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Working Paper Global value chains and income inequality in Africa

Sustainable Global Supply Chains Discussion Papers, No. 8

Provided in Cooperation with: Research Network Sustainable Global Supply Chains

Suggested Citation: Mumin, Yazeed Abdul; Ali, Williams (2025) : Global value chains and income inequality in Africa, Sustainable Global Supply Chains Discussion Papers, No. 8, Research Network Sustainable Global Supply Chains, Bonn, https://doi.org/10.57671/sgscdp-2508

This Version is available at: https://hdl.handle.net/10419/314434

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Cite as: Abdul Mumin, Yazeed and Williams Ali, 2025. Global Value Chains and Income Inequality in Africa. Sustainable Global Supply Chains Discussion Papers Number 8 Research Network Sustainable Global Supply Chains, www.sustainablesupplychains.org. doi: https://doi.org/10.57671/sgscdp-2508.

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Supported by the



Federal Ministry for Economic Cooperation and Development

The "Research Network Sustainable Global Supply Chains" is supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) and hosted by four organisations:











Global Value Chains and Income Inequality in Africa

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Abstract

Recent technological advances and policy initiatives present Africa with enormous growth potential from participating in global value chains (GVCs). However, the widening income inequality is raising questions as to whether participation in GVCs plays any role in this observed phenomenon. Despite the increased attention on regional and global value chains, and on income inequality in Africa, little attention has been given to investigating the potential nexus between both. This study investigates the impacts of GVC participation on income inequality and the underlying mechanisms in Africa. We applied the instrumental variable (IV) approach to address potential endogeneity between GVC participation and income inequality. We find that participation in GVCs substantially reduces income inequality in Africa, which is largely through increased relative prices of exports, access to improved technologies and economic upgrading.

Acknowledgement

The authors are grateful to the German Institute of Development and Sustainability (IDOS) for funding this paper under the Research Network Sustainable Global Supply Chains Project. We also thank Chahir Zaki (University of Orléans) and Nora Aboushady (IDOS) for the useful comments and support during the drafting of this paper.

1. Introduction

For centuries, Africa has relied heavily on the exports of commodities, often with minimal added value, resulting in lower economic gains from global trade. However, recent technological advances and the fall in trade barriers have led to substantial reduction in transportation and communication costs, increasing the -profitability for foreign firms to offshore tasks across wide geographical locations. Through stages of value addition in a complex network process, termed Global Value Chains (GVCs), intermediate inputs cross several borders until the final point of consumption. This new task-based rather than goods-based trade model, in theory, is expected to foster a "win-win" relationship for countries' participation in GVCs, including those in Africa. Baldwin and Lopez-Gonzalez (2015), for example, argue that while developed economies gain from competitive factor prices and economies of scale, those in developing and emerging economies benefit through their access to knowledge, markets and critical assets (Taglioni & Winkler 2016; Epede & Wang 2022), which create employment and increase income growth (Pahl *et al.* 2022).

The aggregate economic outcomes from participation in GVCs necessitates for deepened and enhanced engagement in GVCs (Kummritz *et al.*, 2017; Calatayud & Barachina 2023). However, the worsening distributional outcomes such as income inequality has led to raising concerns on the anticipated benefits from participating in GVCs. Increasingly, studies find evidence of GVC participation exacerbating income inequalities (Hummels *et al.* 2014; Shen & Silva 2018; Lewandowski *et al.* 2023). Incidentally, this body of evidence has largely focused on Europe (e.g. Baumgarten *et al.*, 2013; Borrs & Knauth 2021), Asia (Pomfret & Sourdin 2014; Wang *et al.*, 2021) and the Americas (Adao *et al.*, 2022; Helpman *et al.* 2017), with little on the African continental level. Even the few studies conducted on Africa (e.g. Obeng *et al.*, 2022) often find mixed and inconclusive evidence.

Furthermore, there is less empirical literature on the disaggregation of GVCs into foreign and domestic value-added¹ components (i.e. backward and forward GVC participation) and their effects on income inequality (Wang, Thangavelu & Lin 2021). In China, Wang, Thangavelu & Lin (2021) report of ambiguous impact of backward GVC participation on

¹ Participation in global value chains by countries are either backward (FVA) or forward participation (DVX). Backward participation represents the share of value added by foreign countries that is used in the exports of a given country whereas the forward participation is the share of domestic value added of the given country used in the exports of other countries.

inequality. Given that Africa's participation in GVCs differ by type and nature of products, it is relevant to gain insights into the extent to which the different components of GVC participation impact income inequality. Specifically, the continent's participation in GVC is predominantly through forward integration because of the raw form of most of its exports (Foster-McGregor *et al.*, 2015; Owusu 2021). This notwithstanding, there are also signs that Africa, in recent years, has made substantial strides in terms of backward participation due to outsourcing of tasks and processes by firms based in developed countries to developing countries (Owusu 2021; COMTRADE/UNSTAT 2023). This study therefore seeks to investigate the impact of GVC and its backward (FVA) and forward (DVX) participation on income inequality as well as the underlying mechanisms.

Theoretically, participation in GVCs is expected to influence income inequality through the productivity, relative-price, and labour-supply mechanisms (Grossman & Rossi-Hansberg 2008). As for the productivity channel, Taglioni & Winkler (2016) argue that GVC participation enhances access to markets, quality inputs and technological know-how which would otherwise be extremely difficult for Africa to access. Low-skilled labour in Africa is expected to increase its productivity through specialization in tasks along GVCs that raise wages and narrow the wage gaps. Indeed, a number of empirical studies find evidence of the productivity enhancing role of GVC participation (Constantinescu *el al*, 2019; Del Prete *et al*, 2017). However, as Bair & Werner (2011) argue, firms may remain stuck on certain tasks to the extent that they partake in lower-level activities because of immense competition at the global level. This can lead to stagnating wages or in some instances cause wage declines which further widen the income gap. The lack of conclusive evidence, particularly from developing countries, calls for further research.

The relative price effect of GVCs as a potential channel for inequality, is reflected in the country's trading position operationalized through its' terms of trade (TOT). When it becomes viable for firms in developed countries to offshore labour-intensive tasks to Africa, the TOT may be altered, which would have implications on the price of labor. An improvement in the TOT of Africa, may raise the wages of low-skilled workers, which has the potential to narrow the wage gap. However, deteriorating TOT arising from participation in GVCs could worsen inequality in the destination country (Helpman 2017). Under conditions where wages respond to labour supply under given TOT, the relative price effects could serve as another channel through which GVCs influence inequality. In developed economies, labour is generally

reabsorbed into other sectors with comparatively higher wages when low-skilled tasks are offshored, and this is predicted to reduce wage gaps (Helpman 2017). To the contrary, however, Slaughter (1997) suggests that by participating in GVCs, low-skilled labour in Africa becomes more substitutable, which could lead to them getting trapped in low wages and hence potentially widen the income inequality gap.

The main novelty of our study lies in our contribution to the comprehension of the underlying mechanisms of the impact of GVC on income inequality. This is particularly relevant given that a number of empirical findings from Africa often appear to be inconsistent with well-established theories on global trade (Carpa et al., 2022; Lopez-Gonzalez *et al.* 2015). Our empirical results show that while *productivity* and *relative price effects* serve as relevant impact mechanisms in driving income inequality, labour *supply* effects appear not to matter in Africa.

The rest of the paper is organized as follows. Section 2 presents a brief overview of the literature to situate our study. The data used and their sources are described in Section 3. Section 4 specifies the econometric models and discusses the identification strategies. In Section 5, we present results of our empirical analysis. Finally, section 6 presents the conclusions.

2. Literature review

In theory, GVC participation involving movement of production tasks and activities can affect labour supply by freeing up labour used to perform the task in the country of origin and using more labour in the destination country, which will affect wages of labour and possibly income inequality in these countries. Also, there is a *technological change effect* when GVC participation leads to changes in access to technology between countries in ways that alter the dynamics in labour-technology engagements in production. For instance, movements of improved technologies from advanced countries to Africa may decrease the relative demand for labour in Africa, which can result in decreasing wages and increase income inequality. This mechanism is described as *labour-supply effects*.

Another effect is through *relative-prices*. In this case, differences in factor availability or abundance between countries can result in specialization and comparative advantages in GVC participation. For most African countries, this abundant factor will be labour. The specialization and GVC participation will result in increased engagement of the abundant factor

(i.e., labour) and also increased relative price of labour-intensive products. In a competitive environment, the increased relative price of labour-intensive products will require price of labour to also increase, which will have consequences on wages and income distribution. Relatedly, the increase in relative price of labour makes it expensive relative to the other factors, which will translate into an increase in the marginal product of labour in a competitive market. This will lead to higher real wage, which can affect income inequality in the country. This is known as *productivity effect*.

Also, upgrading could be another potential channel through which GVCs participation could impact income inequality. GVC participation can lead to imports of intermediate inputs required for transitioning of countries from suppliers of raw material to suppliers of intermediate to high-value products (i.e., economic upgrading). This can result in transitioning of labour use from the lower levels of the chain towards higherups of the chain, which will lead to increased wages of the transitioned workers (Pahl & Timmer 2020; Owusu 2021). However, when GVC integration leads to upgrading, and some workers remain at the same level, then this can affect the wage-earning potential of such workers and thus negatively affecting wage rates.

In spite of these potential pathways, the recent decades have seen increasing attention by scholars not only on the overall economic benefits of GVCs participation, but also on the increasingly uneven distribution of the wealth generated from global trade. Incidentally, rising wage gaps are widespread in both developed and developing economies (Pavcnik 2011; Lee 2021). According to the Hecksher-Ohlin theory, wage gaps are expected to widen when capital replaces low-skilled labour in developed countries who engage in global trade by offshoring low-skill tasks to less developed economies (Leamer 1995). Some evidence suggests that these offshored tasks are taken up by high-skilled labour in developing countries, a situation expected to further widen the wage gap (Lee 2014; Harrison, McLaren & McMillan 2011). However, another body of evidence suggests that productivity growth from technological exchanges and access to better inputs from GVC participation could lead to a rise in the income of low-skilled labour and to reduce the wage gap (Helpman 2017; Carpa & Martinez-Zarzoso 2022).

The lack of conclusive evidence on the relationship between GVCs participation and income inequality has led to two strands of empirical literature: the within country (e.g. Bataka 2024; Coveri *et al.*, 2024; Lang *et. al*, 2023) and the between -country studies (Helpman 2017; Carpa & Martinez-Zarzoso 2022) directed towards gaining insights into these complex

phenomena. Regardless of the level of analysis, the productivity, labour-supply & relative price effects (Helpman et al., 2017), power (Ponte, Baier & Dallas 2023; Lang, Ponte & Vilakazi 2023) and upgrading (Coveri, Paglialunga & Zanfei 2024) are among the widely documented potential channels through which GVCs drive income inequality. The Heckscher-Ohlin (H-O) theory, widely used for explaining this channel, offers an elegant explanation by postulating that a higher rate of return accrues to a factor intensively used by a country conditional on its comparative advantage. According to H-O theory, Africa with comparative advantage in the low-skilled labour, would derive wage premia to the low-skilled workers from participation in offshored tasks from developed economies, thus reducing income inequality (Burstein & Vogel 2017).

GVC participation facilitates sectoral level specialization to drive relative demand for labour in those sectors. Labour supply then responds to the demand shocks based on workeridiosyncratic productivities and wages (Lee 2020). This new analytical approach, termed Roy Selection effects model, offers another explanation for potential GVC participation-induced income inequality compared to the traditional H-O model (Roy 1951). In contrast to the traditional H-O model that assumes monotonicity in the benefits of international trade, a heterogeneous effect model laid by Roy (1951) offers greater explanatory power of some seemingly inconsistent findings from developing economies (Parro 2013; Lee 2020; Lee & Yi 2018). Indeed, if workers were homogeneous in their response, GVC participation would not be expected to cause an increase in income inequality in developing countries, as has been observed in some studies (Burstein & Vogel, 2017).

One widely reported impact of GVC participation is the tendency for African countries to partake in higher value activities along the value chains by learning (Ndubuisi & Owusu 2021; Tian *et al.*, 2021). The process of upgrading could potentially reduce inequality if offshored tasks are taken up by low-skilled workers. It is worth-noting that the different components of GVCs exert qualitatively difference impacts on upgrading (Tian et al., 2021), which could ultimately impact income inequality. Our study shares similarity with Tian et al. (2021) who disaggregate GVCs into its backward and forward components. What separates our study from theirs is that we extend our investigation to include income inequality as an outcome of interest. To clearly delineate the effects of the different potential mechanisms, our study contributes to the literature by attempting to investigate different potential mechanisms for the observed impacts to rule out irrelevant channels in our findings.

3. Data

The data used to construct our variables come from two main sources. The data for the construction of the GVC participation and economic upgrading comes from the UNCTAD-Eora MRIO database. The dataset is available for the periods covering 1990 to 2018. The data covers 26 sectors in 187 countries including African and other developing countries. The nature of the Eora MRIO database makes it easy for the computation of the GVC participation and economic upgrading, and the generation of the network graphs. The second data source is the world development indicators from the World Bank, including data on economic, social, environment and other developmental indicators. The data on the Gini index and other controls as well as the impact mechanisms are available for all countries (refer to Table A1 at the Appendix for the sources).

In this study, we compute indicators of GVCs participation, upgrading and inequality. To compute GVCs participation, we follow the approach by Koopman, Wang & Wei (2011) who disaggregated exports into foreign and domestic added content of a country's exports. We then calculate GVC participation for each country as the sum of the foreign value-added (i.e., backward participation) component of exports (i.e., a country's exports that comprise value-added generated from abroad) and the domestic value-added (i.e., forward participation) component of exports (as the intermediate input in value-added export by other countries) (Koopman et al. 2011; Foster-McGregor et al. 2015). We then calculated global value-added (GVC) as the sum of backward and forward participation.

Using the information from the MRIO matrix, we also compute economic upgrading as the unweighted sum of the percentage changes in world market shares and in the export values of a country over a decade (Bernhardt & Milberg 2011). We use the Gini coefficient as an indicator for income inequality. Although this measure has been criticized for being sensitive to median values relative to extreme values at the tails, its ease of computation and wide applicability across various disciplines makes it an ideal option.

3.1 Stylized facts

Table A2 (see appendix) presents the variable description and measurement as well as the means and standard deviations for Africa. As expected, the mean Gini coefficient is 43.64 which is suggestive of high-income inequality in Africa. Regarding GVC participation, the means of forward participation and the backward participation suggest that Africa's participation in global value chains is essentially one of a forward participation. Table A2 also presents the change in export unit values (XUV) and change in export market shares (XMS) as measures of economic upgrading. In fact, Africa appears to have made substantial gains in changes in export unit value of 82.5% (on average) between 1981 and 2017 than they did in changes in export market share which has only changed by an average of 0.5% between 1993 and 2016.

3.1.1 Africa's GVC participation by region over time

We provide a comparison of GVC participation across regions in Africa for selected years from 1990 to 2018 in Figure 1. Generally, participation in GVCs has increased substantially since the 1990s. Specifically, GVC participation has increased from about 3% in 1990 to over 10% in 2005, and subsequently increased to as high as 29% in 2010 for Central Africa and 28% in 2018 for West Africa. In order to shed some insights in the trend of the two GVC components, we present the backward (FVA) and forward (DVX) participations. In general, there has been an increase in both backward and forward participation in all regions with Southern Africa experiencing the largest increase in backward participation from about 3% in 1990 to 27% in 2018. This is followed by North and East Africa where the backward participation increased from about 4% in 1990 to between 26% and 27%. West Africa had the least change in FVA and this increased from about 4.5% in 1990 to about 24.5% in 2018.



Figure 1: GVC participation over time and region in Africa

Notes: The figure depicts the evolution of global value chain participation over time across the various regions of Africa based on author computation. This is computed as a region's aggregate global value chain participation as a percentage of Africa's aggregate global value chain participation in a given year. GVC denotes Global Value Chain participation, FVA denotes Foreign Value-Added/backward participation and DVX denotes Domestic/Indirect Value-Added/forward participation.

Turning to forward participation, the pattern immediately reverses with the largest increase in indirect valued-added being in West Africa from 3% in 1990 to about 28% in 2018. This is followed by North Africa which witnessed an increase in forward participation from 3% in 1990 to about 26% in 2018. Interestingly, Southern Africa appeared to have the least change between 1990 and 2018 of about 3% to 24%, respectively. The pattern of GVC is similar to that of the forward participation which is mainly because of the fact that Africa's participation in GVCs is largely through this indirect value-added. These are already showing that the extent of involvement along these components of GVC differ by region with the Southern African countries leading in terms of the use of intermediate inputs from other countries in their exports, while the West African countries lead in the exports of intermediate inputs to other countries.

3.1.2 Income inequality and GVC participation in Africa

Figure 2 depicts the association between income inequality and GVC participation (see Figures A1 and A2 at the appendix for the backward and forward participation). The picture shown by the figure suggests there is no definite association between income inequality and GVC participation. South Africa has consistently shown both a high Gini coefficient and a high GVC participation rate between 1990 and 2018. However, countries like Namibia and Central African Republic have shown higher inequality with lower global value chain participation over these years. Similarly, while a country like Algeria has lower inequality and comparatively higher global value chain participation², most of the countries are clustered around low to intermediate inequality and low global value chain participation.



Figure 2: GVC participation and income inequality by country in Africa

Notes: Figure is based on authors' computation, and relates GVC and income inequality (Gini coefficient) of countries in Africa for selected years.

² The high GVC rate of oil and gas-rich countries like Algeria, Libya etc. are likely due to the inclusion of oil and gas in the computation which potentially inflate their GVCs.

The picture from Figure 2 further suggests that there has not been any substantial shift in the association between inequality and GVCs over these years. In Namibia, the figure shows that inequality decreased by about 10%, from about 69% in 1990 to about 59% in 2018, but with no change in the country's GVC participation. Conversely, South Africa experienced a marginal increase in inequality from 60% in 1990 to 63% in 2018 and involvement in GVCs also increased from 33% in 1990 to about 43% in 2018. Algeria witnessed a marginal decrease in inequality from 39% in 1990 to 37% in 2018 and an increase in GVC participation from 22% in 1990 to 32% in 2018.

4. Econometric model

In the literature, the commonly used econometric frameworks for panel data have been the panel fixed effects, differenced Generalized Methods of Moment (GMM), system GMM and the traditional instrumental variable (IV) method (Roodman, 2009; Owusu 2021). However, the panel fixed effect model is prone to biased and inconsistent estimates if GVC participation is endogenous in the model.³ The GMM models, although suitable for dealing with dynamic endogeneity and flexible by allowing for the introduction of more instruments (Roodman, 2009), has some setbacks especially when dealing with country-level data. Specifically, persistent series and high variance of country effects relative to that of transitory shocks are characteristic of country-level panel data (Blundell and Bond, 1998). This can weaken the instruments for the GMM estimator. Also, the quadratic growth in the number of instruments with time in the GMM models makes the estimates inconsistent as the number of instruments becomes too large (Bun & Windmeijer 2010).

Following these, we use the instrumental variable (IV) approach involving a joint estimation of a system of two equations. The first-stage estimates the determinants of global value chain participation in Africa, and the second-stage estimates the impact of global value chain participation on income inequality. The estimated first-stage regression model takes the following form:

$$\ln GVC_{it} = \alpha_0 + \alpha_1 \ln GVC_{it-s} + \alpha_2 X'_{it} + \alpha_3 I_{it} + \tau_i + \gamma_t + \mu_{it}$$
(1)

³ Endogeneity can arise due to omitted variable bias or simultaneity especially when high inequality tends to constrain aggregate demand of the country which can also limit production and the volume or value of participation in GVCs.

where $\ln GVC_{it}$ is the natural log of global value chain participation of country *i* in time *t*, and $\ln GVC_{it-s}$ represent the lags of global value chain participation used to account for dynamic endogeneity, with $s = \{1,2\}$. The X_{it} is a vector of control variables, I_{it} is a vector of instrumental variables for identification, τ denotes country fixed effect, γ represents time fixed effects, μ denotes the error term and the α 's are parameters to be estimated. Following this, we express the second-stage income inequality model as follows:

$$\operatorname{Gini}_{it} = \beta_0 + \beta_1 \operatorname{Gini}_{it-s} + \beta_2 \ln \operatorname{GVC}_{it} + \beta_3 X'_{it} + \tau_i + \gamma_t + \varepsilon_{it}$$
(2)

where Gini_{it} is the Gini coefficient of country *i* in time *t* and denote income inequality whereas Gini_{it-s} is the lags of the Gini coefficient where $s = \{1,2\}$. The β 's are parameters to be estimated, ε is the error term and the rest of the variables are as defined in equation (1). The vector of controls consists of gross domestic product, foreign direct investment, absence of corruption index and inflation. The gross domestic product is used as a measure of the output of the country because the domestic output of a nation is expected to increase the participation of a country in global value chains as well as the wage bill (Anderton, Brenton & Oscarsson 2002). Similarly, foreign direct investment is used to measure the extent of capital flow into a country and this is expected to be positively related to GVC participation, economic upgrading and incomes. The quality of institutions and the general price level of a country are also important in determining the overall progress and economic conditions of the country, and we measure these with the absence of corruption index and inflation, respectively (Anderton et al. 2002; Pahl & Timmer 2020; Owusu 2021).

The next important issue is the potential endogeneity of GVC because increased income and wages of a country can result in increased ability to import from other countries. This can also increase the country's output and export to other countries. Also, endogeneity problem can emanate from omitted variable bias, particularly when past GVC participation and income inequality explain current level of GVC integration and income inequality. We control for this by including the lags of the dependent variables in all specifications to account for this dynamic endogeneity concern, as well as the effects of learning-by-doing on the dependent variables (Owusu 2021). In order to deal with the other endogeneity concern highlighted, we use an instrumental variable method which identification requires the existence of a valid instrument. Following Owusu (2021) we used remoteness index and weighted average GVC participation index of other countries as instruments (i.e., *I*). Intuitively, the remoteness of a country approximates the transactions cost associated with the country's trade and engagements with the rest of the world. That is, countries that are remote from the rest of the world are less likely to trade with the rest of the world compared to countries that are not remote from the rest of the world, *ceteris paribus* (Brun et al. 2005; Owusu 2021). However, the mere distance between countries does not directly affect income inequality within the countries.

Also, drawing from the literature on networks and outsourcing (Goldsmith-Pinkham & Imbens 2013; Grossman & Rossi-Hansberg, 2008), we expect neighboring countries to have their GVC participation highly correlated because of the possible learning and imitation of policies and processes. However, these possibilities are expected to be low with increased distance between countries. Similarly, trade-related transaction costs between countries increase with distance. Thus, the use of the remoteness ensures that the effect of the weighted GVC decays with increased distance between countries (Owusu 2021). However, we argue that the weighted GVC participation of other countries does not directly affect income inequality of the country, except through the country's involvement in global value chains.

The construction of the remoteness index requires spatial gravity data that show the distance between a country and the rest of the world, which we extract from the CEPII gravity dataset. We follow the approach of Head (2003) and Owusu (2021) to compute the index using the geographic distance between the capitals of a pair of countries, *i* and *j*, as $\overline{\overline{D}}_{ij}$ = $\sum_{j} \{ (D_{ij} / \sum_{j} D_{ij}) \}$, where $\overline{\overline{D}}_{ij}$ denotes remoteness index, and D_{ij} is the distance in kilometers between the capitals of countries i and j. Unlike these previous studies which weight the remoteness index with the GDP of the country, we use just the geographic distance because of the potential direct correlation between a country's GDP and incomes. The other instrument (i.e., the weighted GVC participation of other countries) is computed as $WGVC_{it}$ = $\sum_{j} GVC_{jt} / D_{ij}$, where $WGVC_{it}$ is the weighted GVC participation of country *i* in time *t*, GVC_{jt} is the GVC participation of other countries j and D_{ij} is the distance between countries i and jin kilometers. Specifically, GVC_{jt} is the global value chain participation of all countries, j, that country *i* has any global value chain relationship with, which is weighted by the geographic distance between countries *i* and *j*. This measure implies that countries *j*, that are closer to *i* in distance will have larger value of the weighted GVC participation, all things being equal, than countries that are far from *i* in distance.

5. Empirical Results

5.1 Inequality and Global Value Chains

This section presents results and discussion of the impact of GVC participation on income inequality based on equation (2). We first conduct tests to ascertain the optimal lag order of the dependent variable to be included as an independent variable to account for potential dynamic endogeneity concerns. The results are reported in Table A3 in the appendix. The Hansen *J*-statistic and the associated *p*-values show that whereas using one-lag can possibly result in instrumental variable inefficiency (i.e., *p*-value <0.05), using at least two-lags results in a higher *p*-value, indicating that the instruments are likely valid. Table A3 also presents the Bayesian (MBIC), Akaike (MAIC) and Quantile (MQIC) information criteria. Whereas the values of the MBIC and MQIC are the lowest for the lag-one, the lowest for lag-two is the MAIC. Thus, considering that both the *J*-statistics of instrument efficiency and the MAIC are in favour of the two-lags, we estimated the two-lag models in all our specifications. However, the cross-sectional dependence (CD) test statistic suggests strong cross-sectional dependence (among countries) in the panel, which are corrected for using clustered-robust standard errors in all specifications.

Table 1 presents the estimates of the impact of GVC participation on income inequality. Column 1 presents results of a panel fixed-effects model which shows a statistically insignificant effect of GVC participation on income inequality in Africa. However, this specification does not account for the potential endogeneity of the GVC variable in the model. To explicitly account for this, we estimate the Instrumental variable (IV) 2SLS model, whose results are reported in columns (2-5). The first-stage estimates reported in Table A4 at the appendix shows that the instruments are significantly correlated with the endogenous GVC participation variable, satisfying the relevance criterion of a valid instruments. The *F*-statistic of the first-stage regression (i.e., Weak ID *F*-test at the bottom of columns (2-5) in Table 2) are all statistically significant at 1% level, suggesting a rejection of null hypothesis of the presence of weak instruments. Columns (2-5) of Table 1 further reports the Hansen-*J* test of overidentification and the *p*-values show statistically insignificant test results. This suggests exogeneity of the instruments, which implies that they are not correlated with the error term in the income inequality model.

Turning to the results in column (2), participation in GVCs significantly reduces income inequality at the 1% level. Specifically, a percentage increase in GVC participation reduces income inequality by about 0.156 percent. This suggests that involvement in GVCs can act as

a catalyst in improving income distribution among African countries. The theoretical underpinning of these empirical results are that participation in GVCs may lead to improvements in worker benefits and conditions (Barrientos, Gereffi & Rossi 2012), and could represent a trajectory towards higher-value activities (Gereffi 2019). The rationale is that participation in GVCs can increase countries' upgrading along the value chains towards high value productions. Through upgrading in their engagement in GVCs, low-skilled workers can transition to participate in higher value activities. This increases their productivity and income growth, and thus, reduces the wage and income gap. These results are consistent with findings from related studies who report that participation in global value chains increases income for all actors and contributes to increased income growth and poverty reduction in developing countries (Bassett, Kone & Munro 2022). As rightly pointed by Grossman and Rossi-Hansberg (2008), GVC participation can potentially increase productivity of low-skilled labour which decreases wage gap between them and their high-skilled counterparts in the destination country.

Gini	Panel Fixed Effects	IV-2SLS	IV-2SLS with Panel Fixed(2)(3) 1.636^{***} 1.635^{***} (0.024) (0.024) -0.696^{***} -0.696^{***} (0.024) (0.024) -0.160^{***} (0.057) -0.164^{***} (0.058) 0.098 0.077 (0.158) (0.153)			
	(1)	(2)	(3)	(4)		
Gini _{t-1}	1.632***	1.636***	1.635***	1.635***		
	(0.023)	(0.024)	(0.024)	(0.024)		
Gini _{t-2}	-0.691****	-0.696***	-0.696***	-0.695***		
	(0.023)	(0.024)	(0.024)	(0.024)		
lnGVC	0.048	-0.160***				
	(0.063)	(0.057)				
lnFVA			-0.164***			
			(0.058)			
lnDVX				-0.158***		
				(0.056)		
lnGDP	-0.100	0.098	0.077	0.107		
	(0.136)	(0.158)	(0.153)	(0.161)		
lnFDI	0.033**	0.029^{*}	0.031^{*}	0.028		
	(0.017)	(0.017)	(0.018)	(0.017)		
lnACI	-0.097	-0.084	-0.091	-0.079		
	(0.114)	(0.123)	(0.124)	(0.123)		
Inflation	1.03E-05	3.90E-05	6.20E-05	3.19E-05		
	(1.03E-04)	(1.28E-04)	(1.28E-04)	(1.29E-04)		
Constant	3.025**	3.874^{***}	3.975***	3.682^{***}		
	(1.215)	(1.056)	(1.054)	(1.062)		
Fixed Effects	Yes	Yes	Yes	Yes		
Ν	1044	979	979	979		
Adjusted R-squared	0.994	0.986	0.987	0.987		
Weak ID F-test	1002.42^{***}	521.79***	437.94***	507.45***		
Hansen-J test (p-value)		0.231	0.229	0.224		

Table 1. Global value chain participation and income inequality in Africa

Notes: Table is based on authors' computation and presents estimates of the effect of global value chain participation on income inequality. FVA denotes Foreign Value Added/Backward participation; DVX is Domestic/Indirect Value Added/Forward participation; IV-2SLS is Instrumental Variable Two Stage Least Squares. *N* denotes number of observations. The "***", "**" and "*" denote significance at 1%, 5% and 10

In columns (4) and (5) of Table 1, we decompose the GVCs into the backward participation and forward participation. Both columns show that Africa tends to benefit from the two levels of integration. Specifically, estimates in column (4) shows that a percentage increase in the share of foreign value added in a country's export of the same item (i.e., backward participation) significantly decreases income inequality by 0.162 percent. This implies that backward participation can enhance African countries' abilities to operate at a relatively higher level of value addition through access to and use of value-added products from other countries in their exports. This relates to the productivity effect discussed in the literature review where access to foreign inputs increases both productivity and marginal product of labour, enabling firms and countries to increase participation in GVCs.

For instance, in recent years there has been technology transfers into Africa, which is contributing to structural transformation, development of regional value chains (RVCs) and enhancing effective GVC integration (AFREXIMBANK 2023). This can contribute to labour transitioning from primary products to intermediate and products, thereby increasing their productivity and incomes. Also, being able to produce at such upgraded levels for export may lead to increased value of the country's export which will subsequently result in improvements in the country's terms of trade. All these will have substantial implication on increasing wages and reducing wage gaps in the country.

Similarly, column (5) shows that an increase in the share of domestic value added in the exports of other countries (i.e., forward participation) also decreases income inequality by 0.156. Unlike the backward participation, the observed result here is in line with the generally held view that for Africa to develop, it must also be able to export some value-added products. Thus, the result implies that when Africa is able to add value domestically to its exports, it can lead to increased gains from GVC integration. These gains can also be through increased terms of trade, foreign reserves and investments, and functional upgrade within the value chain. These investments and upgrading can lead to increased employment, labour productivity and consequently increased wages.

5.2 Impact mechanisms of the GVC participation

Our theoretical framework shows that GVCs can affect income inequality through four potential pathways. These are through *labour-supply effect* where GVC integration leads to movement of job tasks across countries which drives the level of employment; *productivity effect* associated with increased returns when GVC involvement leads to increased (decreased)

efficiency (cost) in production; *relative price effect* where trade in tasks and products based on comparative advantages between countries lead to welfare gains through improvements in the terms of trade; and *technological and upgrading effect* associated with access to new technologies and movement up the ladder in terms of value addition to the country's products.

To formally investigate these, we first use employment rate of the country as a proxy for the *labour-supply effects*. The expectation is that if this effect is at play, then we should observe a significant positive or negative effect, suggesting that GVC participation drives the movement of tasks into or out of these countries. Column (1) of Table 2 presents estimates where we regress the country's employment rate on all controls and the GVC (Panel A), backward participation (Panel B) and forward participation (Panel C). The results consistently show that GVC involvement, albeit positive, does not significantly affect employment in Africa. We therefore rule out the labour-supply effect as a potential mechanism through which GVC affect income inequality.

Next is the *productivity effect* which we proxied with average daily income per capita in column (2) and Gross Domestic Product (GDP) per person employed in column (3). These investigate whether returns to GVC are through gains in wage increment or in real output, respectively. Interestingly, whereas GVC participation appears to not (statistically) significantly affect GDP per capita, we find a positive and statistically significant relationship with the average daily income per capita. In particular, a percentage increase in GVC increases the average daily income per capita by about 0.019 percent. This implies that the productivity effect is one of the pathways by which GVC potentially affect income inequality and that this effect is mainly through increment in daily income and not through gains in real output. Our findings are in line with Lopez-Gonzalez *et al.* (2015), who report of productivity effect dominating labour-supply effect to decrease income inequality.

Following Grossman and Rossi-Hansberg (2008), we examine the *relative price effect* of GVC participation on income inequality using the terms of trade. The estimates reported in column (4) of Table 2 reveal a positive and statistically significant effect of GVC on terms of trade. A percentage increase in any of the indicators of GVC increases the terms of trade by about 5.8 percent. This implies that the relative price effect serves as a relevant channel through which GVC can affect income inequality.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment rate	InDaily_Income	InGDP_Person	Terms of trade	Medium and high-	XMS	XUV
Panel A			employed		tech exports		
lnGVC	0.085	0.019^{***}	-0.053	5.809***	1.834^{*}	-0.011	5.303***
	(0.054)	(0.005)	(0.069)	(1.008)	(0.961)	(0.022)	(0.619)
N	901	958	878	943	706	543	936
Panel B							
lnFVA	0.088	0.019***	-0.045	5.800***	2.042**	-0.014	5.279***
	(0.054)	(0.005)	(0.069)	(1.034)	(0.986)	(0.021)	(0.633)
N	901	958	878	943	706	543	936
Panel C							
lnDVX	0.087	0.019***	-0.060	5.944***	1.743*	-0.009	5.299***
	(0.055)	(0.005)	(0.071)	(1.009)	(0.959)	(0.022)	(0.616)
N	901	958	878	943	706	543	936

Table 2. Global value chain participation and income inequality in Africa: GVC impact mechanisms

•

Notes: Table is based on authors' computation and presents estimates of impacts mechanism. **InDaily_Income** is the natural logarithm household per capita income; **InGDP_Person employed** is the GDP per person employed; **XMS** denotes *Change in market shares*: Percentage change in world market shares of a country' over a period. **XUV** denotes *Change in export unit values*: Percentage change of export unit values of a country over a period. In each case, the regressions in each panel also controls for the first and second lags of the dependent variables, Gross Domestic Product, Foreign Direct Investments (FDI), Absence of Corruption, and Inflation, as well as the fixed effects. The "***", "*" and "*" denote significance at 1%, 5% and 10%.

Finally, we investigate the *technological effect* by using a country's exports of medium and high technology products as a percentage of manufactured exports as proxy, and the *upgrading effect* by using changes in export market shares (XMS) and changes in export unit value (XUV) as proxies. In terms of the technology exports, the estimates in column (5) show that whereas the effect of GVC is weakly significant (i.e., 10% level) with an effect size of 1.83 for a unit change in GVC, a 1.74 percentage increase is associated with a unit increase in forward participation. For backward participation, we find a larger positive (i.e. 2.04) and statistically significant effect for medium and high technology exports. Thus, even though participation in GVC generally enhances Africa's export of medium and high technologies, the effect is relatively stronger for backward participation. This suggests that Africa's integration in GVC through backward participation creates avenue to use value added products produced by foreign countries which increase access and use of technologies and related products in her exports (Ketu & Wirajing 2024).

Finally, columns (6) and (7) present estimates of upgrading in GVC involvement. The results show that economic upgrading is one of the impact mechanisms through which GVC impact income inequality. In particular, our results reveal a positive and statistically significant correlation between GVC and African countries' export unit value by about 5.30 percent. However, our estimates reveal statistically insignificant correlation between GVC and changes in their market shares, implying that GVC indeed enhances countries' upward transition along the value chains through increase in the value of exports. These mixed findings for the changes in market shares and export unit value can be explained by the low levels of Africa's contribution to global trade and visible improvements in manufactured product for exports. Recent statistics report Africa's contribution to global trade to be quite low (i.e., only about 2.6 percent) and relatively stable over the past few decades (AFREXIMBANK 2023; COMTRADE/UNSTAT 2023).⁴ In contrast, there has been substantial changes in the sectoral structure of manufactured product exports in Africa. In fact, sectors such as basic metal, chemicals, food products, motor vehicle, electrical machinery and equipment, manufacture of radios, televisions and communication equipment as well as medical products experienced increase of between 62 and 172 percent over the past decade (AFREXIMBANK 2023). Beyond mediation, there is a possibility of interaction

⁴ This drops to about 0.8 percent when conditioned on only manufactured goods, which is suggestive that Africa is still lagging in terms of export market shares.

effects between GVC and these variables. We investigated this (in Appendix 2 Interactions) and the results in Tables A5-A7 generally show no significant interaction effects.

6. Conclusions

This study investigates the impact of GVC participation on income inequality in Africa. We use datasets from the UNCTAD-Eora MRIO, the world development indicators, and the CEPII gravity sources and estimated an instrumental variable model. The study shows that global value chains participation reduces income inequality in African countries, and that both backward and forward participation decrease income inequality albeit with marginally higher magnitudes for backward participation. This implies that Africa's involvement in GVC increases its access to value-added products and innovations in her production and at the same time increases the ability of members to move from just the exports of raw materials to the export value added products.

The impact pathway analysis show that all the four main impact pathways are at play but the level of importance differ by specific mechanism. The most significant of these pathways across all measures of GVC are the *relative-price effect* and *upgrading in export unit value*. These are followed by *export of medium and high technologies* which is substantial and dominant in backward participation compared to forward participation. This implies that Africa's trade in medium and high technology products is supported by its imports of value-added products from other countries.

Our findings generally suggest that policies and agreements such as the African Continental Free Trade Area (AfCFTA) that promote African international trade will be beneficial in strengthening its international trade engagements, boosting its share of manufactured or valueadded goods and improving wages of labour. However, in order for Africa to fully realize this, there is also the need to strengthen its policies and trade agreements with the rest of the world because imports of value-added products are important medium of Africa's access to technology which supports its ability to also export value added products. Such internationalization policies and agreements will accelerate the transformation of African economies through structural change and reorganization of productive capacities to take advantage of economies of scale associated with backward participation. This can also pave ways for technological transfer and spillovers across countries. This will have an effect on deepening both regional and global value chain involvement of Africa, and promoting economic welfare in the long-run.

Our study has a number of limitations. The first is the limited observations used in the study. The study relied solely on the Gini coefficient as a measure of income inequality instead of other measures such as Atkinson inequality index, because of limited available data from the World Income Inequality Database (WIID), which had just 28 datapoints when pulled by country and year for Africa. In addressing this data limitation challenge, we tried calculating the Atkinson index for the years available using the income per capita and the percentile distribution of income across countries reported by the World Bank. Unfortunately, only a few of the datapoints overlapped with GVCs upon our computation, leading to our decision not to use this.

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Appendices

1. Computation of GVC

Foster-McGregor et al. (2015) report the domestic value-added component of exports, DVX, as obtained from the first element of each column of the trade in value-added matrix generated on industries (l) and country (i) as

$$\begin{pmatrix} T_{v}^{11} & \cdots & T_{v}^{1l} \\ \vdots & \ddots & \vdots \\ T_{v}^{i1} & \cdots & a_{ii} \end{pmatrix} = \begin{pmatrix} v^{1} & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & a_{i} \end{pmatrix} \begin{pmatrix} L^{11} & \cdots & L^{1i} \\ \vdots & \ddots & \vdots \\ L^{i1} & \cdots & L^{ii} \end{pmatrix} \begin{pmatrix} e^{1} & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & e^{i} \end{pmatrix}$$

where the column vector v^i represents the value-added for each industry in a given country *i*; the Leontief inverse matrix represented by L^{ii} and the row vector, e^i , represents the industry-specific exports in country *i*. In the case of country 1, for example, domestic value-added (DVX) is captured by T_v^{11} . Similarly, for country 2, the domestic value-added is captured by T_v^{22} , then $\sum_{k=1}^{K} T_v^{k2}$, where $k \neq 2$ represents the foreign value-added (FVA). When a country's domestic value-added serves as an intermediate input for subsequent export by other countries, then this is captured by the product of the row elements of v^i , L^{ii} and e^i . Simply summing the contents of the row values, excluding that of the diagonal elements, is an indicator of the value-added of a country entering as an intermediate input in the exports of others countries.

Variable	Source
Gini	http://gapm.io/ddgini
XUV	https://data.worldbank.org/indicator/TX.VAL.MRCH.XD.WD;
	https://data.worldbank.org/indicator/TX.QTY.MRCH.XD.WD
XMS	United Nations Conference on Trade and Development
DVX	United Nations Conference on Trade and Development
FVA	United Nations Conference on Trade and Development
GVC	United Nations Conference on Trade and Development
GDP	http://gapm.io/dgdpcap_cppp
FDI	https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS
ACI	http://gapm.io/ddemocrix_idea
Inflation	World Bank staff estimates based on IMF balance of payments data, and
	World Bank and OECD GDP estimates (https://www.gapminder.org/data/).
Employment rate	https://www.ilo.org/ilostat/
Daily income	http://gapm.io/dmincpcap_cppp
GDP per person	International Labour Organization, United Nations Population Division,
	Eurostat, OECD, and World Bank.
Terms of trade	https://data.worldbank.org/indicator/TT.PRI.MRCH.XD.WD
M&H tech exports	United Nations Industrial Development Organization (UNIDO), Competitive
	Industrial Performance (CIP) database
Remote	The CEPII gravity database
Partners GVC	United Nations Conference on Trade and Development & The CEPII gravity
	database

Table A1: Sources of data

Variable	Description	Mean	Ν
		(Std. Dev.)	
Outcomes		10 (1	
Gini	Gini coefficient: Income inequality of a country: In	43.64	2207
.	percentage	(8.39)	
Independent v	variables	107.0	1205
FVA	Foreign value-added in exports: is the share of foreign	497.3	1395
	value-added used in a country's exports of the same GVC	(1,918.6)	
DUV	(i.e., Backward participation) (*000)	1 454 0	1205
DVX	Domestic (Indirect) value-added is the value-added of a	1,454.8	1395
	country used as intermediate inputs in the exports of all other	(5,338.1)	
CUC	countries (i.e., Forward participation).	1.051.0	1205
GVC	Global Value Chain Participation: Computed as the sum of the shore of EVA and the shore of DVX (2000)	1,951.9	1393
CDD	the share of FVA and the share of $DVA(000)$	(/,10/./)	2207
GDP	(1000)	4.00	2207
FDI	(000) Equation direct investment inflows: The sum of equity	(3.33)	1020
ΓDΙ	conital rainvestment of earnings, other long term conital	(7,70)	1960
	and short term capital in percent of GDP	(7.79)	
ACI	Absance of corruntion Index: The extent to which the	35.83	2017
ACI	executive and the public administration more broadly do not	(13.03)	2017
	abuse their office for personal gain	(13.93)	
Inflation	The general price level in percentage	25.84	1061
mination	The general price level in percentage	(180.76)	1701
Imnact mecha	anisms	(100.70)	
Employment	Percentage of total population age group 15+ that has been	60.21	1540
rate	employed during the given year	(14.23)	10.10
Daily income	Mean daily household per capita income expressed in 2017	6.47	2266
	Purchasing Power Parity (constant international dollars	(9.62)	
	[PPP\$])	())	
GDP per	GDP per person employed in 2017 constant (PPP\$)	2,590	1443
person		(2877.91)	
Terms of	Percentage ratio of export unit value indexes to the import	98.84	1991
trade	unit value indexes, measured relative to the base year 2015	(38.12)	
M&H tech	Medium and high-tech exports as a percentage of	19.80	1,029
exports	manufacture exports	(19.29)	
XÛV	Change in export unit values: Percentage change of export	82.49	1819
	unit values of a country over a period	(38.70)	
XMS	Change in market shares: Percentage change in world	0.45	910
	market shares of a country' over a period	(1.22)	
Instruments			
Remote	Remoteness index: mean distance between a country's	6,948	1542
	capital and that of other countries in kilometers	(687.88)	
Partners	Average GVC participation index of other countries	2,922	1538
GVC	weighted by distance (in kilometers) between the countries	(2.084)	

Table A2. Variable description, measurement and descriptive statistics

Notes: ACI calculation uses five indicators; public sector corrupt exchanges, public sector theft, executive embezzlement and theft, executive bribery and corrupt exchanges and corruption which have been aggregated into the absence of corruption. DVX

(*Domestic (Indirect) value-added*) is the row sum of total value added of the traded export matrix divided by gross exports. FVA (*Foreign value-added in exports*) is the column sum of total value added of the traded export matrix divided by gross exports.



Figure A1: FVA participation and income inequality by country in Africa

Notes: Figure is based on authors' computation, and relates FVA and income inequality (Gini coefficient) of countries in Africa for selected years.



Figure A2: DVX participation and income inequality by country in Africa

Notes: Figure is based on authors' computation, and relates DVX and income inequality (Gini coefficient) of countries in Africa for selected years.

Lag	CD	J	J-pvalue	MBIC	MAIC	MQIC
1	1	197.97	0.002	-756.66	-90.03	-346.78
2	1	123.13	0.152	-592.85	-92.87	-285.44
3	1	83.74	0.162	-393.57	-60.26	-188.63
4	1	46.54	0.112	-192.11	-25.46	-89.65

Table A3 Optimal lag order selection test

Notes: Lag denotes lag order, CD is Cross-sectional dependence in the panel, J represents the Hansen J-statistics of instrument validity and J-*p*-value is the associated *p*-value. MBIC is the Bayesian Information Criterion, MAIC is the Akaike Information Criterion and MQIC is the Quantile Information Criterion.

InGVC	lnGVC
Gini _{t-1}	0.007
	(0.011)
Gini _{t-2}	-0.009
	(0.011)
lnGDP	0.601^{***}
	(0.062)
lnFDI	-0.025***
	(0.008)
lnACI	-0.060
	(0.056)
Inflation	-8.80E-05
	(5.89E-05)
lnWGVC	0.756***
	(0.022)
InRemote	-3.481**
	(1.701)
Constant	18.255
	(15.268)
Country and Year Fixed Effects	Yes
N	989
Adjusted R-squared	0.987
Weak ID F-test	529.27***

 Table A4: First-stage estimates

Notes: Table is first-stage estimate of the effect of the instruments and other controls on GVC estimated by the authors. The "***" and "**" denote significance at 1% and 5%.

2. Interaction effects

We investigated the interaction effects of GVC participation and each of the impact mechanisms on income inequality by estimating regression models where we introduced the potential pathways and their interactions with the GVC in the specification. These are presented in Tables A5-A7. The results show that an increases in a country's employment rate, average daily income per capita and GDP per person (i.e., columns 1-3) reduces income inequality in Africa, whiles terms of trade, export of medium and high technology products as a percentage of manufactured exports, XMS and XUV contribute to increasing income inequality (i.e., columns 4-7), although these are not statistically significant. The interaction terms between GVC and each of these potential mechanisms are not statistically significant although the signs suggest some interesting moderating association. For instance, the negative values of the employment and the income variables in columns (1-3) indicate that an increase in these variables decrease income inequality, but the positive interaction effects suggest that GVC increases (decreases) inequality for countries with high (low) employment rate, average daily income per capita or GDP per person. Conversely, terms of trade, export of medium and high technology products and upgrading indicators show that an increase in any of this is associated with an increase in income inequality. However, the interaction effects differ where an increase in GVC increases income inequality of countries with increasing terms of trade and technology but reduces the income inequality of countries with increasing upgrading in GVC. These same pattern of interaction effects are observed for FVA and DVX in Tables A6 and A7.

Gini	(1)	(2)	(3)	(4)	(5)	(6)	(7)
lnGVC	-0.153	-0.059	-0.075	-0.073	-0.112**	-0.181***	-0.061
Employmentate 15	(0.105)	(0.058)	(0.072)	(0.054)	(0.055)	(0.064)	(0.058)
Employmentrate_15	(0.019)						
lnGVC* Employmentrate_15	0.001						
	(0.002)						
InDAvIncome		-0.312					
InGVC* InDAvIncome		0.007					
		(0.017)					
InGDP_Person			-0.028				
InGVC* InGDP Person			(0.114) 0.001				
			(0.008)				
Termsof_trade			()	0.000			
				(0.002)			
InGVC [*] Termsol_trade				(0.000)			
M_hightech_exp				(00000)	0.001		
					(0.003)		
InGVC* M_hightech_exp					(0.000)		
XMS					(0.000)	0.098	
						(0.165)	
lnGVC* XMS						-0.007	
XUV						(0.012)	0.000
							(0.002)
lnGVC* XUV							-0.000
۸ <i>۲</i>	1020	1050	1001	1020	769	641	(0.000)
2 V	1020	1030	1001	1020	/68	041	1015

Table A5. Interaction effects of global value added (GVC) and impact mechanisms on income inequality

Note: In each case, the regressions in each panel also controls for the first and second lags of the dependent variables, Gross Domestic Product, Foreign Direct Investments (FDI), Absence of Corruption, and Inflation, as well as the fixed effects. The "**" and "**" denote significance at 1% and 5%.

Gini	(1)	(2)	(3)	(4)	(5)	(6)	(7)
lFVA	-0.143	-0.042	-0.084	-0.064	-0.114**	-0.179***	-0.050
Employmentrate_15	-0.018	(0.050)	(0.085)	(0.052)	(0.050)	(0.002)	(0.055)
IFVA* Employmentrate_15	(0.01) (0.001) (0.002)						
InDAvIncome	(****)	-0.260					
lFVA* lnDAvIncome		(0.197) 0.002 (0.018)					
lnGDP_Person		()	-0.053				
lFVA* lnGDP_Person			(0.121) 0.003 (0.010)				
Termsof_trade			(01010)	0.000			
IFVA* Termsof_trade				(0.002) 0.000 (0.000)			
M_hightech_exp				(0.000)	0.001		
lFVA* M_hightech_exp					(0.000) (0.000)		
XMS					()	0.101	
IFVA* XMS						(0.150) -0.008 (0.012)	
XUV						(0.012)	0.000
IFVA* XUV							(0.002) -0.000
Ν	1020	1050	1001	1020	768	641	1015

Table A6. Interaction effects of foreign value added (FVA) and impact mechanisms on income inequality

Note: In each case, the regressions in each panel also controls for the first and second lags of the dependent variables, Gross Domestic Product, Foreign Direct Investments (FDI), Absence of Corruption, and Inflation, as well as the fixed effects. The "**" and "*" denote significance at 1% and 5%

Gini	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IDVX	-0.176*	-0.077	-0.072	-0.082	-0.108**	-0.166***	-0.074
Employmentrate_15	(0.105) -0.024 (0.019)	(0.058)	(0.067)	(0.054)	(0.053)	(0.063)	(0.057)
IDVX* Employmentrate_15	(0.017) 0.002 (0.002)						
InDAvIncome		-0.341*					
IDVX* lnDAvIncome		(0.203) 0.010 (0.018)					
InGDP_Person		(0.010)	-0.011				
lDVX* lnGDP_Person			(0.102) -0.001 (0.008)				
Termsof_trade			(0.008)	0.000			
lDVX* Termsof_trade				(0.002) 0.000 (0.000)			
M_hightech_exp				(0.000)	0.001		
IDVX* M_hightech_exp					(0.003) 0.000 (0.000)		
XMS					(0.000)	0.100	
IDVX* XMS						(0.162) -0.007 (0.012)	
XUV						(0.012)	0.000
IDVX* XUV							(0.002) -0.000 (0.000)
Ν	1020	1050	1001	1020	768	641	1015

Table A7. Interaction effects of domestic value added (DVX) and impact mechanisms on income inequality

Note: In each case, the regressions in each panel also controls for the first and second lags of the dependent variables, Gross Domestic Product, Foreign Direct Investments (FDI), Absence of Corruption, and Inflation, as well as the fixed effects. The "**" and "*" denote significance at 1% and 5%.