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# Structural Change in Africa: The Role of North–South and South–South Trade

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## ABSTRACT

This paper investigates the impact of imported capital and intermediate inputs on structural change in African economies, focusing on the origin of imports—Global North versus Global South—and the moderating role of domestic absorptive capacity. The paper relies on a panel dataset comprising 52 African countries from 2000 to 2022 and a two-stage least squares (2SLS) estimation strategy. We find that imported inputs from the Global South consistently positively affect structural change, due to the alignment of those inputs with the technological realities and production structures of African economies. Disaggregated results further reveal that these effects are stronger when imported capital (intermediate) inputs are sourced from the emerging Global South economies (relatively less-industrialised Global South economies). Absorptive capacity dampens these positive effects, suggesting that the structural change effect of imported inputs from the Global South may be especially effective in lower-capacity environments. In contrast, while intermediate inputs from the Global North also foster structural change unconditionally, the benefits of capital imports from the Global North materialise only when African economies possess high levels of domestic absorptive capacity. The findings underscore the importance of a nuanced trade policy that leverages the strengths of both trade relations to advance Africa's structural change.

## 1 | Introduction

Achieving and sustaining robust economic development remains a central priority on the national economic agenda of African countries. At the heart of this agenda lies the pursuit of growth-enhancing structural change—an economy-wide shift in output and employment from low-productivity sectors such as subsistence agriculture to higher-productivity sectors like manufacturing and modern services. A prevailing consensus in the development literature holds that countries that have successfully transitioned from poverty to prosperity did so by undergoing profound growth-enhancing structural change (McMillan et al. 2014; Wood 2019). This view aligns with evidence from East and South Asia economies, where structural shifts prioritising industrialisation, innovation and export diversification played a decisive role in their economic development (Amsden 1989; Rodrik 2004).

However, despite increasing efforts and policy experimentation, several African countries have remained trapped in primary commodity dependence, with limited diversification and weak linkages between sectors. This 'stalled structural transformation' has contributed to sluggish productivity growth, vulnerability to external shocks and a persistent inability to create quality jobs, particularly for the continent's fast-growing youth population. The failure to shift labour into more productive sectors also remains a key explanation for why economic growth in most African countries has not translated into broad-based development. In this context, understanding the factors that can help drive growth-enhancing structural change is crucial for

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shaping effective policies and advancing the continent's structural transformation agenda.

This paper contributes to this critical discourse on Africa's structural transformation by examining a relatively underexplored but increasingly important factor: the role of trade patterns. Specifically, it examines the impact of imported capital and intermediate inputs from the Global North (i.e., advanced economies) and Global South (i.e., developing economies) on structural change in Africa. By disaggregating these imports by their source and type, the paper aims to uncover whether certain trade configurations are more conducive to supporting the technological upgrading and sectoral reallocation needed for structural change in Africa. Moreover, the paper also considers the role of absorptive capacity—the ability to internalise, adapt and deploy external knowledge and technology—as a critical moderating factor that can shape the structural change effects of imported capital and intermediate inputs. In doing so, the paper bridges insights from trade, development and innovation economics to provide a richer understanding of the conditions under which trade integration can catalyse transformative change in African economies.

Imported capital goods such as machinery, equipment and tools avail technologically lagging countries like those in Africa the opportunity to access (world-class) technologies that would otherwise remain out of reach. This enables domestic firms to improve production efficiency, adopt new methods and engage in innovation that accelerates modernization and industrial upgrading in ways that could not be possible under autarky. Likewise, the ability to import intermediates confers a country access to a more diverse, higher-quality and often cheaper pool of production inputs, lowering marginal costs and improving the competitiveness of local firms (Colantone and Crinò 2014; Colantone et al. 2020; Ndubuisi et al. 2020; Alessandria et al. 2023). Overall, imported capital and intermediate inputs can serve as enablers of structural change in at least two important ways. First, by unlocking inputs and technologies previously unaffordable or inaccessible, imported inputs can alter a country's pattern of specialisation—shifting productive capacities toward more dynamic sectors.[1] Second, cost reductions and technological upgrading associated with imported inputs can spur firm entry and expansion, catalysing sectoral reallocation and industrial diversification.

While the preceding suggests that imported inputs (i.e., capital and intermediates) hold transformative potential, the magnitude and direction of their impact depend crucially on both their source and the absorptive capacity of the importing country. Classical technology gap and product cycle models (Krugman 1979; Rivera-Batiz and Romer 1991a; Grossman and Helpman 1991) emphasise that the Global North—home to countries and firms operating on the technological frontier—supplies capital and knowledge-intensive goods with higher quality and embedded innovation, whereas countries and firms in the Global South are at best imitators. North–South trade thus offers African countries not only physical inputs but are also vehicles for technology transfer and skills upgrading given the preexisting technological gap between both regions.

By contrast, South–South trade, though increasingly important, tends to involve lower-cost, less technologically advanced products. Yet, relational proximity—similarity in development stage, technological complexity, institutional structures, endowments and shared preferences and tastes and endowments—can make South–South trade more appropriate (Lall 2000; Acemoglu 2007; Basile et al. 2011).[2] This is further accentuated by the fact that South–South trade often involves the exchange of 'appropriate technologies and inputs' that are more aligned with local contexts, and better match the current capabilities and production realities of African firms (Fu et al. 2011; Hanlin and Kaplinsky 2016), even if they may lack the transformative power of enabling frontier innovation or leapfrogging. This highlights a crucial dilemma in Africa's development discourse: Can South-South or North-South trade meaningfully catalyze the continent's long-sought structural transformation?

On the surface, North–South trade appears more promising, as it is typically capital-intensive and rich in high-quality, frontier technologies that align with the capital and input needs of higher-productivity sectors such as manufacturing and modern services. In theory, such inflows should facilitate structural change by enabling African countries to upgrade their productive base and expand the local industrial sector. However, these benefits are far from automatic. The preexisting technological gap between Africa and the Global North implies that, without adequate absorptive capacity, Africa's capacity to adopt technologies or (re-)combine inputs from the Global North may not necessarily align. This view aligns with longstanding insights from scholars who have emphasised absorptive capacity as a critical determinant of successful technology transfer and latecomer industrialization (Gerschenkron 1962; Abramowitz 1986; Verspagen 1991; Ndubuisi and Owusu 2023).

The transformative potential of North–South trade, for Africa, thus hinges critically on the importing country's absorptive capacity. Without such capacity, even the most sophisticated imported inputs may yield limited developmental returns. This challenge is particularly acute for technologically lagging economies, where the gap between imported technologies and local capabilities is often wide. In this context, South–South trade may offer a better alternative and more pragmatic pathway. For African countries with weak innovation and underdeveloped industrial ecosystems, South–South trade may serve as a stepping stone by providing learning opportunities through cheaper intermediate and legacy technologies that are easier to absorb and adapt.[3] This strategy, however, carries its own risks. Although these inputs can promote incremental upgrading, they may also trap countries in low-tech, low-productivity sector equilibria if not accompanied or complemented by strategic efforts to build absorptive capacity and eventually access higher-end technologies. Whether this sequencing leads to structural change or locks countries into low-productivity sectors remains an open and pressing question in the debate on Africa's industrial future.

This paper contributes to the growing debate on Africa's structural transformation by empirically investigating this question. The analysis relies on a panel sample comprising 52 African countries for the period 2000–2022. We assemble country-level indicators of structural change and imported capital and intermediate. Structural change is measured as the ratio of manufacturing value-added to agriculture value added following Kaba et al. (2022). For the trade variables, we use detailed bilateral



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trade data to identify imported capitals and intermediates as well as distinguish these imports by their origin vis-à-vis Global North and South. The Principal Component Analysis is employed to compute a synthetic absorptive capacity measure. Our empirical strategy tackles the critical challenge of endogeneity, particularly reverse causality and omitted variable bias, by employing a two-stage least squares (2SLS) approach. We construct an instrumental variable based on exogenous variation in trading partner conditions, drawing on methods pioneered by Frankel and Romer (1999) and refined by Blanchard and Olney (2017).

The findings show that imported inputs from the Global South exert an unambiguously positive effect on structural change. Further disaggregated analysis shows that these effects are stronger when imported inputs are sourced from the emerging Global South economies. In contrast, while imported inputs from the Global North foster structural change, the benefits (specifically for imported capital) materialise only when African countries possess high levels of domestic absorptive capacity. Most strikingly, unlike imported inputs from the Global North, the absorptive capacity diminishes the structural change gains of capital and intermediate inputs from the Global South. Given that these inputs have lower technological content as well as often lack the complexity or embedded knowledge required to generate substantial learning externalities, we interpret this as perhaps due to incompatibility at higher complexity levels. That is, while such inputs may initially support structural change by easing cost constraints in low-capacity settings, they offer limited transformational opportunities in contexts where domestic firms are becoming more capable and seeking quality-enhancing innovation inputs. Hence, continued reliance on such basic inputs at higher capacity levels may result in technological stagnation or even misalignment, as domestic firms underutilize their upgrading potential. Ultimately, this dampens the transformation impact. Capital and intermediate imports from the Global South are thus more beneficial in lower-capacity environments but may yield diminishing returns as absorptive capabilities expand.

Overall, our results show that imported inputs are strong predictors of structural change in Africa but point to important nuances that are shaped by input type (capital versus intermediate), the geographical origin of the input (Global North versus Global South) and the level of domestic absorptive capacity. The findings challenge dominant assumptions that technology from the Global North is universally superior in development outcomes and instead highlight the relevance of technological compatibility, affordability and appropriateness of the technologies embodied in those trade exchanges. At a more broader level, the findings also highlight the distinct roles that North–South and South–South trade play in Africa's structural change agenda and underscore the importance of a nuanced trade policy that leverages the strengths of both trade relations to advance Africa's structural transformation.

The findings thus have profound implications for trade-related strategies for structural transformation in Africa. In low-capacity settings, leveraging imported inputs from the Global South may offer more accessible and immediate productive pathways for structural change. However, for African economies seeking to industrialise more deeply and climb the technological ladder, targeted investments in absorptive capacity are essential to unlock the full benefits of imported inputs from the Global North. Policy interventions must, therefore, move beyond simply expanding access to foreign capital and intermediate inputs and focus on the co-evolution of industrial policy, technology sourcing and capability-specific development. Aligning trade policy with domestic readiness will be essential to realising Africa's structural transformation through trade ambitions in an increasingly multipolar global economy.

The remainder of this paper proceeds as follows: Section 2 reviews the related literature and our contributions. Section 3 discusses the data sources, computation of variables and estimation strategy. Section 4 presents the results. Section 5 concludes.

## 2 | Related Literature

Modern trade theories—such as those by Helpman and Krugman (1985), Romer (1986) and Rivera-Batiz and Romer (1991b)—underscore the dynamic gains from trade,[4] emphasising how trade openness can continually expand a country's production possibility frontiers over time by facilitating access to foreign knowledge, technology and intermediate inputs that would otherwise be unavailable or prohibitively expensive domestically. Inspired by this theoretical foundation, a substantial body of empirical literature has explored the impact of trade on various development outcomes, especially on income, growth and productivity. A significant share of this literature focused on the developing world, including countries in Africa given the critical role trade is assumed to play in their long-term development trajectories.

Several studies within this research strand have analysed how trade openness or liberalisation affects economic growth (Onafowora and Owoye 1998; Brückner and Lederman 2012; Chang and Mendy 2012; Zahonogo 2016). A commonly documented finding is that trade openness fosters growth, though the magnitude and direction of this effect are often contingent on country-specific characteristics such as institutional quality, macroeconomic stability, factor endowments and technological readiness. This heterogeneity in outcomes has led scholars to interrogate not just *how much* countries trade, but also *what* they trade and *with whom*. Emerging evidence suggests that the direction and composition of trade flows matter significantly. Notably, several studies have highlighted that trade's developmental impact may differ depending on whether it is oriented toward partners in the Global North or South (Baliamoune-Lutz 2011; He 2013; Amighini and Sanfilippo 2014; Busse et al. 2016; Mullings and Mahabir 2018; Ndubuisi, et al. 2020; Mazzi and Foster-McGregor 2021).

For instance, He (2013) compared the effects of imports from China versus those from the United States and France on Sub-Saharan African manufactured exports. They found that imports from China had a more pronounced positive impact on manufacturing export performance, suggesting that South–South trade may offer specific advantages, such as more affordable technology or inputs better suited to local production structures. Amighini and Sanfilippo (2014) examined the



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impact of South–South and North–South FDI and imports on export upgrading in Africa. Their findings suggest that imports from the South, in particular, had a robust positive effect on moving exports toward the higher-quality spectrum. Ndubuisi et al. (2020) explored the impact of imported intermediate goods on the variety of exported products across African countries. They found that imported intermediates from both developed and developing countries enhanced export variety, but the benefits of imports from developed countries were conditional on the absorptive capacity of the recipient industry.

Although the above studies offer important insights, they largely focus on trade's impact on economic growth or export performance. Yet, for Africa, the central developmental challenge extends beyond these to the more foundational issue of structural change.[5] The failure to achieve growth-enhancing structural change in Africa is widely documented. Mensah et al. (2023), for instance, highlight the persistence of large inter-sectoral productivity gaps and the weak pace of labour reallocation from low- to high-productivity sectors. Achieving meaningful development in Africa will thus require growth-enhancing structural change—something that trade could support, but which has received relatively limited empirical attention. The notable exception is Kaba et al. (2022), which investigated the relationship between trade openness and structural change. The findings reveal that trade openness negatively affects both the long-run and short-run dynamics of structural change in Africa. Importantly, this negative impact is transmitted primarily through exports—especially commodity exports—rather than imports. A breakdown of trade flows further indicated that while commodity exports dampened structural change, manufacturing exports had more benign effects.

Beyond Kaba et al. (2022), the broader literature also provide limited empirical evidence on the drivers of structural change. The few exceptions include McMillan et al. (2014), Owusu (2024), Konte et al. (2022), and Konte and Ndubuisi (2024). For example, McMillan et al. (2014) in a cross-country exploratory analysis found that exchange rate undervaluation promotes growth-enhancing structural change, whereas commodity dependence and rigid labour markets hinder it. Similarly, in a cross-country analysis, Owusu (2024) explored the role of participation in global value chains (GVCs), whereas Konte et al. (2022) and Konte and Ndubuisi (2024) investigated the roles of structural reforms and Chinese development finance, respectively. These latter studies reported limited or insignificant effects of GVCs, structural reforms and Chinese development finance on structural change, suggesting that the pathways to transformation remain elusive, poorly understood and untheorized.

Our study contributes to the relatively sparse but increasingly important literature on the determinants of structural change, especially those focused on Africa. Along this line, our study is related to Kaba et al. (2022) but differs in three important ways. Firstly, while their study was primarily concerned with the composition of aggregate trade (i.e., commodity vs. manufactured goods), our focus is on capital (including machinery, equipment and tools) and intermediates (including semi-processed materials and components) goods. This distinction is analytically important for two reasons. On the one hand, these types of imports—unlike consumption goods—are essential for and directly linked to production capabilities and restructuring, technological upgrading and industrial development. On the other hand, focusing on the composition of trade by end-use category (i.e., capital vs. intermediate goods) rather than by broad sectoral labels (commodities vs. manufactures) allows us to better capture the developmental content of trade. Specifically, while manufactured exports may include low-technology goods with limited learning spillovers, capital and intermediate goods are more directly linked to the technological deepening of domestic production systems. Hence, our approach is better suited to uncovering the functional channels through which trade can either catalyse or constrain structural change.

Second, we consider the geographical origin of these imports, distinguishing between those sourced from the Global North versus the Global South. Although previous studies have acknowledged that the direction or patterns of trade matter for growth and export outcomes, few—if any—have examined this issue in the context of imported capital and intermediates and their implications for structural change. We argue that this distinction is important and provides clearer insights for both theory and policy given that the technological content, cost structures and compatibility of imported inputs may vary widely by source. Specifically, while imports from the Global North often embody frontier technologies and advanced capital equipment, they may also be costly, more complex to absorb and integrate into local production processes. In settings where absorptive capacities are limited and production structures are unaligned, such imports may fail to catalyse broader structural shifts. Conversely, imports from the Global South, especially from countries like China, Brazil, Turkey and India, may offer mid-range or incremental technologies that are more affordable, adaptable and context-relevant for African producers.[6]

Thirdly, we explicitly examine the role of absorptive capacity—the ability to internalise, adapt and deploy external knowledge and technology—as a critical moderating factor that can shape the structural change effects of imported inputs. Our central argument is that the benefits derived from imported inputs are neither automatic nor evenly distributed across countries. Instead, they depend on the domestic absorptive capacity. By accounting for this inherent source of heterogeneity, our study provides more precise insights into whether, how and under what conditions trade, particularly in capital and intermediate inputs, can serve as a catalyst for Africa's long-overdue structural transformation. In doing so, we deepen the broader literature on trade and structural change in Africa, foregrounding the mechanisms through which imported productive inputs affect economy-wide structural shifts of resources, rather than assuming linear or homogenous effects.

## 3 | Research Design

### 3.1 | Data

Our analysis focuses on 52 African countries spanning over the period 2000 to 2022. The key variables for our analysis include indicators of structural change, imported capital and intermediate inputs and absorptive capacity. Structural change is the outcome variable, imported capital and intermediates are the main



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explanatory variables, while we use the absorptive capacity as a control for a country's level of technological capability. The variable also features prominently in testing the conditionality effect of imported inputs on structural change.

Structural change involves a compositional shift in the sectoral structure of an economy. From a production standpoint, it can be assessed by examining the evolution of sectoral value-added shares or employment shares (Herrendorf et al. 2014). Both the employment and value-added data, whenever available, are used interchangeably to measure structural change. Due to limited manufacturing employment data for African countries, our empirical analysis relies on value added data. Following Kaba et al. (2022), we measure structural change as the ratio of manufacturing value-added to agriculture value added. Higher values of the ratio indicate a compositional shift of an economy's sectoral structure from agriculture to manufacturing. We adopt a similar measure in our study. The sectoral value-added data used to compute structural change is taken from the UNCTAD Statistical Database.

To identify the capital and intermediate input each African country imports, we rely on the BACI-CEPII dataset. The dataset contains bilateral import and export values and quantities across many countries at the 6-digit harmonised system classification (HS). Using the appropriate concordance table, we map the trade data into Broad Economic Classification (BEC) Revision 4 to identify imported goods that are classified as intermediate and capital goods. Specifically, we aggregate 6-digit HS products that correspond to the following BEC 41 and BEC 521 as capital inputs, whereas intermediate inputs are the aggregate 6-digit HS products corresponding to the following BEC codes: 111, 121, 21, 22, 31, 322, 42 and 53. Consistent with our research objective, having identified the total capital and intermediate inputs imported by each African country, we also aggregate the imported inputs across two origins: the Global North and South. Our definition of Global North strictly follows Demir and Razmi (2022) as listed in Panel A of Table A1 in the appendix. We also test the robustness of our results to two alternative definitions of Global North as provided by Demir and Duan (2018). Countries that fall into this category are listed in Panels B and C in Table A1 in the Appendix.

To operationalise the concept of absorptive capacity, we construct a synthetic index that integrates three country-level indicators—namely, the number of resident patents, the volume of scientific and technical journal publications and measures of human capital. Data on human capital is directly sourced from the UNCTAD database, whereas data on the number of (resident) patents and scientific and technical journals are sourced from the World Development Indicators.[7] These indicators collectively capture a country's technical base, thus reflecting the ability to internalise, adapt and apply external knowledge and innovations. We compute the synthetic index in three steps. Firstly, we standardise each of these variables to have a mean of 0 and a standard deviation of 1. Secondly, we apply the Principal Component Analysis (PCA) to reduce data dimensionality.[8] Thirdly, following established methodological precedents (Asongu 2015; Pradhan et al. 2017; Ndubuisi et al. 2021), we then extract the first principal component, which we use as the absorptive capacity measure. The extracted component accounts for approximately 67% of the total variance in the data and carries the highest eigenvalue (2). Hence, the selection aligns with the Kaiser criterion, which recommends retaining components with eigenvalues greater than one.

Finally, to minimise potential omitted variable bias, it is important that we control for other variables in the empirical model specification. Guided by a closely related literature (see Lin 2011; Lin et al. 2011; McMillan et al. 2014; Konte et al. 2022; Kaba et al. 2022; Ndubuisi and Owusu 2023; Owusu 2024), our specified empirical model controls for gross capital formation, financial globalisation, exchange rate, urbanisation, mobile broadband and per capita income. We also control for initial industrial structure since this has strong implications for structural change (McMillan et al. 2014). We use each country's initial agricultural value-added to operationalise this variable. Finally, we control for absorptive capacity. Table A2 in the appendix describes and lists the data sources of these variables, whereas Table A3 reports the correlation matrix among the variables of interest in our analysis.

### 3.2 | Model Specification

To examine how structural change is affected by the patterns of trade in Africa, we estimate the following empirical model:

$$S_{it} = \psi_i \phi + T_{i,t}\vartheta + W^{\prime}_{i,t}\theta_{\iota} + \delta_r + \delta_t + \upsilon_{it} \quad (1)$$

The subscripts $i$, $r$ and $t$ denote country, region and year, respectively. $S_{it}$ is a country level indicator of structural change. $\psi_i$ is initial industrial structure (as previously defined), whereas $\phi$ is the corresponding coefficient to be estimated. $T_{i,t}$ is an indicator measuring the pattern of trade, whereas $\vartheta$ is the corresponding coefficient. The trade patterns we are interested in are capital and intermediate inputs African countries source from either the global North or South. Because of the high correlation between the trade variables (see Table A3), in the estimation we introduce the variables independently. $W^{\prime}_{i,t}$ is a $1 \times \iota$ vector of time-varying country characteristics and $\theta_{\iota}$ the respective $1 \times \iota$ vector of coefficients. As discussed in the previous section, the vector $W^{\prime}_{i,t}$ includes time-varying country characteristics which we include to minimise potential omitted variable bias as mentioned in the previous section. $\delta_r$ is regional dummies to capture differences across the regions (see Gui-Diby and Renard 2015), whereas $\delta_t$ is time dummies capturing time-specific shocks. $\upsilon_{it}$ is the error term.

### 3.3 | Estimation Strategy

We first estimate Equation (1) with OLS. However, the OLS estimation may be subject to endogeneity bias due to omitted variables and simultaneity bias. One of the conventional ways to address these endogeneity concerns is to adopt a two-stage least square (2SLS) method, wherein the endogenous explanatory variable is corrected using an external instrument. The external instrument must be valid, meaning it should strongly explain the endogenous explanatory variable and remain uncorrelated with the error component of the model. Inspired by the extant literature (see Frankel and Romer 1999; Blanchard and Olney 2017), we explore instruments that satisfy the validity condition. We achieve this by exploiting plausible exogenous determinants of trade flows to predict



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a country's patterns of trade flow which we then use as an instrument for the respective components of $T_{i,t}$.

The approach we employed to construct the external instruments proceeds in three mutually inclusive steps. The first step entails estimating a bilateral trade flow using the gravity model. Available evidence suggests that bilateral trade is generally determined by economic, political, cultural and geographic factors. As some of these factors are also correlated with structural change, we cannot consider all of them as this could create an endogeneity problem. Instead, we focus mostly on geographical factors as they are exogenously determined. Once we estimate the gravity model, we predict the trade flows and then aggregate them across the trading partners to arrive at a country-specific time-varying predicted trade flow. Next, we use these predicted trade values as instruments in the 2SLS. Our identification assumption is that predicted trade value is uncontaminated by endogeneity concerns such that when used in 2SLS, it allows us to make causal inferences about the effect of trade patterns on the outcome variables.

Equation (2) specifies the baseline gravity model that guides our investigation of the determinants of trade. The typical gravity model predicts bilateral trade flows as a function of the economic sizes (often using GDP) and distance (as a proxy for trade costs) between two units. Nonetheless, the empirical specification of the gravity model varies from study to study. For the most part, these variations are informed by methodological developments in the literature as well as the research objective of the study in question. Our goal is neither to validate nor vilify these studies, but to identify the variation in imported capital and intermediate inputs that is unrelated to conditions in the importing African country. Accordingly, we estimate a gravity model containing a battery of variables that capture intra- and inter-country trade costs.

$$\ln\left(T_{ijt}\right) = \alpha_0 + \alpha_1 \ln\left(GDP_{it}\right) + \alpha_2 \ln\left(GDP_{jt}\right) + \mathbb{Z}'\Theta + \upsilon_{ijt} \tag{2}$$

From Equation (2), $\ln\left(T_{ijt}\right)$ is the logarithm of the import value of country $i$ from country $j$ in year $t$.[9] $\ln(GDP_{jt})$ and $\ln\left(GDP_{jt}\right)$ are the respective annual GDP of importing and exporting countries (expressed in logs), whereas $\alpha_1$ and $\alpha_2$ are their corresponding coefficients to be estimated. $\mathbb{Z}'$ is a vector of trade costs such as distance, language barriers and colonial ties. $\alpha_0$ is the intercept, whereas $\upsilon_{ijt}$ is a normally distributed error term. Table A2 in the appendix lists the gravity variables and their data sources.

Table 1 reports the results of the gravity model estimate. Columns 1–4 show the result for capital inputs, whereas Columns 5–8 show the result for intermediate inputs. Columns 1 and 5 report the results of a crude gravity model estimate. The estimates on all covariates are statistically significant and meet a priori expected sign. Size, speaking the same official language, and sharing a common border and colonial ties are pull factors of international trade, whereas bilateral distance is a push factor. However, since trade could be driven by other factors unrelated to geography, we introduce two additional variables in columns 2 and 6 to capture this component. This includes country-pair dissimilarity as per preference and institutional quality.[10] Estimates of both variables are negative and statistically significant at all conventional significance levels, implying that country-pair differences in preference and institutional quality are also push factors of trade.

The previously discussed estimations include time, and importer and exporter dummies to account for *intra*-country trade costs as required by gravity theory. The inclusion of these fixed effects also approximates the multilateral resistance term (MRT) (see Anderson and van Wincoop 2003; Baldwin and Taglioni 2006; Yotov et al. 2016). However, a commonly shared view in the literature is that importer and exporter fixed effects do not account properly for the MRT. We address this concern by including exporter and importer 'remoteness indexes', which is one of the approaches that have been adopted in the literature to explicitly account for MRT (see Silva and Tenreyro 2006; Yotov et al. 2016). We compute the indexes as functions of bilateral distance and GDPs following Head (2003). Columns 3 and 7 report the results when we include the indexes. Except for column 8, their estimated coefficients are all positive and statistically significant at the conventional level. We also observe that including these new terms does not significantly alter the effects of the conventional gravity model variables.

The gravity model estimates in Columns 1–3 and Columns 5–7 rely on national GDP to control for size. Our instrument may break down if this variable also predicts structural change—something that could be argued for. We address this concern by re-estimating the models, but this time using country land mass to capture size as reported in Columns 4 and 8. The coefficients all turn positive and statistically significant at conventional levels, reiterating the role of size as a pull factor of international trade.

Because of the relative sophistication of the gravity model estimates reported in Columns 3 and 4, and 7 and 8, our 2SLS estimate will rely on predicted trade values from these models. Figure 1 plots the total imported capitals against the corresponding derived instrument from the gravity model. In the same vein, Figure 2 plots the total imported intermediates against the corresponding derived instrument from the gravity model. As expected, Figures 1 and 2 both show a strong positive relationship. In addition, the figures also show substantial variations which we can explore for identification. In the appendix, we report Figures for the different imported inputs categories based on origin (see Figures A1 and A2). The emerging evidence is similar to those reported in Figures 1 and 2.

## 4 | Empirical Results

### 4.1 | Imported Capital Inputs and Structural Change: The Role of Origin

Table 2 presents the empirical results on the impact of imported capital on structural change across African economies. The table is structured in three panels. Panel A provides the baseline results for total capital imports, whereas Panels B and C explore heterogeneity in effects by disaggregating capital imports according to their origin—Panel B for the Global North and Panel C for the Global South. Each panel follows a consistent structure: Column 1 reports baseline OLS estimates, whereas Columns 2 and 3 present the 2SLS IV estimates, each using distinct external instruments to mitigate concerns of endogeneity and reverse causality. Specifically, Column 2 uses 'IV 1' as an



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**TABLE 1** | Construction of instruments using bilateral trade data.

| | Imported capital | | | | Imported intermediate | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Contiguity | 1.5633*** | 1.5634*** | 1.5713*** | 1.5402*** | 1.8594*** | 1.8598*** | 1.8580*** | 1.8505*** |
| | (0.141) | (0.139) | (0.141) | (0.139) | (0.166) | (0.165) | (0.166) | (0.165) |
| Common language | 0.4730*** | 0.4815*** | 0.4827*** | 0.4803*** | 0.4447*** | 0.4535*** | 0.4555*** | 0.4526*** |
| | (0.059) | (0.059) | (0.059) | (0.059) | (0.062) | (0.062) | (0.063) | (0.062) |
| Distance (log) | −1.5253*** | −1.5154*** | −1.5376*** | −1.5136*** | −1.7359*** | −1.7297*** | −1.7416*** | −1.7253*** |
| | (0.060) | (0.060) | (0.061) | (0.060) | (0.067) | (0.067) | (0.068) | (0.067) |
| Colonial pair | 0.8142*** | 0.8156*** | 0.8276*** | 0.8204*** | 1.0601*** | 1.0584*** | 1.0597*** | 1.0585*** |
| | (0.250) | (0.243) | (0.243) | (0.243) | (0.302) | (0.298) | (0.301) | (0.298) |
| Common coloniser | 0.4640*** | 0.4491*** | 0.4586*** | 0.4446*** | 0.6629*** | 0.6450*** | 0.6502*** | 0.6426*** |
| | (0.069) | (0.069) | (0.070) | (0.069) | (0.074) | (0.075) | (0.076) | (0.075) |
| Colonial relationship | 0.6099*** | 0.6137*** | 0.6031*** | 0.6130*** | 0.3080 | 0.3099 | 0.3073 | 0.3122 |
| | (0.195) | (0.189) | (0.188) | (0.189) | (0.246) | (0.243) | (0.245) | (0.242) |
| Exporter GDP (log) | 0.9650*** | 1.0304*** | 1.3564*** | | 0.8079*** | 0.8307*** | 1.1472*** | |
| | (0.072) | (0.072) | (0.079) | | (0.071) | (0.072) | (0.092) | |
| Importer GDP (log) | 0.7297*** | 0.5719*** | 1.7789*** | | 0.6887*** | 0.6060*** | 1.6076*** | |
| | (0.066) | (0.069) | (0.096) | | (0.062) | (0.065) | (0.100) | |
| Income similarity | | −0.0046*** | −0.0047*** | −0.0049*** | | −0.0026*** | −0.0026*** | −0.0029*** |
| | | (0.001) | (0.001) | (0.001) | | (0.001) | (0.001) | (0.001) |
| Institution similarity | | −0.0381*** | −0.0323*** | −0.0447*** | | −0.0255*** | −0.0216*** | −0.0309*** |
| | | (0.006) | (0.006) | (0.006) | | (0.005) | (0.005) | (0.005) |
| Importer remoteness | | | 1.2970*** | 0.1315** | | | 1.0632*** | −0.0501 |
| | | | (0.076) | (0.054) | | | (0.082) | (0.054) |
| Exporter remoteness | | | 0.4860*** | 0.0375 | | | 0.3956*** | −0.2111*** |
| | | | (0.054) | (0.052) | | | (0.067) | (0.054) |

(Continues)



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**TABLE 1** | (Continued)

| | Imported capital | | | | Imported intermediate | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Area exporter (log) | | | | 6.1930** | | | | 16.1008*** |
| | | | | (2.937) | | | | (3.430) |
| Area importer (log) | | | | 0.9691*** | | | | 1.5329*** |
| | | | | (0.188) | | | | (0.196) |
| Constant | −3.0780*** | −1.9894* | −53.8064*** | −86.4783** | 1.9581* | 2.6306** | −41.1851*** | −215.2065*** |
| | (1.170) | (1.178) | (2.954) | (39.907) | (1.154) | (1.164) | (3.454) | (46.424) |
| Observations | 103,067 | 102,305 | 102,305 | 102,305 | 127,826 | 126,981 | 126,981 | 126,981 |
| $R$-squared | 0.639 | 0.641 | 0.643 | 0.639 | 0.657 | 0.658 | 0.659 | 0.656 |
| Year FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Exporter FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Importer FE | YES | YES | YES | YES | YES | YES | YES | YES |

*Note:* Standard errors clustered at country pairs in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

external instrument, whereas Column 3 uses 'IV 2' as an external instrument. These instruments are all discussed in the previous section.

Starting with Panel A, the results indicate a strong and statistically significant positive relationship between capital imports and structural change. The OLS estimate is positive and highly significant at the 1% level, suggesting that countries that import more capital inputs experience faster shifts toward higher-productivity sectors. However, the more telling insight emerges from the IV estimates in Columns 2 and 3. Both 2SLS estimates remain statistically significant at conventional levels and are markedly larger than their OLS counterpart, implying that the baseline OLS estimates may be downward biased. Notably, the IV estimate using IV 1 yields a particularly large and highly significant coefficient, reinforcing the view that imported capital exert a substantial positive effect on structural change when endogeneity is properly accounted for.

Support for the IV strategy is further provided in Appendix Table A4, Panel A, which presents the first-stage results. Both instruments are strongly correlated with imported capital, and the associated F-statistics exceed the conventional threshold of 10, confirming instrument relevance and mitigating concerns of weak instruments. Taken together, the results in Panel A present compelling evidence that imported capitals are not only associated with but causally contribute to structural change in African economies.

Turning to the disaggregated analysis in Panels B and C, we observe a nuanced pattern. In Panel B, which focuses on imported capital from the Global North, the OLS estimate is positive but only marginally significant at the 10% level. Once we correct for potential endogeneity using IV techniques, the estimates become statistically insignificant across both instruments. This change suggests that the baseline positive association may have been confounded by omitted factors that may be correlated with both capital imports from advanced economies and structural change. Focusing on the IV estimates, which is our preferred estimation approach, the statistical significant estimate points to the possibility that capital inputs from the North, though potentially sophisticated, may not yield automatic transformation benefits without a sufficient base of absorptive capacity or complementary inputs, which may be lacking in many African economies.

By contrast, Panel C presents a markedly different picture for imported capital originating from the Global South. Here, both the OLS and IV estimates are not only positive but also statistically significant at the 1% level. As in Panel A, the IV estimates are larger in magnitude than the OLS estimates. The consistency across both instruments reinforces confidence in the identification strategy. First-stage results reported in Panels B and C of Table A4 in the Appendix further confirm that the instruments perform well, with F-statistics comfortably above conventional thresholds. Table A5 in the appendix provides additional results when we employ two alternative definitions of Global North following Demir and Duan (2018). Panels B and C of Table A1 in the Appendix list the countries that fall into these categories. The results strongly align with those reported in Table 2, suggesting that our result is unlikely to be driven by definitional choice.



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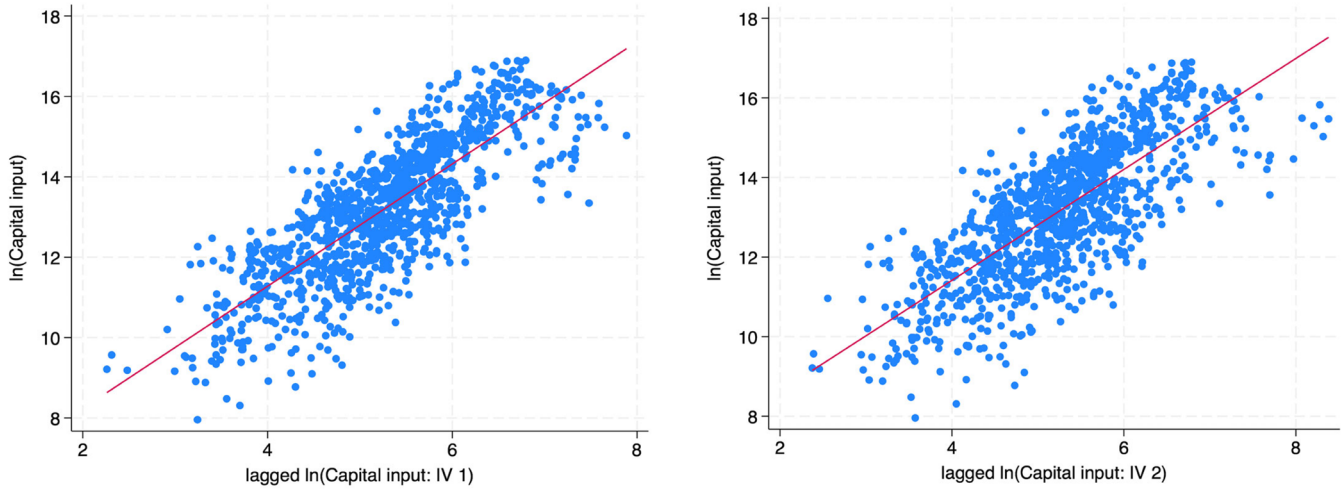


**FIGURE 1** | Total capital input vs. total capital input IV. [Colour figure can be viewed at wileyonlinelibrary.com]

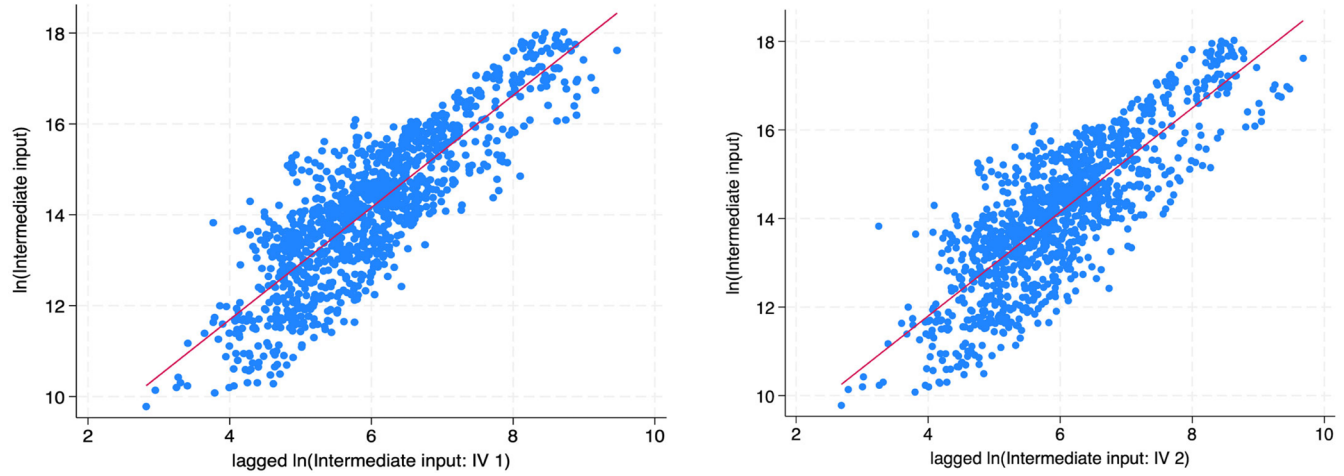


**FIGURE 2** | Total intermediate input vs. total intermediate input IV. IV 1 is based on columns 3 and 7 as reported in Table 1, whereas IV 2 is based on columns 4 and 8. [Colour figure can be viewed at wileyonlinelibrary.com]

Overall, the empirical results point to the importance of origin of imported capital for trade-induced structural change. Capital imports from the South appear to offer more accessible and complementary technologies for African economies, yielding higher marginal returns in the current development context. Meanwhile, capital from the North may require more targeted capability upgrades, skill investments and technological learning to realise their full potential. From a practical perspective, therefore, rather than promoting generic capital imports, trade-related and industrial policies should aim to foster capability-matched capital accumulation, with differentiated support depending on the origin and technological complexity of the inputs. This could include South–South cooperation frameworks for scaling appropriate technologies, as well as strategic North–South partnerships for high-tech transfer conditioned on domestic upgrading programs.

## 4.2 | Imported Capital Inputs and Structural Change: Accounting for South–South Heterogeneity

Table 2 shows that capital imports from the Global South play a significant role in fostering structural change in African economies. However, treating the Global South as a homogenous category masks important variations in the technological capabilities and production complexity of countries within this group. Extant studies have argued and shown that the Global South is far from monolithic (Demir and Duan 2018; Demir and Razmi 2022). There is considerable heterogeneity that warrants analytical disaggregation, particularly between emerging economies (i.e., countries in the Global South that have undergone significant industrialization over the past few decades, leading to advancements in their capital goods sectors) and less-developed Southern countries (other countries within the South that remain technologically constrained and continue to produce simpler, less productive forms of capital).

Other things equal, such notable difference implies that emerging South countries such as China, Brazil, Turkey and India, though part of the Global South, can possess relatively advanced technological infrastructures and operate with a considerable technological and industrial gap when compared to many African nations. To unpack this internal heterogeneity and to better understand the channels through which South–South trade influences African structural change, we undertake a further decomposition of capital imports from the



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**TABLE 2** | Structural change and imported capital.

| | OLS | 2SLS (2nd stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Total imported capital input (log) | 0.144*** | 0.271*** | 0.200* |
| | (0.0427) | (0.0867) | (0.120) |
| Constant | −4.584*** | −4.508*** | −4.583*** |
| | (1.052) | (1.028) | (1.078) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.526 | 0.526 | 0.528 |
| **Panel B** | | | |
| Capital input from North (log) | 0.0719* | 0.0946 | 0.00173 |
| | (0.0429) | (0.0631) | (0.0879) |
| Constant | −4.636*** | −4.649*** | −4.790*** |
| | (1.046) | (1.071) | (1.128) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.523 | 0.526 | 0.526 |
| **Panel C** | | | |
| Capital input from South (log) | 0.140*** | 0.376*** | 0.320*** |
| | (0.0369) | (0.0810) | (0.0945) |
| Constant | −4.329*** | −3.678*** | −3.844*** |
| | (1.028) | (0.998) | (1.097) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.527 | 0.518 | 0.523 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

Global South. The results of this extended analysis are presented in Table 3. Our definition of emerging Global South economies follows Demir and Duan (2018). A detailed list of countries that fall into this category is provided in Panel D of Table A1 in the Appendix.

The results of this extended analysis are presented in Table 3. Panel A presents the results for capital inputs from emerging

**TABLE 3** | Imported capital and structural change: isolating emerging and 'other' South.

| | OLS | 2SLS (second stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Capital inputs from emerging South (log) | 0.114*** | 0.440*** | 0.412*** |
| | (0.0356) | (0.0627) | (0.0858) |
| Constant | −4.325*** | −3.168*** | −3.273*** |
| | (1.011) | (1.100) | (1.217) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.526 | 0.503 | 0.508 |
| **Panel B** | | | |
| Capital inputs from 'Other' South | 0.0653* | 0.315*** | 0.276** |
| | (0.0359) | (0.112) | (0.110) |
| Constant | −4.506*** | −3.690*** | −3.825*** |
| | (1.014) | (0.893) | (0.960) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.524 | 0.506 | 0.512 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

Southern economies, whereas Panel B focuses on imports from other countries within the Global South. As with earlier analyses, Column 1 reports the OLS estimates, whereas Columns 2 and 3 present IV results using two distinct instruments to address endogeneity. First-stage results for the IV regressions are reported in Table A6 in the appendix. For both groups, capital imports have a positive and statistically significant effect on structural change, confirming the overall value of South–South trade in productive inputs. However, the magnitude and robustness of the impact differ notably. Across all specifications, the estimated coefficients for the emerging South are consistently larger than those for the other Southern economies. Moreover, the statistical significance is stronger for capital inputs from emerging economies in Columns 1 and 3. This new piece of evidence, thus, suggests that while imported capital from all parts of the Global South are beneficial, those from the emerging South offer superior gains.

These results carry two critical implications. First, they confirm that capital inputs from the broader Global South



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contribute meaningfully to Africa's structural change, thereby reinforcing the importance of diversifying trade partnerships beyond the traditional North. Second, and more importantly, they suggest that emerging economies within the Global South constitute a more potent source of transformative capital inputs. Their capital inputs may be more technologically sophisticated, yet still adaptable and affordable, offering a better match for African production environments than from less industrialised Southern countries. This calls for a more strategic, differentiated and capability-sensitive engagement with the Global South, recognising that the identity and technological profile of trade partners matter as much as the volume of trade itself.

### 4.3 | Imported Capital, Absorptive Capacity and Structural Change

Thus far, our analysis has focused on the linear relationship between imported capital inputs and structural change, implicitly suggesting that imported capital inputs automatically translate into structural change. However, as emphasised in the introduction and literature review, this assumption may be overly simplistic as the impact may hinge critically on a country's absorptive capacity. This section explicitly examines this critical nuance by testing whether the relationship between imported capital and structural change varies systematically with levels of absorptive capacity. We test this relationship by augmenting the baseline empirical specification with an interaction term between imported capital and a proxy for absorptive capacity as defined in Section 3.

Table 4 reports the results from this extended specification. Its structure mirrors that of Table 2 but with each column now including an interaction term that allows us to test for heterogeneous effects based on absorptive capacity. Because we interact the trade variables with absorptive capacity, the resulting interaction term can also be endogenous (Aghion et al. 2005). To address this concern, the empirical specification here follows Aghion et al. (2005) which uses the interaction between the instrument and the second term of the interaction as an instrument for the interaction term. Because absorptive capacity here is of interest, we also need to address its endogeneity concern. Since finding a proper instrument for absorptive capacity may be daunting, we instrument it using the period lag.

In Panel A, the OLS estimate of the direct effect of total capital imports on structural change remains positive and statistically significant, reinforcing the earlier conclusion that capital goods are broadly beneficial. However, the coefficient of the interaction term, capturing whether absorptive capacity amplifies or moderates this effect, is statistically insignificant. The IV estimates in Columns 2 and 3 further complicate the picture: here, the baseline effect of capital imports becomes statistically insignificant, and the interaction term remains non-significant across specifications. These results, taken together, suggest that, on average, absorptive capacity does not significantly condition the impact of total capital imports on structural change. A plausible explanation lies in the aggregation of capital imports from highly heterogeneous sources. If capital from some regions (e.g., the Global North) requires high absorptive capacity while capital from others (e.g., the Global South) is more readily usable in low-capacity environments, then these dynamics may offset each other in the aggregate, obscuring conditional effects. Evidence presented in Panels B and C corroborates this claim.

In Panel B, where the analysis focuses exclusively on capital inputs from the Global North, we observe that a more nuanced and theoretically consistent pattern emerges. Specifically, the direct effect of capital inputs from the Global North is now positive and statistically significant, particularly in Columns 1 and 2. More importantly, across all specifications, the interaction between capital imports and absorptive capacity is positive and highly statistically significant at the 1% level. This result strongly suggests that the effectiveness of capital inputs from the Global North in driving structural change is highly contingent upon the recipient country's absorptive capacity.

As previously noted, technologies embedded in capital goods from the Global North tend to be more advanced, complex and skill-intensive, requiring higher levels of technical expertise, infrastructure and institutional readiness to be effectively integrated. Hence, the result aligns with theoretical expectations and a long-standing body of literature that highlights the co-evolution of foreign technologies and local capabilities (Fu 2008; Yasar 2013). From a policy perspective, it thus follows that for African countries to benefit from high-tech capital imports from advanced economies, targeted investments in absorptive capacity are indispensable.

Panel C paints a strikingly different picture. The direct effect of capital input from the Global South remains positive and statistically significant, consistent with earlier findings that such imports are generally beneficial. However, the interaction term between capital imports and absorptive capacity is negative and statistically significant across all IV specifications. This result suggests that the effectiveness of capital imports from the Global South may diminish as absorptive capacity increases. One interpretation for this is that, although capital inputs from the Global South are simpler and more compatible with existing technologies and production methods in many African economies, they have lower technological content and often lack complexity. Hence, while such inputs may initially support structural change in low-capacity settings, they offer limited transformational opportunities in contexts where domestic firms are becoming more capable and seeking quality-enhancing innovation inputs. In this context, continued reliance on such basic inputs may result in technological stagnation or even misalignment, as domestic firms underutilize their upgrading potential. Ultimately, this dampens the transformation impact.

Another possibility is that African countries with higher absorptive capacity may shift toward sourcing capital from advanced economies. In this context, the negative interaction term may reflect a transition dynamics: as capacity rises, the marginal utility of Global South capital inputs declines, potentially signalling a need to move up the technology ladder. This implies that the transformational gains from imported technology are not merely a function of exposure but of match quality—that is, the compatibility between imported technology and domestic capabilities.[11] Therefore, while low-tech and quality inputs from the Global South may be better suited for low-capacity contexts,



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**TABLE 4** | Imported capital, absorptive capacity and structural change.

| | OLS | 2SLS (2nd stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Total imported capital input (log) | 0.159*** | −0.113 | −0.175 |
| | (0.0468) | (0.244) | (0.311) |
| Total imported capital input (log) × Absorptive capacity | 0.0691 | −1.788* | −1.826 |
| | (0.0992) | (0.997) | (1.172) |
| Constant | −4.853*** | 2.793 | 2.887 |
| | (1.032) | (4.160) | (4.824) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.526 | 0.287 | 0.280 |
| **Panel B** | | | |
| Capital input from North (log) | 0.149*** | 0.122* | 0.0382 |
| | (0.0429) | (0.0674) | (0.0988) |
| Capital input from North (log) × Absorptive capacity | 0.419*** | 0.519*** | 0.567*** |
| | (0.0786) | (0.0800) | (0.156) |
| Constant | −6.413*** | −6.808*** | −7.149*** |
| | (1.037) | (1.060) | (1.266) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.532 | 0.534 | 0.532 |
| **Panel C** | | | |
| Capital input from South (log) | 0.123*** | 0.238*** | 0.207** |
| | (0.0379) | (0.0915) | (0.105) |
| Capital input from South (log) × Absorptive capacity | −0.0727 | −0.610*** | −0.577*** |
| | (0.0577) | (0.192) | (0.181) |
| Constant | −4.107*** | −1.670 | −1.897* |
| | (0.992) | (1.107) | (1.150) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.528 | 0.464 | 0.474 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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where affordability and ease of assimilation matter more than technological complexity, the match quality of these inputs diminishes and their structural change effects wane as these countries accumulate capabilities; hence the observed negative interaction.

To ensure that these findings are not sensitive to definitional choices, we re-estimate the model using two alternative definitions of the Global North and South, as in the previous case. Result for this exercise is reported in Table A7 in the Appendix. The results remain broadly consistent, reinforcing our main conclusion that absorptive capacity plays a critical role when importing capital from advanced economies, but is less decisive when engaging with Southern partners. Altogether, the emerging evidence thus suggests that while South–South trade can be a strategic entry point in driving structural change in low-capacity settings, its contribution to sustained transformation may be limited in high-capacity settings unless such trade is complemented with higher-tech collaborations.

### 4.4 | Imported Intermediate Inputs and Structural Change: The Role of Origin

Having established how imported capital inputs affect structural change, we now turn to the role of imported intermediate inputs. These inputs often contain embedded knowledge, production techniques and process innovations that can play a catalytic role in upgrading domestic industries. Table 5 presents the results, maintaining the same structure as Table 2 from the previous section.

Starting with Panel A, the OLS estimate of total intermediate imports is positive and statistically significant at the 1% level (Column 1), suggesting a strong association between imported intermediate inputs and structural change. In Columns 2 and 3, we report the second-stage IV results, which also show a positive and statistically significant coefficient across all conventional levels of significance. Notably, the magnitude of the IV coefficient exceeds that of the OLS estimate, reinforcing the argument that endogeneity may have led to an underestimation of the true impact in the OLS model. The first-stage regression results corresponding to Panel A (see Panel A of Table A8 in the Appendix) confirm that our external instruments are both relevant and valid. Notably, the estimated coefficients align with a priori expectations, and the corresponding first-stage F-statistics far exceed the conventional threshold of 10. Overall, the results of the total imported intermediate inputs, as reported in Panel A of Table 5, affirm the idea that intermediate imports provide more than just input substitution; they may also introduce production efficiencies, knowledge spillovers and new business models that unlock structural change.

**TABLE 5** | Imported intermediate and structural change.

| | OLS | 2SLS (2nd Stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Total Imported intermediate (log) | 0.834*** | 1.291*** | 1.357*** |
| | (0.117) | (0.163) | (0.197) |
| Constant | −5.888*** | −6.639*** | −6.733*** |
| | (1.087) | (1.030) | (1.010) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.578 | 0.566 | 0.561 |
| **Panel B** | | | |
| Intermediate from North (log) | 0.237*** | 0.248*** | 0.198** |
| | (0.0555) | (0.0749) | (0.0900) |
| Constant | −4.493*** | −4.524*** | −4.578*** |
| | (1.039) | (1.058) | (1.084) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.528 | 0.530 | 0.530 |
| **Panel C** | | | |
| Intermediate from South (log) | 0.716*** | 1.142*** | 1.161*** |
| | (0.107) | (0.147) | (0.162) |
| Constant | −5.586*** | −6.236*** | −6.260*** |
| | (1.034) | (0.954) | (0.939) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.591 | 0.573 | 0.571 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

Panels B and C of Table 5 further disaggregate the analysis by the source region of the intermediate imports, distinguishing between the Global North and the Global South. In Panel B, the estimated coefficients for intermediate inputs sourced from the Global North are consistently positive and statistically significant across both OLS and IV specifications. This is expected given that intermediated goods from the Global North are typically higher in quality, often embedded with cutting-edge technologies, advanced production standards and potential for spillovers into local industries.

Turning to Panel C, we observe a similar pattern for intermediate inputs from the Global South. Both the OLS and IV estimates are positive and statistically significant, indicating that Southern-sourced inputs also contribute meaningfully to structural change. However, the magnitude of the estimated



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coefficients of inputs from the South is notably larger, with the size of the estimated coefficient being almost three times greater than those from the North. Again, as detailed in Appendix Table A8, the first-stage regression diagnostics for both Panels B and C confirm the relevance and strength of the instruments, further reinforcing the credibility of the IV results. Hence, the observed striking difference suggests that South–South trade in intermediate goods is an especially potent channel for structural change in African economies. To test the robust of our results, Table A9 in the appendix shows the results when we employ alternative definition for the Global North as outlined in Panels B and C of Table A1 in the appendix. The results align with those presented in Table 5.

These findings lend empirical support to the dual-channel framework through which imported intermediate goods influence structural change—namely, the cost channel and the quality channel (Colantone and Crinò 2014; Colantone et al. 2020; Ndubuisi et al. 2020). In retrospection, imported intermediates from the Global South often reflect competitive pricing and adaptability, reducing production costs for African firms—the cost channel.[12] Imports from the Global North, although more expensive, are associated with higher quality and more advanced technology content, making them ideal for not just structural change but also reallocation into high-tech sectors—the quality channel.

Our results suggest that both channels are active in Africa's import structure. However, the magnitude of the estimated effects implies that the gains from the cost channel—driven by trade with the Global South—are currently more substantial. This resonates with the broader development literature which argues that, in developing economies, appropriately priced inputs and adaptable technologies are often more transformative in low-capacity settings than cutting-edge but high-cost alternatives. The lower coefficient magnitude for intermediate input from the Global North, on the other hand, indicates that these gains may be more gradual and relevant to specific high-tech or capital-intensive sectors that may not fully underpin the current stage of African industrial development.

### 4.5 | Imported Intermediate and Structural Change: Accounting for South–South Heterogeneity

To deepen our understanding of how imported intermediate inputs drive structural change, Table 6 presents a more granular analysis by disaggregating the Global South into two distinct categories: the 'Emerging South' and the 'Other South'.

The structure of Table 6 parallels that of Table 3, with Panel A reporting results for intermediate inputs sourced from the Emerging South, and Panel B presenting results for intermediate inputs sourced from the 'Other South'. Starting with Panel A, the OLS estimate for inputs from the Emerging South (Column 1) is positive and statistically significant at conventional levels, indicating that intermediate inputs from these more advanced Global South economies contribute to structural change in Africa. This finding remains robust after correcting for potential endogeneity in Columns 2 and 3, underscoring the effect of these imports on structural change.

**TABLE 6** | The structural change and intermediates from Emerging and 'Other' South.

| | OLS | 2SLS (2nd Stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Intermediate from Emerging South (log) | 0.505*** | 0.720*** | 0.729*** |
| | (0.0550) | (0.0789) | (0.0877) |
| Constant | −4.586*** | −4.622*** | −4.620*** |
| | (0.987) | (0.980) | (0.983) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.564 | 0.560 | 0.560 |
| **Panel B** | | | |
| Intermediate from other South (log) | 0.406*** | 1.940*** | 2.080*** |
| | (0.0993) | (0.351) | (0.438) |
| Constant | −5.178*** | −6.900*** | −7.052*** |
| | (1.056) | (1.153) | (1.200) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.557 | 0.099 | 0.010 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

Table A10 in the appendix reports the results of the first-stage IV regression.

Turning to Panel B, both the OLS and IV estimates of intermediate inputs from the 'Other South', which comprises less industrially advanced and relatively low-income countries compared to the Emerging South, also show positive and highly significant coefficients at the 1% level. This suggests that the structural change benefits of South–South intermediate trade are not confined to major emerging economies. Instead, these relatively less developed Southern economies, through the cost advantages of their inputs, play a central role in Africa's structural change.

A closer look at the results also reveals striking evidence: the IV coefficients of intermediate input from 'Other South' are consistently and considerably higher—more than double—those observed for the Emerging South. At first glance, this finding may seem counterintuitive as conventional wisdom would rather suggest that imports from technologically superior economies, such as those from the Emerging South, should yield greater



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productivity gains and transformative effects. The evidence points to a different underlying mechanism. Inputs from the Other South are less likely to be high-tech or premium-quality but are more likely to be labour-intensive and low-cost—attributes that align better with the production capacities and absorptive capabilities of many African firms. Thus, the impact of these imports on structural change appears to be driven more by affordability and accessibility than by technology intensity. This underscores the importance of technological congruence, cost-effectiveness and contextual relevance—characteristics that often define trade with the broader, less-industrialised Global South.

### 4.6 | Imported Intermediate, Absorptive Capacity and Structural Change

Table 7 presents estimates from an extended empirical specification that incorporates interaction terms between absorptive capacity and imported intermediate inputs. This table parallels the structure of Table 4, ensuring consistency and comparability across specifications. As in Section 4.3, absorptive capacity is instrumented using its lagged values, whereas the trade variables—intermediate input imports—are instrumented using their predicted values as outlined in Section 3.

Panel A examines the interaction between total imported intermediate inputs and absorptive capacity. The linear term for imported intermediates remains positive and statistically significant across all specifications, reinforcing prior evidence that intermediate imports play a meaningful role in advancing structural change. However, contrary to theoretical expectations, the interaction term between total intermediate inputs and absorptive capacity is consistently negative and statistically significant. This surprising result suggests that the structural change benefits of imported intermediate input may actually diminish with higher levels of domestic absorptive capacity, raising important questions about the complementarity—or a lack thereof—between local technological capabilities and the nature of imported intermediates.

Panel B disaggregates the analysis by input origin, focusing on intermediate imports from the Global North. The linear term for these Northern-sourced inputs remains robustly positive and statistically significant across all specifications, consistent with the view that intermediate inputs from advanced economies carry embedded technological advantages or quality standards that support structural change. However, the interaction term with absorptive capacity is statistically insignificant at all conventional levels across all specifications. This suggests that, in contrast to imported capital inputs, although these intermediated inputs from the Global North may positively drive structural change, their effectiveness is less dependent on local technological capabilities.

This finding diverges from theoretical expectations. It also differs from the empirical patterns associated with capital imports (as presented in Table 4), which exhibit a positive and statistically significant interaction with absorptive capacity. This contrast invites a deeper interrogation of the mechanisms through which different types of imported inputs interact with domestic capabilities. One plausible explanation lies in the technological characteristics and knowledge intensity of the inputs. Capital goods from the North, such as precision machinery and industrial equipment, are typically more complex and often embody tacit knowledge. Their deployment requires skilled labour, sophisticated organisational routines and learning-by-doing processes—precisely the domains enhanced by strong absorptive capacity. Hence, in contexts where absorptive capabilities are well developed, capital goods imports are more effectively transformed into productivity gains and structural deepening.

Intermediate inputs, by contrast, often exhibit a more codified and standardised nature. They may consist of raw materials, semi-processed components, or off-the-shelf inputs that integrate into production processes with limited customization or organisational learning. Even when sourced from technologically advanced economies, their integration into production processes may occur through arm's-length, transactional relationships with limited knowledge and technological spillovers. The complementarity between imported capital and domestic capabilities is also structurally more robust than for intermediate inputs. Capital goods often entail long-term relationships with suppliers, post-sale services, training and embedded support structures, which amplify the role of local absorptive capacity in maximising their use. For these reasons, the returns to absorptive capacity in the context of intermediate goods are less pronounced, explaining the statistically insignificant interaction effect observed in the data.

Panel C shifts the focus to intermediate inputs from the Global South. The linear term remains positive and statistically significant, suggesting that these inputs contribute positively to structural change. However, the interaction term between absorptive capacity and Southern intermediates is negative and statistically significant both for the OLS estimate (Column 1) and IV estimate (Columns 1 and 2). First, this result combined with that of Panel B implies that the negative interaction observed in Panel A is primarily driven by inputs from the Global South, rather than a general feature of all intermediate trade. Second, the result aligns strongly with the pattern observed for capital input in Section 4.1.

Several mechanisms could underlie this outcome. It is possible that more capable firms or countries, equipped with higher absorptive capacity, find little value in inputs that are technologically inferior or incompatible with their evolving production needs irrespective of the cost-advantage we highlighted earleir. In such contexts, reliance on lower-quality intermediates may displace higher-quality or more innovative alternatives, thereby imposing opportunity costs or even constraining more ambitious industrial upgrading efforts. Alternatively, this result could reflect a form of 'capability misalignment', wherein advanced domestic capabilities are underutilised when paired with inputs that offer limited learning potential. This pattern resonates with concerns about the risks of 'low-quality lock-ins' and the limits of South–South trade when technological asymmetries remain wide. Finally, Table A11 in the appendix shows the results when we employ alternative definition of the Global North. The results align with those reported in Table 7, indicating that our findings and conclusion is not driven by how we defined the Global North.



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**TABLE 7** | Imported intermediate, absorptive capacity and structural change.

| | OLS | 2SLS (2nd stage) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A** | | | |
| Total imported Intermediate input (log) | 0.797*** | 1.001*** | 1.069*** |
| | (0.113) | (0.171) | (0.213) |
| Total imported Intermediate input (log) × Absorptive capacity | −0.165** | −0.625*** | −0.614*** |
| | (0.0757) | (0.158) | (0.181) |
| Constant | −5.205*** | −3.619*** | −3.764*** |
| | (1.018) | (1.103) | (1.164) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.581 | 0.558 | 0.556 |
| **Panel B** | | | |
| Intermediate input from North (log) | 0.233*** | 0.171** | 0.120 |
| | (0.0578) | (0.0846) | (0.104) |
| Intermediate input from North (log) × Absorptive capacity | −0.0186 | −0.0842 | −0.0773 |
| | (0.0981) | (0.112) | (0.133) |
| Constant | −4.413*** | −4.008*** | −4.091*** |
| | (0.997) | (0.969) | (1.018) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.528 | 0.528 | 0.527 |
| **Panel C** | | | |
| Intermediate input from South (log) | 0.680*** | 0.882*** | 0.912*** |
| | (0.103) | (0.146) | (0.167) |
| Intermediate input from South (log) × Absorptive capacity | −0.183*** | −0.555*** | −0.537*** |
| | (0.0605) | (0.132) | (0.147) |
| Constant | −4.904*** | −3.731*** | −3.833*** |
| | (0.966) | (1.002) | (1.023) |
| Controls | YES | YES | YES |
| Region FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| Observations | 1127 | 1077 | 1077 |
| *R*-squared | 0.596 | 0.572 | 0.572 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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## 5 | Conclusion

The predominant narrative in the structural change literature in Africa is that many of the economies have yet to successfully shift a significant share of their resources and labour from low productivity to more productive and dynamic sectors. For this reason, the contribution of structural change to productivity growth in Africa has been weak and moderate at best. The pursuit of growth-enhancing structural change, therefore, remains a central focus of economic policy across Africa, as it is widely recognised as a key driver of long-term economic development. This paper contributes to the growing literature on Africa's structural change by offering a nuanced analysis of the role played by North–South and South–South trade, with a particular focus on imported capital and intermediate inputs. Uniquely, the study foregrounds two critical sources of heterogeneity that shape the transformative potential of these imports: the geographic origin of the imported inputs and the absorptive capacity of the recipient economy.

The empirical analysis relies on a panel dataset covering 52 African countries over the period 2000 to 2022 and implements a two-stage least squares (2SLS) estimation approach, leveraging external instruments that exploit exogenous shocks in trading partners' conditions. The findings show that the structural change effects of imported inputs are not uniform but highly contingent upon their technological content, origin and interaction with domestic capabilities. Absorptive capacity is not an unconditional enhancer of trade-induced transformation; its catalytic effect is input-specific and origin-dependent. Capital goods from the Global North offer the most promise when matched with strong domestic capabilities. However, intermediate inputs from the Global North deliver gains irrespective of capability levels. While imported inputs from the Global South may yield "appropriate-technology" and "cost-driven benefits", their value diminishes or even reverses as domestic capabilities rise, reflecting a capability-input mismatch.

Together, these findings suggest that absorptive capacity is not a uniform driver of structural change through trade, but a selective amplifier—most powerful when aligned with the technological depth and functional characteristics of the imported input. The findings call into question the notion that enhancing absorptive capacity is universally beneficial. Rather, absorptive capacity must be strategically matched to the technological profile of input sources to be effective. For policy, this means going beyond general capability-building to include nuanced interventions such as technology screening, targeted supplier upgrading and trade partner diversification. Without such matching, countries risk building capabilities that are underutilised or misaligned, thereby squandering scarce developmental resources.

Finally, although our study offers new insights, it also opens several avenues for future research. We highlight four. Firstly, future studies can delve deeper into the co-evolution of absorptive capacity and imported inputs from the Global South. Here, future work could specifically explore dynamic complementarities, assessing whether early-stage gains from low-tech imports later inhibit upgrading or facilitate transitions to higher-value networks. Secondly, beyond origin, there is a need for a more granular classification of imported inputs to help identify which product categories offer the most scope for learning and upgrading. Thirdly, firm-level case studies could complement this macro-quantitative work by uncovering the micro-dynamics of learning and integration, such as how firms choose between suppliers and how organisational routines evolve in response to different types of inputs. Finally, future studies can also explore how other dimensions of technological capability such as innovation systems and infrastructures and university-industry linkages mediate the effects of imported inputs on structural change.


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The authors have nothing to report.


### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

Data available upon request.

### Endnotes

[1] Furthermore, the influx of imported capital and intermediates endows countries with technologies and vital components or raw materials, potentially unavailable domestically or more economically sourced abroad. As noted by Ndubuisi et al. (2020), even where these resources are domestically available, it could be of lower quality or is available at a noncompetitive price relative to the foreign counterpart. Hence, access to foreign and domestic alternatives allows a firm a wider variety to choose from based on observed and unobserved cost differences (Ndubuisi et al. 2020, 5).

[2] Basile et al. (2011, 21) introduced the concept of relational proximity in knowledge spillovers and assimilation, which enables countries acquiring technologies to leverage new knowledge irrespective of their absorptive capacity. Relational proximity refers to the likeness between two areas in shared behavioural codes, cultural norms, and technological proficiencies. This proximity fosters cooperative learning mechanisms that drive the accumulation of knowledge.

[3] Due to greater technological proximity, similar endowments, and shared consumption patterns, South–South exchanges may offer a more compatible learning curve for African firms.

[4] This particularly occurs through mechanisms, such as learning-by-doing, increasing returns to scale, and knowledge spillovers.

[5] Economic growth—particularly when driven by commodity exports or unsustainable capital inflows—may not translate into long-term development unless it is accompanied by a shift in the composition of economic activity toward higher-productivity sectors such as manufacturing and modern services. This particularly is the case in many African countries: they are experiencing "growth without transformation"—a pattern that is economically fragile and socially limiting.

[6] These technologies often align better with the operational conditions of small and medium-sized firms, informal producers, and nascent manufacturing sectors, thus lowering the entry barriers to industrial upgrading and process innovation. Moreover, South–South trade relationships are frequently embedded in development cooperation frameworks, technical assistance, or concessional finance, further enhancing their developmental relevance.

[7] For Patent, we maximised the observation by replacing missing with zeroes.

[8] Principal Component Analysis (PCA) is a robust dimensionality-reduction technique that helps to transform the underlying set of indicators into a smaller set of linear factors as well as allows us to



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extract the most significant patterns in the data without losing critical information.

[9] Note that we estimate separate equations for capital and intermediate goods and then aggregate the predicted values across the different origins of import (i.e., global north or south). In this way, the instruments employed in the 2SLS vary across imported good types and origins. Table 1 shows the results for total imported capital and intermediate—that is, when we do not restrict the sample to South–South or South–North trade. However, the unreported gravity models for these restricted samples strictly follow the approach we discuss here. The results are available upon request.

[10] We compute the preference similarity as the ratio of importer per capita income to exporter per capita income. Institutional similarity is the ratio of importer institutional quality to exporter institutional quality. It suffices noting that constructing these variables this way expunges our instruments breaking down since country-level institutional quality and income could also be a predictor of structural change.

[11] In this scenario, absorptive capacity does not complement the imported input but instead exposes its limitations, thereby lowering its marginal contribution.

[12] This particularly makes them a more effective driver of structural change, especially for reallocation to labour-intensive manufacturing, agro-processing, and light industries that largely reflects the current stage of African industrial development.

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## Appendix

**TABLE A1** | Country group.

**Panel A: Global North—preferred definition**
USA, Finland, Japan, Norway, United Kingdom, Denmark, New Zealand, Germany, Sweden, Australia, Luxembourg, Belgium, Netherlands, Spain, Austria, Portugal, Greece, Canada, Switzerland, Iceland, Italy, France, Israel

**Panel B. Global North [2]—alternative definition for robustness**
Israel, Slovakia, Iceland, Canada, Italy, Hungary, Switzerland, United Kingdom, Slovenia, Luxembourg, Belgium, Australia, Finland, Rep. of Korea, New Zealand, Norway, Netherlands, Czechia, Chile, Austria, USA, Denmark, Greece, Poland, Portugal, Spain, Japan, Estonia, Germany, France, Ireland, Sweden

**Panel C: Global North [3]—alternative definition for robustness**
Cyprus, United Kingdom, Luxembourg, Spain, San Marino, Malta, Japan, Germany, Czechia, Denmark, Chile, Netherlands, Lithuania, Singapore, Slovakia, Poland, Slovenia, Rep. of Korea, Iceland, Australia, Hungary, Norway, Belgium, Israel, Switzerland, Latvia, Sweden, Portugal, Canada, China, Hong Kong SAR, Greece, Austria, Italy, Ireland, Estonia, France, New Zealand, Finland, USA

**Panel D: Emerging South—preferred definition**
Slovakia, Malaysia, Poland, Pakistan, Brazil, Indonesia, Chile, Peru, Guatemala, Jordan, Armenia, Hungary, Latvia, China, Oman, Bolivia, China, Hong Kong SAR, Kazakhstan, Ecuador, Türkiye, Viet Nam, Thailand, Cyprus, Estonia, Singapore, India, Uruguay, Dominican Rep., Venezuela, Azerbaijan, Lithuania, Egypt, Rep. of Korea, Ukraine, Syria, Costa Rica, Bulgaria, Russian Federation, Tunisia, Morocco, Czechia, Slovenia, Paraguay, Croatia, Mexico, Colombia, South Africa

*Source:* Demir and Duan (2018) and Demir and Razmi (2022).

**TABLE A2** | Data sources.

| Distance | CEPII |
|---|---|
| Contiguity | CEPII |
| Colonial relationship | CEPII |
| Common language | CEPII |
| Common coloniser | CEPII |
| Area | CEPII |
| GDP | UNCTAD |
| Financial globalisation | KOF Globalisation Index (Gygli et al. 2019; Dreher 2006) |
| Exchange rate | World Bank Development Indicator (WDI) |
| Urban population share | World Bank Development Indicator (WDI) |
| GDP per capita | World Bank Development Indicator (WDI) |
| Patent | World Development Indicator |
| Scientific and Technical Journal | World Development Indicator |
| Human capital | UNCTAD |
| Mobile Broadband | World Bank Development Indicator (WDI) |
| Absorptive capacity | Authors' computation based on data from UNCTAD and WDI |
| Institution similarity | Authors' computation based on data from UNCTAD |
| Preference similarity | Authors' computation based on data from UNCTAD |
| Remoteness | Authors' computation based on data from CEPII and UNCTAD |
| Imported capital import | Authors' computation based on data from BACI-CEPII |
| Imported Intermediate | Authors' computation based on data from BACI-CEPII |
| Initial industry structure | Authors' computation based on data from UNCTAD |



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**TABLE A3** | Correlation matrix of main variables.

| | Structural change | Capital (Total) | Capital (North) | Capital (South) | Capital (Emerging South) | Capital (Other South) | Intermediate (Total) | Intermediate (North) | Intermediate (South) | Intermediate (Emerging South) | Intermediate (Other South) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Structural change | 1.000 | | | | | | | | | | |
| Capital (Total) | 0.146 | 1.000 | | | | | | | | | |
| Capital (North) | 0.087 | 0.948 | 1.000 | | | | | | | | |
| Capital (South) | 0.157 | 0.956 | 0.832 | 1.000 | | | | | | | |
| Capital (Emerging South) | 0.139 | 0.948 | 0.831 | 0.985 | 1.000 | | | | | | |
| Capital (Other South) | 0.099 | 0.831 | 0.745 | 0.871 | 0.799 | 1.000 | | | | | |
| Intermediate (Total) | 0.168 | 0.904 | 0.858 | 0.866 | 0.875 | 0.754 | 1.000 | | | | |
| Intermediate (North) | 0.116 | 0.875 | 0.928 | 0.763 | 0.764 | 0.700 | 0.916 | 1.000 | | | |
| Intermediate (South) | 0.160 | 0.861 | 0.777 | 0.870 | 0.883 | 0.756 | 0.974 | 0.819 | 1.000 | | |
| Intermediate (Emerging South) | 0.149 | 0.856 | 0.756 | 0.876 | 0.892 | 0.736 | 0.954 | 0.789 | 0.983 | 1.000 | |
| Intermediate (Other South) | 0.096 | 0.808 | 0.776 | 0.788 | 0.789 | 0.760 | 0.922 | 0.832 | 0.930 | 0.859 | 1.000 |



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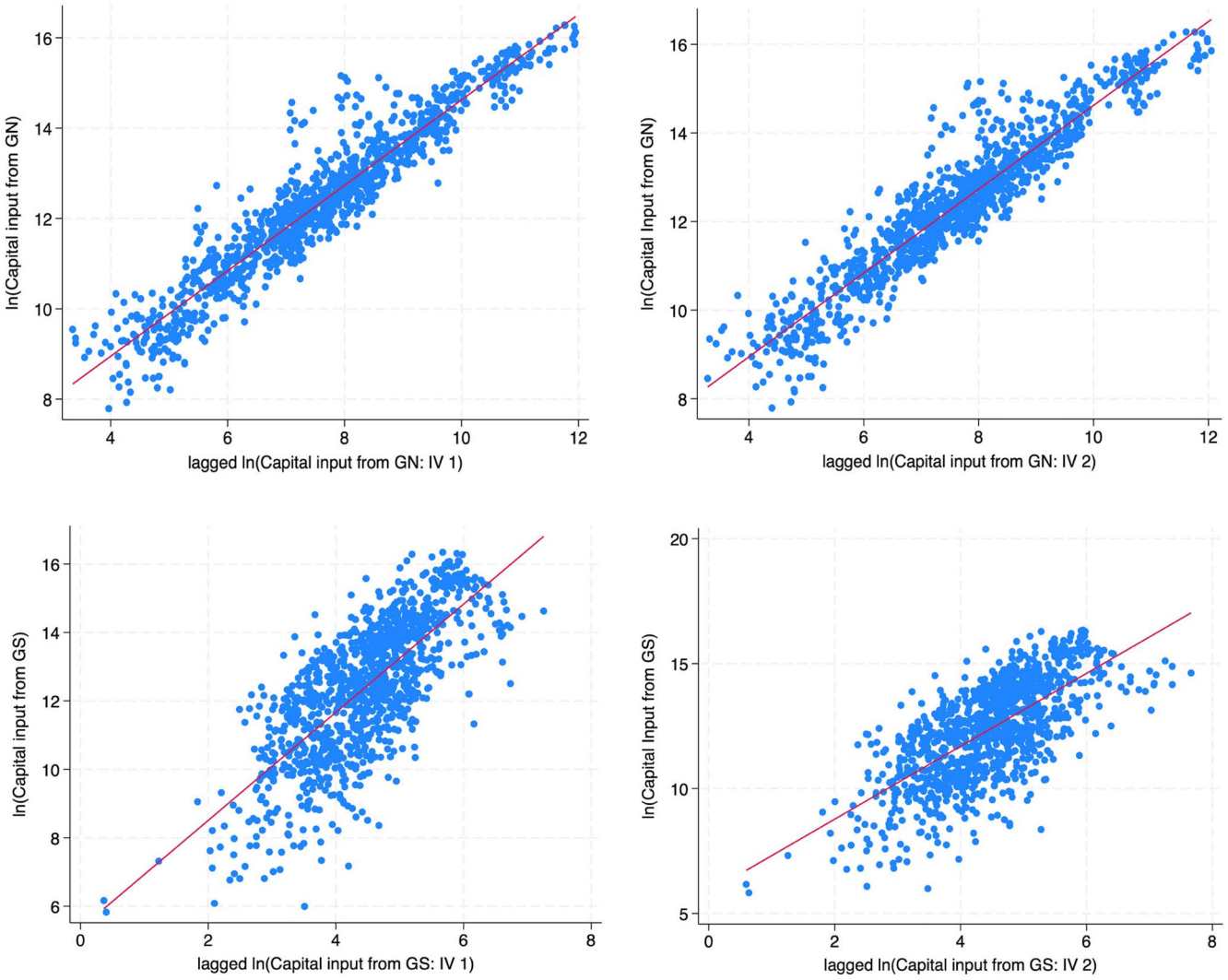


**FIGURE A1** | Capital inputs vs. capital inputs IV, by origin. IV 1 is based on a variant of columns 3 and 7 as reported in Table 1, whereas IV 2 is based on a variant of columns 4 and 8. GN means Global North while GS means Global South. [Colour figure can be viewed at wileyonlinelibrary.com]



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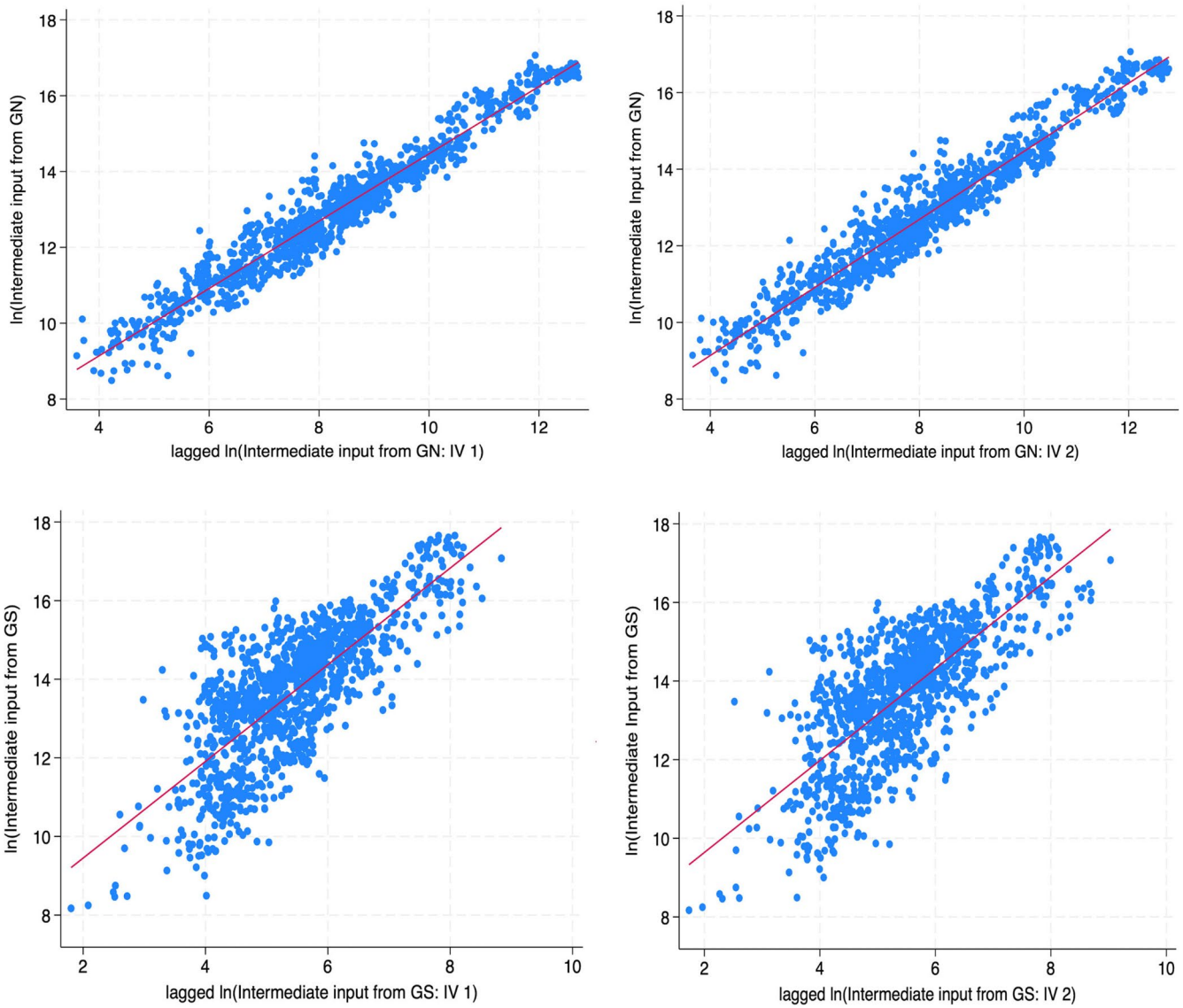


**FIGURE A2** | Intermediate inputs versus Intermediate inputs IV, by origin. IV 1 is based on a variant of columns 3 and 7 as reported in Table 1, whereas IV 2 is based on a variant of columns 4 and 8. GN means Global North while GS means Global South. [Colour figure can be viewed at wileyonlinelibrary.com]



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**TABLE A4** | Drivers of imported capital from the Global North and South—first stage.

| | IV 1 | IV 2 |
|---|---|---|
| | (1) | (2) |
| **Panel A** | | |
| Instrument: Total imported capital (lag) | 0.661*** | 0.199* |
| | (0.054) | (0.040) |
| Constant | −0.428 | −4.582*** |
| | (0.332) | (1.077) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 147.762 | 96.278 |
| Cragg-Donald Wald F statistic | 242.069 | 148.368 |
| **Panel B** | | |
| Instrument: Imported capital from North (lag) | 0.866*** | 0.838*** |
| | (0.032) | (0.032) |
| Constant | 3.952*** | 3.617*** |
| | (0.34) | (0.345) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 699.5 | 658.071 |
| Cragg-Donald Wald *F* statistic | 935.3 | 783.613 |
| **Panel C** | | |
| Instrument: Imported capital from South (lag) | 0.713*** | 0.565*** |
| | (0.057) | (0.053) |
| Constant | −2.063*** | −2.390*** |
| | (0.426) | (0.426) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 151.618 | 111.995 |
| Cragg-Donald Wald *F* statistic | 211.176 | 153.256 |

*Note:* The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. Robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A5** | Imported capital and structural change—alternative definition of global north.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Capital input from North (log) [2] | 0.0496 | | | |
| | (0.0358) | | | |
| Capital input from South (log) [2] | | 0.171*** | | |
| | | (0.0423) | | |
| Capital input from North (log) [3] | | | 0.0409 | |
| | | | (0.0368) | |
| Capital input from South (log) [3] | | | | 0.170*** |
| | | | | (0.0444) |
| Constant | −4.660*** | −4.260*** | −4.677*** | −4.245*** |
| | (1.048) | (1.024) | (1.053) | (1.018) |
| Controls | YES | YES | YES | YES |
| Region FE | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES |
| Observations | 1127 | 1127 | 1127 | 1127 |
| *R*-squared | 0.523 | 0.529 | 0.523 | 0.529 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A6** | Drivers of imported capital from the Emerging South vs "Other" South—first stage.

| | IV 1 | IV 2 |
|---|---|---|
| | (1) | (2) |
| **Panel A** | | |
| Instrument: capital input from Emerging South (lag) | 0.895*** | 0.747*** |
| | (0.053) | (0.053) |
| Constant | −0.305 | −1.060** |
| | (0.4788) | (0.486) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk F statistic | 283.269 | 196.382 |
| Cragg-Donald Wald F statistic | 367.054 | 267.653 |
| **Panel B** | | |
| Instrument: capital input from 'Other' South (lag) | 0.547*** | 0.490** |
| | (0.056) | (0.053) |
| Constant | −3.361*** | −3.475*** |
| | (0.533) | (0.535) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| # Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 93.545 | 83.276 |
| Cragg-Donald Wald *F* statistic | 120.6 | 103.64 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A7** | Imported capital, absorptive capacity and structural change: Alternative Global North Definition.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Capital input from North (log) [2] | 0.123*** | | | |
| | (0.0372) | | | |
| Capital input from North (log) [2] × Absorptive capacity | 0.380*** | | | |
| | (0.0808) | | | |
| Capital input from South (log) [2] | | 0.151*** | | |
| | | (0.0427) | | |
| Capital input from South (log) [2] × Absorptive capacity | | −0.0865 | | |
| | | (0.0530) | | |
| Capital input from North (log) [3] | | | 0.115*** | |
| | | | (0.0387) | |
| Capital input from North (log) [3] × Absorptive capacity | | | 0.383*** | |
| | | | (0.0808) | |
| Capital input from South (log) [3] | | | | 0.150*** |
| | | | | (0.0447) |
| Capital input from South (log) [3] × Absorptive capacity | | | | −0.0916* |
| | | | | (0.0498) |
| Constant | −6.246*** | −4.009*** | −6.277*** | −3.990*** |
| | (1.041) | (0.988) | (1.048) | (0.982) |
| Controls | YES | YES | YES | YES |
| Region FE | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES |
| Observations | 1127 | 1127 | 1127 | 1127 |
| *R*-squared | 0.531 | 0.530 | 0.531 | 0.531 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A8** | Drivers of imported intermediates: Global North vs Global South—first stage.

| | IV 1 | IV 2 |
|---|---|---|
| | (1) | (2) |
| **Panel A** | | |
| Instrument: total imported intermediate (lag) | 0.511*** | 0.374*** |
| | (0.0413) | (0.04) |
| Constant | 2.0619*** | 1.828*** |
| | (0.259) | (0.265) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 152.734 | 87.641 |
| Cragg-Donald Wald *F* statistic | 289.632 | 176.784 |
| **Panel B** | | |
| Instrument: intermediate input from North (lag) | 0.247*** | 0.197*** |
| | (0.074) | (0.09) |
| Constant | −4.524*** | −4.578*** |
| | (1.058) | (1.084) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk F statistic | 1019.683 | 908.868 |
| Cragg-Donald Wald F statistic | 1444.286 | 1216.388 |
| **Panel C** | | |
| Instrument: intermediate input from South (lag) | 0.547*** | 0.435*** |
| | (0.048) | (0.046) |
| Constant | 1.722*** | 1.548029 *** |
| | (0.352) | (0.358) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 126 | 88.67 |
| Cragg-Donald Wald *F* statistic | 250.673 | 177.44 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A9** | Imported intermediate and structural change—alternative definition of global north.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Intermediate input from North (log) [2] | 0.286*** | | | |
| | (0.0564) | | | |
| Intermediate input from South (log) [2] | | 0.714*** | | |
| | | (0.107) | | |
| Intermediate input from North (log) [3] | | | 0.415*** | |
| | | | (0.0568) | |
| Intermediate input from South (log) [3] | | | | 0.687*** |
| | | | | (0.106) |
| Constant | −4.434*** | −5.663*** | −4.460*** | −5.561*** |
| | (1.043) | (1.042) | (1.040) | (1.040) |
| Controls | YES | YES | YES | YES |
| Region FE | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES |
| Observations | 1127 | 1127 | 1127 | 1127 |
| *R*-squared | 0.531 | 0.592 | 0.538 | 0.588 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A10** | Drivers of imported intermediates from the Emerging South and "Other" South—first stage.

| | IV 1 | IV 2 |
|---|---|---|
| | (1) | (2) |
| **Panel A** | | |
| Instrument: Intermediate input from the Emerging South (lag) | 0.734*** | 0.658*** |
| | (0.043) | (0.044) |
| Constant | 1.968*** | 1.616*** |
| | (0.34) | (0.348) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk F statistic | 282.683 | 218.605 |
| Cragg-Donald Wald F statistic | 571.271 | 454.155 |
| **Panel B** | | |
| Instrument: Intermediate input from 'Other' South (lag) | 0.285*** | 0.223*** |
| | (0.046) | (0.0429) |
| Constant | 1.178** | 1.120** |
| | (0.442) | (0.483) |
| Controls | YES | YES |
| Region FE | YES | YES |
| Year FE | YES | YES |
| #Observation | 1077 | 1077 |
| Kleibergen-Paap Wald rk *F* statistic | 37.948 | 26.99 |
| Cragg-Donald Wald *F* statistic | 45 | 31.165 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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**TABLE A11** | Imported intermediate, absorptive capacity and structural change: Alternative Global North definition.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Intermediate input from North (log) [2] | 0.274*** | | | |
| | (0.0594) | | | |
| Intermediate input from North (log) [2] × Absorptive capacity | −0.0511 | | | |
| | (0.0992) | | | |
| Intermediate input from South (log) [2] | | 0.680*** | | |
| | | (0.103) | | |
| Intermediate input from South (log) [2] × Absorptive capacity | | −0.179*** | | |
| | | (0.0598) | | |
| Intermediate input from North (log) [3] | | | 0.401*** | |
| | | | (0.0594) | |
| Intermediate input from North (log) [3] × Absorptive capacity | | | −0.0585 | |
| | | | (0.0988) | |
| Intermediate input from South (log) [3] | | | | 0.653*** |
| | | | | (0.103) |
| Intermediate input from South (log) [3] × Absorptive capacity | | | | −0.173*** |
| | | | | (0.0589) |
| Constant | −4.214*** | −5.003*** | −4.210*** | −4.922*** |
| | (0.997) | (0.974) | (0.991) | (0.973) |
| Controls | YES | YES | YES | YES |
| Region FE | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES |
| Observations | 1127 | 1127 | 1127 | 1127 |
| *R*-squared | 0.531 | 0.597 | 0.538 | 0.593 |

*Note:* Robust standard errors in parentheses. The controls include initial industry structure, absorptive capacity, gross fixed capital formation, financial globalisation, exchange rate, per capita income, mobile broadband and urban population. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.



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