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The University of Dublin

The Elusive Link Between FDI and Economic Growth: Sectoral Heterogeneity and Global Value Chains

Agustín Bénétrix, Hayley Pallan, Ugo Panizza

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Agustín Bénétrix

IM-TCD, Trinity College Dublin

Hayley Pallan

The World Bank

Ugo Panizza

Geneva Graduate Institute & CEPR

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Abstract

This paper reassesses the relationship between foreign direct investment (FDI) and economic growth in emerging and developing economies. Using cross-country data, it first shows that the relationship between FDI, growth, and local conditions such as financial depth and human capital is not stable over time: complementarities documented in studies based on data from the 1970s and 1980s largely disappear in more recent decades. It then builds a new dataset on sectoral FDI covering 112 emerging and developing economies over the period 1975–2023 and documents substantial heterogeneity in the association between FDI and sectoral growth. FDI inflows are positively associated with growth in the primary sector, show no robust relationship in the secondary sector, and are negatively associated with growth in the tertiary sector. To interpret these patterns, we examine the role of global value chains (GVCs). We find that FDI is most strongly associated with growth in country–sectors with low GVC participation, while this relationship weakens or disappears as GVC integration increases. Moreover, the growth effects of FDI depend critically on the type of GVC integration. Backward participation amplifies the positive growth effects of FDI in the primary sector but attenuates them in the secondary sector and worsens the negative effects in tertiary sector, whereas forward participation strengthens the association between FDI and growth in manufacturing. Taken together, the results suggest that the elusive aggregate relationship between FDI and growth reflects a structural transformation in how foreign investment is embedded in global production networks: in highly fragmented value chains, FDI can expand gross activity without generating commensurate domestic value-added growth.

JEL Codes: F21, F23, F14, C23, F60
Keywords: FDI, Economic Growth, Global Value Chains

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1 Introduction

Policymakers in both developing and advanced economies widely regard foreign direct investment (FDI) as a cornerstone of successful development strategies. For example, the European Commission states that "foreign direct investment is a driver of competitiveness and economic development,"[1] and, during the COVID-19 pandemic, the World Bank emphasized FDI as a key instrument for economic recovery (Pazarbasioglu, 2020). This view reflects a long-standing belief that FDI promotes growth by transferring capital, technology, and managerial know-how from source economies to host countries.

Despite this widespread policy consensus, the academic literature has struggled to establish a stable and robust relationship between FDI inflows and economic growth. Paraphrasing Robert Solow, one might say that there is enthusiasm for FDI everywhere except in its correlation with growth. This is not for lack of effort: thousands of papers—many highly cited—study the link between FDI and growth. While some find positive effects, a broad consensus has emerged that FDI inflows alone are insufficient to generate sustained growth and that their impact depends on complementary local conditions, such as human capital (Borensztein et al., 1998) and financial development (Alfaro et al., 2004, 2010).

In this paper, we show that the difficulty in identifying a robust aggregate relationship between FDI and growth reflects deeper structural changes in how production is organized globally and how foreign investment is embedded within host economies. Starting from the 1990s, better communication allowed firms to coordinate complex activities across borders. The rise of global value chains and what Baldwin (2016) has called "the second unbundling" fundamentally altered the mapping between foreign investment, domestic production, and locally recorded value added. In a world of fragmented production and cross-border task specialization, FDI can expand gross output or improve productivity without generating commensurate increases in domestic value-added growth (Koopman et al., 2014). As a result, aggregate regressions that relate total FDI inflows to GDP growth may obscure both substantial heterogeneity across sectors and systematic differences across positions in global production networks.

We reassess the relationship between FDI and growth along three dimensions. First, we revisit the time-series stability of the FDI–growth relationship at the country level. Second, we move beyond aggregate data and examine sectoral heterogeneity in the association between FDI and growth. Third, we study how participation in global value chains mediates the growth effects of sectoral FDI, explicitly distinguishing between backward and forward GVC integration.

Our first contribution is to show that the relationship between FDI, growth, and local conditions is not stable over time. Using cross-sectional and panel data, we document that complementarities between FDI and financial depth or human capital—prominent in studies based on data from the 1970s and 1980s—largely disappear in more recent decades. This finding cautions against extrapolating early results to the current global economy and suggests that changes in

[1] https://ec.europa.eu/internal_market/scoreboard/_docs/2021/12/integration-market-openness/fdi_en.pdf. See also Berger and Ragoussis (2022), who argue that prevailing narratives about FDI warrant reconsideration.

the nature and organization of FDI play a central role in shaping its growth effects.

Our second contribution is to document substantial sectoral heterogeneity in the relationship between FDI and growth. We construct a new dataset on sectoral FDI covering 112 emerging and developing economies over the period 1975–2023. Using sectoral growth regressions with a rich set of country–year, sector–year, and country–sector fixed effects, we find that FDI inflows are positively associated with growth in the primary sector, show no robust relationship with growth in the secondary sector, and are negatively associated with growth in the tertiary sector. These patterns help reconcile mixed findings in the literature and underscore the limitations of aggregate analyses that pool fundamentally different types of foreign investment.

Our third, and central, contribution is to show that global value chains play a key mediating role in shaping these sectoral relationships. We find that FDI is most strongly associated with growth in country–sectors with low GVC participation, while this association weakens and eventually disappears as GVC integration increases. Moreover, the effect of FDI depends critically on the type of GVC integration. Backward participation amplifies the growth effects of FDI in the primary sector but attenuates, reverses, or worsens them in the secondary and tertiary sectors. In contrast, forward participation is associated with more favorable outcomes in manufacturing. These results highlight that backward and forward GVC integration capture qualitatively different positions along global production networks, with distinct implications for domestic value-added creation, local linkages, and spillovers (Antràs and Chor, 2013, 2021; Antràs and Helpman, 2007; Baldwin, 2011; Baldwin and Ito, 2021; Taglioni and Winkler, 2016).

Taken together, our findings suggest that the elusive aggregate relationship between FDI and growth does not reflect a failure of foreign investment per se, nor simply a lack of absorptive capacity. Rather, it reflects a structural transformation in how multinational activity is organized. As production becomes increasingly fragmented across borders, FDI can raise efficiency and expand gross activity while generating limited domestic value added—particularly in highly GVC-integrated sectors such as manufacturing and services. Understanding the growth effects of FDI therefore requires moving beyond aggregate inflows and focusing instead on where foreign investment enters the economy and how it is embedded within global value chains.

Related literature. As mentioned above, there are literally thousands of papers studying the link between foreign direct investment (FDI) and economic growth (for a recent survey, see Paul and Feliciano-Cestero 2021). Here, we are necessarily selective and focus on a small set of influential contributions that emphasize the role of local conditions, endogeneity, and measurement issues.[2]

[2]In surveying the literature, we focus on the long-run growth effects of FDI flows. There is also a literature that studies the effect of FDI on domestic capital formation. For a survey of this literature and new evidence based on industry-level data, see Aminghini et al. (2017). Another strand of research focuses on the short-run macroeconomic effects of capital inflows and asks whether they are expansionary or contractionary at business-cycle frequencies. While standard open-economy macro models often predict contractionary effects due to exchange rate appreciation and trade balance deterioration, the empirical literature finds that some types of capital flows can be expansionary while others are contractionary (see Alfaro, 2016 and Blanchard et al., 2017). For discussions of recent trends in global FDI, see Blanchard et al. (2021) and UNCTAD (2025).

Bruno et al. (2018) conduct a meta-regression analysis based on 175 studies (71 using macro-level data and 104 using firm-level data) examining the impact of FDI flows on economic performance in emerging market economies. They conclude that most studies find a positive association between FDI and economic outcomes and that this relationship is less conditional on local characteristics than often suggested. One limitation of meta-regression approaches, however, is that they necessarily aggregate results from studies of widely varying quality. For example, the set of papers considered by Bruno et al. (2018) includes highly cited articles published in top journals alongside working papers, master's theses, and poorly cited articles in obscure outlets.

We therefore reassess the literature by focusing on a narrower set of influential contributions that emphasize the role of local conditions in shaping the growth effects of FDI. Borensztein et al. (1998) argue that FDI can act as a vehicle for technology transfer, but that host countries can benefit from this channel only if they possess a minimum threshold of human capital. Using cross-country data for 1970–1989, they find that gross FDI inflows are not significantly correlated with economic growth on their own, but that the interaction between FDI inflows and human capital is positive and statistically significant. Wang and Wong (2011) corroborate this result for the same period, replacing the quantity-based measure of education with a measure of education quality.

A related strand of the literature focuses on the role of financial development as a key local condition. Alfaro et al. (2004) and Alfaro et al. (2010) argue that FDI generates positive spillovers through backward linkages and that a well-functioning domestic financial system facilitates this mechanism by enabling local entrepreneurs to establish firms that supply intermediate inputs to foreign multinationals. Using cross-country data for 1975–1995, Alfaro et al. (2004) show that net FDI inflows are not significantly correlated with GDP growth, but that the interaction between FDI and financial depth—proxied by credit to the private sector over GDP—is positive and statistically significant. Azman-Saini et al. (2010) extend this analysis using a threshold regression framework and data for 91 countries over 1975–2005, and similarly find that financial development conditions the growth effects of FDI. Using more recent data and a dynamic panel threshold model for 62 middle- and high-income countries over 1987–2016, however, Osei and Kim (2020) find that financial depth can weaken rather than strengthen the FDI–growth relationship (the authors link their results to the "too much finance" literature, as in Arcand et al., 2015). We reconcile these results by showing that, even within a common model and sample, the mediating role of financial development varies over time: financial depth complemented FDI in stimulating growth in the 1970s and early 1980s, but this is no longer the case in more recent decades.

Two central challenges in assessing the relationship between FDI and growth are endogeneity and measurement. Endogeneity arises because countries with stronger growth prospects are more likely to attract FDI, leading to upward bias in estimates of the causal effect of FDI on growth. At the same time, measurement error can generate attenuation bias. Measurement concerns have become particularly salient in recent years, as FDI statistics are increasingly affected by multinational firms' tax-minimization strategies, including profit shifting, the relocation of headquarters, and the use of shell companies and special purpose vehicles. Since such "phantom FDI" (Damgaard et al., 2019) is unlikely to stimulate real economic activity, its inclusion in official

FDI statistics can bias estimated growth effects downward. Moreover, FDI flows often include cross-border intragroup lending, making them closer in nature to portfolio flows (Blanchard and Acalin, 2016). Existing studies have attempted to address endogeneity by instrumenting FDI flows using lagged values, real exchange rates, country size, political stability, or institutional quality (see Borensztein et al., 1998 and Alfaro et al., 2004). The validity of these instruments, however, is questionable, as many of them are likely to have a direct effect on economic growth. In Bénétrix et al. (2022), we propose a new instrument based on gravity regressions, but this instrument is also subject to weak-instrument concerns.

In this paper, we partly address endogeneity arising from omitted variables by exploiting sectoral data, which allow us to include a rich set of fixed effects controlling for country–year, sector–year, and country–sector shocks. To the best of our knowledge, the only comprehensive studies using sectoral data to examine the relationship between sectoral FDI and growth are Alfaro (2003) and Aykut and Sayek (2007). Both papers find that FDI in the primary sector is negatively associated with growth, that manufacturing FDI is positively associated with growth, and that FDI in services is either statistically insignificant or negatively associated with growth. While the service-sector results are consistent with our finding of a negative association between tertiary-sector FDI and sectoral growth, the results for the primary and manufacturing sectors differ from ours. We find a positive relationship between primary-sector FDI and sectoral growth and no statistically significant relationship in the secondary sector. These differences likely reflect two important distinctions. First, our sample covers a larger set of countries and a longer time period. Second, and more importantly, rather than examining how sectoral FDI affects aggregate growth, we directly match sectoral FDI flows with sectoral growth outcomes and estimate sector-specific effects while controlling for a comprehensive set of fixed effects.

Our work is also related to literature on global value chains. Besides the theoretical work of Antràs (2019), Antràs and Chor (2013), Antràs and Chor (2021), and Antràs and Helpman (2007), many studies have documented the role of GVCs in the global economy and for boosting world trade (e.g. Taglioni and Winkler, 2016 and Alfaro and Chor, 2023 on the "great reallocation" in global supply chain) and there is also work on the relationship between FDI and GVC activity (World Bank, 2020, Qiang et al., 2021, and Ammu et al., 2021). However, to the best of our knowledge, there is no study of how GVC participation affects the link between FDI and growth. The paper which is closest to our work is Mercer-Blackman et al. (2021) who use firm-level data to study how GVC participation conditions the spillovers from foreign direct investment and, like us, find that GVC integration reduces positive FDI spillovers.

Layout. The remainder of the paper is organized as follows. Section 2 uses country-level data to document the evolving relationship between FDI and economic growth and examines the mediating role of local conditions, with a particular focus on financial depth and human capital. Section 3 introduces sectoral FDI data and documents substantial heterogeneity in the relationship between FDI and growth across sectors. Section 4 incorporates GVC participation into the analysis and shows that, while GVC integration generally attenuates the association between FDI and growth, this effect varies systematically across sectors and different forms of GVC integration, distinguishing between backward and forward linkages. Section 5 concludes.

2 FDI and Growth since the 1970s

This section uses cross-sectional and panel estimations to study how net FDI inflows received by emerging market and developing countries are related to GDP growth. It focuses on how the relationship between FDI and economic growth has evolved over time. It first reproduces the standard result that the main effect of FDI on GDP growth is not statistically significant. It then documents that financial depth and education—which were important for the FDI–growth relationship during the 1970s and 1980s—have now become less important.

Table 1 reports summary statistics for all variables used in the analysis. Depending on the sample period and estimation strategy, the regressions include between 61 and 99 countries. Average FDI inflows to emerging and developing economies increased markedly over the sample period, rising from 1.2 percent of GDP in the first 20 years to over 5 percent in the last 20 years. The median FDI inflow increased from 0.7 percent to 2.8 percent of GDP over the same period. More recently, the dispersion of FDI inflows relative to GDP also widened substantially, with the standard deviation increasing from 2 to 13 (see also Appendix Figure A.1).

Table 1: Summary Statistics

This table reports summary statistics for various samples of 20-year annual averages. Panel A focuses on all developing and emerging economies for averages between 1975-94. Panel B uses the same set of countries but shows averages for 2000-2019. See Appendix A for variable definitions.

	Mean	Median	Std. Dev.	Min	Max
Panel A: 1975-94					
GDP per capita growth	1.015	0.921	2.804	-10.921	7.875
FDI	1.229	0.729	1.995	-0.766	14.287
Private credit	0.228	0.203	0.162	0.005	0.707
Schooling	0.996	0.827	0.698	0.082	4.116
Inflation	2.844	2.668	1.162	1.325	7.410
Trade	3.996	3.996	0.536	2.689	5.814
Govt. Consumption	2.590	2.590	0.403	1.473	3.551
Institutions	5.538	5.538	1.305	2.908	10.217
SSA	0.346	0.000	0.479	0.000	1.000
Panel B: 2000-19					
GDP per capita growth	2.209	2.056	1.862	-2.106	8.864
FDI	5.077	2.792	12.898	-0.265	114.638
Private credit	0.351	0.272	0.279	0.032	1.244
Schooling	2.142	2.021	1.090	0.363	4.969
Inflation	1.850	1.850	0.649	0.256	4.122
Trade	4.225	4.196	0.489	3.256	5.903
Govt. Consumption	2.608	2.622	0.344	1.673	3.665
Institutions	7.893	7.893	1.547	2.398	11.758
SSA	0.346	0.000	0.479	0.000	1.000

2.1 Baseline Cross-Country Regressions

To assess the presence of a long-run link between FDI and economic growth, we start by regressing the growth rate of real GDP per capita averaged over a 20-year period (GR_i) on FDI inflows and a set of controls. Formally, we estimate the following model:

$$GR_i = \beta_0 + \beta_1 y_i + \beta_2 FDI_i + X_i\Gamma + \varepsilon_i. \tag{1}$$

The explanatory variables are the log of initial GDP per capita (y_i), net FDI inflows to country i scaled by GDP (FDI_i), and a matrix of controls X_i that includes credit to the private sector, educational attainment, inflation, trade openness, government consumption, institutional quality, and a dummy for Sub-Saharan Africa. These controls are used in the baseline estimations of Borensztein et al. (1998) and Alfaro et al. (2004). All explanatory variables (with the exception of initial income) are averaged over the same 20-year period as the dependent variable.

We begin by estimating Equation 1 for the period 1975–1994, which is the earliest period for which we have a sufficiently large and consistent sample of countries that can also be followed in the later period 2000–2019 (see Appendix Table A.1 for the list of countries included in the regressions and for variable definitions and sources). This period closely overlaps with the time horizon examined by Borensztein et al. (1998) and Alfaro et al. (2004). Although the current vintage of the World Development Indicators contains updated FDI data—leading to some differences relative to earlier studies even for the same country-year observations—we are able to reproduce the well-known result of no statistically significant correlation between FDI and economic growth (see column 1 of Table 2).[3]

We then extend the baseline specification by allowing the effect of FDI inflows to vary with local conditions in the host economy, introducing interactions between FDI and measures of financial depth and human capital, as emphasized in the earlier literature. Formally, we estimate the following model:

$$GR_i = \gamma_0 + \gamma_1 y_i + FDI_i(\gamma_2 + \gamma_3 \widetilde{LC}_i) + X_i\Gamma + \varepsilon_i, \tag{2}$$

where LC_i denotes a measure of local conditions, proxied either by financial depth (measured as credit to the private sector as a share of GDP), following Alfaro et al. (2004), or by educational attainment (measured as average years of secondary schooling), following Borensztein et al. (1998).

We demean local conditions ($\widetilde{LC}_i = LC_i - \overline{LC}$) so that γ_2 captures the correlation between FDI and economic growth when local conditions are at their mean value (the main effect of local conditions is included in the vector X_i), while γ_3 measures how local conditions affect the relationship between FDI and GDP growth. A positive value of γ_3 indicates that FDI is associated with higher growth in countries with more developed financial markets or higher levels of human capital. All other variables are defined as in Equation 1.

Estimating Equation 2 for the period 1975–1994, we find that the main effect of FDI remains close to zero and is either statistically insignificant or only marginally significant but *negative*. This implies that, at average levels of financial depth or education, FDI inflows are not associated with higher economic growth; if anything, the estimated correlation is negative. By contrast, the

[3]We thank Laura Alfaro for alerting us to discrepancies between older and newer FDI series in the WDI.

Table 2: FDI and Growth: Cross-Country Regressions

This table reports a set of cross-country regressions where the dependent variable is the average growth rate of real annual GDP per capita over a twenty-year period and the explanatory variables are: net FDI inflows as a percentage of GDP; credit to the private sector as a percentage of GDP; the log of average years of secondary schooling in adult population; the log of initial GDP per capita; the log of 1 + inflation; the log of trade (export plus import over GDP); the log of government expenditure over GDP; the ICRG investment risk index (to capture institutions); and a dummy that takes value one for countries located in Sub-Saharan Africa. The table focuses on developing and emerging economies for which we have a balanced sample for 1975-94 and 2000-19.

	1975-94			2000-19		
	(1)	(2)	(3)	(4)	(5)	(6)
FDI	-0.274	-0.195	-0.302*	-0.001	0.005	0.022
	(0.238)	(0.128)	(0.162)	(0.006)	(0.030)	(0.039)
FDI × Pr. Cr.		1.528***			-0.008	
		(0.458)			(0.043)	
FDI × School			1.044***			-0.0321
			(0.344)			(0.053)
GDP_{t-1}	-1.717***	-1.607***	-1.636***	-1.127***	-1.126***	-1.135***
	(0.301)	(0.243)	(0.249)	(0.316)	(0.318)	(0.315)
Pr. Cr.	2.810	-0.563	1.027	3.174***	3.214***	3.220***
	(1.971)	(2.268)	(2.003)	(1.103)	(1.172)	(1.106)
School	1.449***	1.703***	0.897*	0.320	0.313	0.410
	(0.457)	(0.475)	(0.467)	(0.430)	(0.436)	(0.458)
Infl.	0.0313	-0.0958	-0.0199	0.349	0.352	0.361
	(0.274)	(0.246)	(0.254)	(0.290)	(0.290)	(0.286)
Trade	0.869	0.125	0.328	0.228	0.212	0.175
	(0.631)	(0.524)	(0.527)	(0.418)	(0.434)	(0.409)
Govt. Cons.	0.404	0.871	0.761	-0.324	-0.321	-0.285
	(0.686)	(0.658)	(0.674)	(0.661)	(0.662)	(0.635)
Institutions	0.811***	0.741***	0.861***	0.244	0.246	0.262
	(0.270)	(0.263)	(0.246)	(0.158)	(0.160)	(0.157)
SSA	-1.558**	-1.214**	-1.449**	-1.502***	-1.512***	-1.542***
	(0.636)	(0.599)	(0.614)	(0.550)	(0.550)	(0.550)
Constant	5.738*	7.148**	5.993**	8.851***	8.861***	8.808***
	(3.203)	(3.015)	(2.965)	(2.696)	(2.715)	(2.687)
N. Obs.	81	81	81	81	81	81
R2	0.565	0.622	0.622	0.396	0.396	0.399

Robust standard errors in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

coefficient γ_3 is positive and statistically significant both when financial depth is used as the measure of local conditions (column 2 of Table 2) and when schooling is used as the measure of local conditions (column 3 of Table 2). These results corroborate existing evidence of complementarity between FDI and local conditions, indicating that FDI inflows are positively related to economic growth only in countries with sufficiently high levels of education or sufficiently deep credit markets.

Turning to the most recent period (2000–2019), the model without interaction terms again yields a main effect of FDI that is close to zero and statistically insignificant (column 4 of Table 2). The specifications that include interactions between FDI and local conditions, however, lead to a different conclusion. Although the main effect of FDI remains close to zero, the interaction terms are now *negative* and not statistically significant (columns 5 and 6 of Table 2). Thus, in more recent data, we find no evidence of complementarity between FDI inflows and local conditions, whether proxied by financial depth or human capital. If anything, FDI inflows appear to be associated with slower growth in countries with deeper financial sectors or higher levels of human capital, although these estimates are not statistically significant.

To show that we did not cherry-pick the estimation periods of Tables 2, we estimate Equations 1 and 2 for all possible 20-year periods between 1975-94 and 2000-19 and then plot the results for both the main effects of FDI and the interactive terms.

Panel A of Figure 1 shows the evolution of the estimated coefficients for the main effect of FDI in the model without interaction terms (Equation 1). Each point represents the point estimate for a given 20-year period, together with its corresponding 95% confidence interval. The first point in Panel A corresponds to the FDI coefficient reported in column 1 of Table 2, while the last point corresponds to the coefficient reported in column 4 of the same table. Over time, the estimated coefficient moves from negative to positive and then back to values close to zero, but it is never statistically significant.

Panel B plots the estimated main effect of FDI from the specification that includes the interaction between FDI and financial depth (Equation 2, corresponding to columns 2 and 5 of Table 2). As in Panel A, the coefficient is rarely statistically significant. However, there are a few growth spells—those between 1991–2010 and 1993–2016—for which the main effect is positive and statistically significant. In these periods, FDI inflows in countries with average levels of financial depth are positively associated with GDP growth.

Panel C plots the estimated coefficient on the interaction between FDI and financial depth. The interaction term is large and statistically significant for early growth spells but becomes insignificant for spells starting in the 1980s. Between 1990–2010 and 1993–2016, the interaction is negative and statistically significant. Because these periods have positive and statistically significant main effects of FDI, the implied relationship between FDI and growth is the opposite from that observed earlier in the sample. During this interval, FDI is positively associated with growth in countries with relatively low financial depth, but negatively associated with growth in countries with more developed financial sectors.

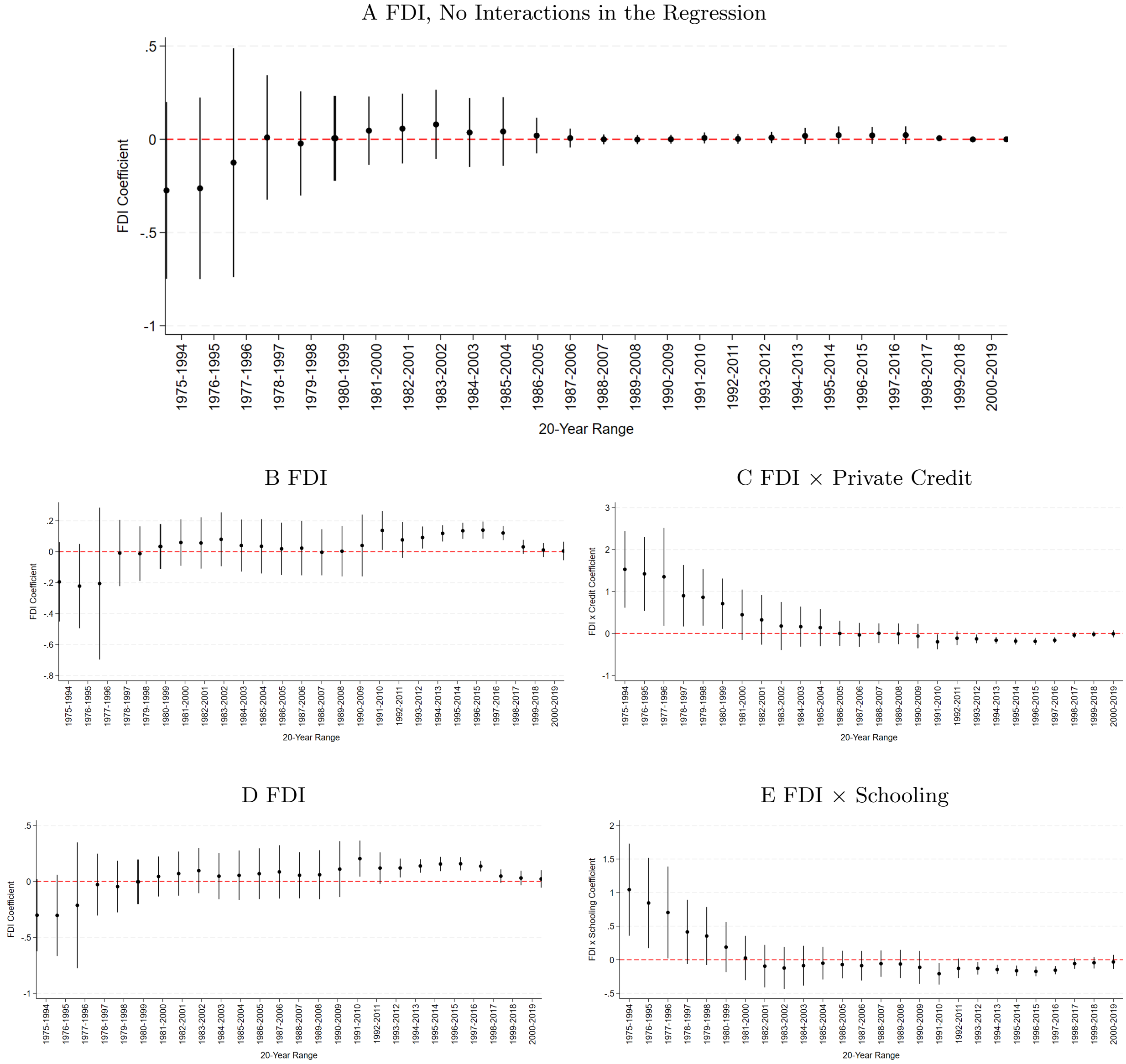
Panel D plots the estimated main effect of FDI from the specification that includes the interaction between FDI and schooling (corresponding to columns 3 and 6 of Table 2). As in Panel B, the coefficient is rarely statistically significant, but it is positive and statistically significant for growth spells between 1991–2010 and 1993–2016. During these periods, countries with average levels of human capital exhibit a positive association between FDI inflows and GDP growth.

As in the case of financial depth, we also find that during these same periods the interaction between FDI and schooling—which is positive and statistically significant in the earlier part of the sample—becomes negative and statistically significant. This pattern indicates that, in this period, FDI inflows are positively associated with growth in countries with relatively low levels of human capital, while the association turns negative in countries with higher average levels of education.

In summary, cross-country regressions examining the direct effect of FDI and its complementarities with financial depth or education yield results that are sensitive to the time period considered. The main effect of FDI is rarely statistically significant. However, regressions focusing on growth spells beginning in the 1970s reveal strong complementarities, with financial depth or education strengthening the positive association between FDI inflows and growth. In

Figure 1: FDI and Interactive Coefficients with 20-Year Growth Spells

This figure plots the coefficients on FDI and its interactions with financial depth (measured as private credit to GDP) and schooling from cross-sectional regressions based on 20-year period averages. Panel A reports the estimated main effect of FDI in specifications without interaction terms. Panel B reports the estimated main effect of FDI when its interaction with financial depth is included, while Panel C reports the estimated coefficient on the interaction between FDI and financial depth. Panel D reports the estimated main effect of FDI when its interaction with schooling is included, and Panel E reports the estimated coefficient on the interaction between FDI and schooling. Both financial depth and schooling are demeaned. The results correspond to the constant sample of developing and emerging economies used in Table 2. Points denote point estimates, and shaded bands represent 95 percent confidence intervals.



contrast, in more recent periods these complementarities weaken or disappear. In some periods, local factors—such as financial depth and education—are even associated with adverse effects on the relationship between FDI and growth.[4]

2.2 Panel Data

While the cross-sectional regressions reported in Table 2 include a standard set of control variables, they cannot fully account for unobserved heterogeneity. We therefore turn to a panel data framework that mitigates omitted-variable bias by including country fixed effects, which absorb all time-invariant factors jointly correlated with FDI flows and GDP growth, as well as year fixed effects, which capture global shocks that may simultaneously affect FDI flows and economic growth. Formally, we estimate the following model:

$$GR_{i,t/t-10} = \alpha_i + \tau_t + \gamma_1 y_{i,t-10} + FDI_{i,t-10}\big(\gamma_2 + \gamma_3 \widetilde{LC}_{i,t-10}\big) + X_{i,t-10}\Gamma + \varepsilon_{i,t}, \qquad (3)$$

where $GR_{i,t/t-10}$ denotes average real GDP per capita growth in country i between years $t-10$ and t. We focus on 10-year growth spells to ensure a sufficient number of time periods. The terms α_i and τ_t denote country and year fixed effects, respectively. All other variables are defined as in Equation 1, with the exception of institutional quality and the Sub-Saharan Africa dummy. The latter is fully absorbed by the country fixed effects, while the former exhibits limited within-country variation and is therefore highly collinear with the country fixed effects.

To avoid selecting an arbitrary starting year, we estimate Equation 3 using all possible overlapping 10-year growth spells within a given estimation window. Because overlapping spells induce a moving-average structure in the error term, we correct for arbitrary forms of within-country and within-year dependence by clustering standard errors at both the country and year levels.

As in the cross-sectional analysis, we examine different time periods. The panels in Figure 2 plot the estimated FDI coefficients from panel regressions of the form given in Equation 3, estimated over rolling 30-year windows ending in the year shown on the x-axis. The first regression, for example, includes all 10-year growth spells starting between 1970–1990 and ending between 1980–1999. The last regression includes all 10-year growth spells starting between 1990–2000 and ending between 2000–2019.

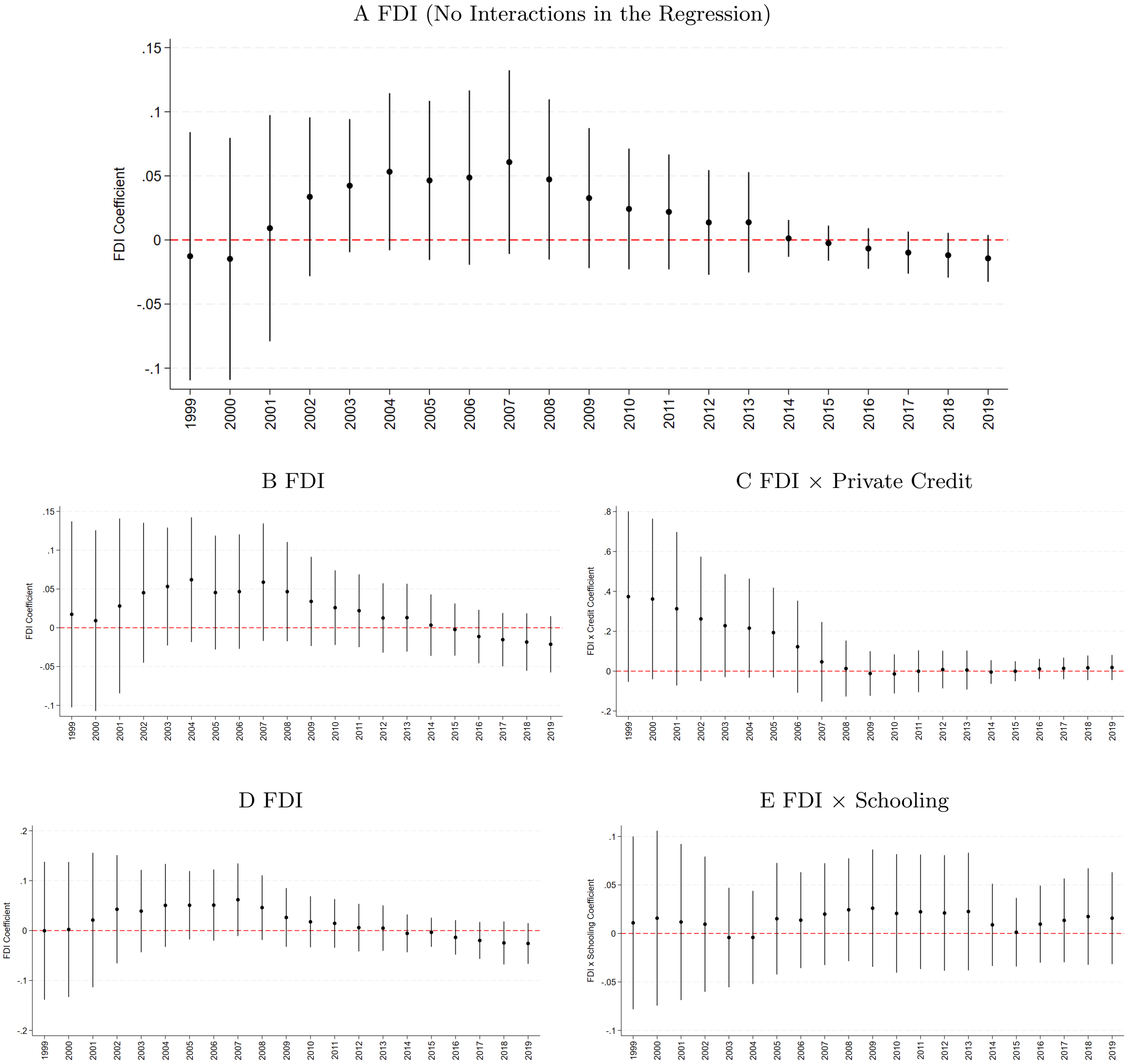
We begin by estimating the model by imposing $\gamma_3 = 0$. This is the panel analogue of the cross-sectional specification without interaction terms in Equation 1. Consistent with the existing literature, we find that the coefficient on FDI fluctuates between positive and negative values, with point estimates ranging roughly between -0.02 and 0.06, but is never statistically significant (Panel A of Figure 2).

We then estimate the full model allowing FDI to interact with financial depth. The estimated main effect of FDI is essentially identical to that obtained in the specification without interactions (compare Panel B with Panel A of Figure 2). The interaction between FDI and financial depth

[4] These results are robust to controlling for the black market premium, a variable included in earlier empirical studies but excluded from the main specification due to limited data availability across countries and years (data from Gramacy et al., 2014).

Figure 2: FDI and Interactive Coefficients from Panel Regressions

This figure plots the coefficients on FDI from panel regressions of the type shown in Equation 3, estimated over rolling 30-year windows ending in the year reported on the x-axis. The first regression therefore covers all 10-year growth spells starting between 1970–1990 and ending between 1980–1999, while the last regression covers growth spells starting between 1990–2000 and ending between 2000–2019. All specifications include year and country fixed effects. Panel A reports results from specifications without interaction terms. Panel B reports the estimated main effect of FDI when its interaction with financial depth (measured as private credit to GDP) is included. Panel C reports the estimated coefficient on the interaction between FDI and financial depth. Panel D reports the estimated main effect of FDI when its interaction with schooling is included, and Panel E reports the estimated coefficient on the interaction between FDI and schooling. Both private credit and schooling are demeaned. Points denote point estimates, and shaded bands represent 95 percent confidence intervals.



follows the familiar pattern observed in the cross-sectional analysis: it is relatively large and positive in the early part of the sample and gradually declines toward zero in later years (Panel C of Figure 2). In this case, however, the interaction term is never statistically significant at the 5% level, although it is statistically significant at the 10% level in the early part of the sample.

When we interact FDI with years of schooling, the estimated main effect of FDI remains similar to that obtained in the model without interactions (compare Panels A and D of Figure 2). By contrast, the interaction between FDI and schooling is consistently close to zero and never statistically significant (Panel E).

2.3 Discussion

Cross-country and panel regressions indicate that the complementarities between FDI and local conditions, such as financial depth and human capital, documented using data for the 1970s and 1980s do not persist when more recent data are used.

An important caveat of the analysis conducted so far is that it does not identify the causal effect of FDI on economic growth.[5] For this reason, we have been careful in interpreting the estimated coefficients as correlations or associations rather than causal effects.

Our primary objective at this stage is not causal identification, but to document how the relationship between FDI and growth, and in particular its interaction with local conditions, has evolved over time. To fully account for the patterns we document, endogeneity would have to vary across periods in a way that differentially affects the complementarity between FDI and financial depth or education. While reverse causality from growth to FDI is a familiar concern in country-level regressions, it is not obvious why such mechanisms would generate strong positive complementarities in earlier decades but no such complementarities—or even negative ones—in more recent periods. Moreover, the inclusion of country and year fixed effects—which at least partially attenuates endogeneity concerns—does not overturn our central finding that financial depth acted as a complementary factor to FDI in the 1970s and 1980s but no longer does so in later years.

More broadly, these results point to the limitations of aggregate country-level regressions for understanding the growth effects of FDI. Changes over time in the nature, composition, and allocation of FDI across sectors within countries may weaken the link between aggregate FDI inflows and macroeconomic outcomes, even in the absence of large changes in total FDI volumes. This consideration suggests that focusing exclusively on country-level endogeneity is unlikely to fully resolve the question of how FDI affects growth. Instead, a more promising approach is to move beyond aggregate regressions and examine sectoral heterogeneity in the allocation and effects of FDI.

[5] In a previous version of this paper (Bénétrix et al., 2022), we address endogeneity more directly by instrumenting FDI with variables designed to capture exogenous (push) determinants of capital flows to a given country, and obtained results that are qualitatively similar to those reported here.

3 Sectoral Heterogeneity

Motivated by these considerations, and recognizing that aggregate country-level regressions may mask heterogeneity in the effects of FDI, we move to country–sector-level data.

As mentioned in the introduction, one of the contributions of this paper is the construction of sectoral-level FDI inflow data for an unbalanced panel covering up to 112 emerging and developing economies over the period 1975–2023. We build these series for the three main sectors (primary, secondary, and tertiary) using raw data from UNCTAD (1992) and UNCTAD (2004), as well as data obtained from UNCTAD's archives. Appendix B provides details on the construction of the series.

In our sample, average sectoral real GDP growth is about 2.7%. The tertiary sector exhibits the highest average growth rate (3.7%), while the primary and secondary sectors underperform, at 2.0% and 2.3%, respectively (Table 3). Average FDI inflows are below 1% of total GDP in both the primary and secondary sectors—characterized by very wide dispersion in the primary sector, with median values of 0.2% and 0.5%, respectively—and around 2% of GDP in the tertiary sector (median 1.2%). We scale sectoral FDI by total GDP rather than by sectoral GDP. This normalization facilitates direct comparisons between aggregate and sectoral FDI dynamics and avoids mechanical correlations between sectoral growth and the FDI measure used as an explanatory variable in our regressions.

Table 3: Summary Statistics for Sectoral GDP Growth, FDI, and GVCs

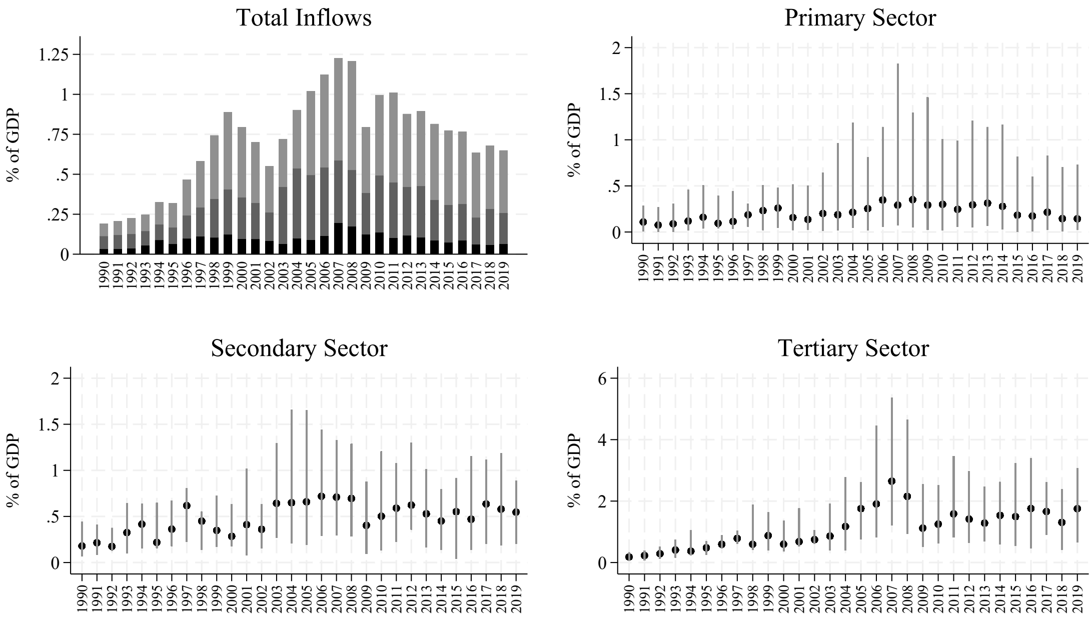
This table reports summary statistics for average sectoral real GDP growth over a 10-year period (in %) , sectoral FDI over GDP (in % and winsorized at 1%), and sectoral GVC exports over total GDP (in %).

	Mean	Median	Std. Dev.	Min	Max	N. Obs.
All Sectors						
Sectoral Growth (%)	2.65	2.58	3.09	-13.89	18.96	4,075
FDI/GDP (%)	1.22	0.57	1.85	-0.48	10.79	4,347
GVC Exports/Total GDP (%)	4.38	2.26	6.01	0.01	54.31	4,248
Primary Sector						
Sectoral Growth (%)	2.00	1.83	2.95	-13.29	18.96	1,456
FDI/GDP (%)	0.90	0.20	1.90	-0.48	10.79	1,449
GVC Exports/Total GDP (%)	2.36	0.96	3.65	0.01	26.66	1,416
Secondary Sector						
Sectoral Growth (%)	2.28	2.15	3.46	-13.89	16.20	1,255
FDI/GDP (%)	0.80	0.51	1.00	-0.48	10.79	1,449
GVC Exports/Total GDP (%)	7.53	4.48	8.51	0.07	54.31	1,416
Tertiary Sector						
Sectoral Growth (%)	3.67	3.68	2.57	-6.15	17.80	1,364
FDI/GDP (%)	1.98	1.23	2.20	-0.48	10.79	1,449
GVC Exports/Total GDP (%)	3.22	2.12	3.10	0.01	19.07	1,416

Figure 3 plots the evolution of sectoral FDI as a percentage of total GDP. The top-left panel shows total FDI inflows to emerging and developing economies as a share of the group's total GDP. Total inflows mirror patterns documented by Adarov and Pallan (2025) and in the in-

Figure 3: Sectoral FDI

This figure plots the evolution of sectoral FDI inflows as a percentage of GDP. The top-left panel shows total inflows as a share of GDP, with black bars indicating inflows into the primary sector, medium-gray bars inflows into the secondary sector, and light-gray bars inflows into the tertiary sector. The top-right panel reports the median and interquartile range for the primary sector, while the bottom two panels report the median and interquartile range for the secondary and tertiary sectors, respectively.



ternational financial integration literature for overall financial flows (which also include other equity investment and debt): a run-up beginning in the mid-1990s, a reversal during the Global Financial Crisis, and a post-crisis plateau (Lane and Milesi-Ferretti, 2018).

In the 1990s, primary-sector FDI accounted for approximately 20% of total inflows, with the secondary and tertiary sectors each accounting for about 40%. In more recent years, the share of primary-sector FDI fell to less than 10% of the total, secondary-sector FDI accounts for about 30%, and services FDI now account for roughly 60% of total FDI (top left panel).

The remaining three panels of Figure 3 report the median and interquartile range by sector. Primary-sector FDI rose slightly through 2007, with very wide cross-country dispersion, and then contracted modestly after 2014 (top right panel). Secondary-sector FDI increased over the 1990–2003 period, remained broadly stable until 2008, and then declined in the aftermath of the Global Financial Crisis (bottom left panel). Tertiary-sector FDI rose rapidly over 1990–2007, reaching a median value of 2.7% of GDP in 2007, before dropping markedly after the crisis and stabilizing at a median value of approximately 1.7% of GDP (bottom right panel). Note that the top-left panel is GDP-weighted, whereas the medians in the other panels are not; as a result, the patterns in the distributional panels need not mirror the aggregate trend exactly.

3.1 Sectoral FDI and Growth

There are two key advantages to using sectoral data to study the relationship between FDI and growth. First, sectoral data allow an assessment of whether the effects of FDI on growth are heterogeneous, by permitting the FDI–growth relationship to vary across sectors. Second, sectoral data make it possible to estimate specifications with a rich set of fixed effects, enabling to control for shocks that are specific to a country–year, a sector–year, and a country–sector.

We proceed in steps and begin by estimating a model that uses sectoral data but imposes homogeneous effects across sectors. We then relax this restriction and allow for sectoral heterogeneity, and then examine how local conditions shape the relationship between sectoral FDI inflows and sectoral growth.

Using sectoral data without allowing for sectoral heterogeneity yields the following estimating equation:

$$GR_{s,i,t/t-10} = \beta_1 y_{s,i,t-10} + \beta_2 FDI_{s,i,t-10} + \alpha_{i,t} + \delta_{s,t} + \gamma_{i,s} + \varepsilon_{s,i,t}, \tag{4}$$

where $GR_{s,i,t/t-10}$ is average growth in real GDP of sector s in country i over the period from $t-10$ to t, $y_{s,i,t-10}$ is the log of real GDP of sector s in country i at time $t-10$, and $FDI_{s,i,t-10}$ denotes FDI inflows in sector s as a percentage of total GDP in country i at time $t-10$. The term $\alpha_{i,t}$ denotes country–year fixed effects that control for all shocks specific to a given country in a given year; $\delta_{s,t}$ denotes sector–year fixed effects that control for all shocks specific to a given sector in a given year; and $\gamma_{i,s}$ denotes country–sector fixed effects that control for all shocks specific to a given sector in a given country.

Results from estimating Equation 4 show no evidence of a statistically significant relationship between sectoral FDI inflows and sectoral growth (Column 1, Table 4). Controlling for country–year, sector–year, and country–sector fixed effects while imposing homogeneous coefficients across sectors yields the same conclusion as standard cross-country regressions: sectoral FDI inflows are not associated with higher growth.

We now allow for sectoral heterogeneity by estimating the following model:

$$\begin{aligned} GR_{s,i,t/t-10} = {} & \sum_{s=1}^{3} \beta_{1,s} \left(y_{s,i,t-10} \times D_s \right) + \sum_{s=1}^{3} \beta_{2,s} \left(FDI_{s,i,t-10} \times D_s \right) \\ & + \alpha_{i,t} + \delta_{s,t} + \gamma_{i,s} + \varepsilon_{s,i,t}, \end{aligned} \tag{5}$$

where $s = 1$ denotes the primary sector, and $s = 2$ and $s = 3$ denote the secondary and tertiary sectors, respectively and D_s is a dummy variable that takes value 1 for sector s. Accordingly, $\beta_{2,1}$ captures the relationship between FDI inflows into the primary sector and growth in the primary sector, while $\beta_{2,2}$ and $\beta_{2,3}$ capture the relationships between FDI and growth in the secondary and tertiary sectors, respectively. All other variables are defined as in Equation 4.

The results indicate that the average effect estimated with Equation 4 masks substantial sectoral heterogeneity. In the primary sector, higher FDI inflows are associated with faster growth: the point estimates imply that a one–standard-deviation increase in FDI inflows raises sectoral growth by almost half a percentage point, relative to an average growth rate of 2% (Column 2

Table 4: Sectoral FDI and Growth

This table reports a set of regressions in which the dependent variable is sectoral GDP growth. The explanatory variables include the log of initial sectoral GDP, sectoral FDI inflows as a percentage of total GDP, a dummy variable equal to one for country–years with financial depth above the sample median (HFD), and a dummy variable equal to one for country–years with education levels above the sample median (HED).

	(1)	(2)	(3)	(4)	(5)
$y_{s,i,t-10}$	-8.703***				
	(0.999)				
$y_{1,i,t-10} \times D_1$		-10.81***	-10.75***	-11.03***	-10.90***
		(1.053)	(0.987)	(1.141)	(1.106)
$y_{2,i,t-10} \times D_2$		-7.786***	-7.875***	-7.608***	-7.691***
		(1.197)	(1.224)	(1.278)	(1.325)
$y_{3,i,t-10} \times D_3$		-8.840***	-8.949***	-8.346***	-8.426***
		(1.510)	(1.422)	(1.369)	(1.255)
$FDI_{s,i,t-10}$	0.0026				
	(0.0298)				
$FDI_{1,i,t-10} \times D_1$		0.241**	0.113	0.234	0.138
		(0.106)	(0.089)	(0.179)	(0.162)
$FDI_{2,i,t-10} \times D_2$		0.009	0.104	-0.011	0.017
		(0.069)	(0.130)	(0.157)	(0.164)
$FDI_{3,i,t-10} \times D_3$		-0.086***	-0.112***	-0.0689	-0.102**
		(0.029)	(0.029)	(0.0445)	(0.0448)
$FDI_{1,i,t-10} \times D_1 \times$ HFD			0.334***		0.297***
			(0.111)		(0.0913)
$FDI_{2,i,t-10} \times D_2 \times$ HFD			-0.151		-0.0859
			(0.151)		(0.164)
$FDI_{3,i,t-10} \times D_3 \times$ HFD			0.056		0.073*
			(0.039)		(0.0405)
$FDI_{1,i,t-10} \times D_1 \times$ HED				0.147	0.0899
				(0.296)	(0.246)
$FDI_{2,i,t-10} \times D_2 \times$ HED				-0.017	0.0265
				(0.180)	(0.185)
$FDI_{3,i,t-10} \times D_3 \times$ HED				-0.026	-0.0282
				(0.059)	(0.056)
HFD $\times D_2$			0.948*		0.825
			(0.547)		(0.554)
HFD $\times D_3$			-0.303		-0.144
			(0.295)		(0.272)
HED $\times D_2$				-0.543	-0.596
				(1.380)	(1.392)
HED $\times D_3$				0.174	0.198
				(0.961)	(1.020)
N. Obs.	1,963	1,963	1,901	1,903	1,841
R2	0.927	0.930	0.931	0.931	0.932
Country-year FE	✓	✓	✓	✓	✓
Sector-year FE	✓	✓	✓	✓	✓
Country-sector FE	✓	✓	✓	✓	✓

Robust standard errors clustered at the country level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

of Table 4). By contrast, the estimate for the secondary sector is close to zero and statistically insignificant, while the effect for the tertiary sector is negative and statistically significant. In the latter case, a one–standard-deviation increase in service-sector FDI inflows is associated with a decline in growth of about 0.2 percentage points, compared with an average growth rate of 3.7%.

The positive effect in the primary sector is consistent with an "enclave" interpretation: even when primary-sector FDI generates limited spillovers to the rest of the economy, it can still raise measured sectoral output through capital accumulation, technology transfer, and scale effects. The results also align with the "own-plant effect" emphasized by Aitken and Harrison (1999), whereby FDI is associated with higher productivity even in the absence of spillovers to domestic firms. This finding contrasts with Alfaro (2003) and Aykut and Sayek (2007), who document negative effects of primary-sector FDI on *total* GDP growth. The two sets of results are not directly comparable, however, as the analysis here focuses on sectoral rather than aggregate growth and controls for a richer set of fixed effects.

The absence of a significant association between FDI inflows in the secondary sector and subsequent sectoral growth is consistent with offsetting forces at the sector level. While foreign affiliates may increase productivity and scale through own-plant effects, entry can also displace domestic producers via market-stealing or restructuring. In addition, manufacturing FDI is highly heterogeneous—spanning greenfield investment and mergers and acquisitions, as well as activities ranging from high–value added production to export-platform assembly with limited domestic content—so sector-level averages may conceal substantial variation across countries, time, and positions in global value chains (a point revisited in the next section).

Similar considerations help interpret the negative coefficient on tertiary-sector FDI. Much FDI in services occurs in non-tradable or regulated industries and often takes the form of mergers, acquisitions, or restructuring rather than greenfield expansion. In such settings, foreign entry may displace domestic providers and coincide with consolidation, so sectoral growth need not increase—and may even decline—despite potential efficiency gains. As in manufacturing, interactions between sectoral FDI and different forms of GVC integration are likely central to understanding these patterns.

Before turning to global value chains, we explore whether country-level local conditions affect the relationship between FDI and growth at the sectoral level. Formally, we estimate the following model:

$$\begin{aligned} GR_{s,i,t/t-10} = {} & \sum_{s=1}^{3} \beta_{1,s} \left(y_{s,i,t-10} \times D_s \right) + \sum_{s=1}^{3} \beta_{2,s} \left(FDI_{s,i,t-10} \times D_s \right) \\ & + L_{i,t-10} \left(\beta_{3,2} \times D_2 + \beta_{3,3} \times D_3 \right) + \sum_{s=1}^{3} \beta_{4,s} \left(FDI_{s,i,t-10} \times D_s \times L_{i,t-10} \right) \\ & + \alpha_{i,t} + \delta_{s,t} + \gamma_{i,s} + \varepsilon_{s,i,t}, \end{aligned} \tag{6}$$

where $L_{i,t-10}$ is a measure of local conditions. Following the existing literature, we focus on financial depth (proxied by credit to the private sector over GDP) and education (proxied by average years of schooling). All other variables are defined as in Equation 5. Note that in the model of Equation 6 the main effect of local conditions, as well as one of the interactions between local conditions and sectoral dummies (in our case, $\beta_{3,1} L_{i,t-10} \times D_1$), is absorbed by the fixed effects. Because the model includes multiple interaction terms, we measure local conditions using a dummy variable in the baseline specifications to facilitate interpretation. Specifically, the dummy takes value one if either credit to the private sector over GDP in country i in year $t-10$ is above its median value (the HFD high-financial-depth dummy in Table 4), or if years of schooling in country i in year $t-10$ are above their median value (the HED high-education dummy in Table 4). As a robustness check, we show that the results are similar when using the continuous measures of credit to the private sector and years of schooling.

When we measure local conditions using financial depth, we find that local financial development does not affect the relationship between sectoral FDI and growth in the secondary and tertiary sectors (Column 3 of Table 4). However, it matters for the primary sector. The point estimates suggest that the association between primary-sector FDI and growth is positive but not statistically significant in country–years with low financial depth, while it becomes larger and statistically significant in country–years with high financial depth. Specifically, the implied coefficient for high-financial-depth observations ($0.447 = 0.113 + 0.334$; p-value < 0.01) indicates that a one–standard-deviation increase in FDI is associated with nearly a one–percentage-point increase in sectoral growth.[6]

This sector-specific pattern can be driven by the fact that primary-sector projects often rely on local contractors, transport, maintenance, and other supplier services; when credit is scarce these linkages remain limited and FDI is more likely to operate as an enclave. Deeper local credit markets relax working-capital and scaling constraints for domestic suppliers, strengthening the within-sector FDI–growth relationship in the primary sector.

When we measure local conditions with education, we find weaker results, but they remain similar to those obtained for financial depth. In this case, the interaction coefficient $\beta_{4,1}$ is not statistically significant, implying that we cannot reject equality between the primary-sector FDI–growth relationship in country–years with above- versus below-median education (Column 4 of Table 4). Nevertheless, the sum $\beta_{2,1} + \beta_{4,1}$ is positive and statistically significant, indicating that in country–years with above-median education there is a statistically significant positive association between primary-sector FDI inflows and primary-sector growth. The point estimate (0.381; p-value < 0.05) suggests that a one–standard-deviation increase in FDI inflows is associated with an increase in primary-sector growth of about 0.75 percentage points. This result, however, is not robust to jointly controlling for financial depth and education (Column 5 of Table 4).

Turning to the tertiary sector, the interaction between financial depth and service-sector FDI is not always statistically significant (it is insignificant in Column 3 but significant in Column 5),

[6] Using a continuous measure of financial depth yields qualitatively similar results. In this case, however, higher financial depth also attenuates the negative association between FDI inflows and growth in the tertiary sector (see Column 1 of Appendix Table C.1). Note that the main FDI coefficients are not directly comparable across tables because in Table C.1 the main effect captures the correlation between FDI and growth when credit to the private sector is equal to zero.

yet it is consistently positive. Combined with the negative and statistically significant main effect of tertiary-sector FDI, these estimates imply that deeper financial markets attenuate the adverse association between services FDI and service-sector growth. As mentioned above, the negative effect of FDI in the tertiary sector might be driven by the fact that foreign entry displaces domestic providers. Financial depth can mitigate these effects by easing credit constraints for domestic service firms, facilitating their entry and expansion.

The sectoral results help shed light on the country-level evidence discussed in Section 2. There, we showed that local conditions, which played an important conditioning role in the 1970s and 1980s, no longer appear to shape the relationship between aggregate FDI and GDP growth in more recent decades. At the sectoral level, we find that local conditions matter most for the primary sector, which, as documented in Figure 3, has steadily declined as a share of total FDI. The shrinking importance of primary-sector FDI may therefore help explain why the amplifying role of financial depth in the aggregate FDI–growth relationship has weakened over time. At the same time, the evolution of FDI is not solely about shifts in sectoral composition. It also reflects changes in how foreign investment is organized within and linked to global production networks. We therefore turn next to the role of global value chain integration in shaping the relationship between sectoral FDI inflows and growth.

4 The Role of Global Value Chain Penetration

Starting in the early 1990s, advances in information and communication technologies (ICT) and the associated decline in coordination costs made it increasingly feasible for firms to fragment production across borders and to manage complex, multi-stage processes at distance. This "second unbundling" fostered the rapid expansion of global value chains (GVCs) and changed both the organization of multinational activity and the channels through which FDI may affect growth (Baldwin, 2016). In the GVC era, FDI is often tied to trade in intermediate inputs and tasks, with production stages allocated across locations according to comparative advantage, contractual frictions, and the availability of complementary capabilities (Grossman and Rossi-Hansberg, 2008; Antràs and Chor, 2013, 2021; Antràs, 2019).

From the perspective of host-country development, GVC integration can generate opposing forces. On the one hand, by allowing multinationals to offshore narrowly defined tasks, GVCs may reduce the breadth of domestic capabilities required to attract foreign production, potentially lowering barriers to entry into manufacturing and services supply chains (Baldwin, 2016; Antràs, 2019). On the other hand, fragmentation can also facilitate the geographic separation of low- and high-value-added activities, with lower-skill locations specializing in relatively standardized stages while higher-value-added functions (e.g., design, R&D, and branding) remain concentrated in skill-abundant economies, thereby limiting local upgrading and attenuating positive spillovers. Moreover, GVCs can strengthen multinationals' bargaining power vis-à-vis local suppliers, with implications for rent sharing and the distribution of gains along the chain (Antràs, 2019; Antràs and Chor, 2021).

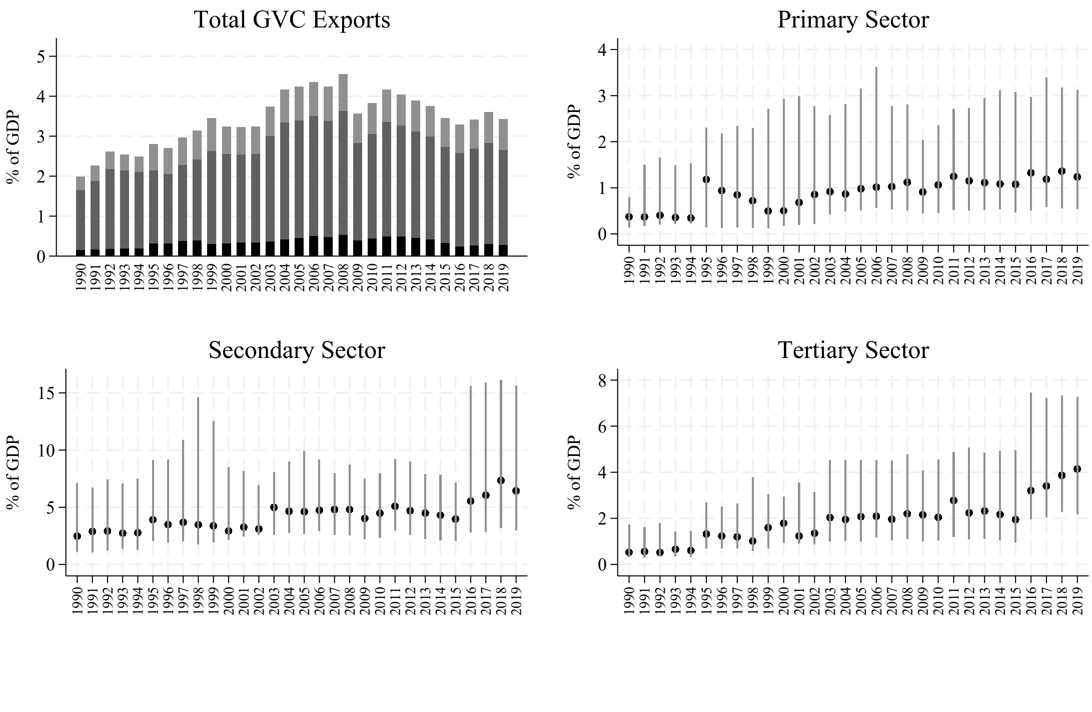
Motivated by these considerations, this section examines whether a sector's position in GVCs shapes the relationship between sectoral FDI inflows and subsequent sectoral growth. In particular, we study how the marginal effect of FDI varies with GVC penetration and then explore the possible role of forward and backward GVC linkages.

Figure 4 plots the evolution of GVC penetration as a share of GDP across the three sectors. The top-left panel shows total GVC exports by emerging and developing economies as a share of the group's total GDP. The dark bars represent GVC exports from the primary sector, the dark gray bars from the secondary sector, and the light gray bars from the tertiary sector. GVC exports more than doubled between 1990 and 2007, rising from about 2% to over 4% of GDP. They declined somewhat in the aftermath of the global financial crisis but have remained well above 3% of aggregate GDP in emerging and developing economies.

In terms of composition, secondary-sector GVC exports accounted for roughly 70% of the total throughout the period. Primary-sector GVC exports represented about 20% of total GVC exports in the early years of the sample but have since declined to around 10% . Over the same period, tertiary-sector GVC exports increased symmetrically, rising from about 10% to roughly 20% of the total.

Figure 4: Sectoral GVC Exports

This figure plots the evolution of GVC exports as a percentage of GDP. The top-left panel shows cumulative GVC exports as a share of GDP, with primary sector exports in black, secondary sector exports in dark gray, and tertiary sector exports in light gray. The top-right panel reports the median and interquartile range for the primary sector, while the bottom two panels report the median and interquartile range for the secondary and tertiary sectors, respectively.



The remaining panels plot the median and interquartile range by sector. In the primary sector, the median trends slightly upward and dispersion increases over time, peaking in 2016–2019. In the secondary sector, the median is broadly stable, with a modest increase around 2003 and higher dispersion in 1997–1999 and 2016–2019. In the tertiary sector, the median remains close to 1% for most of the period, while the interquartile range widens after the early 2000s. Note that the top-left panel is GDP-weighted, whereas the median and interquartile-range panels are unweighted. As a result, the distributional patterns do not necessarily mirror the GDP-weighted aggregate series one for one.

To explore how global value chains shape the relationship between FDI and growth, we begin with a parsimonious specification that abstracts from cross-sector heterogeneity in the effects of FDI and GVC participation:

$$\begin{aligned} GR_{s,i,t/t-10} = \beta_1 y_{s,i,t-10} + \beta_2 FDI_{s,i,t-10} + \beta_3 GVC_{s,i,t-10} \\ + \beta_4 \left(FDI_{s,i,t-10} \times GVC_{s,i,t-10} \right) + \alpha_{i,t} + \delta_{s,t} + \gamma_{i,s} + \varepsilon_{s,i,t}, \end{aligned} \tag{7}$$

where $GVC_{s,i,t-10}$ measures GVC penetration. For ease of interpretation, in the baseline specifications we proxy GVC penetration with a dummy equal to one for country–sector–years in which the share of GVC exports in total GDP is above the sample median.[7] In a robustness check, we show that the results are similar when using a continuous measure of GVC exports as a share of GDP. All other variables are defined as in Equation (4).

We first set $\beta_4 = 0$, thereby controlling for GVC participation while ruling out an interaction between GVC integration and FDI. In this specification, the estimated correlation between sectoral FDI inflows and subsequent sectoral growth becomes negative but remains close to zero and statistically insignificant. By contrast, sectoral GVC participation is positively and statistically significantly correlated with growth over the subsequent ten years (Column 1 of Table 5).

We next allow for an interaction between GVC participation and FDI flows. The estimates indicate that the main effect of FDI inflows is positive and marginally statistically significant, whereas the interaction term is negative and statistically significant (Column 2 of Table 5). This implies that sectoral FDI is positively associated with sectoral growth when GVC participation is low, but the implied marginal effect becomes negative—though not statistically significant—in country-sector-years with above-median GVC integration ($\beta_2 + \beta_4 = -0.047$, p-value $= 0.25$). Even in this simple model, which does not allow for cross-sector heterogeneity, the results indicate that GVC integration plays an important role in mediating the relationship between FDI inflows and sectoral growth. Specifically, it shows that GVC participation reduces the FDI effect on economic growth.

This finding might be due to the fact that GVCs reduce linkages. Micro evidence suggests that productivity spillovers from FDI materialize primarily through backward linkages—that is, through relationships between foreign affiliates and domestic input suppliers (Javorcik, 2004). In sectors with high GVC participation, foreign affiliates may rely more on established international supplier networks and imported intermediates, reducing local sourcing and supplier assistance, thereby weakening the main transmission channel for domestic gains. Our findings are also

[7] The median threshold is pooled across all sectors. In our sample, 26% of primary-sector, 73% of secondary-sector, and 39% of tertiary-sector observations have above median GVC penetration.

Table 5: Sectoral FDI, GVC, and Growth

This table reports a set of regressions in which the dependent variable is sectoral GDP growth. The explanatory variables include the log of initial sectoral GDP, sectoral FDI inflows as a percentage of total GDP, and a dummy variable equal to one for country–years in which the share of GVC exports over total GDP is above the sample median (GVC).

	(1)	(2)	(3)	(4)
$y_{s,i,t-10}$	-8.710***	-8.710***		
	(1.034)	(1.033)		
$y_{1,i,t-10} \times D_1$			-11.11***	-11.20***
			(1.008)	(1.020)
$y_{2,i,t-10} \times D_2$			-7.695***	-7.651***
			(1.207)	(1.199)
$y_{3,i,t-10} \times D_3$			-9.113***	-8.990***
			(1.481)	(1.431)
$FDI_{s,i,t-10}$	-0.00683	0.0846*		
	(0.0301)	(0.0446)		
$FDI_{1,i,t-10} \times D_1$			0.212**	0.481***
			(0.0990)	(0.127)
$FDI_{2,i,t-10} \times D_2$			-0.0105	1.076**
			(0.0644)	(0.437)
$FDI_{3,i,t-10} \times D_3$			-0.0900**	-0.055
			(0.029)	(0.039)
$GVC_{s,i,t-10}$	0.740*	0.854**		
	(0.378)	(0.384)		
$GVC_{1,i,t-10} \times D_1$			1.562*	1.953**
			(0.792)	(0.792)
$GVC_{2,i,t-10} \times D_2$			0.579	0.962
			(0.694)	(0.669)
$GVC_{3,i,t-10} \times D_3$			0.529	0.568
			(0.379)	(0.381)
$FDI_{s,i,t-10} \times GVC_{s,i,t-10}$		-0.132**		
		(0.0611)		
$FDI_{1,i,t-10} \times GVC_{1,i,t-10} \times D_1$				-0.358**
				(0.170)
$FDI_{2,i,t-10} \times GVC_{2,i,t-10} \times D_2$				-1.191**
				(0.455)
$FDI_{3,i,t-10} \times GVC_{3,i,t-10} \times D_3$				-0.056
				(0.050)
N. Obs.	1,963	1,963	1,963	1,963
R2	0.929	0.929	0.933	0.935
Country-year FE	✓	✓	✓	✓
Sector-year FE	✓	✓	✓	✓
Country-sector FE	✓	✓	✓	✓

Robust standard errors clustered at the country level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

in line with Mercer-Blackman et al. (2021), who merge Multi-Regional Input–Output tables on international production linkages with World Bank Enterprise Survey data and show that the productivity benefits of FDI are larger when GVC integration is low. They attribute this pattern to a competition channel: where GVC participation is low, foreign entry raises domestic competitive pressure more strongly, which in turn encourages firms to increase innovative effort, including spending on R&D.

Given that GVC participation varies across sectors and that its effect might not be the same in all sectors, we estimate a model that relaxes the assumption of a common sectoral effect and allows the interaction between GVC participation and FDI flows to vary across sectors:

$$\begin{aligned} GR_{s,i,t/t-10} &= \sum_{s=1}^{3} \beta_{1,s} \left(y_{s,i,t-10} \times D_s \right) + \sum_{s=1}^{3} \beta_{2,s} \left(FDI_{s,i,t-10} \times D_s \right) \\ &+ \sum_{s=1}^{3} \left(\beta_{3,s} GVC_{s,i,t-10} \times D_s \right) + \sum_{s=1}^{3} \beta_{4,s} \left(FDI_{s,i,t-10} \times GVC_{s,i,t-10} \times D_s \right) \\ &+ \alpha_{i,t} + \delta_{s,t} + \gamma_{i,s} + \varepsilon_{s,i,t}. \end{aligned} \tag{8}$$

All variables are defined as in the preceding equations.

As before, we first mute the interaction between FDI and GVC participation by imposing $\beta_{4,1} = \beta_{4,2} = \beta_{4,3} = 0$. Adding sector-specific controls for GVC participation leaves the main patterns essentially unchanged: sectoral FDI inflows remain positively associated with growth in the primary sector, negatively associated with growth in the tertiary sector, and not significantly associated with growth in the secondary sector (compare Column 2 of Table 4 with Column 3 of Table 5). High GVC participation is positively associated with growth in all three sectors, but the coefficient is statistically significant only for the primary sector.

The full specification shows that in country–sector–years with low GVC penetration, FDI inflows are positively and significantly associated with growth in the primary and secondary sectors, but not in the tertiary sector (Column 4, Table 5). The point estimates imply that a one–standard-deviation increase in FDI inflows raises sectoral growth by about 1 percentage point in both the primary and secondary sectors.

By contrast, the interaction between FDI inflows and high GVC penetration is negative across all sectors. In country–sector–years with high GVC penetration, the total effect of a one-percentage point increase in FDI on growth becomes negative and statistically significant in the tertiary sector (the total effect is $-0.055 - 0.056 = -0.11$, p-value $= 0.002$) and negative but small and not statistically significant in the primary and secondary sectors.[8] These marginal

[8] As robustness checks, we estimate specifications that interact FDI with a continuous measure of GVC penetration (Appendix Table C.2), as well as specifications that interact GVC penetration with local conditions, including high financial depth and high educational attainment (Appendix Table C.3). The results in Appendix Table C.2 are qualitatively similar to the baseline estimates reported in Table 5. In particular, the coefficients on the triple interaction terms between sector dummies, FDI, and GVC penetration are consistently negative, corroborating the attenuating role of high aggregate GVC penetration. One minor difference is that the coefficient for the primary sector is statistically significant in the specification using dummy variables but not in the specification using the continuous measure of GVC penetration. Note that, in terms of magnitude, coefficients from specifications with continuous interaction terms are not directly comparable to those obtained using dummy variables. Finally, Ap-

effects imply that, with high GVC penetration, a one-standard-deviation increase in FDI inflows (specific for each sector) raises sectoral growth by 0.23 percentage point in the primary sector (not statistically significant) and lowers growth by 0.12 in the secondary sector and 0.25 percentage point in the tertiary sector (statistically significant at the 10- and 1-percent levels, respectively).

These results are consistent with GVC participation weakening the link between FDI and sectoral value-added growth by reducing the share of activity captured domestically. This mechanism is especially relevant for the secondary sector, where high GVC integration often entails specialization in standardized assembly or processing stages with thin domestic margins, in line with the "smile-curve" view (Baldwin and Ito, 2021). In such settings, FDI can expand gross production while generating limited gains in domestic value added, or even lowering it if imported inputs displace domestic suppliers (Koopman et al., 2014). This interpretation is also consistent with firm-level evidence that downstream, export-platform production tends to source fewer inputs locally, whereas more upstream positions are associated with stronger local sourcing and supplier linkages (Amendolagine et al., 2019).

A similar logic applies to the tertiary sector, where high GVC penetration often reflects integration into fragmented, standardized cross-border service provision, such as logistics or back-office services. In these activities, FDI may raise scale but compress margins or crowd out domestic providers, leading to weaker or negative correlations with value-added growth. In the primary sector, by contrast, high GVC integration typically reflects upstream specialization with limited downstream development, yielding small and statistically insignificant net growth effects when GVC penetration is high (UNCTAD, 2013; Taglioni and Winkler, 2016; World Bank, 2020).

Taken together, these results highlight a nuanced interaction between FDI, GVC participation, and sectoral structure. They align with the global value chain literature, which stresses that an industry's position within the value chain and the organization of multinational production shape both value capture and opportunities for upgrading. Upstream or contractually vulnerable suppliers tend to capture a smaller share of rents and face stronger hold-up problems (Antràs and Chor, 2013, 2021), while contractual frictions and organizational choices can limit knowledge transfer in highly fragmented production networks (Antràs and Helpman, 2007). These mechanisms are consistent with the "second unbundling" view (Baldwin, 2011, 2016), according to which international fragmentation raises the importance of coordination and intangible know-how but concentrates these capabilities within lead firms. In our data, FDI is associated with higher sectoral growth when GVC penetration is low, while its growth effects weaken or turn negative in GVC-intensive settings, consistent with limited local value capture in highly fragmented chains.

These patterns are consistent with the idea that the effect of FDI on sectoral value-added growth depends on the *type* of GVC integration. In the secondary sector, high *backward* (downstream) participation often corresponds to import-intensive assembly or processing stages with thin domestic margins, in line with the "smile-curve" view (Baldwin and Ito, 2021). In such settings, FDI can expand gross production while generating limited gains in domestic value added,

pendix Table C.3 shows that controlling for local conditions does not affect the baseline results reported in Table 5.

or even lowering it if imported intermediates displace domestic suppliers.

4.1 Backward and Forward GVC Participation

Beyond its sectoral composition, GVC participation can be decomposed into backward and forward linkages, which correspond closely to downstream and upstream positions along the production chain. Backward participation measures the foreign value added embodied in a sector's exports and is characteristic of downstream, import-intensive activities such as processing, assembly, and final production. For example, electronic assembly typically relies heavily on imported intermediates and thus exhibits high backward participation. Forward participation instead measures the domestic value added embodied in other countries' exports and characterizes upstream activities that supply intermediates, raw materials, or services used in foreign production. Chemical inputs and business services are examples of upstream activities that generate forward participation.

This distinction is central for interpreting the relationship between FDI and sectoral growth because GVC position shapes how much of the expansion associated with FDI translates into domestically recorded value added and how strongly it propagates to domestic firms. In sectors with high backward participation, FDI often expands activities that rely heavily on imported inputs and are embedded in multinational supply networks. While output and gross exports may increase, domestic value added can rise more modestly if local firms capture only thin margins in standardized downstream tasks and foreign sourcing limits upstream spillovers. By contrast, in sectors with high forward participation, FDI that raises productivity or capacity in upstream activities can generate larger domestic value-added gains and broader spillovers, as domestic inputs are used repeatedly along downstream production chains. As a result, similar increases in sectoral FDI can be associated with very different growth outcomes depending on whether GVC integration occurs primarily through backward or forward linkages, motivating our focus on GVC participation as a key moderator of the FDI–growth relationship.

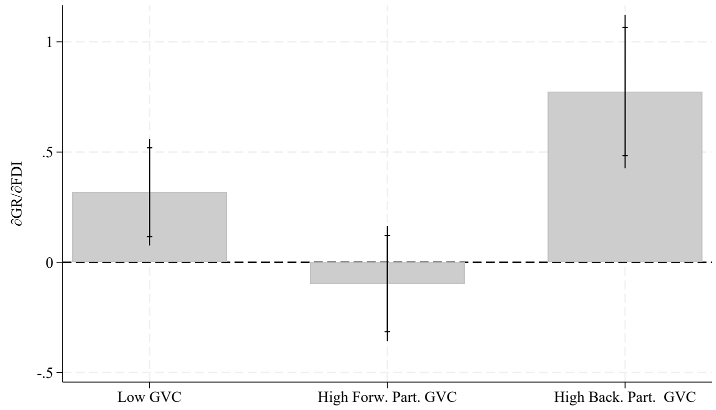
Backward and forward participation capture qualitatively different forms of integration, with potentially different implications for domestic value-added creation and spillovers. In buyer–supplier relationships with strong contractual frictions, contractually vulnerable stages often capture a smaller share of rents and face greater hold-up risks, while lead firms retain key intangible assets and coordination capabilities (Antràs and Chor, 2013, 2021; Antràs and Helpman, 2007). This is consistent with the "second unbundling" view, according to which the fragmentation of production increases the importance of coordination and intangible know-how but concentrates these capabilities within lead firms (Baldwin, 2011). Building on these insights, we expect the *type* of GVC integration to condition the growth effects of FDI, with different implications across sectors depending on whether integration occurs through backward (import-to-export, downstream) or forward (supplying inputs, upstream) linkages (Koopman et al., 2014; UNCTAD, 2013; Taglioni and Winkler, 2016; World Bank, 2020).

These considerations motivate sector-specific hypotheses. First, in the *primary sector*, where production is often constrained by access to imported capital goods and specialized intermediates

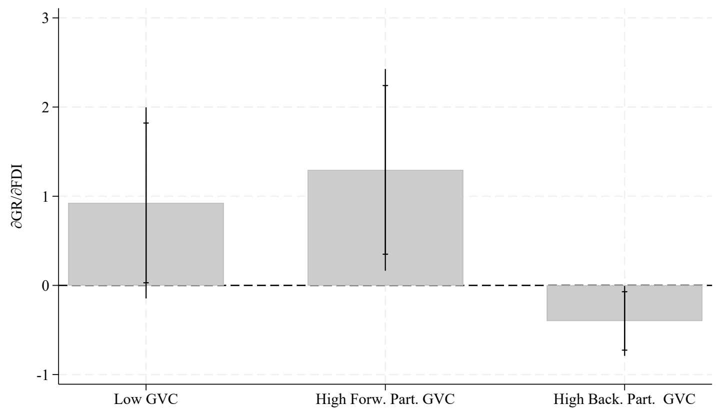
Figure 5: FDI, Backward and Forward GVC, and Sectoral Growth

This figure shows how the presence of GVC with backward and forward participation affects the relationship between sectoral FDI and sectoral growth. The top panel focuses on the primary sector, the mid panel on the secondary sector and the bottom panel on the tertiary sector. The figure is based on the estimates in Column 1 of Table C.4.

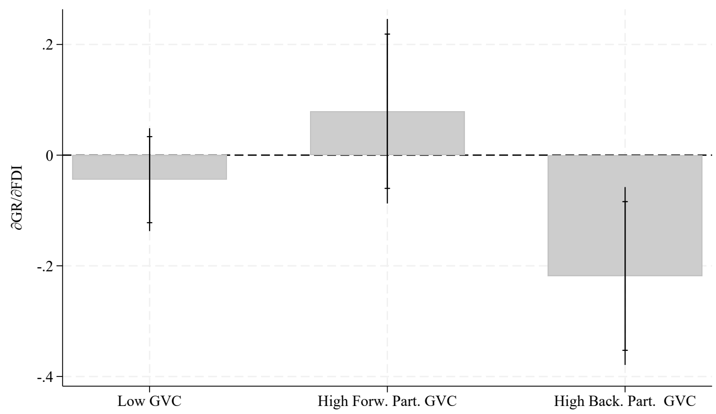
A Primary Sector



B Secondary Sector



C Tertiary Sector



(machinery, engineering services, chemicals), we expect FDI to be more growth-enhancing when *backward* participation is high because efficient access to imported inputs allows FDI projects to scale and raise domestic value added. By contrast, high *forward* participation in the primary sector may weaken the growth effects of FDI if it reflects upstream specialization in raw or lightly processed inputs embodied in other countries' exports, reinforcing enclave-type patterns with limited downstream processing and thin local linkages (UNCTAD, 2013; Taglioni and Winkler, 2016; World Bank, 2020). Second, in the *secondary sector*, we expect the opposite asymmetry: FDI should be more growth-enhancing when *forward* participation is high, because upstream manufacturing that supplies intermediates can generate larger domestic value-added gains and spillovers as domestic inputs are used repeatedly along downstream production chains. In contrast, high *backward* participation in manufacturing often corresponds to import-intensive assembly stages in which domestic value added is small and local supplier linkages are limited, implying weaker or negative value-added growth effects (Koopman et al., 2014). Likewise, in the *tertiary sector*, we expect high *backward* participation to dampen the growth effects of FDI because services with strong backward linkages often rely on imported intangible inputs (software and IP, cloud services, headquarters services, management fees) and may book a larger share of value added abroad through royalties and intra-firm imports. High *forward* participation in services signals that domestic services are embedded as inputs into other sectors' exports (logistics, ICT, finance, engineering and professional services), which is more conducive to local value capture and spillovers (World Bank, 2020). These hypotheses are also consistent with evidence that FDI spillovers are more likely to arise through local linkage formation, particularly upstream supplier relationships, than through import-intensive production modes (Javorcik, 2004).

We test these hypotheses by augmenting Equation 8 with a set of interaction terms which allow for the effect of FDI to vary along GVC type. We find that the growth effects of sectoral FDI vary systematically with the type of GVC integration. In the primary sector, FDI is associated with higher growth when GVC participation is low and becomes very large and positive when backward participation is high, while it turns negative but statistically insignificant when forward participation is high (top panel of Figure 5; see Table C.4 for full regressions results, including marginal effects and associated standard errors in Column 2). In the secondary sector, FDI is positive but only marginally significant when GVC participation is low, becomes larger and statistically significant when forward participation is high, and turns negative and (marginally, in absolute terms) statistically significant when backward participation is high (mid panel of Figure 5). In the tertiary sector, FDI is negative and not statistically significant when GVC participation is low, becomes positive but not statistically significant when forward participation is high, and turns negative and statistically significant when backward participation is high.

Taken together, these patterns suggest that FDI is most growth-enhancing when it complements a sector's structural role within global production networks: by easing imported-input constraints in primary activities, by strengthening upstream manufacturing linkages in the secondary sector, and by avoiding an excessive reliance on imported intangibles in services.

5 Conclusions

This paper reassesses the long-standing debate on the relationship between foreign direct investment and economic growth. While policymakers continue to view FDI as a central engine of development, the academic literature has struggled to identify a stable and robust positive association between FDI inflows and growth. Our results show that this tension is not the result of missing controls or insufficient data, but rather reflects profound changes over time in the composition of FDI, its sectoral allocation, and its integration into global value chains.

Using country-level data, we first document that the complementarities between FDI and local conditions—such as financial depth and human capital—that featured prominently in earlier decades have largely disappeared in more recent periods. These findings caution against extrapolating results from the 1970s and 1980s to the current global economy and suggest that the growth effects of FDI depend on how foreign investment is organized and embedded in host economies.

Moving beyond aggregate regressions, we show that sectoral heterogeneity is central to understanding the elusive link between FDI and growth. FDI inflows are positively associated with growth in the primary sector, uncorrelated with growth in the secondary sector, and negatively associated with growth in the tertiary sector. These patterns help reconcile conflicting findings in the literature and highlight the limitations of aggregate analyses that pool fundamentally different types of foreign investment.

Our core contribution is to show that global value chains play a key mediating role in shaping these sectoral relationships. We find that FDI is most strongly associated with growth in country–sectors with low GVC participation, while this association weakens or disappears as GVC integration increases. Moreover, the effects of FDI depend critically on the type of GVC integration. Backward participation amplifies the positive growth effects of FDI in the primary sector but attenuates—or even reverses—them in the secondary sector and strengthens the negative growth effects in the tertiary sector. In contrast, forward participation is associated with more favorable outcomes in manufacturing. These findings underscore that backward and forward GVC integration capture qualitatively different positions in global production networks, with distinct implications for domestic value-added creation, local linkages, and spillovers.

Taken together, our results suggest that the lack of an aggregate relationship between FDI and growth does not imply that FDI is irrelevant for development. Rather, it reflects a structural transformation in the nature of multinational activity. In a world characterized by fragmented production and cross-border task specialization, FDI can expand gross output without generating commensurate domestic value added—particularly in highly GVC-integrated sectors such as manufacturing and services. As a result, traditional measures of absorptive capacity, including financial development and human capital, play a more limited role on average than they did in earlier decades.

These findings have implications for both research and policy. For researchers, they highlight the importance of moving beyond aggregate country-level regressions and focusing instead on sectoral outcomes and value-added measures that better capture the distribution of gains from foreign investment. For policymakers, they suggest that attracting FDI is not sufficient: the growth impact of foreign investment depends on where it enters the economy and how it is integrated into global production networks. Depending on the composition of FDI, policies aimed at strengthening domestic linkages, upgrading along value chains, and increasing local value-added capture may therefore be more consequential than policies that seek to raise FDI inflows per se.

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Appendix

A Country-Level Data

To start, our empirical analysis relies on country-level aggregate data. We describe the variables we use below.

Our dependent variable is real per capita GDP growth from the World Bank's Development Indicators (WDI). Our key explanatory variables are net FDI inflows over GDP sourced from the WDI, financial depth as measured by credit to the private sector over GDP from the World Bank's Global Financial Development database, and human capital measured using Barro and Lee (2013) data on average years of secondary schooling (included as log of years in the regressions). Additional controls include: initial GDP per capita, logs of government consumption/GDP, inflation, and trade/GDP (all sourced from WDI), a measure of institutional quality (ICRG's Investment Profile index), and a dummy variable for Sub-Saharan Africa. The list of countries included in the baseline sample is reported in Table A.1.

Table A.1: List of Countries included in the Cross-Country Regressions

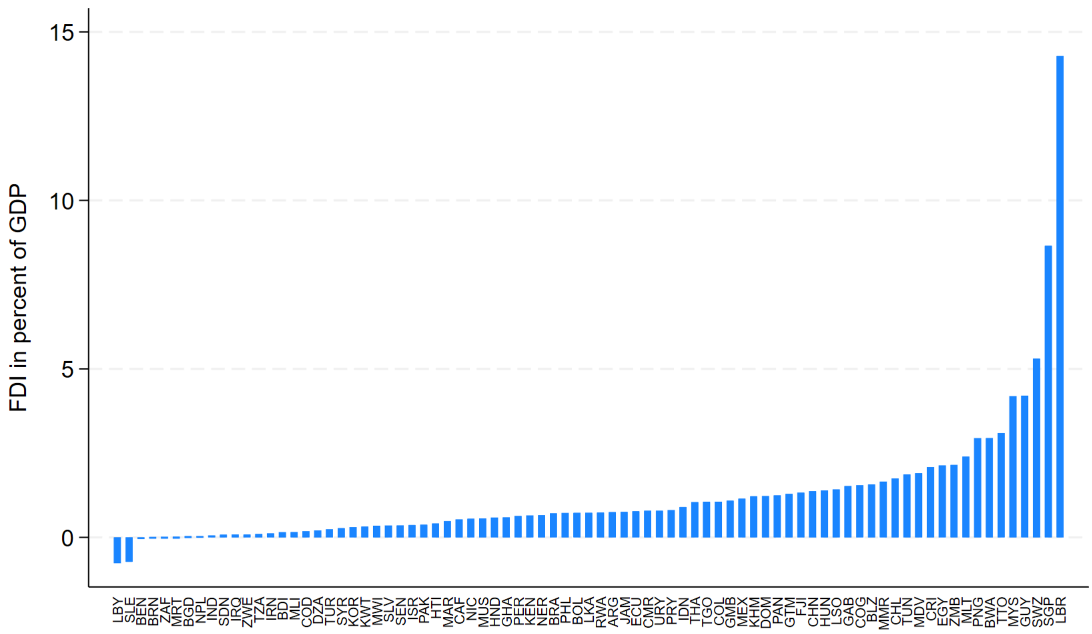
This table reports the list of countries for which we have data for both periods used in the summary statistics and cross-country estimations of Tables 1 and 2.

Algeria	Congo, Rep.	Iran	Mexico	Sri Lanka
Argentina	Costa Rica	Iraq	Morocco	Sudan
Bangladesh	Dominican Rep.	Israel	Myanmar	Swaziland
Belize	Ecuador	Jamaica	Nepal	Syria
Benin	Egypt	Kenya	Nicaragua	Tanzania
Bolivia	El Salvador	Korea, Rep.	Niger	Thailand
Botswana	Fiji	Kuwait	Pakistan	Togo
Brazil	Gabon	Lesotho	Panama	Trinidad & Tobago
Brunei	Gambia, The	Liberia	Papua NG	Tunisia
Burundi	Ghana	Libya	Paraguay	Turkey
Cambodia	Guatemala	Malawi	Peru	Uruguay
Cameroon	Guyana	Malaysia	Philippines	Zambia
Centr. Afric. Rep.	Haiti	Maldives	Rwanda	Zimbabwe
Chile	Honduras	Mali	Senegal	
China	Hungary	Malta	Sierra Leone	
Colombia	India	Mauritania	Singapore	
Congo, Dem. Rep.	Indonesia	Mauritius	South Africa	

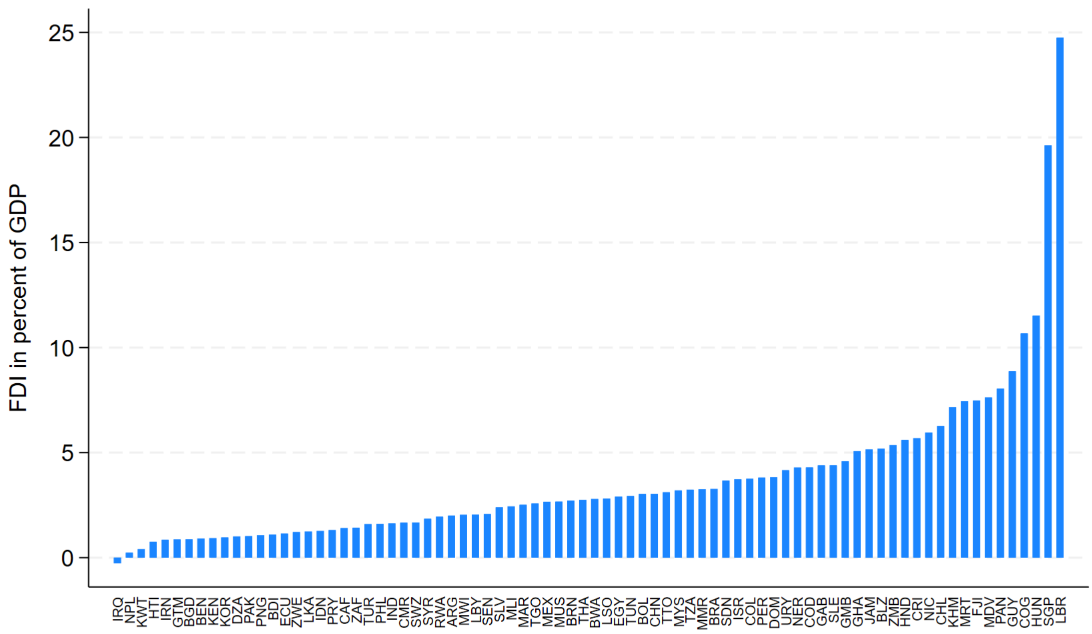
Figure A.1: Net FDI Inflows by Country

This figure plots the average of net FDI inflows (% of GDP) for the countries in Panels A and B of Table 1. Malta is omitted from sub-figure B as its value of FDI is 114.

A 1975-94



B 2000-19



B Sectoral Data

This appendix provides a detailed description of the steps undertaken for the construction of sectoral GDP, sectoral FDI, and sectoral GVC series.

B.1 Sectoral GDP

We source information on sectoral GDP from the World Bank's World Development Indicators (WDI) and the United Nations Basic Statistics website.[9] As a first step, we downloaded data from the United Nations Basic Statistics "Value Added by Economic Activity, at current prices in US Dollars" for the following sectors: (i) agriculture; (ii) mining, manufacturing, and utilities; (iii) manufacturing; (iv) wholesale trade; (v) transport; and (vi) other.

We begin by constructing sectoral GDP in current US dollars using UN data. We compute value added in mining and utilities by subtracting manufacturing from "mining, manufacturing, and utilities," and compute value added in the primary sector as the sum of agriculture, mining, and utilities. We acknowledge that this classification is imperfect: utilities properly belong to the secondary sector, but the UN data do not report utilities separately from mining. Consequently, our primary sector measure includes utilities, introducing a small upward bias. However, this misclassification is quantitatively minor. While comprehensive cross-country data on utilities' GDP share are limited, available evidence suggests utilities typically represent a small portion of economic activity, often less than 2% of GDP in countries with reported data, and likely even less in economies in which the data is not reported. The secondary sector is set equal to manufacturing value added, and value added in the tertiary sector is defined as the sum of wholesale trade, transport, and other services.[10]

For the regressions, we use the growth rate of real sectoral GDP per capita. To construct real series, we first compute sectoral shares using the UN data described above and then multiply these shares by GDP per capita in constant 2015 USD, sourced from the WDI. Formally real GDP per capita in sector s in country i and year t ($y_{s,i,t}$) is equal to:

$$y_{s,i,t} = \varphi_{s,i,t} \times \frac{Y_{i,t}}{POP_{i,t}}, \tag{B.1}$$

where $\varphi_{s,i,t}$ is the value-added share of sector s in country i and year t, $Y_{i,t}$ is GDP in constant dollars for country i in year t, and $POP_{i,t}$ is the population of country i in year t.[11] Table 3 reports summary statistics for 10-year real sectoral GDP per capita growth for all sectors pooled together (top panel) and for each of the three sectors separately (bottom three panels).

[9] See https://databank.worldbank.org/source/world-development-indicators and https://unstats.un.org/unsd/snaama/Basic.

[10] We rely on UN data because the World Bank does not report a unified primary sector series, providing only agriculture and fishing separately.

[11] Note that we are applying the same GDP deflator to all sectors as lack of data for sector-specific deflators do not allow to control for relative price shifts.

B.2 Sectoral FDI

We obtain data on sectoral FDI flows and stock from three separate sources:

1. Table 7 of UNCTAD (1992), which reports sectoral FDI stock as a share of GDP for selected years over 1970–1989 (this is the same source used by Alfaro, 2003);

2. Table A.I.20 of UNCTAD (2004), which reports inward FDI flows in services (in millions of dollars) for selected years over 1990–2002;

3. Confidential data obtained from UNCTAD on sectoral FDI flows and stocks (in millions of dollars) for an unbalanced panel of countries over the period 2003–2023.

We then use the sectoral GDP data in current dollars described above with sectoral FDI stock data from UNCTAD (1992) to construct series for FDI stocks in current dollars. Because these data are available only at three- to five-year intervals, we interpolate the missing years and construct pseudo-flows for years prior to 1990 by taking year-on-year changes in the stock.

We complete these series with the confidential UNCTAD data on FDI sectoral flows in current dollars. When missing years occur, we again rely on interpolation. For country-years not covered by either of these sources but for which inward FDI flows in services are available from UNCTAD (2004), we construct series for services FDI and allocate the remaining amount of total FDI across the primary and secondary sectors using the closest available sectoral shares. After this process, we obtain an unbalanced panel of FDI flows (in millions of USD) covering up to 112 emerging and developing economies over the period 1975–2023 (we also have data for 25 advanced economies, but do not use them in the analysis).

To reconcile our data with aggregate FDI flow data reported by the WDI, we use the sectoral data described above to compute sectoral FDI shares and multiply these shares by the net FDI inflows (in current dollars) reported by the WDI. We finally divide by current-dollar GDP to construct sectoral FDI flows as a share of overall GDP. Our key explanatory variable that measures FDI flows to sector s in country i and year t ($FDI_{s,i,t}$) is thus obtained as:

$$FDI_{s,i,t} = \omega_{s,i,t} \frac{FDI_{i,t}}{GDP_{i,t}}, \tag{B.2}$$

where $FDI_{i,t}$ denotes net FDI inflows to country i in year t (in current dollars) sourced from the WDI, $GDP_{i,t}$ is nominal GDP (in current dollars) in country i and year t, also from the WDI, and $\omega_{s,i,t}$ is the share of FDI going to sector s in country i and year t, constructed using UNCTAD data as described above. Table 3 reports summary statistics for sectoral FDI inflows as a percent of overall GDP for all sectors pooled together (top panel) and for each of the three sectors separately (bottom three panels).

B.3 Sectoral GVC

The construction of sectoral GVC data is described in Mancini et al. (2024) and Borin et al. (2025) and the data are sourced from Tradeconomics and World Bank WITS.[12] Table 3 reports summary statistics for sectoral GVC exports as a percent of total GDP for all sectors pooled together (top panel) and for each of the three sectors separately (bottom three panels).

[12]Downloaded from https://www.tradeconomics.com/position/ and https://wits.worldbank.org/gvc/gvc-data-download.html

C Additional Results

Table C.1: Sectoral FDI and Growth with Continuous Measures of Local Conditions

This table reports regressions in which the dependent variable is sectoral GDP growth and the explanatory variables include sectoral FDI inflows, financial depth (PC), and years of schooling (EDU), along with their interactions with FDI. The specifications correspond to columns 3–5 of Table 4, but with a continuous measure of local conditions

	(1)	(2)	(3)
$y_{1,i,t-10} \times D_1$	-11.47***	-10.78***	-11.25***
	(1.053)	(1.147)	(1.157)
$y_{2,i,t-10} \times D_2$	-8.321***	-8.222***	-8.614***
	(1.055)	(1.079)	(1.115)
$y_{3,i,t-10} \times D_3$	-9.214***	-8.529***	-8.683***
	(1.288)	(0.830)	(0.930)
$FDI_{1,i,t-10} \times D_1$	-0.253**	0.258	-0.136
	(0.108)	(0.211)	(0.183)
$FDI_{2,i,t-10} \times D_2$	0.0828	0.249	0.234
	(0.113)	(0.160)	(0.163)
$FDI_{3,i,t-10} \times D_3$	-0.175***	-0.0689	-0.196***
	(0.0466)	(0.0607)	(0.0721)
$FDI_{1,i,t-10} \times PC_{i,t-10} \times D_1$	0.016***		0.016***
	(0.004)		(0.004)
$FDI_{2,i,t-10} \times PC_{i,t-10} \times D_2$	-0.0007		0.0007
	(0.0016)		(0.0021)
$FDI_{3,i,t-10} \times PC_{i,t-10} \times D_3$	0.002**		0.003***
	(0.001)		(0.0009)
$FDI_{1,i,t-10} \times D_1 \times EDU_{i,t-10}$		0.0351	-0.009
		(0.0597)	(0.042)
$FDI_{2,i,t-10} \times D_2 \times EDU_{i,t-10}$		-0.0732	-0.0692
		(0.0470)	(0.0466)
$FDI_{3,i,t-10} \times D_3 \times EDU_{i,t-10}$		-0.0067	-0.0014
		(0.0168)	(0.0179)
$PC_{i,t-10} \times D_2$	0.0302**		0.0202**
	(0.0116)		(0.0098)
$PC_{i,t-10} \times D_3$	0.0152**		0.0068
	(0.0059)		(0.0051)
$EDU_{i,t-10} \times D_2$		3.644**	3.366**
		(1.629)	(1.476)
$EDU_{i,t-10} \times D_3$		2.273	2.000
		(1.419)	(1.300)
N. Obs	1,901	1,791	1,729
R2	0.934	0.935	0.936
Country-year FE	✓	✓	✓
Sector-year FE	✓	✓	✓
Country-sector FE	✓	✓	✓

Robust standard errors clustered by country and year are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Table C.2: Sectoral FDI and Growth with Continuous Measures of GVC

This table reports regressions in which the dependent variable is sectoral GDP growth and the explanatory variables include sectoral FDI inflows, sectoral GVC participation and their interactions. The models are the same as those of Table 5 but with continuous measures of GVC participation instead of dummies.

	(1)	(2)	(3)	(4)
$y_{s,i,t-10}$	-9.171***	-9.199***		
	(1.009)	(1.001)		
$FDI_{s,i,t-10}$	0.003	0.054		
	(0.031)	(0.035)		
$GVC_{s,i,t-10}$	0.155	0.172*		
	(0.0978)	(0.0959)		
$FDI_{s,i,t-10} \times GVC_{s,i,t-10}$		-0.0099*		
		(0.005)		
$y_{1,i,t-10} \times D_1$			-11.61***	-11.68***
			(1.221)	(1.227)
$y_{2,i,t-10} \times D_2$			-8.205***	-8.255***
			(1.235)	(1.227)
$y_{3,i,t-10} \times D_3$			-9.264***	-9.226***
			(1.499)	(1.503)
$FDI_{1,i,t-10} \times D_1$			0.218**	0.267**
			(0.0933)	(0.120)
$FDI_{2,i,t-10} \times D_2$			0.00106	0.209*
			(0.0666)	(0.118)
$FDI_{3,i,t-10} \times D_3$			-0.0806**	-0.0407
			(0.0322)	(0.0534)
$GVC_{1,i,t-10} \times D_1$			0.367**	0.384*
			(0.175)	(0.194)
$GVC_{2,i,t-10} \times D_2$			0.0719	0.108
			(0.0874)	(0.0841)
$GVC_{3,i,t-10} \times D_3$			0.202	0.222
			(0.210)	(0.210)
$FDI_{1,i,t-10} \times GVC_{1,i,t-10} \times D_1$				-0.0095
				(0.016)
$FDI_{2,i,t-10} \times GVC_{2,i,t-10} \times D_2$				-0.021**
				(0.0088)
$FDI_{3,i,t-10} \times GVC_{3,i,t-10} \times D_3$				-0.0107
				(0.0125)
N. Obs	1,963	1,963	1,963	1,963
R2	0.929	0.929	0.933	0.934
Country-year FE	✓	✓	✓	
Sector-year FE	✓	✓	✓	✓
Country-sector FE	✓	✓	✓	✓

Robust standard errors clustered by country and year are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Table C.3: Sectoral FDI, GVC, Financial Depth, Education and Growth

This table reports a set of regressions in which the dependent variable is sectoral GDP growth. The explanatory variables include the log of initial sectoral GDP, sectoral FDI inflows as a percentage of total GDP, a dummy variable equal to one for country–years in which the share of GVC exports over total GDP is above the sample median (GVC), a dummy equal to one for country–years with financial depth above the sample median (HFD), and a dummy variable equal to one for country–years with education levels above the sample median (HED).

	(1)	(2)	(3)
$y_{1,i,t-10} \times D_1$	-11.12***	-11.32***	-11.18***
	(0.964)	(1.163)	(1.135)
$y_{2,i,t-10} \times D_2$	-7.739***	-7.571***	-7.644***
	(1.205)	(1.204)	(1.231)
$y_{3,i,t-10} \times D_3$	-9.027***	-8.691***	-8.693***
	(1.358)	(1.262)	(1.164)
$FDI_{1,i,t-10} \times D_1$	0.398***	0.410***	0.351**
	(0.120)	(0.144)	(0.137)
$FDI_{2,i,t-10} \times D_2$	1.067**	0.825**	0.828**
	(0.442)	(0.397)	(0.406)
$FDI_{3,i,t-10} \times D_3$	-0.0786*	-0.0338	-0.0629
	(0.0460)	(0.0488)	(0.0553)
$GVC_{1,i,t-10} \times D_1$	1.856**	1.974**	1.885**
	(0.768)	(0.765)	(0.756)
$GVC_{2,i,t-10} \times D_2$	0.934	0.842	0.797
	(0.668)	(0.660)	(0.650)
$GVC_{3,i,t-10} \times D_3$	0.478	0.690*	0.602*
	(0.374)	(0.358)	(0.346)
$FDI_{1,i,t-10} \times GVC_{1,i,t-10} \times D_1$	-0.403**	-0.344*	-0.373*
	(0.157)	(0.195)	(0.195)
$FDI_{2,i,t-10} \times GVC_{2,i,t-10} \times D_2$	-1.236***	-1.055**	-1.079**
	(0.458)	(0.426)	(0.423)
$FDI_{3,i,t-10} \times GVC_{3,i,t-10} \times D_3$	-0.0504	-0.0545	-0.0482
	(0.0496)	(0.0453)	(0.0447)
$FDI_{1,i,t-10} \times HFD \times D_1$	0.298**		0.247**
	(0.131)		(0.104)
$FDI_{2,i,t-10} \times HFD \times D_2$	0.0743		0.0524
	(0.142)		(0.155)
$FDI_{3,i,t-10} \times HFD \times D_3$	0.0455		0.0654*
	(0.0369)		(0.0375)
$FDI_{1,i,t-10} \times HED \times D_1$		0.228	0.181
		(0.282)	(0.241)
$FDI_{2,i,t-10} \times HED \times D_2$		0.176	0.159
		(0.155)	(0.157)
$FDI_{3,i,t-10} \times HED \times D_3$		-0.0330	-0.0435
		(0.0572)	(0.0555)
$HFD \times D_2$	0.634		0.569
	(0.460)		(0.456)
$HFD \times D_3$	0.191		0.0160
	(0.294)		(0.275)
$HED \times D_2$		0.146	0.086
		(0.813)	(0.891)
$HED \times D_3$		0.845	0.835
		(0.813)	(0.891)
N. Obs.	1,901	1,903	1,841
R-squared	0.936	0.935	0.936
Country-year FE	✓	✓	✓
Sector-year FE	✓	✓	✓
Country-sector FE	✓	✓	✓

Robust standard errors clustered at the country level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Table C.4: Sectoral FDI and Types of GVC Participation

This table reports regressions in which the dependent variable is sectoral GDP growth. The explanatory variables include the log of initial sectoral GDP, sectoral FDI inflows as a percentage of total GDP, measures of forward (GVC F) and backward (GVC B) linkages, and their interactions with FDI. Column 1 measures GVC penetration (as a share of GDP) using a dummy equal to one when penetration is above the median. Column 2 reports the results of the same regressions as in column 1 but for each sector it reports the total effects (and standard errors) for High Forward GVC ($FDI_{s,i,t-10} \times D_s + FDI_{s,i,t-10} \times$ GVC $\text{F}_{s,i,t-10} \times D_s$) and High Backward GVC ($FDI_{s,i,t-10} \times D_s + FDI_{s,i,t-10} \times$ GVC $\text{B}_{s,i,t-10} \times D_s$). These are the coefficients presented in Figure 5.

	(1)		(2)
$y_{1,i,t-10} \times D_1$	-11.42***	$y_{1,i,t-10} \times D_1$	-11.42***
	(0.986)		(0.986)
$y_{2,i,t-10} \times D_2$	-7.713***	$y_{2,i,t-10} \times D_2$	-7.713***
	(1.229)		(1.229)
$y_{3,i,t-10} \times D_3$	-9.010***	$y_{3,i,t-10} \times D_3$	-9.010***
	(1.298)		(1.298)
$FDI_{1,i,t-10} \times D_1$	0.317**	$FDI_{1,i,t-10} \times D_1$	0.317**
	(0.121)		(0.121)
$FDI_{2,i,t-10} \times D_2$	0.925*	$FDI_{2,i,t-10} \times D_2$	0.925*
	(0.538)		(0.538)
$FDI_{3,i,t-10} \times D_3$	-0.0444	$FDI_{3,i,t-10} \times D_3$	-0.0444
	(0.0467)		(0.0467)
$FDI_{1,i,t-10} \times$ GVC $\text{F}_{1,i,t-10} \times D_1$	-0.414**	$FDI_{1,i,t-10} \times D_1(1 +$ GVC $\text{F}_{1,i,t-10})$	-0.097
	(0.186)		(0.131)
$FDI_{2,i,t-10} \times$ GVC $\text{F}_{2,i,t-10} \times D_2$	0.370*	$FDI_{2,i,t-10} \times D_2(1 +$ GVC $\text{F}_{2,i,t-10})$	1.295**
	(0.200)		(0.568)
$FDI_{3,i,t-10} \times$ GVC $\text{F}_{3,i,t-10} \times D_3$	0.124	$FDI_{3,i,t-10} \times D_3(1 +$ GVC $\text{F}_{3,i,t-10})$	0.079
	(0.0771)		(0.084)
$FDI_{1,i,t-10} \times$ GVC $\text{B}_{1,i,t-10} \times D_1$	0.457***	$FDI_{1,i,t-10} \times D_1(1 +$ GVC $\text{B}_{1,i,t-10})$	0.774***
	(0.118)		(0.174)
$FDI_{2,i,t-10} \times$ GVC $\text{B}_{2,i,t-10} \times D_2$	-1.324**	$FDI_{2,i,t-10} \times D_2(1 +$ GVC $\text{B}_{2,i,t-10})$	-0.399**
	(0.572)		(0.197)
$FDI_{3,i,t-10} \times$ GVC $\text{B}_{3,i,t-10} \times D_3$	-0.174**	$FDI_{3,i,t-10} \times D_3(1 +$ GVC $\text{B}_{3,i,t-10})$	-0.218***
	(0.0849)		(0.081)
GVC $\text{F}_{1,i,t-10} \times D_1$	2.252**	GVC $\text{F}_{1,i,t-10} \times D_1$	2.252**
	(0.913)		(0.913)
GVC $\text{F}_{2,i,t-10} \times D_2$	-0.840*	GVC $\text{F}_{2,i,t-10} \times D_2$	-0.840*
	(0.469)		(0.469)
GVC $\text{F}_{3,i,t-10} \times D_3$	0.187	GVC $\text{F}_{3,i,t-10} \times D_3$	0.187
	(0.259)		(0.259)
GVC $\text{B}_{1,i,t-10} \times D_1$	-0.0694	GVC $\text{B}_{1,i,t-10} \times D_1$	-0.0694
	(0.727)		(0.727)
GVC $\text{B}_{2,i,t-10} \times D_2$	1.948**	GVC $\text{B}_{2,i,t-10} \times D_2$	1.948**
	(0.775)		(0.775)
GVC $\text{B}_{3,i,t-10} \times D_3$	0.428	GVC $\text{B}_{3,i,t-10} \times D_3$	0.428
	(0.636)		(0.636)
N. Obs	1,963		1,963
R2	0.938		0.938
Country-year FE	✓		✓
Sector-year FE	✓		✓
Country-sector FE	✓		✓

Robust standard errors clustered at the country level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.