or both. In this context, research has mostly focused on the effect of trade war on trade diversion, while the evidence on the effect on FDI is limited.

Although we cannot establish causal inference without further analyzing other (plausibly independent) determinants of investment decisions, the patterns in the data are consistent with concerns that the rise in protectionist trade policy may have pushed multinational enterprises (MNEs) to reconsider their international production networks, particularly in some manufacturing industries, which rely heavily on firms' ability to import components and supplies, and to export.

Our analysis uses project-level data on announced greenfield investment, which is ideally suited to capture early changes in companies' investment intentions. Importantly, these data offer unique features in terms of frequency (quarterly basis), industry and geography, allowing us to link FDI to tariff-exposed industries and countries. We can thus consider different samples of countries with varying degrees of integration across different markets and exposure to the tariff escalation. Moreover, the data set facilitates analyzing FDI diversion, as observed changes in greenfield FDI reflect companies' decisions to stop new projects in a country and invest in another, rather than divestment – i.e. the closure or sale of foreign affiliates. Adding to this, it should be noted that greenfield FDI decisions typically have a long incubation period, so any observed changes in greenfield FDI patterns are likely to capture only part of the underlying shifts in company-level reconfiguration strategies induced by trade tensions.

[1] See Bown (2020). Despite the change in the United States administration, the tariffs imposed in 2018 remain in place.

Even if the COVID-19 shock added a new layer of complexity, evidence on the pre-pandemic period (2018–2019) suggests that trade tensions may have had a significant and independent influence on the global FDI landscape. Observed changes in the number and composition of announced FDI projects offer clues. Although the overall change in the number of FDI projects in the manufacturing sector was relatively modest, there was a differential decline in trade-oriented FDI projects with greater exposure to tariffs in 2019. Trade tensions thus may have accelerated pre-existing underlying trends away from fragmentation of international production.[2]

The evidence points to a negative impact of trade tensions globally and for East and South-East Asian countries in particular. In the aggregate – considering all trade-exposed manufacturing projects – we find that all of Asia suffered of an investment slowdown in 2019 and that China's neighbors have seen the sharpest decline since 2018 in the number of new FDI projects with high trade exposure. This finding underscores the potential importance of regional production linkages: declining trade and investment in a major trading partner, especially one as large as China, may compromise the expected profitability of complementary investments in nearby countries.

A closer examination of trends by industry sheds light on diverse strategies across GVCs: MNEs in some industries appear to have diverted investment towards South-East Asian and Latin American countries (especially to Mexico), thus diversifying their supply chain. In industry-level analysis, our results also lend support to UNCTAD's predictions for international production trajectories towards some form of restructuring of GVCs (UNCTAD, 2020a and 2021). In particular, we find that after the onset of new trade tensions in 2018, some more agile (less capital-intensive) industries shifted towards investment that was oriented more to the local market, whereas long, complex and capital-intensive value chains proved harder to dismantle or divert. Tariffs mostly affected manufacturing industries, the most productive form of investment (UNCTAD, 2021). Preliminary evidence also suggests that some typical efficiency-seeking investment projects in textiles and apparel might have started moving away from traditional host economies at a faster pace after 2018, offering new opportunities to join GVCs to other less advanced economies.

The paper proceeds as follows. Section 2 reviews the literature. Section 3 explains the data and methodology. Section 4 discusses the empirical results. Section 5 discusses policy implications and presents concluding remarks.

[2] Greenfield project investment in the manufacturing sector across the developing world has been declining steadily for more than a decade, making it more difficult to discern a specific impact of trade tensions on investment (UNCTAD, 2019a).

2. Literature review: a brief look at the evidence

The importance of trade and investment as engines of global economic growth and development cannot be overstated. Since the 1990s, trade and FDI have been key drivers of global economic integration, growth and prosperity. The spread of GVCs accelerated the catch-up of developing countries' income levels and led to greater convergence between economies.

Early theories on the relationship between FDI and trade identified two opposing outcomes depending on the type of FDI: market seeking versus efficiency seeking. In the first case, the proximity-concentration trade-off (Helpman et al., 2004) predicts that firms will tend to substitute FDI for exports when transport costs, trade costs and/or tariffs are high and plant-level returns to scale are small; the result is so-called tariff-jumping or "horizontal" FDI. In contrast, vertically integrated enterprises (Helpman, 1984), which engage in trade and seek to exploit international price differentials, complement FDI with exports, resulting in efficiency-seeking or "vertical" FDI. In reality, most MNEs are neither purely horizontal nor purely vertical; the rapid spread of GVCs hints at the importance of more complex integration strategies, including export-platform investment decisions that involve consideration of characteristics and policies of both host countries and their neighbors.[3] An increase in trade costs due to tariff escalation (or even *expected future* tariff escalation) can thus have a different effect on FDI, depending on the characteristics of the targeted investment host market, including the extent of its integration in global or regional value chains.

More recent literature specifically explores the impact of trade conflicts on GVCs and FDI both theoretically and empirically. The first strand of the literature focuses on establishing a framework to study the restructuring of GVCs following trade conflicts, looking closely at the responses of firms. Restructuring happens due to the strategic choices of multinationals that change supply chain partners or upgrade value chain activities to adapt to new trade rules (Gereffi et al., 2021; UNCTAD, 2020a). Such a view underscores the role of multinationals as the focal point of analysis. Using a model of multinational decision-making in the car industry, Head and Mayer (2019) also point out that the structure of multinational production has a pivotal role, as the origins and networks of production shape counterfactual outcomes. McGratten and Waddle (2020) analyse the case of Brexit using a multi-country growth model and find that producers substitute between exports and FDI depending on the policy responses from both the European Union (EU) and the United Kingdom.

[3] See for example Yeaple (2003); Neary (2002 and 2008); Elkholm et al. (2007); and Mukherjee (2012).

The second strand of the literature looks at the evidence of trade conflicts on the investment decisions of firms. During the United States–China trade conflict, studies find that firms from the United States have shied away from investment (Amiti et al., 2020) and have relocated their supply chains by increasing their foreign suppliers, which potentially incurred a substantial strategic cost (Charoenwong et al., 2020; Wu et al., 2021; Zhang and Shi, 2020). More specifically, Amiti, Kong and Weinstein (2020) analysed the effect of tariff actions through 2018 and 2019 and predicted that the investment growth rate of listed United States companies would be lowered by 1.9 percentage points by the end of 2020. Charoenwong et al. (2020) find that in response to uncertainties United States firms have relocated their supply chains by increasing foreign suppliers and decreasing domestic suppliers. For the case of Brexit, major studies unilaterally find negative effects on GVCs due to higher trade costs. Dhingra et al. (2017) argue that Brexit will reduce the participation of the United Kingdom in GVCs because of rising trade costs. Bruno et al. (2021), using a structural gravity model, study the impact of EU membership on FDI and find that FDI into the United Kingdom is predicted to fall by 37 per cent post-Brexit as a result of leaving the EU single market and customs union. This is because the United Kingdom is heavily involved in GVCs, as often it is the case that products cross the United Kingdom border multiple times (Ali-Yrkko and Kuusi, 2019).

The third strand of research underscores the diversion effect of trade conflicts. As highlighted by some papers, the trade conflicts between the United States and China have brought trade diversion effects on major trading partners of both China and the United States both near and far, such as Taiwan Province of China, Mexico, the EU and Viet Nam (Nicita, 2019; Bolt et al., 2017; Li et al., 2020). This is naturally a result of restructuring of GVCs, as firms aim to avoid excessive reliance on China by diversifying supplier bases in the context of the trade war (Javorcik, 2020). Recent studies examine the effect of diversion in countries neighbouring China. Pengestu (2019) studies the relocation of production capacity by firms that serve the United States market and argues that investment relocation and trade diversion will benefit ASEAN countries.[4] Moeller (2018) suggest that South-East Asian economies may benefit from the trade conflict between the United States and China, as they seek opportunities to replace Chinese goods in the United States market, as well as United States goods in the Chinese market. In a similar vein, Tham et al. (2019) study the effect on the Malaysian market and predict that Malaysia will benefit from the investment diversion effect in the medium term.

[4] ASEAN is the intergovernmental organization of 10 South-East Asian economies: Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.

Given the very recent date of these sharp tariff escalation episodes, the empirical evidence on the impact of trade tensions on investment is inevitably scarce. This paper and its companion project (Blanchard et al., 2021b), represent a unique opportunity to contribute to the literature on how changes in trade policies impact MNEs' decisions and GVC structure.

3. Analyzing trade-exposed projects: Data and methodology

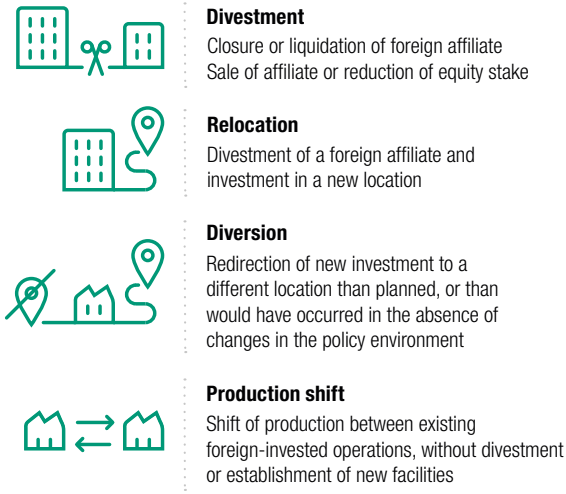
Following Blanchard et al. (2021b), we use data on announced greenfield projects as collected by fDi Markets from the *Financial Times Ltd* (www.fDimarkets.com). Greenfield project announcements are a key indicator of trends in cross-border investment; they encompass new projects as well as expansion of existing projects. Announcements have the advantage of offering the most reactive part of MNE's investment decisions; they are thus more likely to give evidence on early diversion trends. The recent trade tensions and pandemic crisis are likely to accelerate the reconfiguration of global production networks (UNCTAD 2020a and 2021) by shifting production capacity from one location to another less affected by trade and technology conflicts, including through divestment, relocation of foreign affiliates and diversion of new investments (figure 1).

FDI implies a long-term commitment to a market; the liquidation or sale of foreign affiliates entails operational and regulatory complexities, causing a delayed reaction to sudden changes in the economic environment. In the initial period after a "shock" (such as an unexpected increase in tariffs or an exogenous shock such as a financial or health crisis), early responses mostly take the form of shifts in production between existing facilities or repurposing of production for the domestic market rather than for exports.

Both anecdotal evidence and analysis of trends show indications of investment diversion as a result of the trade conflict between the United States and China (see for example, UNCTAD, 2020b). Table 1 lists selected cases of recent investment decisions of firms that are either implemented or under way. It is worth noting that many of these cases are investment diversion and relocation out of mainland China, mainly in reaction to the United States–China trade war.[5]

[5] Other reasons cited by firms for investment diversion or relocation include cost savings and competitive-advantage decisions – notably labour costs, and more recently, diversifying supply chains beyond China, after widespread disruption following the COVID-19 shock. Other companies, e.g. in the automotive industry, noted that the new North American trade agreement approved by the U.S. Senate ensures that automakers will still be able to build pickup trucks in Mexico without facing new punitive tariffs.

Figure 1. MNEs reconfiguration mechanisms



Source: Authors' elaboration.

However, in many instances MNEs have cited the need to diversify their supply chain capabilities as main motivation for a new investment decision in another location in which case they might just add new locations to their network.

The greenfield projects database used for this paper covers only new investment. It does not record resizing or plant closures, nor does it contain information on projects that were cancelled or delayed. Thus, it does not consider divestment decisions and accounts only partially for relocations and production shifts. In this sense, our data captures only positive variations to FDI flows and is thus likely to provide a lower estimate of any diversion trends. That said, the extent to which MNE reconfigurations have led to divestments or liquidations of foreign affiliates is plausibly limited. To date, there is little evidence of substantial closures of facilities in China; this may be due in part to firms' ability to repurpose Chinese production facilities to serve the large domestic market rather than exports. Indeed, some electronics MNEs have effectively replicated their supply chains by opening new facilities outside China while still also investing heavily in the country to maintain market share in its fast-growing economy.[6]

[6] *Financial Times*, "Companies try to cut geopolitical risk from supply chains", 7 April 2021.

Table 1. Relocation plans announced by multinational firms in relation to the trade conflict between China and the United States

Country of Origin	Relocation Country	Firm Name	Industry	Remarks
United States	Philippines	Ever Win International Corp.	Electronic components	Ever Win International opened a manufacturing facility in Laguna Technology Park, Philippines to assist customers with transitioning production outside of China.
	Malaysia	iRobot Corp.	Home and office products	iRobot Corp established manufacturing operations in Malaysia to diversify the firm's manufacturing and supply chain capabilities, as well as to decrease its exposure to the trade conflict between China and the United States.
	Viet Nam/ India	Hasbro	Leisure products	Hasbro Inc. shifted away from China in favor of new plants in Viet Nam and India.
	United States	Stanley Black & Decker	Machinery	Stanley Black & Decker Inc. plans to move production of Craftsman wrenches from China back to the United States; the manufacturer is looking to use automation to increase domestic output as tariffs raise the cost of imports from overseas.
	Viet Nam	Key Tronic	Technology hardware	Key Tronic added additional capacity in Viet Nam to diversify its global manufacturing base and provide an additional hedge against uncertainty given the trade war between China and the United States.
China	Thailand	Prinx Chengshan Shandong Tire Co. Ltd.	Automotive	Prinx Chengshan, a Chinese tyremaker, decided to build a $600 million plant in Thailand.
	Viet Nnam	HL Corp. Shenzhen	Leisure products	Hl Corp, a Shenzhen-listed bike parts maker, announced to investors that hiking tariffs made the company decide to move production facilities to Viet Nam.
	Viet Nam/ United States	Zhejiang Hailide New Material Co. Ltd.	Apparel and textile products	Zhejiang Hailide New Material relocated much of its industrial yarns, tyre cord fabric and printing materials from its plant in eastern Zhejiang Province to the United States and other countries, such as Viet Nam.
Japan	Viet Nam	Kyocera	Technology hardware	Japanese electronics parts maker Kyocera Corp. has relocated part of its automotive camera modules and displays production from China to Thailand to avoid the possible imposition of higher United States tariffs.
	Thailand	Ricoh Co. Ltd.	Technology hardware	Ricoh Company, Ltd. announced that it will shift production of its key MFP portfolio destined for the United States market to Thailand, to hedge any risk associated with the United States–China trade issue.

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Table 1. Relocation plans announced by multinational firms in relation to the trade conflict between China and the United States (Concluded)

Country of Origin	Relocation Country	Firm Name	Industry	Remarks
Taiwan Province of China	Taiwan Province of China, United States and Mexico	Multiple tech companies	Technology hardware	• Quanta supplies data centre servers to United States technology giants including Facebook and Google. It now assembles parts made in China into products at factories in the United States or Mexico. • Other tech companies such as Innolux Corp, AU Optronics, Yageo, Unimicron Technology, Pegatron and Giant are expanding production and R&D facilities within Taiwan Province of China.
	Thailand	Primax Electronics Ltd.	Technology hardware	Primax Electronics decided to set up a production base in Thailand outside of mainland China; production and shipment began in 2020.

Source: UNCTAD from Bloomberg and Financial Times for the period 1 January 2018 to 31 March 2021.

In this paper we use as variable of interest the number of announced projects rather than their value since the number of projects is a better reflection of possible diversion trends. Also, the value reported refers to the total cost of the project and is likely deployed over some years; and project costs vary widely across industries and types (expansion versus new plant), adding considerable volatility to the data.

Projects are classified by the primary industry code of the investor following the ISIC (rev. 4) two-digit classification and by the actual activity envisaged by the project, termed the project's "function". For example, more than a third of manufacturing companies' investments in developing and transition economies are actually business activities (which comprise setting up local sales and marketing support services) and retail operations, rather than manufacturing activities. Similarly, almost all of the projects by hotels and restaurants actually imply the construction of an accommodation structure. Combined, a project's industry and function define the project's *destination activity* (which, it should be noted, need not coincide with the industry of the investor). This is important because not all manufacturing investment is directly affected by trade tensions; functions thus can help to identify market-oriented versus trade-exposed FDI projects.[7]

Although GVCs tie together companies belonging to a potentially wide range of industries in many economies, we anticipate that trade tensions will differentially affect the most tariff-exposed projects. To first outline the possible impact of trade

[7] For more details, see Blanchard et al. (2021b).

tensions on investment we define greenfield projects with high tariff exposure as those belonging to an industry affected by tariff escalations. Specifically, we use data on tariffs at the 10-digit HS level between the United States and China, from Blanchard et al. (2021a), and construct a more aggregated industry-level variable consistent with the two-digit definitions of industries available for greenfield data. We identify *trade-exposed* projects with a dummy variable equal to 1 if any product line associated with the industry was targeted in the 2018 tariff escalation (high tariff exposure), *and* if the project function includes manufacturing, logistics and wholesale operations. Tables A.1 and A.2 show the share of investment projects affected and the tariffs raised by the United States on imports from China by industry.

4. Trade tensions and FDI

The global number of announced FDI projects declined in 2019, consistent with the onset of new trade tensions. The number fell by 1.3 per cent between 2018 and 2019; in value terms, the decline was 16.5 per cent. Although this observed fall in the number of FDI projects is modest, it marks an unusual divergence from the change in global GDP, which rose by 2.3 per cent during the same period. As shown in figure 2, the number of announced and opened greenfield FDI projects has generally tracked overall global economic activity, particularly since 2015, making the 2019 divergence noteworthy. Focusing specifically on trade-exposed FDI projects, two more facts stand out: first, the growth of trade-exposed FDI projects had started to plateau relative to the growth in overall FDI projects before 2019; and second, the 2019 decline in high trade-exposed FDI projects was particularly stark.

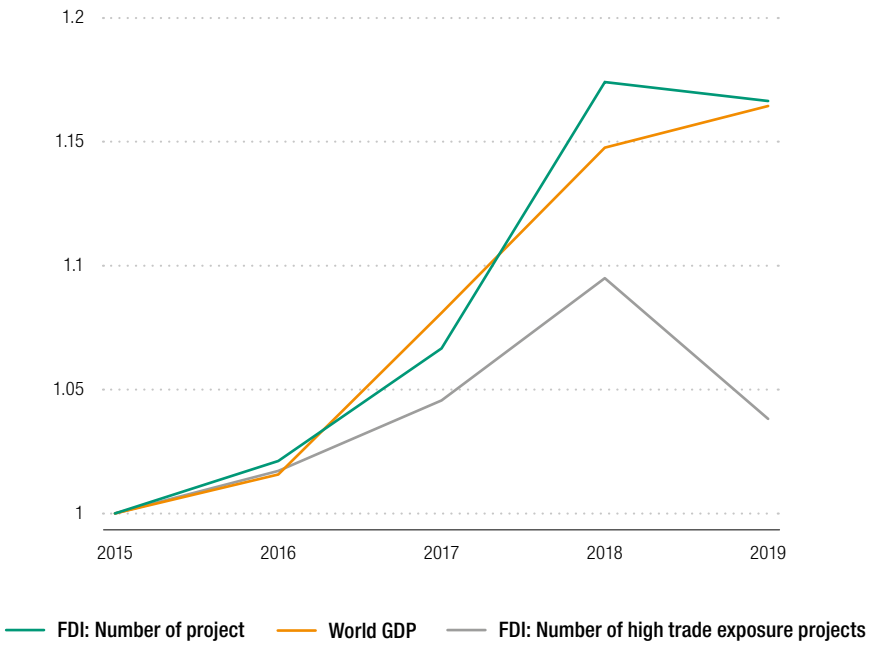
These patterns are consistent with previous evidence. Foreign investment in the manufacturing sector across the developing world has been declining steadily for more than a decade. The *World Investment Report 2019* analyses the long-run structural change in FDI flows (see chapter 1, UNCTAD, 2019a). Matching the decline in manufacturing, UNCTAD (2019a) documents the rising importance of FDI in the services sector and in intangibles.[8]

The decline in FDI projects accelerated existing trends in manufacturing and in Asia. Over the past decade, the growth rate of manufacturing projects has been slowing down in East and South-East Asia, driven largely by slower expansion in China.[9] Both trends accelerated between 2018 and 2019. By 2019, the share of

[8] UNCTAD (2021) confirms the reinforcing of this trend during 2020.

[9] Between 2013 and 2017, the number of announced investment projects in the manufacturing sector was lower than in the preceding five years, across all developing regions. This negative trend briefly reversed in 2018, which posted a one-year 35 per cent increase from 2017, but even then, the *share* of manufacturing among new FDI project announcements remained flat. See UNCTAD (2019b).

Figure 2. Number of Announced FDI Projects globally and world GDP, 2015–2019

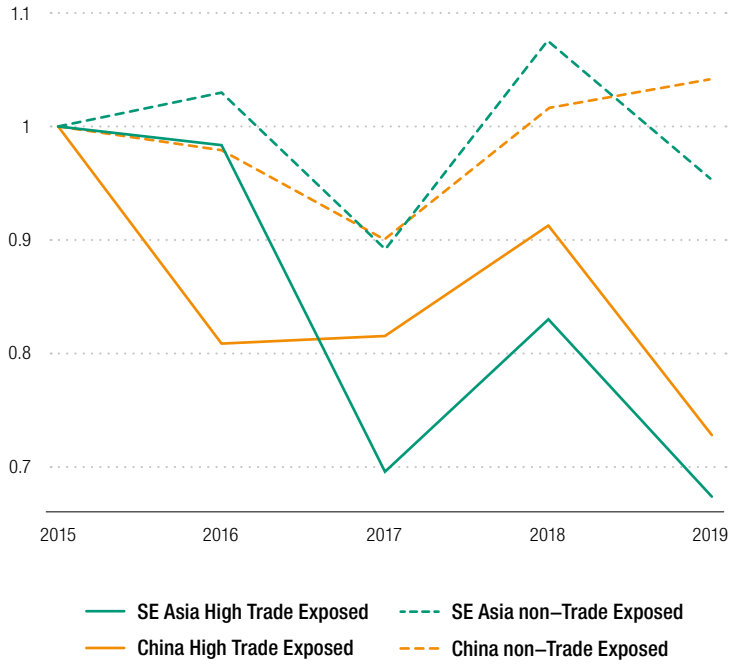


Source: UNCTAD, based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com).
Note: The numbers of FDI projects and the world GDP in the figure are normalized by their respective levels in 2015.

announced and opened FDI projects in manufacturing had reached a new nadir of 16 per cent, compared with 33 per cent in 2003. Similarly, the share of announced FDI projects in East and South-East Asia (including China) fell to 14 per cent from 25 per cent in 2003. There are a number of reasons for these changes, including the recent increase in tariffs. For instance, UNCTAD (2020b) documents that rising factor costs in China have driven a gradual shift of production facilities from higher- to lower-income economies in South-East Asia and argues that this process was accelerated by the trade tensions.

Figure 3 tracks the change in the number of FDI projects that face the greatest direct exposure to higher tariffs or non-tariff barriers since trade tensions began to escalate in January 2018 in China and South-East Asian countries. Since the first quarter of 2018, the number of high-trade-exposure FDI projects fell by about 20 per cent worldwide. In China, the trend has been more volatile;

Figure 3. Change in the number of announced and opened high-trade-exposure FDI projects, 2015–2019, yearly (Indexed to 2015)



Source: UNCTAD, based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com).

the average number of projects decreased only in 2019 and on average by less than 15 per cent with respect to the first quarter of 2018. In contrast, the number of new high-trade-exposure FDI projects in East and South-East Asia plummeted by nearly 30 per cent over the same period, with the steepest declines in late 2019.

These patterns run counter to some predictions that higher United States tariffs against China would cause investment projects to be diverted away from China in favor of its South-East and East Asian neighbors. At least in the aggregate, there is no evidence to suggest that this has happened. Quite the opposite: the data indicate that China's neighbors saw the sharpest decline in the number of new high-trade-exposure FDI projects after 2018. This finding underscores the potential importance of regional production linkages: declining trade and investment in a major trading partner, especially one as large as China, may compromise the expected profitability of complementary investments in nearby countries.

Figure 3 portrays aggregate trends for all trade-exposed projects and thus conceals important differences across industries. Yet patterns of FDI restructuring are likely to differ across industries, depending on the characteristics of industries' GVCs, including the degree of GVC length, complexity or fragmentation; the geographical distribution of value added production; and the degree of internationalization (UNCTAD, 2020a). Moreover, FDI diversion will likely differ across destination countries too, shaped not least by the political economy between the potential host market and the protagonists in the 2018 trade war, the United States and China. In light of these considerations, we now look at selected industries (those most trade exposed) across the host economies most likely to be affected, to explore the potential differential impacts of the 2018 tariff escalation.

Depending on their orientation towards exports and exposure to the costs of a trade conflict, MNEs can either decide to relocate and diversify their value chain to mitigate their risks or can increase their investment footprint, seeking to gain local market share. Figure 4 shows trends for selected industries that are particularly vulnerable to an increase in trade risks for various reasons: they are the most often targeted with tariff hikes because of their political sensitivity, they are GVC intensive and they are concentrated in East and South-East Asian economies.[10]

As shown in figure 4, trends differ notably across these industries. Investment in the tradable automotive industry slowed down in China and neighboring countries and increased significantly in Latin American economies. Here the concomitant ratification of the United States–Mexico–Canada Agreement (to replace the then-imperiled North American Free Trade Agreement) may also have contributed to attracting more investment in Mexico. For electronics, investment remained resilient in China and increased in neighboring countries as well as in Latin America, consistent with anecdotal media reports of certain multinational firms' efforts to diversify their supply chains. Investment in the food and beverages industry was already on a downward trajectory in East and South-East Asian economies; the associated increase in Latin America in 2019 was probably unrelated to FDI diversification strategies, given the dominance of local resources and regional tastes in this sector. For textiles, investment in China had already been decreasing for a number of years, with the drop accelerating after the second quarter of 2018. Some of these production facilities seem to have been relocated to South-East Asian economies, corroborating reports of the gradual shift of labor-intensive industries out of China to lower-wage locations such as Viet Nam.

[10] Studies show that the major beneficiaries of the United States–China conflict are likely to be certain neighbors of mainland China and the United States, including not only ASEAN members but also Mexico, Colombia, Costa Rica and Mexico in Latin America as well as India and Taiwan Province of China (in line with the findings on trade diversion as documented by – for example – Nicita, 2019; Ferraro and Van Leemput, 2019; Subbaraman et al., 2019; LaScaleia, 2019; and Chiang, 2020).

Figure 4. Number of high-trade-exposure FDI projects: selected industries and host economies, 2018–2019, quarterly

Source: UNCTAD, based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com).

To further validate the patterns observed in figures 3 and 4, we now estimate a fixed-effects model. In the following simple regression model, the dependent variable is FDI, defined as the natural log of the quarterly number of projects in country *i*, industry *s*, at time *t* in the period 2015–2019.

$$FDI_{ist} = \beta_0 + \beta_1 HighExp + \beta_2 TW + \beta_3 HighExp * TW + \gamma_i + \gamma_s + \gamma_t + \varepsilon_{ist}$$

The main explanatory variable is the interaction of *HighExp*, a dummy variable equal to 1 for the tradable industries affected by the trade conflict (as defined in section 3), and *TW*, a dummy variable that takes the value of 1 after the second quarter of 2018. We also control for the uninteracted terms plus time, industry and country fixed effects, which account for idiosyncratic as well as country- and industry-specific characteristics. In auxiliary regressions, we add triple interaction terms by country (in table 2) – or by industry (in table 3) – to test for differential trends across specific countries or regions or industries of interest. To account for possible serial correlation of residuals, we cluster standard errors at the level of industry and country.

Table 2 presents the results from estimating the interaction between the coefficient capturing the dummies for all tradable sectors with a country or region to assess whether the impact of trade tension differs systematically across these economies.

Table 2. The impact of trade war on the number of high-trade-exposure projects worldwide and by host economies

	Dependent variable : ln (Number of projects)				
	(1)	(2)	(3)	(4)	(5)
High trade exposed	0.204 (0.172)	0.204 (0.172)	0.204 (0.172)	0.204 (0.172)	0.203 (0.172)
High trade exposed * TW	-0.0251 (0.0188)	-0.0263 (0.0170)	-0.0249 (0.0191)	-0.0385** (0.0173)	-0.0330* (0.0175)
High trade exposed * TW * China		0.0548* (0.032)			
High trade exposed * TW * SEA			-0.00319 (0.0394)		
High trade exposed * TW * MEX				0.465*** (0.03)	
High trade exposed * TW * IND					0.401*** (0.036)
Obs.	25761	25761	25761	25761	25761
Time FE	yes	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes

Source: Based on multiple data sources (see tables A.1 and A.2).
Note: TW = trade war, SEA = South-East Asia, MEX = Mexico, IND = India. Standard errors in parentheses clustered by country and industry: *** significant at p < 1%, ** significant at p < 5%, * significant at p < 10%.

The regression results, relying on the panel data estimations presented in table 2, support the trends shown in figure 3. While China's tradable industries saw minimal changes after the onset of the trade war, the South-East Asian economies saw negative – but not statistically significant – reductions in the number of trade-exposed FDI projects. In fact, the marginally statistically significant positive coefficient in column (2) for the interaction of highly trade-exposed projects in China after 2018 is consistent with the possibility that some MNEs may have reinforced productive capacity in the country in response to higher tariffs.

Conversely, the results in columns (4) and (5) demonstrate a statistically and economically significant increase in the number of trade-exposed FDI projects in Mexico and India following the 2018 tariff escalation. Although these economies are not highly integrated with China, they are closer to important final consumers in the United States.

Table 3 presents the marginal effect of high trade exposure on the relevant sector of projects (i.e. the interaction terms between high exposed projects, the trade tension dummy and the relevant sector) in regressions repeated for China, South-East Asia and Latin America. Results are broadly in line with figure 4.

Table 3. The impact of the trade war on selected industries worldwide and by host economies

	World (1)	China (2)	SEA (3)	LAC (4)
High Trade Exposed	0.22 (0.173)	0.421 (0.6)	0.446 (0.293)	0.206 (0.153)
High Trade Exposed * TW	-0.0393** (0.0132)	-0.227** (0.0976)	-0.136 (0.0852)	-0.0976*** (0.0279)
High Trade Exposed * TW * Auto	0.243* (0.119)	1.019 (0.764)	0.002 (0.161)	1.351** (0.498)
High Trade Exposed * TW * Electronics	0.530** (0.221)	0.0506 (0.682)	0.416* (0.229)	0.456* (0.226)
High Trade Exposed * TW * Food	-0.197* (0.0905)	-1.690** (0.561)	-0.324* (0.176)	-0.230*** (0.0308)
High Trade Exposed * TW * Textile	-0.0487 (0.19)		0.962*** (0.213)	-0.243 (0.242)
Constant	0.602*** (0.0674)	1.058*** (0.146)	0.527*** (0.0565)	0.459*** (0.0605)
Obs.	25767	680	2760	2763

Source: Estimations based on multiple data sources (see tables A.1 and A.2).

Note: Standard errors in parentheses clustered by industry and country: *** significant at $p < 1\%$, ** significant at $p < 5\%$, * significant at $p < 10\%$. Columns 2 to 4 show results for regions or country.

There is some evidence of diversion to South-East Asia in specific industries, confirming findings of other research, but the aggregate effect on investment in China is limited and the overall effect on investment in South-East Asia is actually negative. This seems to be the case for the number of projects in electronics industries that have been diverted to South-East Asian and Latin American economies. This result is consistent with the idea that less capital-intensive industries (i.e. excluding battery production and semiconductors in the electronics industry) may be more flexible and able to diversify their international production networks, opening possibilities to capture additional location cost advantages.

Projects in the automotive industry exhibit less clear-cut patterns following the start of the trade war, which could be indicative of stronger tariff-jumping motives.[11] Cost considerations tied to economies of scale and deeply integrated GVCs might also play a role in MNEs' apparent decisions to simultaneously maintain investment in China while also replicating the value chain in outside regions (such as Latin America).[12]

Investment in food processing industries decreased in the whole region, possibly because the pressure of increased costs may have been pushing margins too low. Investment in the textile industries had already been shifting from high-cost to low-cost locations since well before the recent tariff war.

A closer examination of trends by industry sheds light on the diverse strategies across GVCs: MNEs in some industries appear to have diverted investment towards South-East Asian and Latin American countries. The analysis by industry confirms UNCTAD's predictions for international production trajectories towards some form of restructuring of GVCs (UNCTAD, 2020a and 2021). In particular, trade tensions may have contributed to a shift towards more market-oriented investment, as long and complex value chains proved harder to dismantle or divert. There are also signs that some MNEs have been trying to build resilience by diversifying their supply chain, especially among geographically concentrated industries such as electronics. This trend accelerated after 2018 but was already evident in the preceding decade.

The implications of these trends are especially important for developing countries. Tariffs affected primarily manufacturing industries, which are critically important for developing productive capacity and trade. Nevertheless, preliminary evidence suggests that some typical efficiency-seeking investment might have started moving away from traditional host economies, particularly after the 2018 tariff escalation, offering other less advanced economies new opportunities to join GVCs.

[11] The concomitant increase of investment in Latin American economies might be driven by the ratification of the North American free trade agreement and the subsequent increase of automotive investment in Mexico.

[12] See also *Financial Times*, "In charts: Asia's manufacturing dominance", March 21, 2021.

5. Concluding remarks and policy implications

This research contributes to the literature on the impact of trade conflicts on FDI, and specifically on international production. This study focuses on the pre-pandemic period because the drivers of the trade tensions might bear on investment differently when compared with the multifaceted COVID-19 shock. While causal inference cannot be established without further analyzing other determinants of investment decisions, the patterns are consistent with concerns that the rise in protectionist trade policies may have pushed MNEs to reconsider their international production networks, particularly in some manufacturing industries, which rely heavily on firms' ability to import components and supplies, and to export. At the same time, tariffs and trade restrictions appear to have disproportionately – and negatively – affected East and South-East Asia, particularly in the most export-oriented industries. Conversely, investment in projects in China's tradable sectors showed resilience in 2019.

Importantly, the impact of trade tensions on cross-border investment projects varied considerably across industries: the results for GVC-intensive but less capital-intensive industries such as electronics and textiles and apparel showed some evidence of diversion towards South-East Asian and Latin American economies. Investment in the automotive industry showed no clear-cut trend in China, whereas some other industries suffered a regional setback.

The industries most exposed to trade tensions represent about 30 to 40 per cent of all manufacturing investment in developing economies and play a key role in the industrialization strategies of many developing economies. Hence, the reconfiguration of the international production network of these industries resulting from the trade tensions has important development implications; more importantly, in the current crisis a slowdown of manufacturing investment can imply a delay in the recovery.

Policies to cope with the new trends will vary depending on the industrial strength of the economy and its integration in regional and global value chains. For economies highly reliant on export-led strategies, investment diversion or relocation might threaten their development path; at the same time new locations can benefit from this same trend and thus need to be ready to attract new investors. The emergence of market-seeking FDI will make regional integration an important element in the development strategy, especially for smaller economies.

Further research (Blanchard et al., 2021b) will develop a more comprehensive empirical framework for analysing the extent to which the recent escalation of trade tensions may have induced investment diversion or aggregate level-changes in foreign investment. In future work, extending this model to include the effect of COVID-19 on the restructuring of international production networks, and post-pandemic recovery, will be valuable from both research and policy standpoints.

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Table A.1. Exposure to tariff by industry, 2018–2020

Industry classification	Average tariff charged against China (%)	US Import Share affected (%)	Share of HS10 affected (%)
Textile (313)	8.93	89.34	80.69
Paper (322)	9.35	81.92	80.48
Furniture (337)	8.03	80.25	80.12
Metal (331)	12.42	87.73	78.10
Petrol products (324)	6.69	66.69	76.92
Transportation equipment (336)	11.60	91.00	75.13
Machinery (333)	13.54	79.40	74.44
Fabricated Metal (332)	9.01	68.22	72.84
Plastics (326)	5.92	49.33	72.19
Non-metal (327)	5.93	58.50	69.74
Electrical (313)	9.34	68.07	69.64
Oil/Gas (211)	9.54	95.41	66.67
Wood (321)	6.18	61.76	61.10
Mining (212)	2.87	28.66	59.77
Chemical (325)	6.12	48.53	58.80
Fishing (114)	7.39	73.89	54.13
Crop (111)	7.18	71.80	53.36
Food manufacturing (311)	7.58	75.85	53.31
Computer (334)	4.75	35.60	50.09
Textile products (314)	1.38	13.84	39.75
Forestry (113)	0.84	8.40	31.37
Leather (316)	2.63	26.33	25.89
Animal (112)	0.50	5.01	25.00
Beverage (312)	5.61	56.11	24.39
Printing (323)	1.83	18.29	21.54
Miscellaneous manufacturing (339)	0.36	2.89	16.39
Apparel (315)	0.74	7.43	4.21

Source: Blanchard et al (2021a).
Note: Industry classification is based on NAICS3 codes.

Table A.2. Number of tariff-exposed greenfield projects by industry, 2018–2020

NAICS3 industry classification	Total projects	Affected projects	Share of affected projects (%)
Fishing (114)	5	5	100.00
Animal (112)	42	36	85.71
Non-store Retailers (454)	199	169	84.92
Wood product (321)	44	34	77.27
Paper manufacturing (322)	124	93	75.00
Forestry and logging (113)	8	6	75.00
Furniture (337)	33	23	69.70
Nonmetallic mineral product (327)	260	177	68.08
Food manufacturing (311)	696	457	65.66
Textile (314)	47	30	63.83
Primary metal (331)	248	157	63.31
Food manfacturing (311)	105	65	61.90
Merchang wholesalers (424)	44	27	61.36
Mining (212)	75	46	61.33
Beverage and tobacco (312)	150	87	58.00
Plastics and rubber (326)	583	331	56.78
Electrical equipment (335)	323	177	54.80
Fabricated metal (332)	252	135	53.57
Oil and gas (211)	43	23	53.49
Printing (323)	29	15	51.72
Petroleum and coal (324)	142	73	51.41
Chemical (325)	1375	609	44.29
Transportation equipment (336)	1568	668	42.60
Machinery (333)	1384	432	31.21
Electronics/Appliance store (443)	171	48	28.07
Motor vehicle and parts dealer (441)	73	19	26.03
Building material dealers (444)	138	34	24.64
Computer (334)	1109	262	23.62

/…

Table A.2. Number of tariff-exposed greenfield projects by industry, 2018–2020
(Concluded)

NAICS3 industry classification	Total projects	Affected projects	Share of affected projects (%)
Furniture store (442)	549	83	15.12
Miscellaneous manfacturing (339)	730	101	13.84
Food and Beverage (445)	750	78	10.40
Merchang wholesalers (423)	264	27	10.23
Health and personal care (446)	552	56	10.14
Miscellaneous store (453)	194	17	8.76
Leather (316)	487	29	5.95
Apparel (315)	2746	120	4.37
Mining support activity (213)	30	1	3.33
General merchandising (452)	143	3	2.10
Gas station (447)	82	1	1.22
Total	15797	4754	

Source: UNCTAD.

Note: Affected sectors are defined as highly exposed based on the designated function (extraction, manufacturing, distribution and logistics) and sector (ISIC 1–2, 5, 10–11, 13–14), manufacturing (ISIC 15–22, 24–36), or wholesale/retail (ISIC 51–52).

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