Foreign Direct Investment and Economic Growth in Sub-Saharan Africa: The Mediating Role of Structural Transformation and the Moderating Effect of Domestic Capital Formation

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ABSTRACT

The study investigates the impacts of foreign direct investment (FDI) on economic growth in Sub-Saharan Africa through increased manufacturing, and whether domestic capital formation conditions that channel. The analysis is based on World Development Indicators data for 43 countries during 2001 to 2024 (880 country-year observations) and estimates a moderated mediation model with country and year fixed effects, country-clustered inference and a cluster bootstrap with 2,000 replications at the country level. Within countries, there is no detectable correlation between FDI net inflows and GDP growth (coefficient 0.005, p = 0.925) or between FDI net inflows and the manufacturing share of GDP (-0.027, p = 0.383). A higher manufacturing share is correlated with slower growth (-0.252, p = 0.010), and this correlation is concentrated in resource-intensive economies. The manufacturing channel is not supported, as the indirect effect of FDI through manufacturing is 0.007 with a bootstrap 95% confidence interval of [-0.009, 0.027]. In the manufacturing equation, the FDI-capital formation interaction turns out to be positive but imprecise under clustered inference, and it is statistically different from zero when gross fixed capital formation is used instead of total capital formation. The conclusions do not change when manufacturing is measured by log real manufacturing value added per person, when slopes are allowed to differ across countries with Mean Group and Augmented Mean Group estimators, or when System GMM is used. The evidence suggests that, at the regional level, inflows of foreign capital have not translated into growth driven by manufacturing, and that complementary fixed investment is a necessary but weak condition for such growth. Policy should focus on the nature of FDI and its relationship to domestic producers rather than the amount of FDI inflows.

Keywords*:* foreign direct investment; manufacturing; structural transformation; gross capital formation; moderated mediation; Sub-Saharan Africa

INTRODUCTION

Foreign direct investment (FDI) is a significant source of external private investment for African economies. Africa's inflows in 2024 were at record highs, at US$97 billion, but much of this was due to a large urban development project in Egypt, without which inflows would have risen by around 12% to about US$62 billion (UNCTAD, 2025). However, in 2025, inflows slowed to approximately US$70 billion, remaining the third largest since 1990, and their share of gross capital formation fell from 12.6% in 2024 to 7.9% in 2025 (UNCTAD, 2026a, 2026b). UNCTAD (2026a) also acknowledges that investments continue to be concentrated in a few countries and sectors, and that mineral investments can boost inflows without generating a great deal of domestic value.

The case for attracting FDI is based on more than the amount of capital. Foreign companies are supposed to transfer production technology, managerial practices and routines and access to export markets, and domestic companies are supposed to absorb some of it via supplier connections, worker mobility and imitation (Blomström & Kokko, 1998; Javorcik, 2004). These gains have tended to be the highest in the manufacturing sector, where scale economies and tradability are combined with a significant catch-up potential in

productivity growth (Rodrik, 2016). There is a poor record in Sub-Saharan Africa on this issue. Africa accounts for less than 2% of global manufacturing output, even though 37 of 52 African countries recorded some industrial progress between 2010 and 2021 (African Development Bank et al., 2022). Rodrik (2016) demonstrates that many low-income economies reached their peak manufacturing shares at significantly lower incomes than did their earlier industrialising counterparts, while McMillan and Rodrik (2011) show that reallocating labour between sectors in Africa between 1990 and 2005 reduced aggregate productivity growth.

These facts motivate a particular empirical question which the FDI-growth literature has not addressed directly. Does FDI help growth in the region and, if it does, is it by increasing manufacturing? And if the manufacturing channel does operate, does it rely on the level of investment in fixed capital in the host economy? Recent research provides partial and conflicting answers. Some find that FDI raises industrial or manufacturing value added (Darko & Xu, 2024; Emako et al., 2022; Mano et al., 2025), while others find that FDI has reduced industrial output or contributed to premature deindustrialisation (Benfratello et al., 2025; Oduola et al., 2022; Wako, 2021). Studies on the growth effect report that it appears only above thresholds of inflows or absorptive capacity (Asafo-Agyei & Kodongo, 2022; Ben Mim et al., 2022) or only in some groups of countries (Yimer, 2023). Evidence on the link between foreign and domestic investment is equally divided, with crowding-in in the short run but crowding-out over longer horizons (Fonchamnyo et al., 2021; Magbondé et al., 2025).

What these studies share is that they examine one relationship at a time. The effect of FDI on manufacturing, the effect of manufacturing on growth and the role of domestic investment are estimated in separate models, often on different samples and periods. That design cannot tell whether the growth effect of FDI actually passes through manufacturing, nor whether domestic capital formation alters the size of that indirect effect. This study fills this gap by placing all the relationships in a single moderated mediation model and testing the indirect effect directly instead of inferring it from a series of separate coefficients.

The study makes three contributions. First, it presents a direct test of the manufacturing transmission channel between FDI and growth for 43 Sub-Saharan African countries between 2001 and 2024, using a country-level cluster bootstrap to calculate the confidence intervals for the indirect effect. Second, it examines whether gross capital formation moderates the effect of FDI on manufacturing, and presents conditional indirect effects at low, average and high levels of domestic investment in addition to the Hayes (2015) index of moderated mediation. Third, it applies a variety of other measures, estimators and samples to the results, including a division between resource-intensive and less resource-intensive economies, thus avoiding reliance on a single specification.

The remainder of the paper is organised as follows. The next section presents a review of the theory and recent evidence and the formulation of the hypotheses. The following section presents the data and the estimation approach. The results and their discussion are presented afterwards, while the last section provides policy recommendations and directions for further work.

LITERATURE REVIEW AND HYPOTHESES

Theoretical foundations

The model is motivated by three bodies of theory. In endogenous growth theory, technology and knowledge are produced factors whose returns do not diminish as those of physical capital do (Romer, 1990). Foreign affiliates tend to be nearer the technology frontier, so their entry may increase the supply of usable knowledge in the host economy and, through that, the long-run growth rate. Borensztein et al. (1998) qualify this effect by the host economy's capability to adopt the new technology, which in their study is measured by human capital. This qualification is what gives rise to the absorptive capacity argument in the literature that followed.

The spillover literature refers to the transfer of knowledge from foreign to domestic firms. Blomström and Kokko (1998) list demonstration effects, labour turnover, competition and vertical linkages as the most important means of transmission. As foreign affiliates purchase inputs from local suppliers and transfer quality standards and technical assistance, the largest productivity gains come from backward linkages, as shown by

Javorcik (2004). Both studies suggest that spillovers are higher in manufacturing than in extractive activities, due to manufacturing affiliates' higher share of local intermediate inputs and higher ratio of employees to capital.

Structural transformation theory begins by noticing the differences in productivity between sectors in low-income economies. Lewis (1954) explains that growth occurs as labour shifts from a traditional sector with lower productivity to a modern sector, which sees an increase in output per worker with the increase in capital accumulation. McMillan and Rodrik (2011) build on this concept and demonstrate that the nature of the reallocation is important: in Asia, workers were transferred to higher-productivity activities and aggregate growth increased, whereas in Africa and Latin America the reallocation reduced aggregate productivity growth. The reason the manufacturing sector's share is a concern for long-run growth, according to Rodrik (2016), is that manufacturing has an unusually strong unconditional tendency to catch up to the frontier.

When these ideas are combined, the causal chain tested here is obtained. FDI can contribute to increased manufacturing activity both through new manufacturing capacity and spillover effects to local firms. The aggregate growth potential is higher in economies with a larger manufacturing sector because it has higher productivity and faster catch-up. Domestic capital formation can help to strengthen the first link because foreign producers rely on the host country's infrastructure, equipment capacity and suppliers, and domestic firms must also invest to adopt new production techniques.

Empirical evidence on FDI, manufacturing and growth

Recent evidence in Africa suggests high conditionality on FDI and growth. Yimer (2023) estimates error-correction models with common correlated effects for African countries over the period 1990 to 2016, and the results show a positive long-run relationship between FDI and growth in investment-driven and factor-driven economies, but no long-run relationship in fragile states. Asafo-Agyei and Kodongo (2022) use threshold regression for Sub-Saharan Africa and report that FDI raises growth only when inflows per person exceed about US$45 and when the technology gap between foreign and domestic firms is not too wide; below the lowest threshold the estimated effect is negative. Kwablah and Amoah (2022) find that economic freedom and a well-developed financial market complement FDI in raising growth in 36 Sub-Saharan countries, and Adegboye and Okorie (2023) document the volatility of FDI flows to the region and its weak link with development outcomes.

Evidence on FDI and industrial output is divided. Darko and Xu (2024) use data for 49 African countries over 2003 to 2020 and report that Chinese FDI increases industry and manufacturing value added, with stronger effects where human capital, electricity access and political stability are better. Emako et al. (2022) find a positive effect of FDI on a composite index of structural transformation for 44 developing and four newly industrialised countries, working through manufacturing and services output and employment. Mano et al. (2025) analyse the effect of FDI inflows on manufacturing value added in South Africa with asymmetric autoregressive distributed lag models. Against these results, Oduola et al. (2022) find a negative and significant effect of FDI on manufacturing value added per capita for 43 Sub-Saharan countries over 1996 to 2018, which political institutions offset only slightly. Wako (2021) concludes that FDI has contributed to premature deindustrialisation in the region, except where investment is not resource-seeking. At the micro level, Benfratello et al. (2025) combine greenfield FDI data with worker records for Ghana and find that FDI shifts employment towards retail and other services but not into manufacturing, and Hoekman et al. (2025) show, with geolocated FDI data for 2,570 subnational units, that FDI is linked to movement into modern sectors and higher-skilled jobs, with effects that vary by investor type.

Several studies examine sectoral output directly. Chukwu and Adewuyi (2024) use panel structural vector autoregressions for 23 African countries and find that FDI shocks raise manufacturing and services output in the short run but not agricultural output. Asamoah and Alagidede (2023) report that FDI has no effect on manufacturing growth on its own and that a positive effect appears only at the 90th percentile of financial development. Appiah et al. (2023) relate financial development, FDI and growth to industrial development in Sub-Saharan Africa, and Kinda and Sawadogo (2023) show that financial development raises industrialisation only above a threshold level.

Domestic capital formation and absorptive capacity

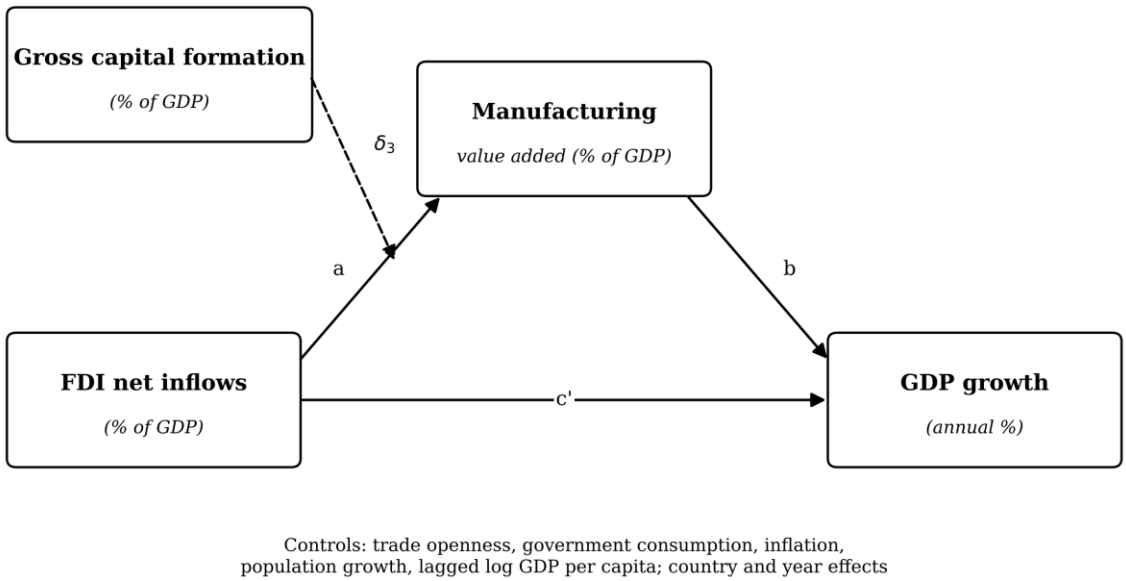
The role of domestic investment enters this literature in two ways. The first concerns whether FDI adds to or displaces domestic investment. Fonchamnyo et al. (2021) find for Sub-Saharan Africa over 1990 to 2017 that FDI raises domestic investment in the short run but crowds it out in the long run. Magbondé et al. (2025) use 105 developing countries over 2002 to 2018 and find crowding-out with no role for institutions. The second concerns absorptive capacity. Ben Mim et al. (2022) study 46 African countries over 1998 to 2019 and find that FDI raises industrial output only within a band of inflows, and that countries with greater absorptive capacity gain most, with infrastructure and financial development among the channels. Darko and Xu (2024) report similar amplification from electricity access.

Physical capital formation is a natural, measurable proxy for one part of absorptive capacity. Roads, power plants, ports and machinery financed by domestic and public investment lower the cost of operating foreign plants and give local firms the equipment needed to supply them. Yet no study in the reviewed literature tests whether the level of domestic capital formation changes the effect of FDI on manufacturing, nor whether it changes the indirect effect of FDI on growth through manufacturing. Most studies that model conditionality use financial development, institutions or human capital as the conditioning variable, and none of the African studies reviewed here combines a mediator and a moderator in one model with a direct test of the conditional indirect effect.

Hypotheses

Based on the theory and evidence above, the study tests six hypotheses. FDI raises economic growth (H1). FDI raises the manufacturing share of GDP (H2). A higher manufacturing share raises economic growth (H3). Manufacturing transmits part of the effect of FDI to growth, so the indirect effect is positive (H4). Gross capital formation strengthens the effect of FDI on manufacturing (H5). The indirect effect of FDI on growth through manufacturing rises with gross capital formation (H6). Because the recent evidence contains both positive and negative findings for H1 and H2, the hypotheses are stated in their theoretically expected direction and are not assumed to hold. Figure 1 presents the conceptual model.

Figure 1. Conceptual model



Note: Path a is the effect of FDI on manufacturing, path b the effect of manufacturing on growth holding FDI constant, and c' the direct effect of FDI on growth. The dashed arrow denotes moderation of path a by gross capital formation (δ_3).

DATA AND METHODOLOGY

Data and sample

All data come from the World Development Indicators (World Bank, 2026), extracted for the 48 Sub-Saharan African economies covered by the database for 2000 to 2025. The estimation period ends in 2024 because reporting for 2025 was incomplete at the time of extraction. One lag of GDP per capita is used as a control, so the first usable year is 2001. Five economies (Burundi, Liberia, Nigeria, Somalia and South Sudan) drop out because one or more of gross capital formation, trade or government consumption are missing for the entire period or for all but a handful of years; for Nigeria, the expenditure-side national accounts series are not reported in the extract. The final unbalanced panel consists of 880 observations across 43 countries, ranging from 8 to 24 years per country. The countries are provided in the note to Table 2.

Variables

Economic growth is the percentage rate of change of real GDP per year. FDI is defined as net inflows (percentage of GDP). When disinvestment and/or intra-company loan repayments exceed new investments, net inflows are negative; such observations are retained, since their omission would bias the sample towards expansionary periods. The mediator is the value added of manufacturing industries as a percentage of GDP, the typical indicator of the role of manufacturing in the economy, which was adopted by Oduola et al. (2022) and Darko and Xu (2024). The moderator is gross capital formation as a percentage of GDP. Gross capital formation is interpreted as economy-wide capital formation and includes investment from abroad, while a sensitivity test replaces gross capital formation with gross fixed capital formation, which excludes changes in inventories.

The choice of control variables is motivated by the literature on growth and the availability of series in the extract. Trade openness (exports plus imports as a percentage of GDP) is a measure of integration with world markets. The size of the state is measured by general government final consumption as a percentage of GDP. The measure of inflation is calculated using the growth rate of the GDP deflator (GDP in current over constant local currency) and transformed using $100 \times \ln(1 + \pi/100)$ to reduce the impact of hyperinflation episodes in Zimbabwe, Sudan and Angola. Population growth is computed from real GDP and real GDP per capita, because the population series is not included in the extract. The natural logarithm of real GDP per capita lagged one year controls for initial income and the catch-up effect. Table 1 summarises the definitions.

Table 1. Variable definitions and sources

Variable	Definition	WDI code	Role
GDPG	GDP growth (annual %)	NY.GDP.MKTP.KD.ZG	Dependent
FDI	Foreign direct investment, net inflows (% of GDP)	BX.KLT.DINV.WD.GD.ZS	Independent
MAN	Manufacturing, value added (% of GDP)	NV.IND.MANF.ZS	Mediator
GCF	Gross capital formation (% of GDP)	NE.GDI.TOTL.ZS	Moderator
TRADE	Trade (% of GDP)	NE.TRD.GNFS.ZS	Control
GOV	General government final consumption expenditure (% of GDP)	NE.CON.GOVT.ZS	Control
INF	GDP deflator inflation, $100 \times \ln(1 + \pi/100)$	Computed from NY.GDP.MKTP.CN and NY.GDP.MKTP.KN	Control
POPG	Population growth (annual %)	Computed from NY.GDP.MKTP.KD and NY.GDP.PCAP.KD	Control
LGDPPC	Log of real GDP per capita (constant 2015 US$), lagged one year	NY.GDP.PCAP.KD	Control

Source: World Bank (2026).

Model specification

The empirical model follows the logic of conditional process analysis (Hayes, 2015), adapted to panel data with two-way fixed effects. Let i index countries and t years, let $X_{i,t}$ be the vector of controls, μ_i a country effect and λ_t a year effect. The total effect of FDI on growth is estimated from

$$GDPG_{i,t} = \beta_0 + \beta_1 FDI_{i,t} + \beta_2 GCF_{i,t} + \varphi X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

The effect of FDI on manufacturing (path a) is estimated from

$$MAN_{i,t} = \alpha_0 + \alpha_1 FDI_{i,t} + \alpha_2 GCF_{i,t} + \psi X_{i,t} + \mu_i + \lambda_t + u_{i,t} \quad (2)$$

and the effect of manufacturing on growth holding FDI constant (path b), together with the direct effect of FDI (path c'), from

$$GDPG_{i,t} = \gamma_0 + \gamma_1 FDI_{i,t} + \gamma_2 MAN_{i,t} + \gamma_3 GCF_{i,t} + \omega X_{i,t} + \mu_i + \lambda_t + v_{i,t} \quad (3)$$

The indirect effect is the product of the two path coefficients. Because Equations (1) to (3) are estimated on the same observations with the same controls and fixed effects, the total effect decomposes exactly into direct and indirect parts:

$$IE = \alpha_1 \gamma_2, \quad \beta_1 = \gamma_1 + \alpha_1 \gamma_2 \quad (4)$$

Moderation is introduced in the manufacturing equation by interacting FDI with gross capital formation. Both variables are centred at their sample means (3.86% and 23.65% of GDP), so δ_1 is the effect of FDI on manufacturing at average capital formation:

$$MAN_{i,t} = \delta_0 + \delta_1 FDI^c_{i,t} + \delta_2 GCF^c_{i,t} + \delta_3 (FDI^c_{i,t} \times GCF^c_{i,t}) + \kappa X_{i,t} + \mu_i + \lambda_t + e_{i,t} \quad (5)$$

The marginal effect of FDI on manufacturing at a given level of capital formation is

$$\frac{\partial MAN}{\partial FDI} = \delta_1 + \delta_3 GCF^c \quad (6)$$

and the conditional indirect effect of FDI on growth through manufacturing is

$$IE(GCF^c) = (\delta_1 + \delta_3 GCF^c)\gamma_2 \quad (7)$$

The conditional indirect effect is evaluated at one standard deviation below the mean of gross capital formation, at the mean and at one standard deviation above it (the standard deviation is 9.29 percentage points). Whether the indirect effect changes with capital formation is tested with the index of moderated mediation (Hayes, 2015):

$$IMM = \delta_3 \gamma_2 \quad (8)$$

A confidence interval for IMM that excludes zero indicates that the indirect effect differs across levels of capital formation.

Estimation and inference

The analysis proceeds in stages. Descriptive statistics, correlations and variance inflation factors are examined first. Each equation is then tested for cross-sectional dependence with the Pesaran (2015) CD test, for groupwise heteroskedasticity with the modified Wald test (Greene, 2018), for first-order serial correlation with the Wooldridge (2010) test, for the choice between fixed and random effects with the Hausman test, and for slope homogeneity with the bias-adjusted delta test of Pesaran and Yamagata (2008). Stationarity is examined

with the Fisher-type augmented Dickey-Fuller test of Maddala and Wu (1999) and with the cross-sectionally augmented CIPS test of Pesaran (2007). Because the panel is unbalanced and the published CIPS critical values assume balanced panels, the critical values used here were simulated for the actual numbers of countries and years with 1,500 replications under the null of a unit root.

The main estimator is the two-way fixed effects model. Country effects remove time-invariant differences such as geography, colonial history and slow-moving institutions, and year effects remove shocks common to all countries, such as commodity price cycles, the 2008 to 2009 global financial crisis and the COVID-19 pandemic. Standard errors are clustered by country, which allows for heteroskedasticity and arbitrary serial correlation within countries; with 43 clusters the usual small-sample correction is applied and inference uses the *t* distribution with 42 degrees of freedom. Driscoll and Kraay (1998) standard errors, which also allow for correlation across countries, are reported alongside. System GMM is not used as the main estimator, because with 43 countries and up to 24 years the instrument count grows quickly relative to the number of groups; it is reported instead as a sensitivity check.

Product terms such as $\alpha_1\gamma_2$ do not follow a normal distribution in finite samples, so inference on indirect effects relies on a nonparametric cluster bootstrap. In each of 2,000 replications, 43 countries are drawn with replacement, keeping each country's full time series, every equation is re-estimated with fixed effects, and the indirect effect, the conditional indirect effects and the index of moderated mediation are recomputed. The 2.5th and 97.5th percentiles of the bootstrap distribution form the 95% confidence interval. Resampling whole countries keeps the within-country correlation structure intact. Sensitivity analyses use 1,000 replications.

Three further checks respond to specific weaknesses of the baseline design. First, because the manufacturing share is a ratio whose denominator is GDP, the mediator is replaced by the natural logarithm of real manufacturing value added (constant 2015 US$) per person, which measures manufacturing output independently of the size of other sectors. Second, because slope homogeneity is rejected, the path equations are re-estimated country by country with the Mean Group estimator of Pesaran and Smith (1995) and the Augmented Mean Group estimator of Eberhardt and Teal (2010), which adds to each country regression a common process estimated from the year effects of a pooled first-difference regression; Appiah et al. (2023) apply the same estimator to Sub-Saharan Africa. These estimators use the 33 countries with at least 18 observations, and confidence intervals for the averaged coefficients and the indirect effect come from 2,000 resamples of countries. Third, to address time-varying endogeneity and the persistence of the manufacturing share, the equations are estimated by two-step System GMM (Blundell & Bond, 1998) with a lagged dependent variable and Windmeijer (2005) corrected standard errors. FDI, manufacturing and capital formation are treated as endogenous and instrumented with their own lags, the other controls are treated as exogenous, and the instrument matrix is collapsed (Roodman, 2009). Common year effects are removed by subtracting cross-sectional year means from every variable, which keeps the number of instruments between 15 and 18, well below the 43 countries. Lags 2 and 3 serve as instruments in the manufacturing equations; in the growth equations the Arellano and Bond (1991) test detects second-order serial correlation when lag 2 is used, so lags 3 and 4 are used instead.

RESULTS AND DISCUSSION

Descriptive statistics

Table 2 reports summary statistics. Average real growth over the period was 4.07% a year, with a standard deviation of 4.64 points. FDI averaged 3.87% of GDP but ranged from -29.94% to 56.29%, and its kurtosis of 20.7 reflects a small number of very large inflows, mostly tied to extractive projects in Mozambique, Equatorial Guinea, the Republic of Congo and Chad. Manufacturing averaged 10.47% of GDP. The cross-country mean of the manufacturing share stayed between about 9.8% and 10.9% in every year of the sample, which is consistent with the absence of broad industrialisation reported by African Development Bank et al. (2022). Gross capital formation averaged 23.65% of GDP.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min.	Max.	Skewness	Kurtosis
GDPG	880	4.074	4.643	-36.392	33.629	-1.015	14.444
FDI	880	3.865	5.898	-29.944	56.288	2.776	20.726
MAN	880	10.475	5.082	0.606	31.718	1.03	4.583
GCF	880	23.649	9.292	1.524	76.782	1.083	5.583
TRADE	880	69.592	34.573	17.4	222.178	1.475	5.546
GOV	880	15.482	7.014	2.048	46.601	1.49	5.944
INF	880	8.116	17.808	-23.782	248.284	7.902	86.074
POPG	880	2.467	1.159	-2.594	20.774	3.974	73.716
LGDPPC	880	7.235	0.946	5.661	9.877	0.818	2.765

Note: Sample of 880 country-year observations, 2001 to 2024. Countries: Angola, Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Table 3 shows the pairwise correlations. FDI correlates positively with growth (0.13) and with capital formation (0.43), but negatively with the manufacturing share (-0.17). Manufacturing correlates negatively with growth (-0.17). These are simple pooled associations and say nothing yet about causation, but they already run against H2 and H3. The largest correlation among regressors is 0.61, between trade openness and lagged income. The highest variance inflation factor is 2.60, so multicollinearity is not a concern.

Table 3. Correlation matrix

	GDPG	FDI	MAN	GCF	TRADE	GOV	INF	POPG	LGDPPC
GDPG	1								
FDI	0.13	1							
MAN	-0.17	-0.17	1						
GCF	0.19	0.43	-0.18	1					
TRADE	-0.05	0.36	0.06	0.31	1				
GOV	-0.18	0.11	0.08	0.15	0.57	1			
INF	0	-0.03	-0.03	-0.15	-0.08	-0.1	1		
POPG	0.18	0.03	-0.17	0.12	-0.23	-0.26	0.01	1	
LGDPPC	-0.19	0.05	0.12	0.04	0.61	0.35	-0.04	-0.27	1

Note: Pearson correlations, 880 observations. Variance inflation factors: FDI 1.40; MAN 1.09; GCF 1.38; TRADE 2.60; GOV 1.54; INF 1.03; POPG 1.17; LGDPPC 1.73.

Diagnostic tests

Table 4 reports the diagnostic tests. The CD statistic for the growth equation with country effects only is 17.27 ($p < 0.001$), with an average absolute residual correlation of 0.27, confirming that growth in the region responds to common shocks. Once year effects are added, the statistic falls to -1.14 ($p = 0.254$), so the year effects absorb the common component. The manufacturing equations show no cross-sectional dependence even without year effects. The modified Wald and Wooldridge tests reject homoskedasticity and the absence of serial correlation in every equation, which justifies clustered standard errors. The Hausman test rejects random effects in favour of fixed effects in all four equations. The Pesaran and Yamagata (2008) test rejects slope homogeneity, which means that the fixed effects coefficients should be read as average within-country effects

across the panel. To check whether this affects the conclusions, the sensitivity analysis also reports Mean Group and Augmented Mean Group estimates for the 33 countries with at least 18 observations.

Table 4. Panel diagnostic tests

Test	Equation (1) GDPG	Equation (2) MAN	Equation (3) GDPG	Equation (5) MAN
Pesaran CD, country effects	17.27 (< 0.001)	-1.19 (0.232)	17.35 (< 0.001)	-1.02 (0.308)
Pesaran CD, country and year effects	-1.14 (0.254)	-0.59 (0.556)	-1.26 (0.207)	-0.49 (0.624)
Modified Wald, $\chi^2(43)$	8201.2 (< 0.001)	14994.4 (< 0.001)	5802.6 (< 0.001)	15205.0 (< 0.001)
Wooldridge serial correlation, F(1, 42)	88.77 (< 0.001)	14.92 (< 0.001)	87.53 (< 0.001)	15.47 (< 0.001)
Hausman, $\chi^2(k)$	68.77 (< 0.001)	20.80 (0.004)	81.95 (< 0.001)	19.20 (0.014)
Pesaran-Yamagata Δ adjusted	8.19 (< 0.001)	20.67 (< 0.001)	8.19 (< 0.001)	18.79 (< 0.001)

Note: p-values in parentheses. k equals 7 in Equations (1) and (2) and 8 in Equations (3) and (5). The slope homogeneity test uses the 37 countries with at least 15 observations.

Table 5 reports the unit root tests. The Fisher test rejects a unit root in levels for every variable at the 5% level. The CIPS test, which accounts for cross-sectional dependence, rejects a unit root in levels for growth, FDI, gross capital formation, inflation and population growth, but not for the manufacturing share, trade openness, government consumption or lagged income. Every variable is stationary in first differences under both tests. The manufacturing share is the variable of most concern, because it is the mediator. Manufacturing value added as a share of GDP is bounded between zero and 100 and cannot follow a random walk indefinitely, and the CIPS test has low power in panels with about 23 periods. Even so, a sensitivity test replaces the level of the manufacturing share with its first difference.

Table 5. Panel unit root tests

Variable	Fisher ADF, level	Fisher ADF, first difference	CIPS, level	CIPS, first difference
GDPG	627.00 (< 0.001)	1510.41 (< 0.001)	-2.804***	-4.512***
FDI	319.51 (< 0.001)	1158.20 (< 0.001)	-2.404***	-3.727***
MAN	129.67 (0.002)	791.63 (< 0.001)	-1.977	-3.042***
GCF	136.36 (< 0.001)	842.89 (< 0.001)	-2.241**	-3.687***
TRADE	114.57 (0.021)	857.46 (< 0.001)	-1.656	-3.114***
GOV	114.48 (0.022)	879.30 (< 0.001)	-1.556	-3.408***
INF	597.12 (< 0.001)	1480.66 (< 0.001)	-3.061***	-4.416***
POPG	129.34 (0.006)	521.75 (< 0.001)	-2.131**	-2.914***
LGDPPC	118.90 (0.042)	589.04 (< 0.001)	-1.666	-2.753***

Note: Fisher statistics are χ^2 values with p-values in parentheses; intercept included, lag length chosen by AIC with a maximum of two. CIPS statistics include an intercept and one lag and are computed on the countries with complete records over 2001 to 2023 for each series. Simulated 5% critical values range from -2.08 to -2.15 across series. ***, ** and * denote rejection of the unit root null at 1%, 5% and 10%.

Baseline estimates: FDI and growth

Table 6 reports the growth equation estimated by pooled OLS, random effects and fixed effects. In all three models the coefficient on FDI is small and statistically indistinguishable from zero. The preferred fixed-effects model shows a growth effect of 0.005 points for a 1 percentage point rise in the ratio of FDI to GDP (p = 0.925), and the 95% confidence interval excludes effects larger than about 0.12 points. H1 is therefore not supported. The coefficient of gross capital formation is positive (0.089, p = 0.073), and significant at the 1%

level (with Driscoll-Kraay errors) and at the 10% level (with clustered errors). As expected when growth is measured over time within countries, lagged income has a large negative coefficient, and growth is positively associated with trade openness and population growth.

The African evidence suggests that the growth effect of FDI is threshold dependent and varies with the country type, and this is reflected in the null result obtained. Yimer (2023) finds no effect in fragile economies, which are well represented in this sample, and Asafo-Agyei and Kodongo (2022) find negative effects below the lowest threshold of inflows. The fixed effects estimates test if years with higher FDI inflows than a country's average FDI inflows are years with faster growth. The positive association between countries, which is present in the pooled correlation, breaks down in this within-country comparison.

Table 6. Baseline growth estimates (dependent variable: GDPG)

Variable	Pooled OLS	Random effects	Fixed effects
FDI	0.034	0.029	0.005
	-0.052	-0.05	-0.055
GCF	0.078*	0.071	0.089*
	-0.044	-0.043	-0.05
TRADE	0.018	0.035**	0.055**
	-0.011	-0.014	-0.026
GOV	-0.129***	-0.165***	-0.192*
	-0.039	-0.052	-0.113
INF	0.002	0.004	0.001
	-0.01	-0.01	-0.013
POPG	0.343*	0.374**	0.426**
	-0.182	-0.153	-0.179
LGDPPC	-0.931***	-1.419***	-8.124***
	-0.297	-0.339	-1.79
Country effects	No	Random	Yes
Year effects	No	No	Yes
Observations	880	880	880
R^2 (within for FE)	0.115	0.101	0.146

Note: Country-clustered standard errors in parentheses. ***, ** and * denote $p < 0.01$, $p < 0.05$ and $p < 0.10$. The Hausman test rejects random effects ($\chi^2(7) = 68.77$, $p < 0.001$).

Fixed effects estimates: FDI, manufacturing and growth

The fixed effects estimates of the manufacturing and growth equations of the mediation model are reported in Table 7. In Equation (2), the coefficient on FDI is -0.027 ($p = 0.383$). FDI inflows are not associated with a higher manufacturing share within countries, and the point estimate is negative. H2 is not supported. This result agrees with Oduola et al. (2022), who find a negative effect of FDI on manufacturing per capita in a similar sample, and with the firm and worker evidence of Benfratello et al. (2025) for Ghana. It differs from the positive effects that Darko and Xu (2024) report for Chinese FDI. A likely reason is composition. Much of aggregate FDI in the region is resource-seeking (UNCTAD, 2026a; Wako, 2021), whereas Darko and Xu (2024) interpret the Chinese FDI effect in their sample as efficiency-seeking rather than resource-driven.

In Equation (3), the manufacturing share enters the growth equation with a negative coefficient of -0.252 ($p = 0.010$; Driscoll-Kraay $p < 0.001$). Holding FDI and the other controls constant, a rise of one percentage point in a country's manufacturing share relative to its own average is associated with growth about a quarter of a point lower. H3 is rejected because the sign is the opposite of the hypothesis. This should not be taken as a sign that manufacturing is harmful to growth. The manufacturing share is a ratio, the denominator being GDP. Manufacturing's share of output declines during booms and rises during downturns in oil-rich, mineral-rich,

construction or trade service-oriented economies, because its output increases at a slower rate than oil, minerals, construction or trade services during booms. The pattern is that of Africa as described by McMillan and Rodrik (2011), where structural change led to a decline in, instead of an increase in, aggregate growth, and it is consistent with the premature deindustrialisation observed by Rodrik (2016) and Wako (2021). The sample split presented below is consistent with this interpretation: the negative coefficient is larger and well estimated for resource-intensive economies, while the coefficient is smaller and not statistically significant for other economies.

Table 7. Fixed effects estimates of the mediation and moderation equations

Variable	**(1) GDPG**	**(2) MAN**	**(3) GDPG**	**(5) MAN**
FDI	0.005	-0.027	-0.002	
	-0.055	-0.031	-0.055	
	[0.033]	*[0.017]*	*[0.031]*	
FDI (centred)				-0.057
				-0.037
				[0.017]
MAN			-0.252***	
			-0.097	
			[0.070]	
GCF	0.089*	-0.004	0.088*	
	-0.05	-0.025	-0.047	
	[0.028]	*[0.025]*	*[0.027]*	
GCF (centred)				-0.011
				-0.025
				[0.026]
FDI × GCF				0.002
				-0.001
				[0.001]
TRADE	0.055**	-0.023	0.049*	-0.023
	-0.026	-0.017	-0.027	-0.016
	[0.017]	*[0.007]*	*[0.018]*	*[0.007]*
GOV	-0.192*	0.035	-0.183*	0.036
	-0.113	-0.084	-0.111	-0.085
	[0.053]	*[0.017]*	*[0.052]*	*[0.017]*
INF	0.001	0.007	0.002	0.007
	-0.013	-0.005	-0.013	-0.005
	[0.020]	*[0.006]*	*[0.020]*	*[0.006]*
POPG	0.426**	-0.148	0.388**	-0.143
	-0.179	-0.127	-0.155	-0.127
	[0.170]	*[0.045]*	*[0.163]*	*[0.046]*
LGDPPC	-8.124***	-3.624	-9.036***	-3.523
	-1.79	-2.496	-1.989	-2.49
	[2.000]	*[1.079]*	*[1.960]*	*[1.070]*
Observations	880	880	880	880
Countries	43	43	43	43
Within R^2	0.146	0.079	0.163	0.082

Note: All models include country and year effects. Country-clustered standard errors in parentheses; Driscoll-Kraay standard errors (bandwidth 3) in square brackets. Stars are based on clustered standard errors: ***, ** and * denote $p < 0.01$, $p < 0.05$ and $p < 0.10$. In Equation (5), FDI and GCF are centred at their sample means.

Mediation analysis

Table 8 reports the decomposition of the total effect and the bootstrap confidence intervals. The total effect of FDI on growth is 0.005, the direct effect is -0.002, and the indirect effect through manufacturing is 0.007. The indirect effect is positive only because both of its components are negative: FDI is weakly associated with a lower manufacturing share, and a lower manufacturing share coincides with faster growth. Its 95% bootstrap confidence interval, [-0.009, 0.027], includes zero, so H4 is not supported. Manufacturing does not carry any measurable part of the growth effect of FDI in this sample, and there is in any case almost no total effect to transmit.

Table 8. Mediation and moderated mediation: bootstrap results

Quantity	**Estimate**	**Bootstrap SE**	**95% confidence interval**
Total effect of FDI on GDPG (β_1)	0.0052	0.056	[-0.1034, 0.1175]
Direct effect (γ_1)	-0.0017	0.055	[-0.1103, 0.1083]
Path a: FDI on MAN (α_1)	-0.027	0.033	[-0.097, 0.034]
Path b: MAN on GDPG (γ_2)	-0.252	0.102	[-0.510, -0.100]
Indirect effect ($\alpha_1\gamma_2$)	0.0069	0.0091	[-0.0089, 0.0268]
FDI on MAN at mean GCF (δ_1)	-0.057	0.039	[-0.142, 0.007]
Interaction FDI × GCF (δ_3)	0.0021	0.0017	[-0.0006, 0.0065]
Index of moderated mediation ($\delta_3\gamma_2$)	-0.0005	0.0006	[-0.0020, 0.0001]
Conditional indirect effect, low GCF	0.019	0.016	[0.000, 0.062]
Conditional indirect effect, mean GCF	0.014	0.012	[-0.002, 0.046]
Conditional indirect effect, high GCF	0.0094	0.0101	[-0.0063, 0.0334]

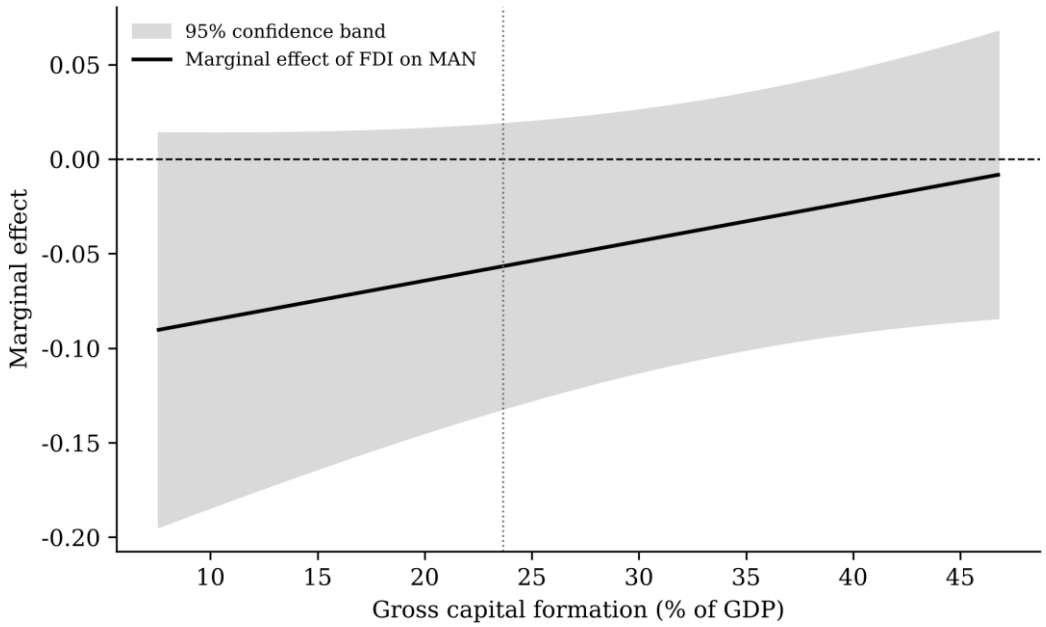
Note: Country-level cluster bootstrap with 2000 replications; percentile confidence intervals. Low and high GCF are the mean minus and plus one standard deviation (14.36% and 32.94% of GDP). 880 observations, 43 countries.

Moderation and moderated mediation

Equation (5) in Table 7 adds the interaction between FDI and gross capital formation to the manufacturing equation. At average capital formation, the effect of FDI on manufacturing is -0.057 ($p = 0.124$). The interaction coefficient is 0.0021, positive as H5 predicts, but its clustered p-value is 0.139 and its bootstrap interval, [-0.0006, 0.0065], includes zero. With Driscoll-Kraay errors the interaction is significant ($p = 0.019$). The evidence for H5 is therefore weak: the sign is as expected, but the effect is not precisely estimated once within-country correlation over time is taken into account. In substantive terms, the coefficient implies that the effect of FDI on manufacturing increases by approximately 0.002 for each 1 percentage point increase in capital formation, and moving from low to high capital formation (roughly 18.6 points) shifts the marginal effect of FDI by approximately 0.04 points.

The marginal effect from Equation (6) is graphed in Figure 2 over the observed range of capital formation. The impact increases with capital formation, from approximately -0.09 at the lower end to approximately -0.01 at the higher end, but the 95% confidence band includes zero throughout. At no level of domestic investment within the sample is FDI significantly related to a higher share of manufacturing.

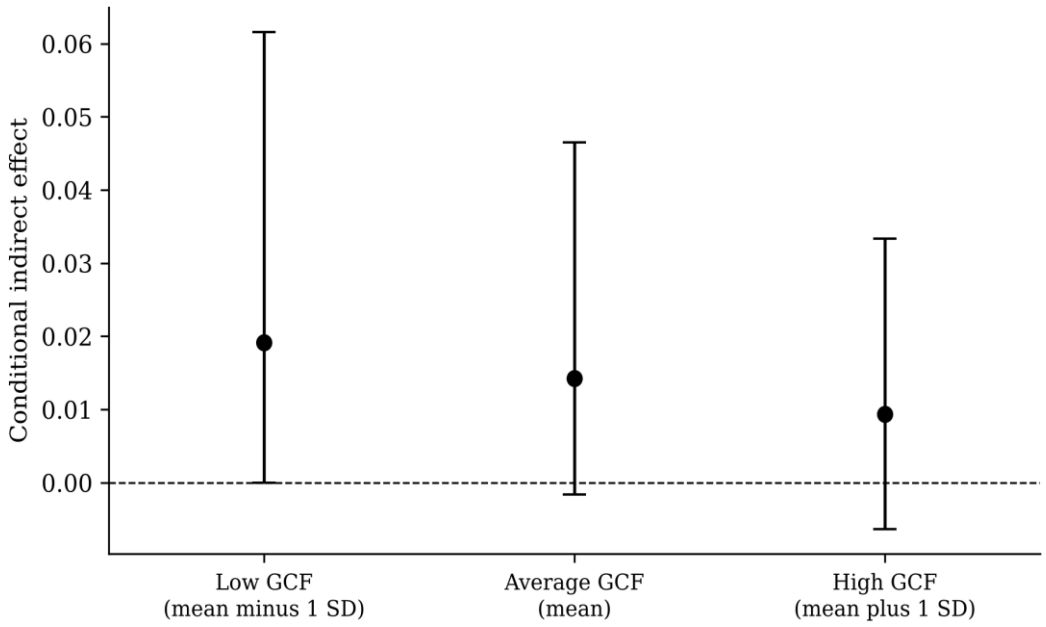
Figure 2. Marginal effect of FDI on manufacturing at various levels of gross capital formation



Note: Based on Equation (5) with country-clustered standard errors. The dotted vertical line marks mean gross capital formation (23.65% of GDP).

Figure 3 and the lower part of Table 8 report the conditional indirect effects. They are 0.019, 0.014 and 0.009 at low, average and high capital formation, and all three confidence intervals include zero, although the lower bound at low capital formation is very close to it. The index of moderated mediation is -0.0005 with interval [-0.0020, 0.0001]. Its negative sign follows from the negative path b: if higher capital formation makes manufacturing respond more positively to FDI, and manufacturing growth coincides with slower GDP growth, the indirect effect must decline as capital formation rises. Since the interval includes zero, H6 is not supported.

Figure 3. Conditional indirect effects of FDI on growth through manufacturing



Note: Point estimates with 95% percentile intervals from a country-level cluster bootstrap with 2000 replications.

Sensitivity analysis

Table 9 shows eight alternative specifications, and a ninth in which the manufacturing share is replaced by its first difference. Lagging FDI by one year, to account for lags between FDI and output, and to minimise the possibility that growth pulls in FDI in the same year, does not affect the conclusions. Replacing GDP growth with growth of GDP per capita gives nearly the same estimates. Winsorising all variables at the 1st and 99th percentiles also leaves the indirect effect insignificant, though the conditional indirect effect at low capital formation becomes marginally positive (0.021, interval [0.002, 0.058]).

Three results deserve comment. First, when gross fixed capital formation, which excludes inventory changes, replaces total capital formation, the interaction becomes statistically different from zero (0.0032, interval [0.0006, 0.0094]), as does the index of moderated mediation (-0.0009, interval [-0.0029, -0.0001]). H5 is arguably better tested with the fixed investment measure, which does not include inventory changes; these are volatile in commodity-exporting economies and create noise in the moderator. This gives some support to the idea that fixed investment raises the response of manufacturing to FDI. Second, when industry value added (which includes mining, construction and utilities) replaces manufacturing, path b becomes positive though insignificant, and the interaction becomes negative (-0.0077, interval [-0.0140, -0.0002]). The negative growth association is thus specific to the manufacturing share and does not apply to industry as a whole, which fits the composition explanation given above. Third, path b is -0.349 (interval [-0.719, -0.064]) in the 19 resource-intensive economies, defined as those whose average natural resource depletion exceeds the sample median of 5.69% of GNI, against -0.160 (interval [-0.441, 0.125]) in the 24 less resource-intensive economies.

Because fixed investment gives the clearer signal, the full moderated mediation results with gross fixed capital formation as the moderator are also reported. The sample falls to 830 observations for 40 countries. At mean fixed investment (22.59% of GDP), the effect of FDI on manufacturing is -0.054 ($p = 0.124$). The interaction coefficient of 0.0032 has a clustered p-value of 0.059 and a bootstrap interval of [0.0006, 0.0094] that excludes zero. The marginal effect of FDI on manufacturing rises from -0.084 at the 10th percentile of fixed investment (13.36% of GDP) to -0.021 at the 90th percentile (33.18%), and it is not significantly positive at any observed value. The conditional indirect effects are 0.022 [0.002, 0.067], 0.015 [-0.001, 0.047] and 0.007 [-0.008, 0.030] at low, average and high fixed investment. The low-investment effect is positive only because FDI is associated with a lower manufacturing share where fixed investment is low, and a lower share coincides with faster growth. Higher fixed investment therefore moves the response of manufacturing to FDI from negative towards zero, but it does not make that response positive. Total capital formation is kept as the baseline moderator because it is the measure named in the hypotheses, it covers three more countries, and switching the baseline after seeing which measure gives the stronger result would overstate the evidence.

Using annual manufacturing growth or the first difference of the manufacturing share as the mediator also gives indirect effects close to zero. A leave-one-country-out exercise re-estimates the model 43 times. The indirect effect ranges from 0.003 to 0.011, path b from -0.305 to -0.187 and the interaction from 0.0016 to 0.0033, and none of these quantities changes sign. No single country drives the results.

Table 9. Sensitivity analysis

Specification	**Path a**	**Path b**	**Indirect effect**	**δ_3**	**IMM**	**N (countries)**
Baseline	-0.027	-0.252	0.0069	0.0021	-0.0005	880 (43)
	[-0.097, 0.034]	[-0.510, -0.100]	[-0.0089, 0.0268]	[-0.0006, 0.0065]	[-0.0020, 0.0001]	
Lagged FDI (t-1)	-0.015	-0.25	0.0038	0.002	-0.0005	880 (43)
	[-0.080, 0.035]	[-0.517, -0.103]	[-0.0099, 0.0192]	[-0.0014, 0.0054]	[-0.0021, 0.0003]	
Mediator: industry value added	-0.12	0.093	-0.0112	-0.0077	-0.0007	912 (43)

	[-0.271, 0.054]	[-0.086, 0.243]	[-0.0406, 0.0100]	[-0.0140, -0.0002]	[-0.0022, 0.0005]	
Mediator: manufacturing growth	-0.131	0.03	-0.004	-0.0034	-0.0001	862 (43)
	[-0.405, 0.132]	[-0.007, 0.158]	[-0.0304, 0.0046]	[-0.0199, 0.0155]	[-0.0011, 0.0008]	
Outcome: GDP per capita growth	-0.027	-0.245	0.0067	0.0021	-0.0005	880 (43)
	[-0.099, 0.031]	[-0.480, -0.094]	[-0.0076, 0.0257]	[-0.0005, 0.0059]	[-0.0018, 0.0001]	
Moderator: gross fixed capital formation	-0.016	-0.272	0.0044	0.0032	-0.0009	830 (40)
	[-0.082, 0.039]	[-0.519, -0.111]	[-0.0112, 0.0257]	[0.0006, 0.0094]	[-0.0029, -0.0001]	
Winsorised at 1% and 99%	-0.043	-0.207	0.009	0.0028	-0.0006	880 (43)
	[-0.127, 0.025]	[-0.422, -0.060]	[-0.0058, 0.0310]	[-0.0008, 0.0082]	[-0.0022, 0.0001]	
Resource-intensive economies	0.007	-0.349	-0.0025	0.0031	-0.0011	395 (19)
	[-0.139, 0.103]	[-0.719, -0.064]	[-0.0391, 0.0468]	[-0.0008, 0.0166]	[-0.0053, 0.0002]	
Less resource-intensive economies	-0.041	-0.16	0.0066	-0.001	0.0002	485 (24)
	[-0.115, 0.023]	[-0.441, 0.125]	[-0.0078, 0.0288]	[-0.0047, 0.0049]	[-0.0015, 0.0008]	
Mediator: first difference of MAN	0.0033	-0.095	-0.0003	0.0007	-0.0001	872 (43)
	[-0.0178, 0.0210]	[-0.356, 0.223]	[-0.0038, 0.0036]	[-0.0008, 0.0021]	[-0.0005, 0.0001]	

Note: Point estimates with 95% cluster bootstrap percentile intervals in brackets below (2,000 replications for the baseline, 1,000 otherwise). All models include the full set of controls with country and year effects. Resource intensity is based on each country's average natural resources depletion (% of GNI) over 2000 to 2024.

Table 10 reports the three additional checks. With log real manufacturing value added per person as the mediator, FDI has no effect on manufacturing output (0.002, interval [-0.004, 0.008]), and the indirect effect is 0.002 with interval [-0.011, 0.013]. Path b becomes positive (1.174, interval [-0.279, 4.659]) but is imprecise. The negative path b of the baseline therefore does not carry over to an absolute measure of manufacturing, which supports the reading that it reflects the denominator of the manufacturing share rather than a harmful effect of manufacturing output on growth.

The country-by-country estimates lead to the same conclusions. Under the Mean Group estimator, the average effect of FDI on manufacturing is -0.038 [-0.138, 0.055], path b is 0.191 [-0.413, 0.980] and the indirect effect is -0.007 [-0.061, 0.036]. Under the Augmented Mean Group estimator, the corresponding values are -0.051, -0.221 and 0.011, and all intervals include zero. FDI is positively related to manufacturing in only 14 of the 33 countries, and the averaged interaction coefficients are negative but very imprecise. The country slopes differ widely, as the Pesaran and Yamagata (2008) test indicated, but neither the average path coefficients nor the indirect effect differ from zero once this is allowed for.

The System GMM estimates pass the Hansen test of overidentifying restrictions and show no second-order serial correlation in the differenced errors. The manufacturing share is highly persistent, with a coefficient of 0.726 on its lag. FDI has no significant effect on growth (0.123, $p = 0.649$) or on manufacturing (0.125, $p = 0.246$), manufacturing enters the growth equation with a negative coefficient (-0.722, $p = 0.098$), and the indirect effect is -0.090 ($p = 0.342$). The interaction coefficient, however, is not stable across instrument sets: it

is negative and significant with lags 2 and 3, insignificant with lag 2 alone, and positive but insignificant with lags 3 and 4, while the Hansen p-value of 0.998 with lags 2 and 3 points to weak instruments. System GMM therefore gives no reliable information on moderation in this panel, which is consistent with the concern about the small number of countries that led to the choice of fixed effects as the main estimator.

Table 10. Additional checks: absolute mediator, country-specific slopes and System GMM

Specification	**Path a**	**Path b**	**Indirect effect**	**δ_3**	**N (countries)**
Mediator: log real manufacturing value added per person (FE)	0.002	1.174	0.0024	0	846 (40)
	[-0.0042, 0.0081]	[-0.279, 4.659]	[-0.0110, 0.0128]	[-0.0003, 0.0004]	
Mean Group	-0.038	0.191	-0.007	-0.0076	-33
	[-0.138, 0.055]	[-0.413, 0.980]	[-0.061, 0.036]	[-0.0370, 0.0195]	
Augmented Mean Group	-0.051	-0.221	0.011	-0.0079	-33
	[-0.168, 0.053]	[-0.695, 0.234]	[-0.022, 0.062]	[-0.0409, 0.0236]	
Two-step System GMM	0.125	-0.722*	-0.09	-0.006***	792 (43)
	-0.108	-0.436	-0.095	-0.0019	

Note: Rows one to three report point estimates with 95% bootstrap percentile intervals in brackets below: a country-level cluster bootstrap with 1,000 replications for the first row and 2,000 resamples of countries for the Mean Group and Augmented Mean Group rows, which use the countries with at least 18 observations. All three include the full set of controls; the first row also includes country and year effects. The System GMM row reports coefficients with Windmeijer-corrected standard errors in parentheses; the indirect effect uses delta-method standard errors, and the interaction coefficient is not stable across instrument sets (see text). GMM diagnostics for Equations (2), (3) and (5): instruments 15, 18 and 18; Hansen p = 0.561, 0.775 and 0.998; AR(2) p = 0.787, 0.139 and 0.834. In the growth equation without the mediator, FDI is 0.123 (0.271), Hansen p = 0.608, AR(2) p = 0.099. ***, ** and * denote $p < 0.01$, $p < 0.05$ and $p < 0.10$.

Summary of hypothesis tests and discussion

Table 11. Hypothesis tests

Hypothesis	**Expected sign**	**Estimate**	**Decision**
H1: FDI raises growth	+	0.005 (p = 0.925)	Not supported
H2: FDI raises manufacturing share	+	-0.027 (p = 0.383)	Not supported
H3: Manufacturing share raises growth	+	-0.252 (p = 0.010)	Rejected; opposite sign
H4: Positive indirect effect	+	0.007 [-0.009, 0.027]	Not supported
H5: GCF strengthens FDI effect on MAN	+	0.0021 [-0.0006, 0.0065]	Weak support; significant with GFCF
H6: Indirect effect rises with GCF	+	-0.0005 [-0.0020, 0.0001]	Not supported

Note: Bootstrap 95% intervals in brackets.

The results describe a region where FDI has not worked as an engine of manufacturing-led growth over the past two decades. Three features of the evidence explain why. The first is the composition of inflows. The FDI measure in the WDI is aggregate and cannot separate investment in mines and oilfields from investment in

factories. Where inflows are dominated by extractive and resource-seeking projects, foreign affiliates buy few local inputs, employ few workers per dollar of capital and export unprocessed goods, so the backward linkages that Javorcik (2004) identifies as the main source of spillovers are thin. UNCTAD (2026a) makes the same point about mineral investment raising inflows without much domestic value. Wako (2021) and Oduola et al. (2022) reach similar conclusions with different methods.

The second is the negative correlation between the manufacturing share and growth within countries. Commodity boom years, in which extraction, construction and services grow faster than manufacturing, are the years with the fastest growth in resource-intensive economies. For this reason, the manufacturing share does not provide a good indicator of structural change in these economies, and studies that take it as the outcome of FDI (such as some of those mentioned above) should be interpreted with that in mind. When manufacturing is measured by real output per person, the negative association with growth disappears. The more policy-relevant takeaway from these data is that the region as a whole has no discernible manufacturing-led growth period between 2001 and 2024, consistent with the almost flat cross-country average manufacturing share in the sample.

The third feature concerns domestic investment. The interaction between FDI and capital formation is positive in the baseline and statistically different from zero when fixed capital formation is used. This is consistent with the absorptive capacity findings of Ben Mim et al. (2022) and Darko and Xu (2024): FDI has a better chance of raising manufacturing where the host economy invests in the physical capital that foreign and domestic producers need. The size of the effect is small, however, and in no part of the observed range is the marginal effect of FDI on manufacturing positive and significant. Domestic investment is a condition for manufacturing gains from FDI, but it has not been sufficient to produce them.

Limitations

The estimates measure within-country associations and should not be read as fully identified causal effects. While fixed effects eliminate time-invariant confounders, year effects eliminate common shocks, and the lagged FDI specification reduces simultaneity, time-varying factors like institutional reforms, conflict and commodity discoveries may influence FDI, manufacturing and growth simultaneously. There are no credible external instruments for FDI for this panel. System GMM relies on internal instruments and confirms the main results, but its moderation estimates are unstable, and an external instrument such as world commodity price shocks interacted with initial mineral endowments would require commodity-level export and price data that the World Development Indicators do not provide. The study cannot test for the possible different behaviour of FDI in manufacturing compared to non-manufacturing, since the overall FDI measure does not allow for disaggregation. The database also contains no manufacturing employment series, so an absolute output measure is used in place of an employment-based measure of structural transformation. Lastly, the slope homogeneity test shows that the impact varies by country, and the pooled estimates represent the average impact, not the impact in any particular country; the Mean Group and Augmented Mean Group estimates reach the same conclusions on average, but the individual country slopes are imprecise. Finally, the CIPS test does not reject a unit root for the manufacturing share in levels, although the first-difference and growth versions of the mediator lead to the same conclusions.

CONCLUSION AND POLICY RECOMMENDATIONS

This study examined whether FDI contributes to growth in Sub-Saharan Africa through manufacturing, and whether domestic capital formation strengthens that channel, by adopting the moderated mediation approach and estimating it for 43 countries over 2001 to 2024. Within countries, FDI inflows are uncorrelated with growth, the manufacturing share is negatively correlated with growth, and the indirect effect of FDI on growth via manufacturing is low. The impact of gross capital formation on the response of manufacturing to FDI is weak, and more visible in the case of fixed investment. The results hold across the other lags, outcomes, mediators, outlier treatments, country samples and estimators used.

Four recommendations follow. Instead of measuring FDI by the amount of investment, investment promotion agencies should evaluate it based on the connection to local producers, while incentive packages should be

linked to the extent of local sourcing, supplier development and skills transfer. In resource-intensive economies, governments should channel the fiscal and foreign exchange earnings from extractive FDI into building infrastructure and industrial inputs to make manufacturing possible, given the evidence that extractive booms, without these types of investments, push economies away from manufacturing. Public and private fixed investment in power, transport and industrial facilities should be accorded priority, as it is the conditioning variable which has some influence on manufacturing's sensitivity to FDI. The publication of FDI by sector of destination by statistical agencies and central banks would permit a test of the impact of manufacturing-oriented FDI, to see if it has the effects that aggregate FDI does not.

Future research could benefit from sectoral FDI from central banks, UNCTAD or project-level greenfield databases, if available, firm-level evidence of supplier linkages, and external instruments built from commodity price shocks and initial resource endowments. Employment-based measures of structural transformation would also not suffer from the ratio problem that the manufacturing share of GDP does.

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Declaration of Interest

The author declares no financial interests or personal relationships that could have potentially influenced the work reported in this paper.

Data Availability Statement

The data used in this study are publicly available in the World Bank World Development Indicators database. The code and constructed panel are available from the author upon reasonable request.

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