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Reverse technological spillovers from outward FDI on home countries' total factor productivity: Does the mode of investment matter?

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ABSTRACT

We examine the effect of outward foreign direct investment (OFDI) on total factor productivity (TFP) of home (source of FDI) countries in a global sample of 85 economies, distinguishing between outward greenfield FDI (OGFDI) and outward cross-border merger and acquisition (M&A) purchases. The goal of the study is to test for *reverse technological spillovers* to the FDI source country. The hypothesis is that OGFDI and M&As have different capabilities of carrying out *reverse technological spillovers,* which would affect the TFP of home countries differently. We apply a two-step system generalized method of moments (GMM) to deal with possible endogeneity and find the following results. *First*, total OFDI has no effect on the home country's TFP. *Second*, disentangling OFDI by mode of investment reveals both positive and negative *reverse spillovers* from FDI to TFP. While OGFDI produces *negative reverse spillovers* on the TFP of an MNE's home country due to displacement of production and reduced competition at home, M&A purchases produce *positive reverse spillovers* on the TFP of an MNE's home country due to their potential to acquire high-value knowledge assets. *Third*, home countries' human capital development positively moderates the impact of OGFDI and M&A purchases on TFP, while trade openness positively moderates only the M&A impact on TFP. Our findings imply that policies that seek to promote OFDI can be beneficial once countries have reached a certain degree of human capital development and participation in international trade.

1. Introduction

Foreign direct investment (FDI) has always been under close social and political scrutiny. According to the statistics from the United Nations Corporation for Trade and Development (UNCTAD), between 1980 and 2017 the global stock of FDI over GDP grew from 5.45% to 41.33%. This dramatic growth has driven research on its economic implications on FDI recipients and source countries. The present paper contributes to the literature that gauges the implications of outward FDI (OFDI) on source countries' economic performance, and on total factor productivity (TFP) more specifically.

Policymakers often perceive that OFDI have negative consequences on home countries' domestic investment. It is feared that firms that invest abroad will stop investing at home, and, moreover, that through vertical FDI, multinational enterprises (MNEs) will relocate their economic activity to those countries that offer a cheaper labour force. Thus there is a fear that OFDI may have negative implications on countries' output, productivity, and employment. As a result of the Covid-19 crisis, due to these reasons, the temptation for policymakers to restrict OFDI has increased.

To a certain extent, these fears are supported by some empirical evidence. Bhasin and Kapoor (2021) find a negative relationship between OFDI and BRICS's exports, and for a sample of developing countries Herzer and Donaubauer (2018) conclude that OFDI has negative consequences on TFP. Nonetheless, there is empirical evidence to refute this negative view of OFDI. For instance, Herzer (2008) finds that OFDI promotes domestic production, Egger et al. (2001) show that it fosters productivity, and van Pottelsberghe de la Van Pottelsberghe de

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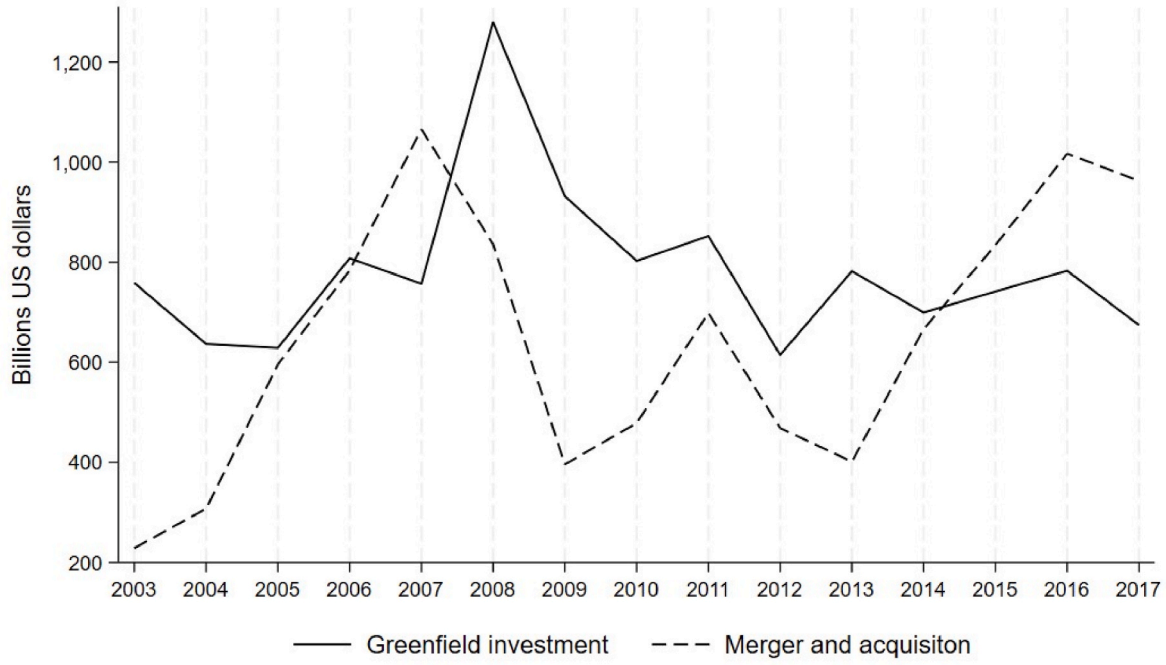

Fig. 1. GFDI and M&A evolution
Note: Data on GFDI and M&A are retrieved from and UNCTAD's World Investment report and Eikon Thomson Reuters, respectively.

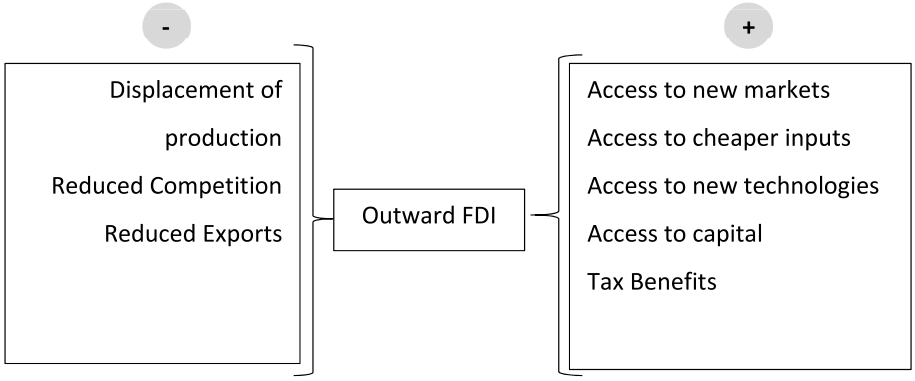

Chart 1. Spillovers from outward FDI
Note: Authors' own elaboration based on the literature review presented in Section 2.

la Potterie and Lichtenberg (2001) conclude that it favours technology diffusion.

In principle, the reasons why OFDI may have a positive or negative impact on source countries' economies can be viewed in parallel with the theoretical foundations for the impact of inward FDI on host countries. Research on inward FDI has paid attention to the existence – or the lack of – positive spillover from FDI at both the firm level (Javorcik, 2004; Javorcik & Spatareanu, 2008) and industry level (Doytch & Uctum, 2011, 2019), where the channels for potential positive spillovers are through a technological and a competition effect, and the channels for potential negative spillovers are through the crowding-out effect on domestic producers (Aitken & Harrison, 1999; Kindleberger, 1969). By analogy, OFDI may cause *negative reverse spillovers* on the home economy because of the displacement of production and reduction of competition. They may also cause *positive reverse spillovers* by improving firms' access to inputs, capital, and foreign markets, and enabling tax planning, or as a result of a transfer of knowledge and technologies from the subsidiaries back to the headquarter firms and source economies (Chart 1). Such a *positive reverse technological spillover* is especially important in an investigation on the impact of OFDI on the TFP of home countries, which is the subject of the current study.

This paper falls within the scope of emerging literature on *reverse technological spillovers* of FDI, some of which examines the reverse transfer of knowledge through patent acquisition (Vallachi et al., 2021; Reddy et al., 2022; Hong et al., 2019; Zhou et al., 2019). The presence of *reverse technological spillovers* gives rise to a new type of MNE – an MNE that seeks strategic asset acquisition. Thus, our empirical analysis provides insight into whether there are *reverse technological spillovers* due to the mode of OFDI, greenfield investment, or merger and acquisition investment.[1]

All in all, evidence of the economic consequences of OFDI is scant and mixed. Interestingly, a few studies have given insight into the implications of OFDI depending on the mode of investment: greenfield investment (GFDI) or cross-border merger and acquisition (M&A). This

[1] Reverse spillovers by FDI have recently been examined in the context of environmental economics literature (Ashraf & Doytch, 2023; Uctum et al., 2023).

is a relevant empirical question, since the determinants of GFDI and M&A are different, and the two are expected to have different effects (Cozza et al., 2015; Davies et al., 2018). In this regard, Ashraf et al. (2016) show that inward greenfield and M&A investment have different implications on host countries' TFP. In contrast to Ashraf et al. (2016), the present analysis focuses on the consequences of OFDI for home countries' TFP depending on the mode of investment.

The two modes of investment have a different evolution, and different geographic distributions and are subject to different policy responses. Globally, GFDI flows appear to be more stable over time than M&A flows. M&A deals are characterised by waves of investment flows, in which at the crest of the wave, M&As usually surpass GFDI flows (see Fig. 1). Furthermore, M&A is the preferred mode of investment from and into developed countries, while greenfield investment is still predominant in developing countries (UNCTAD, 2021). In addition, host countries are usually more welcoming to GFDI, while M&As are more likely to suffer from restrictions motivated by the fear of losing control of strategic assets to foreign firms or potential job losses (Carril-Caccia et al., 2022).

The present paper focuses on the impact of OFDI on home countries' total factor productivity. Our work contributes to the literature in three ways. First, for a large sample of countries, it addresses the question of whether the effect of OFDI is dependent on the mode of investment. To the best of our knowledge, previous studies that address this specific research question only focus on one country's source of OFDI. Second, it provides insight into whether the differential effects of outward GFDI (OGFDI) and outward M&A depend on home countries' human capital endowment. Third, this paper explores the question of whether trade openness moderates the link between OGFDI or M&A and the home country's total factor productivity.

We use a large data set on outward GFDI and outward M&A, compiled using UNCTAD, for the period 2003–2017. We differentiate the countries by their level of development, analysing the results for two sub-samples – 37 developed countries and 48 developing countries. Our results show that the distinction between OGFDI and outward M&A is relevant when addressing the effect of OFDI on TFP. Globally, our empirical findings suggest that outward M&A promotes TFP in source countries, while OGFDI reduces it. We also show that home countries' human capital development positively moderates the impact of OGFDI and M&A on TFP, while trade openness positively moderates the M&A impact on TFP. Robustness tests further confirm that, depending on the mode of investment, OFDI has a different effect on the TFP of home nations.

The rest of the paper is organized as follows. Section 2 presents a literature review on the economic implications of OFDI on home countries. Sections 3 and 4 describe the empirical methodology and data, respectively. Section 5 discusses the results, and Section 6 offers some concluding remarks.

2. Literature review

The previous literature on the link between OFDI and the economic performance of home countries (e.g. Desai et al., 2005; Herzer, 2011, 2012; Lee, 2010; Stevens & Lipsey, 1992) describes several channels through which OFDI might have negative or positive implications on home countries' domestic investment, economic growth or productivity. The most common fear related to OFDI is the displacement of production. In the context of vertical FDI, MNEs distribute their productive activities across borders with the aim of benefiting from different countries' competitive advantages. This concern is exacerbated if firms are perceived as facing capital restrictions, and investment projects that are made abroad are substitutes for those that they would have done in their home country (Stevens & Lipsey, 1992). If firms that internationalize production reduce their domestic investment, this would have negative implications for productivity.

Similarly, MNEs may use horizontal FDI as an alternative strategy to exports for serving a foreign market. Thus, OFDI growth can reduce domestic employment, production, and exports, and constrain productivity growth (Herzer, 2011). In this regard, Debaere et al. (2010) show that South Korean firms that invest in less industrialized countries suffer from a reduction in employment growth. Bhasin and Kapoor (2021) find that the OFDI of BRICS substitutes for their exports. With the aim of analysing the link between wages and offshoring, Davies and Desbordes (2015) demonstrate for a sample of 17 OECD countries that OGFDI in support services improves the wages of high-skilled workers but worsens those of medium-skilled workers. Bitzer and Kerekes (2008) present evidence indicating that OFDI has a negative effect on non-G7 countries' production.

Indirectly, OFDI can displace domestic firms as these face starker competition from new domestic multinationals. At the same time, provided that FDI has positive economic implications on host economies in terms of technology transfer and productivity (e.g. Ashraf et al., 2016; Woo, 2009), this may also entail that firms from the home country will have to face increasing competition from abroad. If domestic firms are not able to adapt, these surges of competition can push them out of the market, result in lower competition, and have negative consequences on productivity.

On the positive side, OFDI can foster output and productivity at home through several channels. OFDI can have *positive reverse technological spillovers*. For a sample of 24 European economies and examining 10 service industries, Doytch (2022) finds that financial and business services OFDI flows contribute to the growth of their home countries. The author argues that in the case of financial services FDI, the growth effect works through financial holding companies and home countries especially benefit from investment in foreign banks, which provides access to credit. At the same time, in the case of business services FDI, the positive reverse spillover passes through management holding companies, which provide organization and computer activities, providing access to specialized human capital and high-value knowledge assets.

The hypothesis of the *reverse technological spillovers* of OFDI has also been tested at the level of the firm, examining the impact on innovation. For example, Thakur-Wernz et al. (2019) find that GFDI fosters innovation in core technologies, while cross-border M&A deals foster innovation in non-core technologies. In addition, FDI destinations that are high-income countries promote product innovation, while low-income country destinations foster process innovation. Valacchi et al. (2021), who examine only OGFDI and look at the patent generation of parent firms, find a positive *reverse technological spillover,* which is stronger for high-tech sectors such as chemicals, computers, and motor vehicles, and lower for low-tech sectors like oil, electricity, or construction. Similar conclusions are drawn by Chung and Alcacer (2002) for the pharmaceutical sector, as well as for the automotive industry (Pradhan & Singh, 2008). Moreover, MNEs often invest abroad to access or develop new technologies that are complementary to the ones they already have, or technologies that serve to overcome their competitive disadvantages (Amal et al., 2013; Knoerich, 2017; Van Pottelsberghe de la Potterie & Lichtenberg, 2001). Success in this regard can significantly boost investing firms' productivity. On a different note, Desai et al. (2005) argue that for an MNE, foreign and domestic investment are not substitutes but complements, as they ease firms' access to capital markets. Golbach et al. (2019) demonstrate that OFDI can benefit the investment of domestic firms' subsidiaries through tax planning profit shifting, and better access to capital markets.

Through OFDI, firms can improve their market access in the countries – and regions in the case of export platform FDI – in which they invest. This can result in a growth of exports and economies of scale. Furthermore, through vertical OFDI, firms can access inputs with higher quality at a lower cost. In addition, firms that internationalize their production will likely face higher levels of competition than at home, pushing them to improve their products and at the same time keep prices low (Herzer, 2011).

Evidence on the overall impact of OFDI on productivity is scant and mixed. For the case of Germany and the USA, Golbach et al. (2019) and

Monarch et al. (2017), respectively, find that firms' TFP remains unaffected by their decision to invest abroad. In the case of Austria's manufacturing sector investing in Eastern Europe, Egger et al. (2001) show that OFDI increases productivity growth at home. Herzer (2011) finds a positive relationship between countries' TFP and OFDI for a sample of 33 developing countries, and Herzer (2012) for the case of Germany. In contrast, Herzer and Donaubauer (2018) find a negative effect of OFDI on TFP for a sample of 49 developing countries. Elsewhere, for a sample of 17 OECD countries and 10 manufacturing sectors, Bitzer and Görg (2009) find that OFDI is on average negatively linked to productivity, but also show that there is certain heterogeneity across countries. The authors report that OFDI fosters certain countries' productivity. However, to the best of our knowledge, the role of the mode of investment abroad has been mostly overlooked by previous studies. Yet, since GFDI and cross-border M&A have different drivers, they may have different implications at home.

With cross-border M&A, MNEs acquire existing assets located abroad. Accordingly, M&A enables participating firms to benefit from synergies that may result in greater efficiency through investments that seek cost reduction (Raff et al., 2009). Along this same line of thought, through M&A, firms in general – and in particular firms from emerging countries – can acquire competitive advantages, both in the form of intangible and tangible assets, which can foster the growth of investing firms and their country of origin (Davies et al., 2018; Knoerich, 2017; Reddy et al., 2022; Vallachi et al., 2021). Furthermore, M&A can serve as a strategy through which an MNE can access or improve its presence in a foreign market, and at the same time reduce competition through the acquisition of a direct competitor (Hymer, 1970; Raff et al., 2009).

Nonetheless, among other factors, cultural barriers, the liability of foreignness, MNEs' lack of experience, and the resistance of firms' workers to change are dimensions that can hamper the success of an M&A (Carril-Caccia, 2021), and thus limit the potential positive effect that they can have on the home country. In addition, to achieve efficiency gains and minimize duplicates of the MNE's economic activity, outward M&A can result in a reduction of employment and investment at home.

With GFDI, MNEs build a new subsidiary abroad and usually rely more on their own capabilities than in the case of M&A (Davies et al., 2018). With this mode of investment, MNEs do not directly acquire foreign firms' tangible and intangible resources, but are able to incorporate into their productive activity those inputs that are available in the country in which they invest (Meyer et al., 2009). In addition, Nocke and Yeaple (2008) argue that GFDI is driven more by host countries' differences in resource endowment and labour costs than M&A. Thus, through GFDI firms also incorporate complementary assets that can potentially foster productivity at home. However, in the case of GFDI, the offshoring of economic activity is even more likely than in the case of M&A (Davies et al., 2018).

The literature that analyses and compares the implications of outward M&A and OGFDI is limited and provides evidence on OFDI from only one country. In the context of Chinese OFDI to the European Union, using firm-level data, Cozza et al. (2015) show that OGFDI fosters Chinese MNEs' productivity more than in the case of M&A purchases. Amendolagine et al. (2021) demonstrate that outward M&A deals have a greater positive impact on Indian manufacturing MNEs innovation than OGFDI.

3. Methodology

We use a dynamic empirical model that controls for the variables most commonly used in the literature (e.g. Woo, 2009), along with country-fixed effects and time-fixed effects:

$$\begin{aligned} ln(TFP_{it}) = {} & \beta_0 + \beta_1\, ln\left(TFP_{i,t-1}\right) + \beta_2\, ln\left(ofdi_{it}^{j}\right) + \beta_3 polstab_{it} \\ & + \beta_4 tra_{it} + \beta_5 govexp_{it} + \beta_6 popgrowth_{it} + \beta_7 infla_{it} \\ & + \beta_8 humancap_{it} + \beta_9\, D_t + \mu_i + \varepsilon_{it} \end{aligned} \tag{1}$$

with $\mu_i \sim i.i.d(0,\ \sigma_{\mu_i})$, $\varepsilon_{it} \sim$ i.i.d.$(0, \sigma_\varepsilon)$, $E[\mu_i \varepsilon_{it}] = 0$ and where i is the country sub-subscript and $ofdi_{it}^{j}$ is the respective net OFDI flows share of GDP with superscript of j that stands for: total OFDI; OGFDI; and outward M&A purchases. The variable TFP_{it} represents the total factor productivity; and $polstab_{it}$ is a measure of political stability and absence of violence/terrorism, which is used as a proxy for institutional quality. The index of political stability and absence of violence ranges from approximately (−2.5 to 2.5).

The control variable tra_{it} stands for trade openness measured as a percentage share of GDP of the sum of imports and exports; $govexp_{it}$ is the government consumption expenditure as a share of GDP; $popgrowth_{it}$ represents the growth rate of the population; $infla_{it}$ represents inflation rate measured as GDP deflator; and $humancap_{it}$ denotes human capital. D_t is a vector of time dummies and μ_i is an idiosyncratic country-specific effect.

We expect higher political stability and the absence of violence/terrorism to improve productivity and efficient use of resources by reducing uncertainty ($\beta_3 > 0$), and higher government expenditures to decrease productivity due to associated higher taxation ($\beta_5 < 0$). The coefficient on human capital is expected to be positive ($\beta_8 > 0$) due to the fact that the high quality of human resources leads to the more efficient use of resources and innovations. In the same vein, one can expect that a larger population would lead to greater productivity. This effect can also go in reverse because, in highly resource-constrained countries, population growth might not be accompanied by an improvement in human capital. Thus, the expected sign of β_6 is uncertain. The expected sign of inflation is negative ($\beta_7 < 0$), because a high level of inflation is associated with greater macro instability and uncertainty that affects efficient resource allocation and productivity negatively, while that of trade is positive since openness of trade enhances specialization and technology and leads to productivity growth ($\beta_4 > 0$).

The dynamic-effects methodology is used to capture long memory in the process of accumulation of productivity growth. We apply a two-step system GMM that allows us to capture both the cross-sectional and the time-series characteristics of the data (Alonso-Borrego & Arellano, 1999; Blundell & Bond, 1998), and to control for the endogeneity and possible reverse causality between FDI and the dependent variable.[2] The fixed effects estimation is not appropriate since the fixed effects estimator fails to address the problem of endogeneity without an instrument in dynamic specifications.

We instrument FDI with *GMM-style* instruments to address the endogeneity and reverse causality between $ofdi_{it}^{j}$ and TFP_{it} , and *iv-style* instruments for all other variables. In order to avoid the overfitting of the model caused by too many instruments (Roodman, 2009), we follow the rule of thumb stating that the "number of instruments should be less than the number of countries". After experimenting with a different number of lags, we present here a set of results based on the minimum optimum lags.[3] This approach is widely used in the literature to preserve the degrees of freedom (e.g., Ashraf, 2021; Ashraf & Chaudhry, 2022; Doytch & Ashraf, 2022).

The necessary condition for the consistency of system GMM requires that the error term does not have second-order serial correlation. If the

[2] We prefer system GMM than Arellano and Bond "difference" GMM because difference GMM creates bias if a dependent variable follows a random walk, the independent variables are persistent over time, and the sample has small time dimension.

[3] The results are largely consistent.

condition does not hold, the standard errors of the instrument estimates grow without a bound. We rely on Arellano and Bond's (1991) second order (AR2) test, which measures whether the first-differenced error term is second-order serially correlated. The AR2 test shows that serial correlation is not present here. Another requirement that makes System GMM estimation consistent is the exogeneity of the instruments. The standard Hansen test of over-identification, which examines the validity of the instruments, indicates no signs of invalid over-identifying restrictions in our case.

We perform robustness checks with the method of fixed effects and the sequential (two-stage) estimation (SELPDM) of Kripfganz and Schwarz (2015). The SELPDM corrects the standard errors from the two-step system GMM, as per Windmeijer (2005).

3.1. Total factor productivity

We construct the TFP variable as follows:

$$TFP = Y \Big/ \left[K^{1-\propto} L^{\propto}\right] \tag{2}$$

where Y is output, K denotes capital stock, L represents labour input.[4] While $\propto$ denotes the labour share of income, $1 - \propto$ is the capital share of income with the standard assumption of $\propto = 0.6667$. Recent studies suggest that the labour share does not remain constant in many countries (Karabarbounis & Neiman, 2014; Herzer and Donaubauer, 2017). A closer inspection indicates that reliable data on labour share is not available for many countries in our sample. Thus, we take the standard assumption of constant labour share in the same way the existing studies do. Output is measured by GDP at constant 2010 US$ and labour input is represented by the total labour force (people aged 15 and older who supply labour for the production of goods and services). In the robustness check, we also calculate TFP as follows:

$$TFP = Y \Big/ \left[K^{1-\propto} (LH)^{\propto}\right] \tag{3}$$

where H is the human capital and LH represents human capital augmented labour force.

4. Data

We use annual data for 85 countries (investigated countries are listed in Appendix A), spanning from 2003 to 2017. The data are collected from multiple sources.

The data on *FDI* outflow variables, total FDI,[5] and the value of *GFDI* projects, are from the UNCTAD database. These data are expressed as a percentage of GDP, the data for which are obtained from World Development Indicators (WDI) in current US dollars.[6] The data on GFDI are based on information provided by *fDi Markets* of the Financial Times. The data on the volume of cross-border M&A purchases are from Eikon Thomson Reuters, from which we access firm-level M&A data. We exclude all the M&As that represented less than 10% of the target firm ownership. Missing data on the value of M&As usually refer to small transactions in which the value is undisclosed. We impute this missing data with the value of one million US dollars.[7] The data on M&A purchases represents the total value of M&A purchases in a given year.

[4] Due to unavailability of data on TFP levels, the data on TFP are constructed in the same way the existing studies construct them (e.g., Ashraf et al., 2016).

[5] For our empirical analysis, negative total FDI outflows are replaced with a zero. Our results are robust to excluding them from the analysis. To conserve space, estimates are available upon request.

[6] In order to keep the zeros present in the FDI outflows variable, we take the logarithm of the FDI variable plus one.

[7] This strategy is followed by Carril-Caccia et al. (2022). As we show in our sensitivity analysis, results are robust to excluding M&A transactions whose value is missing.

Table 1
The effects of outward FDI, outward GFDI and cross-border M&A purchases on TFP.

	(1)	(2)	(3)	(4)
$\log(TFP)_{t-1}$	0.9912***	0.9863***	0.6644***	0.9597***
	(78.75)	(27.96)	(18.70)	(72.27)
log(outbound FDI)	−0.0005			
	(-0.69)			
log(outbound greenfield)		−0.0133**		−0.0066***
		(-2.03)		(-2.88)
log(M&A purchases)			0.0153***	0.0070***
			(5.34)	(3.10)
Political stability	−0.0033	−0.0085	0.0124	0.0150***
	(-0.89)	(-0.90)	(0.48)	(2.60)
Trade	0.0001	0.0004	0.0023***	0.00002
	(0.95)	(1.21)	(4.28)	(0.21)
Govt. expenditures	−0.0002	0.0016	0.0187***	0.0004
	(-0.25)	(0.63)	(5.12)	(0.44)
Population growth	−0.0049***	−0.0031	0.0253***	−0.0029*
	(-2.60)	(-0.63)	(4.17)	(-1.91)
Inflation	0.0004	0.0008	0.0014*	0.0007
	(0.45)	(1.29)	(1.78)	(1.46)
Human capital	0.0019	0.0162	0.2339***	0.0156*
	(0.30)	(0.67)	(4.99)	(1.80)
Observations	1056	1138	1088	1051
No. of countries	83	85	85	85
No. of instruments	32	32	46	45
Hansen test (p-val)	0.605	0.278	0.170	0.280
AR2 (p-val)	0.877	0.225	0.545	0.324

Notes: All FDI variables are included as a share of GDP. The two-step system GMM estimates; t-statistics are in brackets; *, **, *** are significance levels at 10%, 5%, and 1%, respectively.

Political stability and the absence of violence measure the perception of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means (Kaufman et al., 2010). The data are obtained from Worldwide Governance Indicators.

Inflation rate is measured by the annual growth rate of the GDP implicit deflator. The data on inflation, government consumption expenditures, trade openness, and population growth rate are obtained from WDI.

For constructing the above-described different TFP measures, we retrieve the GDP at constant 2010 US$ and the total labour force from WDI. From the Penn World Table (PWT) version 10.0 we obtain the data on capital stock in constant US$, and the human capital index based on years of schooling and returns from education.

The descriptive statistics are presented in Appendix B: Table B1. We summarize the definitions and sources of variables in Table B2 (Appendix B).

5. Results

5.1. Main results

Regarding the OFDI-TFP link, column (1) in Table 1 shows that overall OFDI flows have a non-significant effect on home countries' TFP. This finding is in line with the previous empirical evidence reported by Golbach et al. (2019) and Monarch et al. (2017), and suggests that on average the mechanisms through which OFDI can benefit a home country's productivity are countered by the mechanisms that can harm it.

Estimates reported in columns (2)–(4) demonstrate that disentangling OFDI by mode of investment uncovers both a positive and a negative link between OFDI and TFP. OGFDI seems to hamper the TFP of the MNE home country. Increasing the share of OGFDI flows over GDP by 1% can reduce TFP by 0.007%–0.015%. In contrast, outward M&A investment seems to benefit home countries' TFP. A growth of 1% of M&A flows over GDP can foster TFP by 0.007%–0.015%. Notice that the similarity in the size but opposite effects of OGFDI and M&A are in line

with the lack of significance reported in column (1) for OFDI flows. Furthermore, according to these estimates, in the long run,[8] OGFDI can limit countries' TFP by 0.16–0.97% and M&A can foster it by 0.05–0.17%.

The above result clearly points out the existence of *negative reverse technological spillovers* from OGFDI and *positive reverse technological spillovers* from M&A purchases to the home country TFP. The likely reason for the positive *reverse technological spillovers* is the fact that M&A purchases are often motivated by acquiring high-value tangible and intangible assets, which are subsequently made available to the acquiring firm at home. Such assets could range from mineral resources and agricultural goods to parts and components produced with rare mineral resources to intangible assets embedded in patents, or industry-specific and market-specific know-how. Our result ties up well with findings within the growing literature on technological innovation (Vallachi et al., 2021; Sasidharan & Kathuria, 2011; Hong et al., 2019; Zhou et al., 2019; Thakur-Wernz & Samant, 2019; Marin & Sasidharan, 2010). The likely reason for the *negative reverse technological spillovers* of OGFDI is likely due to displacement of production and reduced competition at home, which does not create a conducive atmosphere for innovation.

The effects of the control variables are largely in accordance with our expectations. We also find that political stability is significantly positively associated with TFP. The sign on the coefficient of trade openness is positive in all specifications, but significant only in column (3), indicating that trade openness increases TFP by enhancing specialization and technology. Likewise, the sign on the coefficient of human capital is positive in all specifications, but significant only in columns (3) and (4). This significantly positive effect of human capital on TFP is consistent with the results of previous studies (e.g. del Barrio-Castro, López-Bazo, & Serrano-Domingo, 2002; Woo, 2009; Fleisher et al., 2010). However, some studies do not find a significant impact of human capital on TFP (e.g. Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004; Baltabaev, 2014; Miller & Upadhyay, 2000).

As per our expectations, the sign of the coefficient of population growth is negative and significant in columns (1) and (4) and is positive and significant in column (3). The effect of government expenditure on TFP is insignificant in most cases. However, it is positive and significant in column (3). The reason could be that higher government expenditure may lead to higher productivity through the demand side effect on production. In contrast to our expectations, the sign on the coefficient of inflation is positive, although it remains insignificant in most cases.

5.2. Heterogeneity analysis

Below, we attempt to shed light on some of the possible mechanisms that drive the link between TFP and OGFDI or M&As. In particular, we explore the extent to which source countries' human capital and trade openness moderate the link between TFP and OGFDI or M&A. To this end, we adapt Specification (1) by interacting OGFDI (or M&As) by the human capital index (or trade openness). We estimate:

$$\begin{aligned} ln(TFP_{it}) = {} & \beta_0 + \beta_1\, ln\left(TFP_{i,t-1}\right) + \beta_2\, ln\left(ofdi^j_{it}\right) \\ & + \beta_3\, ln\left(ofdi^j_{it}\right) {*} humancap_{it} + \beta_4 polstab_{it} + \beta_5 tra_{it} \\ & + \beta_6 govexp_{it} + \beta_7 popgrowth_{it} + \beta_8 infla_{it} + \beta_9 humancap_{it} \\ & + \beta_{10}\, D_t + \mu_i + \varepsilon_{it} \end{aligned} \tag{3}$$

To analyse the moderating effect of trade openness on the TFP-OFDI link, Specification (3) is adapted by interacting $ofdi^j_{it}$ with trade openness instead of human capital. Estimates are reported in Table 2.

Table 2
The moderating effect of human capital and trade openness on the TFP-outward FDI link.

	Human capital		Trade openness	
	(1)	(2)	(3)	(4)
β_1 log(TFP)$_{t-1}$	0.6765***	0.9688***	0.8824***	0.9588***
	(31.06)	(55.30)	(73.95)	(56.22)
β_2 log(outbound greenfield)	−0.0447***	−0.0083**	0.0277***	−0.0060**
	(-3.24)	(-2.15)	(7.20)	(-2.34)
β_3 log(M&A purchases)	0.0015**	−0.0302*	0.0026***	−0.0099**
	(2.05)	(-1.65)	(4.68)	(-2.08)
β_4 log(outbound greenfield)*human capital	0.0171***			
	(3.38)			
β_5 log(M&A purchases)* human capital		0.0118*		
		(1.92)		
β_6 log(outbound greenfield)*trade			−0.0002***	
			(-6.89)	
β_7 log(M&A purchases)* trade				0.0002***
				(3.20)
β_8 Political stability	0.1080***	−0.0005	0.0228***	0.0162**
	(7.17)	(-0.06)	(2.85)	(2.36)
β_9 Trade	0.0001	0.0001	0.0002***	−0.0001
	(1.39)	(1.40)	(3.69)	(-1.41)
β_{10} Govt. expenditures	0.0165***	−0.0003	0.0037***	0.0018**
	(7.55)	(-0.31)	(3.36)	(2.12)
β_{11} Population growth	0.0355***	0.0005	0.0078***	−0.0028
	(7.58)	(0.20)	(4.36)	(-1.49)
β_{12} Inflation	0.0020***	0.0007	−0.0005*	0.0004
	(4.15)	(1.28)	(-1.90)	(0.96)
β_{13} Human capital	0.2147***	0.0807***	0.0751***	0.0239**
	(7.75)	(2.58)	(7.18)	(2.08)
Observations	1051	1051	1051	1051
No. of countries	85	85	85	85
Hansen test (p-val)	0.275	0.233	0.0552	0.806
AR2 (p-val)	0.643	0.216	0.083	0.145

Notes: All FDI variables are included as a share of GDP. The two-step system GMM estimates; t-statistics are in brackets; *, **, *** are significance levels at 10%, 5%, and 1%, respectively.

It is expected that a higher degree of human capital development would enhance countries' capacity to benefit from reverse technological spillovers from OFDI. Human capital can allow countries to fully benefit from the complementary knowledge and technology from abroad. It also makes them less vulnerable to the potential negative consequences associated with the offshoring of production. Higher human capital is associated with countries' capabilities of developing high-value-added and capital-intensive activities that are less susceptible to being delocalized.

Estimates reported in columns (1) and (2) from Table 2 are aligned with this hypothesis. Overall OGFDI has a negative effect on countries' TFP, but the interaction between OGFDI and human capital reports a positive and significant coefficient (see column (1)). This suggests that the negative effect of OGFDI on TFP decreases as countries' human capital improves. Based on these estimates, we can gauge the level of human capital that cancels out the negative effect of OGFDI on TFP. If we take the first derivative from the estimated model in column (1) with respect to OGFDI, we obtain:

$$\frac{\partial TFP}{\partial (OFDI^j)} = \widehat{\beta}_2 + \widehat{\beta}_3 Human\ capital = 0 \tag{4}$$

Where j=(OGFDI; M&A purchases). Using Equation (4), we can calculate that countries should have 2.61 in the human capital index to cancel out the negative consequences that OGFDI has on TFP. Similarly, estimates in column (2) show that countries need 2.56 in the human capital index in order to be able to start benefiting from outward M&A.

Table 3 illustrates the impact of a 1% increase in OGFDI or M&A (as a share of GDP) on TFP depending on different levels of human capital. As can be gathered, for countries that are above the fourth percentile of our

[8] As in Ashraf et al. (2016) we calculate the long-run effect by dividing the estimated short-run coefficient by ones minus the coefficient of the lagged dependent variable. For instance, one of the long-run effects of M&A is the result of $\frac{0.0153}{(1-0.6644)}$.

Table 3
Impact of outward GFDI and M&A for a given level of human capital.

Percentile	Human capital	As in	Greenfield investment	M&A
10%	2.25	Türkiye	−0.0063	−0.0037
20%	2.40	Colombia	−0.0036	−0.0019
30%	2.56	Thailand	−0.0010	0.0000
40%	2.73	United Arab Emirates	0.0019	0.0020
50%	2.88	Sri Lanka	0.0046	0.0038
60%	3.07	Bulgaria	0.0079	0.0061
70%	3.22	Luxembourg	0.0103	0.0078
80%	3.32	Sweden	0.0121	0.0090
90%	3.56	Norway	0.0162	0.0118
Average	2.86	Argentina	0.0042	0.0035

Note: Authors' own calculations, based on estimates from Table 2 and the average level of human capital index during the period 2003–2017.

Table 4
Impact of outward GFDI and M&A for a given level of trade openness.

Percentile	Trade	As in	Greenfield investment	M&A
10%	46.91%	India	0.0183	−0.0005
20%	51.18%	Kenya	0.0175	0.0003
30%	58.53%	Greece	0.0160	0.0018
40%	68.90%	Zimbabwe	0.0139	0.0039
50%	78.55%	Morocco	0.0120	0.0058
60%	87.78%	Iceland	0.0101	0.0077
70%	104.47%	Namibia	0.0068	0.0110
80%	131.74%	Lithuania	0.0014	0.0164
90%	155.88%	Hungary	−0.0035	0.0213
Average	96.39%	Denmark	0.0084	0.0094

Note: Authors' own calculations, based on estimates from Table 2 and the average level of trade openness during the period 2003–2017.

sample's human capital, OGFDI and M&A can benefit their TFP. This result is to a certain extent in line with the previous empirical evidence that shows that OFDI benefits developed countries' productivity (Bitzer & Görg, 2009; Egger et al., 2001; Herzer, 2012), or results in the offshoring of low-skill jobs (Davies & Desbordes, 2015). It is also in agreement with Herzer and Donaubauer (2018), who demonstrate that the negative effect that OFDI has on developing countries' TFP is lower for those countries that have higher levels of human capital.

Columns (3) and (4) from Table 2 address the extent to which trade openness moderates the link between OGFDI and TFP, and M&A and TFP, respectively. Table 4 illustrates the impact of a 1% increase in OGFDI or M&A (as a share of GDP) on TFP depending on different levels of human capital.

When the OGFDI and trade interaction is included, the coefficient associated with the overall effect of OGFDI turns positive and significant. The coefficient associated with the interaction turns negative and significant. Both estimates indicate that countries' trade openness undermines the potential positive link between OGFDI and TFP. If a country has a trade openness higher than 113.5%, growth in OGFDI might harm its TFP. This finding is aligned with the argument that OGFDI is likely to be linked with the offshoring of production. The more open a country is to international trade and participates in global value chains, the more likely it is that OGFDI resulting in the offshoring of production will harm TFP.

For the case of outward M&A, the inclusion of the interaction with trade openness turns the overall effect of M&A on TFP negative and significant, while the interaction is positive and significant. In this way, the extent to which M&A can benefit a country's TFP is positively moderated by its level of trade openness. The results suggest that countries' trade openness needs to be larger than 49.5% in order for M&A to foster its TFP. The overall results for M&A are indicative that through trade openness and high human capital, home countries are capable of fully benefiting from the complementary knowledge, technology, and inputs acquired abroad by their MNEs. In addition, through M&A, MNEs are capable of reducing foreign competition and improving their own product market position abroad. This can benefit domestic investment, production, and productivity.

In Table 5 we split our sample of analysis into developed and developing countries. Traditionally, OFDI has been dominated by developed countries, but according to UNCTAD's FDI statistics, since 2010 the share of global OFDI flows from developing countries has fluctuated between 20% and 47% (UNCTAD, 2022). For developed countries, the results show that on average only GFDI has a positive and significant effect on productivity, while M&As have a non-significant effect (see columns 1 to 3). In the case of developing countries,

Table 5
The effects of outbound greenfield FDI and cross-border M&A purchases on TFP: Sub-sample results.

	Developed countries			Developing countries		
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(TFP)_{t-1}$	0.9721***	1.0376***	0.9956***	0.9663***	0.9736***	0.9598***
	(90.44)	(50.22)	(127.84)	(55.11)	(57.18)	(142.89)
log(outbound greenfield)	0.0041**		0.0031**	−0.0155**		−0.0057**
	(2.11)		(2.00)	(-2.35)		(-2.00)
log(M&A purchases)		−0.003	−0.0005		0.0038	0.0034***
		(-1.22)	(-0.53)		(1.18)	(2.61)
Political stability	0.0029	−0.0131**	0.0037	0.0042	0.0048	0.0059
	(1.01)	(-2.14)	(0.91)	(0.51)	(0.97)	(1.31)
Trade	0.00002	0.0001	−0.0001*	0.0002**	0.00004	0.0001*
	(0.6992)	(1.13)	(-1.81)	(2.09)	(0.99)	(1.84)
Govt. expenditures	−0.00002	−0.0015	−0.0005	0.0001	−0.001	−0.0002
	(-0.0504)	(-1.53)	(-1.08)	(0.07)	(-1.18)	(-0.31)
Population growth	0.0015	−0.0159**	−0.0025	0.0005	−0.0046**	−0.0003
	(0.39)	(-2.65)	(-0.93)	(0.15)	(-2.00)	(-0.19)
Inflation	0.0031***	0.0054***	0.0022***	0.0001	0.0006	0.0005
	(5.14)	(3.64)	(3.74)	(0.24)	(1.19)	(1.31)
Human capital	0.0414***	0.0656*	0.0046	0.0339	−0.0087	0.0328*
	(2.63)	(1.82)	(0.93)	(1.19)	(-0.66)	(1.87)
Observations	517	507	506	621	581	545
No. of countries	37	37	37	48	48	48
Hansen test (p-val)	0.343	0.331	0.702	0.197	0.216	0.25
No. of instruments	34	33	46	31	32	44
AR2 (p-val)	0.0627	0.289	0.0687	0.604	0.593	0.518

Notes: Two-Step System GMM estimation. t-statistics are reported in parentheses. ***, **,* represent 1%, 5% and 10% level of significance.

Table 6
The effects of the number of outward FDI, outward GFDI and cross-border M&A purchase projects on TFP.

	(1)	(2)	(3)	(4)
$\log(TFP)_{t-1}$	0.9706***	0.9907***	0.5966***	0.9713***
	(57.76)	(36.75)	(10.33)	(80.60)
log(outbound FDI projects)	0.0002			
	(0.05)			
log(outbound greenfield projects)		−0.0167***		−0.0204***
		(-2.73)		(-5.51)
log(M&A purchase projects)			0.0481***	0.0231***
			(2.95)	(3.43)
Political stability	0.0057	0.0043	0.0163	0.0087*
	(1.31)	(0.79)	(0.42)	(1.90)
Trade	0.0000	0.0004*	0.0018***	−0.0000
	(0.92)	(1.76)	(2.80)	(-0.35)
Govt. expenditures	0.0002	0.0025	0.0148***	0.0002
	(0.39)	(1.10)	(3.35)	(0.26)
Population growth	−0.0022	−0.0017	0.0235**	−0.0038**
	(-1.16)	(-0.39)	(2.31)	(-2.30)
Inflation	−0.0002	0.0007	0.0003	0.0008**
	(-0.39)	(1.48)	(0.33)	(2.15)
Human capital	0.0164*	0.0224	0.2582***	0.0119
	(1.95)	(1.16)	(4.23)	(1.37)
Observations	1029	1138	1088	1051
No. of countries	83	85	85	85
No. of instruments	32	32	45	45
Hansen test (p-val)	0.562	0.535	0.624	0.313
AR2 (p-val)	0.892	0.0977	0.551	0.817

Notes: Two-Step System GMM estimation. t-statistics are reported in parentheses. ***, **,* represent 1%, 5% and 10% level of significance.

estimates suggest that outward GFDI has a negative effect on TFP, while M&As have a positive effect. These findings are in line with the previous results that suggest that human capital positively moderates the impact of GFDI on TFP.

5.3. Robustness analysis

We now turn to testing whether our main findings are robust to alternative empirical strategies. As a first test, we replace the OFDI, OGFDI, and outward M&A capital flows by the number of projects of each group. This sensitivity test is driven by the fact that often a relatively small number of investment projects represent a large share of global FDI capital flows. For instance, in this regard, Carril-Caccia and Pavlova (2018) describe how in 2016 there were nearly 21,000 FDI projects and that only 215 M&A deals accounted for 55% of the total capital investment flows. As can be gathered from Table 6, our main conclusions remain unchanged when we replace OFDI, OGFDI, and outward M&A capital flows by the number of projects. Total FDI projects, which is the sum of greenfield and M&A projects, have a non-significant effect on TFP, while OGFDI has a significant negative effect, and outward M&A projects have a positive effect. This sensitivity analysis demonstrates that our baseline results are not driven by a few large investment projects.

Table 7 shows that our main results, the positive link between TFP-M&A and the negative link between TFP-greenfield investment, are not sensitive to estimating with the fixed effects or SELPDM method. In Table 8, columns (1) to (3), we replace our dependent variable with a TFP that is calculated using an augmented measure of human capital. Estimates show that they are qualitatively and quantitatively robust to a different measure of TFP. In columns (4) to (6), we replace GDP with gross capital formation (GKF) in order to calculate the relative relevance that GFDI and M&A have for each economy. As can be gathered, our results are robust. Finally, column (7) illustrates that the results are not sensitive to the data imputation of the value of M&A.

6. Concluding remarks

This paper provides new empirical evidence on the relationship between MNEs' investment abroad and the effect on their home country's TFP. In particular, the present study shows that the impact of OFDI on home countries' TFP depends on the mode of investment abroad, GFDI, or M&A. To this end, we exploit a database of outward M&A and GFDI flows during the period 2003–2017 for a sample of 85 countries.

Our empirical analysis demonstrates that it is crucial to distinguish the mode of investment abroad to gauge its economic implications on the home country. Overall, OGFDI seems to harm countries' TFP, while M&A deals appear to foster it. We also show that outward M&A and GFDI are prone to negatively affect TFP in countries with low levels of human capital. In addition, trade openness seems to positively moderate

Table 7
The effects of GFDI and cross-border M&A purchases on TFP: Alternative estimation techniques.

	Fixed Effects			Sequential Regression		
variables	(1)	(2)	(3)	(4)	(5)	(6)
log(outbound greenfield)	−0.0017		−0.0044*	−0.0062***		−0.0022*
	(-0.77)		(-1.77)	(-4.85)		(-1.78)
log(M&A purchases)		0.0029*	0.0038**		0.0009***	0.0028**
		(1.86)	(2.37)		(2.85)	(2.25)
Political stability	0.0658***	0.0673***	0.0647***	−0.0379*	0.0145***	−0.027
	(7.41)	(7.12)	(6.82)	(-1.68)	(3.36)	(-1.21)
Trade	−0.0008***	−0.0008***	−0.0008***	−0.0003	0.0005***	0.0025***
	(-4.79)	(-5.10)	(-4.95)	(-1.10)	(5.89)	(7.12)
Govt. expenditures	−0.0038**	−0.0046***	−0.0058***	−0.0197***	−0.0101***	0.0152***
	(-2.39)	(-2.84)	(-3.34)	(-3.90)	(-6.04)	(4.75)
Population growth	0.0160***	0.0146***	0.0138***	−0.0756***	−0.0033**	0.0210**
	(6.82)	(6.15)	(5.80)	(-10.94)	(-2.52)	(2.73)
Inflation	0.0002	0.0012***	0.0017***	0.0011***	0.0001	0.0012***
	(0.36)	(2.51)	(3.36)	(3.00)	(0.40)	(4.02)
Human capital	0.0296	0.0062	−0.0015	0.181***	0.3632***	0.4009***
	(0.95)	(0.19)	(-0.05)	(4.70)	(6.28)	(8.54)
Observations	1216	1156	1116	1138	1088	1051
R-squared	0.3548	0.3488	0.3469			
No. of countries	85	85	85	85	85	85
No. of instruments				33	34	47
Hansen test (p-val)				0.06	0.01	0.43
AR2 test (p-val)				0.65	0.19	0.48

Notes: All FDI variables are included as a share of GDP. The two-step system GMM estimates; t-statistics are in brackets; *, **, *** are significance levels at 10%, 5%, and 1%, respectively.

Table 8
The effects of GFDI and cross-border M&A purchases on TFP: Sensitivity Analysis.

	TFP measured with augmented human capital			FDI as a percentage share of gross capital formation			Without imputed M&A
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log(outbound greenfield)	−0.0074**		−0.0056**				−0.0048**
	(-2.41)		(-2.47)				(-2.22)
log(M&A purchases)		0.0065**	0.0027**				
		(2.25)	(2.34)				
log(outbound greenfield/capital formation)				−0.0143**		−0.0068***	
				(-2.28)		(-2.89)	
log(M&A purchases/capital formation)					0.0139***	0.0069***	
					(5.04)	(3.04)	
log(M&A purchases un-imputed)							0.0046***
							(3.30)
Political stability	0.017	0.0211**	0.0143***	−0.0116	0.0066	0.0153***	0.0104***
	(1.32)	(1.99)	(2.58)	(-1.17)	(0.26)	(2.58)	(2.83)
Trade	0.00002	−0.00004	0.0000	0.0005	0.0025***	−0.000004	0.00003
	(0.55)	(-0.86)	(-0.09)	(1.39)	(4.81)	(-0.04)	(1.20)
Govt. expenditures	−0.0018	0.0011	−0.0003	0.0018	0.0182***	0.0002	0.0006
	(-1.39)	(0.82)	(-0.34)	(0.72)	(5.07)	(0.22)	(0.94)
Population growth	−0.0045*	−0.0012	−0.0032**	−0.0033	0.0249***	−0.0028*	−0.0017
	(-1.67)	(-0.46)	(-2.11)	(-0.68)	(4.24)	(-1.82)	(-1.28)
Inflation	−0.0003	0.0011	0.0004	0.0008	0.0015*	0.0006	−0.0002
	(-0.49)	(1.10)	(1.21)	(1.32)	(1.80)	(1.19)	(-0.61)
Human capital	−0.014	0.0042	0.0114	0.014	0.2347***	0.0152*	0.0218***
	(-0.51)	(0.23)	(1.61)	(0.58)	(5.14)	(1.73)	(2.81)
Observations	1138	1088	1051	1138	1088	1051	897
No. of countries	85	85	85	85	85	85	85
Hansen test (p-val)	0.897	0.771	0.154	0.253	0.559	0.314	0.206
AR2 (p-val)	0.096	0.933	0.103	0.27	0.172	0.285	0.059

Notes: The two-step system GMM estimates; t-statistics are in brackets; *, **, *** are significance levels at 10%, 5%, and 1%, respectively.

the TFP-M&A link, but undermines the TFP-greenfield investment positive relationship.

Our empirical results suggest that outward M&A can benefit home countries' TFP. This is particularly true for countries that are open to trade and enjoy high human capital. However, our results indicate that outward greenfield investment from countries highly open to trade and with low human capital can harm their TFP. The positive moderating effect from human capital is aligned with the existence of positive reverse technological spillovers from OFDI, while the negative moderating effect of trade openness for the case of greenfield investment is aligned with the negative reverse spillovers from displacement of production.

Policy implications can be derived from our empirical analysis. Economically advanced countries should resist the temptation of limiting OFDI. At least in terms of productivity, this policy can have larger negative consequences than positive ones. Less developed countries need to be cautious with OFDI and favour the development of their human capital. Policies that seek to promote OFDI, such as the Chinese "Go Global" policy, can be beneficial once countries have reached a certain degree of human capital development, particularly in the case of outward M&As.

Turning the focus to future research, this work opens several new avenues. For instance, future studies should address the OFDI effect on different economic dimensions by distinguishing by the mode of investment. Further analysis should also explore whether the type of investment in terms of horizontal or vertical is different for GFDI and M&A.

Declaration of interest statement

The authors declare no competing interests.

CRediT authorship contribution statement

Ayesha Ashraf: Conceptualization, Empirical Methodology, Formal analysis, Writing – original draft. **Federico Carril-Caccia:** Conceptualization, Formal analysis, Investigation, Funding acquisition, Resources, Writing – original draft, Writing – review & editing. **Nadia Doytch:** Investigation, Validation, Writing – review & editing.

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Appendix A

Countries

Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States of America Argentina, Bahrain, Botswana, Brazil, Chile, China, Hong Kong, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, Ghana, Guatemala, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kuwait, Malaysia,

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Mauritius, Mexico, Morocco, Namibia, Nigeria, Pakistan, Panama, Peru, Philippines, Qatar, Republic of Korea, Russian Federation, Saudi Arabia, Serbia, Singapore, South Africa, Sri Lanka, Thailand, Tunisia, Türkiye, Ukraine, United Arab Emirates, Uruguay, Venezuela, Viet Nam, Zimbabwe.
Total Sample: 85

Appendix B

Table B1
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TFP	1377	653.41	504.11	60.16	2791.56
Outbound FDI	1351	6.66	51.20	0.00	1602.54
Outbound Greenfield	1317	2.21	6.20	0.00	125.40
M&A purchases	1400	2.40	10.20	0.00	151.14
Political stability	1410	0.16	0.91	−2.81	1.69
Trade	1382	96.39	65.13	20.72	442.62
Govt. expenditure	1382	16.44	4.77	0.95	30.00
Population growth	1410	1.17	1.84	−9.08	17.51
Inflation	1399	5.31	7.86	−25.96	95.41
Human capital	1275	2.86	0.52	1.55	3.97

Table B2
Data definitions and sources

Variable	Full Name	Definition	Source
$TFP = Y/(K^{1-\propto}L^{\propto})$ Y = *output*, Real GDP at constant 2010 US$. K = *capital stock* L = people aged 15 and older who supply labour for the production of goods and services	Total factor productivity	Unexplained part of output left behind after accounting for the direct contributions of the inputs.	Y = World Development Indicators (WDI). K = Penn World Table (Version 10.0) L = WDI
tra_{it}	Trade openness	Sum of imports and exports relative to GDP.	World Development Indicators (WDI).
$ofdi^{i}_{it}$	Total FDI percentage share of GDP	Net outflows, accounting for the purchases and sales of foreign assets by domestic residents.	United Nations Conference on Trade and Development (UNCTAD), FDI/MNE database (www.unctad.org/fdistatistics).
	Greenfield FDI percentage share of GDP	Estimated amounts of announced Greenfield FDI projects by source.	UNCTAD, based on information from the Financial Times Ltd, fDi Markets (www.fDimarkets.com).
	Cross-border M&A purchases percentage share of GDP	Total value of sales of companies in a host economy to foreign MNEs.	Thomson and Reuters
$polstab_{it}$	Political stability and absence of violence (a proxy for institutional variable)	The perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means.	Worldwide Governance Indicators
$govexp_{it}$	General government final consumption expenditure	All government current expenditure on purchases of goods and services, national defence and security, but excluding government military expenditure.	WDI
$popgrowth_{it}$	Population growth rate	All residents regardless of legal status or citizenship.	WDI
$infla_{it}$	Inflation, GDP deflator (annual %)	The ratio of GDP in current local currency to GDP in constant local currency.	WDI
$humancap_{it}$	Human capital index	Based on the average years of schooling and rate of return to education.	Penn World Table (PWT) version 10.0.

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