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Abstract

Despite extensive research on Global Value Chains (GVCs), there remains a notable lack of empirical studies examining their impact on economic upgrading. Our study addresses this gap by investigating how different forms of GVC participation influence economic upgrading across industries. Our findings indicate that GVC participation plays a pivotal role in both product and process upgrading across all industries. For MENA region, both forward and backward GVC participation significantly and positively contribute to process and product upgrading in agriculture industry. On the other hand, while the fuels- minerals and manufacturing sectors exhibit product upgrading but these sectors do not demonstrate any improvement for process upgrading by GVC participation.

Keywords: GVCs, Product Upgrading, Process Upgrading, MENA countries.
JEL Classifications: F43, O11, O53.

ملخص

على الرغم من الدراسات المكثفة حول سلاسل القيمة العالمية (GVCs)، لا يزال هناك نقص ملحوظ في الدراسات التجريبية التي تبحث في تأثيرها على الارتقاء الاقتصادي. تتناول دراستنا هذه الفجوة من خلال التحقيق في كيفية تأثير الأشكال المختلفة للمشاركة في سلاسل القيمة العالمية على الترقية الاقتصادية عبر الصناعات. تشير النتائج التي توصلنا إليها إلى أن مشاركة سلاسل القيمة العالمية تلعب دورًا محوريًا في كل من ترقية المنتجات والعمليات في جميع الصناعات. وبالنسبة لمنطقة الشرق الأوسط وشمال أفريقيا، تساهم المشاركة الأمامية والخلفية في سلاسل القيمة العالمية مساهمة كبيرة وإيجابية في تحسين العمليات والمنتجات في الصناعة الزراعية. ومن ناحية أخرى، في حين أن قطاعي الوقود والمعادن والصناعة التحويلية يظهران تحسينًا للمنتجات، إلا أن هذه القطاعات لا تظهر أي تحسن في تحسين العمليات من خلال مشاركة سلاسل القيمة العالمية.

1. Introduction

Driven by the liberalization of goods and capital markets, the international landscape of production underwent significant changes at the end of the 20th century. This was primarily because multinational corporations began offshoring production tasks and processes, leading to the creation of transnational production networks and Global Value Chains (GVCs) that connect producers worldwide. This global fragmentation of production has given developing countries new opportunities to engage in international trade. These countries no longer need to build capacities to manufacture complete products or compete directly with more developed countries. Instead, they can specialize in specific segments of the production process. The offshoring of production by leading firms has allowed suppliers in developing countries to join the global economy and produce items more sophisticated than their traditional exports. Involvement in GVCs is considered highly beneficial for economic development, not only because it generates income but also because it opens access to external markets, facilitates technology and knowledge transfer, and supports overall capability development through learning and upgrading.

Economic upgrading is a key notion of participating in GVCs. It refers to the process through which industries enhance their capabilities to move up the value chain and reap a larger share of the value created within GVCs (see, Marcato and Baltar, 2020). This enhancement involves adopting new technologies, increasing market share, improving production processes, and diversifying products to gain lucrative returns from the global market (see, Criscuolo and Timmis, 2017; Ndubuisi and Owusu, 2023; Constantinescu et al., 2019; Altun et al., 2023). However, the effectiveness of GVCs in facilitating economic upgrading is not guaranteed; it is contingent upon a country's ability to advance toward producing and exporting higher value-added goods. Without this progression, countries could be at higher risks remaining stuck in low-value-added activities, which can limit the benefits of GVC participation and even reinforce existing economic disparities within GVCs (Milberg and Winkler, 2013; Pahl and Timmer, 2020). Humphrey and Schmitz (2002) categorize economic upgrading into four types such as process, product, functional, and chain. Process upgrading focuses on achieving improvements in efficiency and enhancing productivity which is crucial for remaining competitive in GVC ladder (see, Kummritz, 2017). Meanwhile, product upgrading is characterized by enhancing the overall value of products through GVC participation, contributing directly to a firm's ability to capture more value from global markets (Tian et al., 2022). The functional upgrading refers to the increase in the skill content of value-added activities that are performed by firms (see, Yanikkaya et al., 2022, Mudambi, 2008). Lastly, chain upgrading is moving horizontally to a new value chain with higher value added that require similar knowledge, skill, capital, and labor (see, Marcato and Baltar, 2020).

While numerous studies have examined the impact of GVCs on various economic indicators such as value-added growth (see, Kummritz, 2016; Yanikkaya et al., 2022; Yanikkaya and Altun, 2020), productivity (see, Constantinescu et al., 2019) and firm profitability (see, Altun et al., 2023), relatively few studies have empirically explored the implications for economic

upgrading through GVC participation (see, Pahl and Timmer, 2020; Kummritz et al., 2017). In this context, our study aims to address several key questions: What effects do GVCs have on economic upgrading? How do different directions of GVC participation, namely backward and forward, influence economic upgrading across resource-based industries and manufacturing? And does involvement in GVCs primarily lead to process or product upgrading in these industries? Answering these questions has significant implications for industrialization and the trade policy, especially for countries struggling with low-value-added activities such as the MENA region.

The novelties of our study are several: Firstly, we consider an extensive panel of 49 countries and 93 industries derived from EXIOBASE-3 database to better understand the role of GVC participation on the measures of economic upgrading. Secondly, since some studies clearly indicate that (see, Yanikkaya and Altun, 2020; Kummritz, 2016) the importance of making distinction between sub-categories of GVC participation, we investigate both backward and forward GVC participation on economic upgrading in agriculture, fuels-minerals, and manufacturing industries. Thirdly, unlike Kummritz et al. (2017), Pahl and Timmer (2020) and Zhang (2023), we distinguish economic upgrading measures as product and process upgrading. This distinction enables us to discern which type of GVC participation—backward or forward—leads to product or process upgrading across industries. Lastly, while previous studies have focused on different geographical regions (see, DeVries et al., 2019; Obasaju et al., 2021), our study concentrates on the MENA region. Characterized by its distinct natural resource wealth, the region exhibits a huge potential for shifting from primary resource-based activities to higher segments of the value chain. This investigation into economic upgrading is pivotal for understanding how the region can advance up the value chain and maximize trade gains through GVC participation.

Our empirical results reveal that GVC participation in three industry groups crucially improves both product and process upgrading for the full sample. However, for the MENA region, our empirical results differ significantly, especially for the process upgrading. The fuels-minerals and manufacturing sectors show enhanced product upgrading through GVC participation but not for the process upgrading. Our results clearly indicate that the effectiveness of GVCs in facilitating economic upgrading is not bringing the anticipated benefits for all industries. While GVC participation leads to technological innovation, higher market access or cost-advantageous inputs and economic upgrading in some industries could not be materialized. Therefore, the neutral effect of GVC participation on process upgrading in both fuels-minerals and manufacturing could be the manifestation of low absorptive capacity for MENA region (see, Griffith et al., 2003; Stock et al., 2001).

This paper is constructed as follows; the next part reviews the related literature, the third part presents model and the data, fourth part discusses the empirical results, and the last part concludes and presents the policy implications.

2. Literature review

GVC participation can influence economic upgrading through several factors, including specialization, knowledge and technology transfer and market access (see, Gereffi and Lee, 2016; De Marchi and Alford, 2022). Through GVC participation, a higher specialization would play a decisive role, resulting in higher economic upgrading. Participating in GVCs enables firms to identify and specialize in high value-added tasks that match their comparative advantage (see, Gereffi et al., 2005). Specifically, GVCs could enable firms to specialize in certain stages of production rather than the entire value chain which would lead to higher upgrading on the value-chain (see, Grossman and Rossi-Hansberg, 2008).

As firms engage highly in both backward and forward GVCs, they are exposed to knowledge spillovers from leading firms in global markets. This can also drive technology transfer, research, and development (R&D) and the learning-by-exporting, ultimately results in higher economic upgrading for domestic firms (see, Lall, 2000). Another factor is that by actively participating in various tasks in GVCs, domestic firms could gain experience from learning implications of exporting where firms move up more sophisticated production processes (see, Blalock and Gertler, 2004; Loecker, 2013, Humphrey and Schmitz, 2002).

Additionally, accessing a large market size is important to reach higher economic upgrading through forward GVC participation which can lead to a wider consumer base and increased sales volumes for participating firms. As firms reach and become a part of global production networks, they access broader market demand, stimulating production in larger quantities and lowering the average operation costs. (see, Grossman and Rossi-Hansberg, 2008; Braunerhjelm and Thulin, 2008; Taglioni and Winkler, 2016). Also, higher access to a broader market base through GVCs often translates to higher export revenue which can facilitate technological advancements, capacity building and ultimately higher levels of economic upgrading (see, Taglioni and Winkler, 2016).

However, a critical point is raised by Milberg and Winkler (2013), who warns against the assumption that participation in GVCs automatically leads to economic upgrading (see also, Pahl and Timmer, 2020). They present the idea of "downgrading," where firms might be stuck in low-value activities or even shift to lower value-added activities. Additionally, when firms participate in GVCs without sufficient absorptive capacity, they may fail to internalize the knowledge and skills transferred through these chains. This failure can result in firms confined to low-value-added tasks despite being part of global production networks. The inability to absorb and utilize advanced technologies can lead to a scenario where firms are simply executing low-skill, labor-intensive tasks without moving up the value chain.

Additionally, several empirical studies investigate the impacts of GVCs on economic upgrading in different industries and regions (see, De Vries et al., 2019; Pahl and Timmer, 2020). More specifically, some studies show that GVC participation has beneficial effect on economic upgrading (see, De Vries et al., 2019; Kummritz et al., 2017). For instance, Pahl and Timmer

(2020) find that the participation in GVCs has a favorable influence on manufacturing upgrading across 57 countries. Wiryawan et al. (2022) find that a rise in manufacturing GVC participation leads to an increase in the share of high-tech sector output. They also indicate that forward (backward) GVC linkages significantly improve (decrease) the performance of high-tech (low-tech) industries' upgrading.

Some studies indicate that the direction of GVC participation plays a critical role in economic upgrading. Tian et al. (2021) note that backward GVC participation is particularly beneficial for developing countries. Conversely, Ndubuisi and Owusu (2021) find that GVC participation enhances export quality in developed countries through both directions of GVCs, in developing regions the positive effect is only observed though backward GVCs. Lastly, some studies emphasize the role of human capital and technological capabilities to reach higher economic upgrading (see, Nouria and Saafi, 2022; Zhou, 2018, Wu et al., 2021). Banga (2022) highlights how digital capabilities in Indian firms lead to product sophistication, and similarly Gao et al. (2023) emphasize the role of technological innovation in Chinese manufacturing upgrading.

3. Model and data

To investigate the interrelationship between economic upgrading and global value chains, our baseline model is borrowed from Kummritz (2016). We estimate a simple model for sector *s* of country *c* at the time *t*:

$$\text{Economic Upgrading}_{c,s,t} = \beta_1 \text{GVC Participation}_{c,s,t} + \beta_2 X_{c,s,t} + \alpha_c + \alpha_s + \alpha_t + \varepsilon_{c,s,t} \quad (1)$$

Consistent with Kummritz et al. (2017) and Zhang (2023), we use domestic value added and export complexity as the measures of economic upgrading[4]. According to Humphrey and Schmitz (2005), as industries integrate into value chains, producers should increase the technological content of their products to keep up with the competition in the global market. This type of upgrading is coined as the product upgrading. On the other hand, measuring the product upgrading that involves bilateral trade linkages is difficult (see, Marcato and Baltar, 2020). Therefore, we choose to represent product upgrading by export technical complexity for our dataset. Based on Hausmann et al. (2007) export technical complexity can be shown in equation (3):

[4] One may think that upstreamness and length measures can serve as proxies for product upgrading. While both length and upstreamness provide insights into the structure and position of industries within GVCs, they do not necessarily indicate whether a product's intrinsic value or complexity has increased. Product upgrading is specifically about enhancing the value, quality, or sophistication of products—not just about participating in more stages or moving to different stages of the GVC. Although longer GVCs or an upstream position could imply greater potential for adding value, this isn't always the case. For example, a firm could move upstream to procure raw materials more cheaply without necessarily enhancing the end product's sophistication. Similarly, a longer chain does not automatically mean a product is being upgraded; it could merely indicate more steps without added value.

Also, some may wonder that total factor productivity and labor productivity could capture the export complexity. These metrics are frequently proposed to measure certain aspects of economic performance concerning efficiency and output; however, they may not be sufficient measures for evaluating product upgrading (see, Marcato and Baltar, 2020). These measures can indicate how efficiently resources are being used, but they do not measure the qualitive improvements of exported products.

$$PRODY_{c,s,t} = \frac{vx_{c,s,t}/\sum_s vx_{c,s,t}}{\sum_s vx_{c,s,t}/\sum_c vx_{c,s,t}} * Y_{c,s,t} \quad (2)$$

$$EXPY_{c,s,t} = \frac{vx_{c,s,t}}{\sum_s vx_{c,s,t}} * PRODY_{c,s,t} \quad (3)$$

In equations (2) and (3) vx_{ji} represents the value-added exports in industry j in country i; Y_{ji} is the value-added of industry in industry j and country i, $EXPji$ denotes the technical complexity of exports in the industry. Higher value of $EXPji$ represents higher sophisticated technological content produced by the industry. $PRODY_{ji}$ is the weighted productivity index calculated by the average of the value-added in exporting industries. Following Taglioni and Winkler (2016), we also use the level of value added to measure the economic upgrading. According to Kummritz et al. (2017), the level of value-added could capture the total factor productivity improvements (the process upgrading) and the gains for firms and workers such as gross profits and the labor compensation.

To gain initial insights, we depict some figures both for the full sample and the MENA countries. Figure 1 shows product upgrading trends of agriculture, fuels-minerals, and manufacturing between 1995 – 2022 for the full sample. All three sectors show an upward trend, indicating worldwide improvements in the quality and sophistication of products within these industries. Figure 1 also shows that manufacturing has experienced the highest level of product upgrading across time for the world. Figure 2 presents the product upgrading for these sectors of the MENA region. For agriculture, despite the fluctuations, there appears to be a general upward trend. This indicates that there has been a general increase in product upgrading in the agricultural sector in the MENA region after the global crisis. Unlike agriculture, it shows a more consistent and steady increase over time in product upgrading for fuels-minerals and manufacturing.

Figure 1. Product upgrading in the world

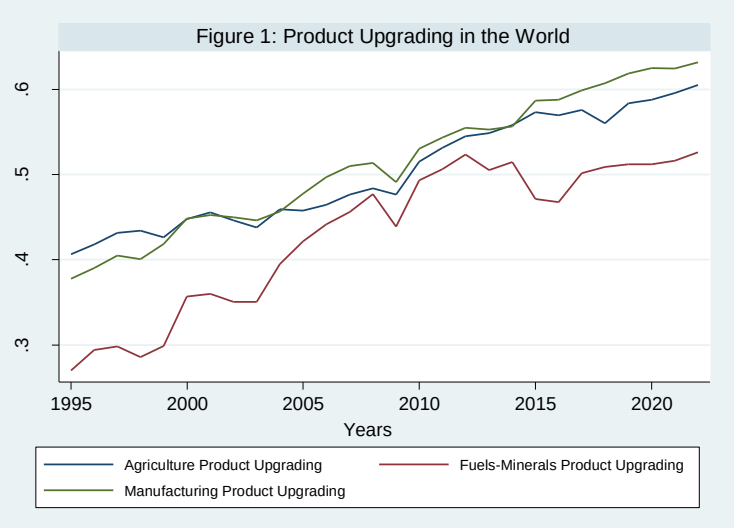
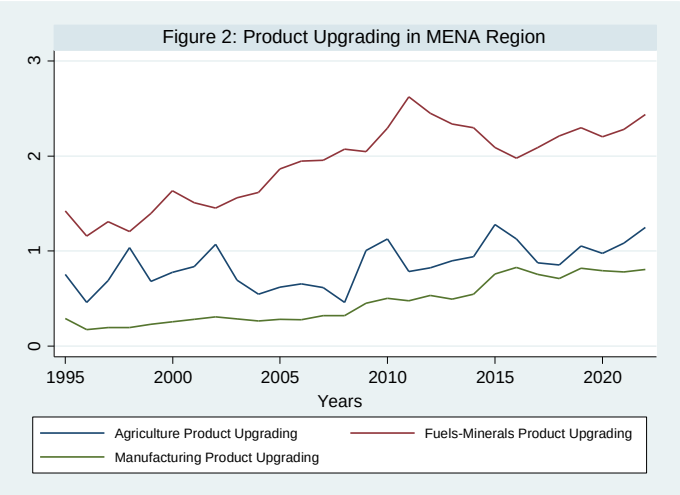


Figure 2. Product upgrading in MENA region



In equation (1), the backward and forward participation GVCs are derived from EXIOBASE-3 database (see, Stadler et al., 2016), spanning from 1995 to 2022 for 49 countries including the MENA countries[5]. The EXIOBASE-3 database offers a highly complex sectoral resolution with 163 industries and broad global coverage for investigating the GVC-upgrading nexus.

We investigate upgrading effects of GVCs in agriculture, fuels-minerals and manufacturing industries which consist of 20, 14, and 63 subsectors, respectively. We also include some control variables in our model affecting economic upgrading such as capital stock per worker and total employment hours, represented by $X_{c,t}$ in equation (1). By controlling capital stock per worker, we can better account how capital deepening affects economic upgrading. Also, more advanced machinery and equipment can enable workers to produce more complex or higher value-added products. Also, controlling employment hours is a critical factor for explaining economic upgrading because labor input is critical for complexities of exported goods. Lastly, α_t, α_c, α_i and $\varepsilon_{c,s,t}$ are the time dummies, country dummies, industry dummies and the error term, respectively. The mean values are presented in Table 1.

Table 1. Mean values

	Full Sample					
	Agriculture		Fuels-Minerals		Manufacturing	
Variable	Obs.	Mean	Obs.	Mean	Obs.	Mean
log(BP)	20736	1.393	15327	1.394	67541	3.158
log(FP)	20660	1.227	15261	2.171	67469	3.606
log(EXPY)	20618	0.542	15264	0.550	67468	0.590
log(VA)	20736	5.526	15327	3.919	67541	5.627
log(K/L)	20736	0.022	15327	0.072	67541	0.029
log(Employment Hours)	20736	4.413	15327	2.114	67541	3.344
	MENA Region					
	Agriculture		Fuels-Minerals		Manufacturing	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
log(BP)	459	2.774	384	3.528	1333	4.240
log(FP)	459	4.241	384	4.841	1333	5.057
log(EXPY)	459	0.859	384	2.038	1333	0.560
log(VA)	459	7.812	384	7.032	1333	7.343
log(K/L)	459	0.021	384	0.129	1333	0.007
log(Employment Hours)	459	6.015	384	4.755	1333	4.542

[5] Country list is provided in the Appendix section.

To investigate whether GVCs have upgrading effects in three industry groups, we employ the fixed effects method. Firstly, the effects model is adept at controlling individual heterogeneity. In the context of GVCs, different countries or industries may have omitted characteristics that influence GVCs magnitude on the economic upgrading. Therefore, by using the fixed effects model, we account unobservable characteristics that are constant over time across countries and industries. Secondly, the fixed effects model helps to eliminate the omitted variable bias. In the context of GVCs, this could be important due to the certain factors affecting economic upgrading could not be easily measurable, such as path-dependent characteristics of the industry or government policies. Lastly, in addition to controlling for individual heterogeneity and omitted variable bias, the fixed effects models can also control for common shocks or trends that affect all countries or industries during the period, such as global economic crises or technological breakthroughs. This is particularly relevant in the context of GVCs as global economic conditions and technological changes can have widespread effects on how countries and industries participate in the global production networks.

4. Empirical results and discussion

Table 2 presents empirical results whether GVC participation leads to economic upgrading in our full sample[6]. Estimates in columns 1 to 4 of Table 2 indicate that both forward and backward participation leads to product and process upgrading in the agriculture industry. By selling agricultural products through forward participation, agricultural producers could be exposed to higher competition which can drive firms to improve their efficiency by learning-by-exporting, economies of scale to increase their market share (see, Melitz, 2003, Aitken et al., 1997; Salomon and Shaver, 2005; Loecker, 2013, Kowalski et al., 2015). In the meantime, participation in backward GVCs allows agricultural producers to import high-quality and cheaper inputs such as seeds, fertilizers and machinery which lead to improved productivity, in turn higher upgrading levels (Halpern et al., 2015).

We also find that backward and forward participation positively contributes to product and process upgrading within the fuels and minerals industries as seen from columns 5 to 8. By integrating the backward GVCs, these industries could access to advanced technologies (high-quality machinery and drilling equipment etc.) which can significantly increase the value-added content of output (see, Gereffi et al., 2005; Halpern et al., 2015). Also, backward GVC participation often opens doors to networking and collaborative opportunities with leading global firms through importing activities. These relationships can be instrumental for the fuels industry in entering into joint ventures on collaborative R&D projects, all of which can lead to both process and product upgrading (see, Morrison et al., 2008). Similarly, there is also positive effect of forward GVC participation on both process and product upgrading for fuels and minerals industry. For fuel and mineral producers, integrating global market segments through forward participation can provide lucrative opportunities to increase the product quality.

[6] We have re-estimate our specifications by using one year lag of the independent variables. The empirical results are nearly identical to those in the paper. These results are available upon request from the authors.

Table 2. GVC effects on economic upgrading for 49 countries

	Agriculture				Fuels-Minerals				Manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Product Upgrading		Process Upgrading		Product Upgrading		Process Upgrading		Product Upgrading		Process Upgrading	
log (K/L)	0.029	0.026	0.222***	0.208***	0.179***	0.112**	0.696***	0.547***	0.100***	0.089***	0.292***	0.264***
	(0.057)	(0.052)	(0.049)	(0.048)	(0.057)	(0.052)	(0.144)	(0.115)	(0.017)	(0.014)	(0.059)	(0.049)
log(Employment Hours)	0.113***	0.058***	0.604***	0.544***	0.227***	0.194***	0.776***	0.638***	0.238***	0.173***	0.738***	0.616***
	(0.019)	(0.016)	(0.030)	(0.030)	(0.028)	(0.030)	(0.039)	(0.040)	(0.013)	(0.012)	(0.017)	(0.017)
log(BP)	0.432***		0.173***		0.490***		0.478***		0.341***		0.344***	
	(0.033)		(0.028)		(0.046)		(0.039)		(0.015)		(0.016)	
log(FP)		0.425***		0.264***		0.366***		0.522***		0.391***		0.495***
		(0.027)		(0.025)		(0.036)		(0.033)		(0.015)		(0.017)
Observations	20,618	20,598	20,736	20,660	15,264	15,243	15,327	15,261	67,468	67,442	67,541	67,469
R-squared	0.609	0.647	0.881	0.889	0.634	0.624	0.844	0.866	0.537	0.569	0.888	0.905

*Notes: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Time, industry, and country dummies are included in all specifications, but not reported.*

We also find that both backward and forward participation positively contribute to product and process upgrading within the manufacturing industry, at the columns 9 to 12 of Table 2. Backward GVC participation, where industries import intermediate goods for final assembly or further processing, can lead to product upgrading by allowing firms to integrate more advanced components or technologies. (see, Sturgeon and Kawakami, 2011). This result also indicates that importing technologically advanced intermediate goods can facilitate spillover effects, enabling the local firms to upgrade their production processes and production quality through backward GVC integration (see, Bisztray et al., 2018; Blalock and Veloso 2007). Also, engaging in forward GVC participation allows countries to export intermediate goods that can be integrated into diverse products abroad. For instance, a firm involved in exporting car components may find its products integrated into vehicles of different specifications and standards. To meet these requirements, manufacturing firms must continually enhance their products, leading to a consistent process of product upgrading. Such an upgrading is not limited to physical improvements of the products but also includes innovations in design, functionality, and customization for manufacturing industries (see, Ernst, 2000).

Economic upgrading through GVCs could be pivotal for the MENA region, which predominantly relies on its abundant natural resources for the integration into global production networks. By engaging more deeply in GVCs, the MENA region can diversify its economy, moving beyond primary resource exports, thereby ensuring higher economic growth. Active participation in GVCs also allows the MENA countries to amplify their value addition by fetching higher gains from the resource wealth effectively, enhancing productivity, and narrowing technology gaps (see, Taglioni and Winkler, 2016). Building on these perspectives, we explore the potential pathways for economic upgrading via GVC participation in the MENA region, with our empirical findings presented in Table 3.

In our estimates, as the full sample, there are positive impacts of both forward and backward participation on both product and process upgrading in agriculture as indicated in columns 1 and 4 of Table 3. The positive coefficients associated with forward (backward) GVC participation underscore the beneficial effects of exporting (importing) intermediary goods and entering foreign markets. This lends substantial support to the notion of export-led, or forward-led (backward-led), process (product) upgrading (see Giles and Williams., 2000). Likewise, because forward participation stimulates demand in overseas markets, it is likely to positively impact upgrading process by boosting employment and the income (see Feenstra et al., 2019). Also, exporting to global markets through forward GVCs can also attract more investment into agricultural industry from both global and domestic firms. This could also fuel the R&D investments which lead to higher-quality agricultural products and more efficient production methods (see, Gereffi and Fernandez-Stark, 2016; Pray and Fugilie, 2015).

Table 3. GVC effects on economic upgrading for MENA region

	Agriculture				Fuels-Minerals				Manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Product Upgrading		Process Upgrading		Product Upgrading		Process Upgrading		Product Upgrading		Process Upgrading	
log (K/L)	0.058**	0.062**	-0.006	-0.004	0.559	0.752*	0.162	0.289	-2.697***	-3.005***	-0.083	-0.280
	(0.020)	(0.021)	(0.007)	(0.006)	(0.320)	(0.369)	(0.495)	(0.496)	(0.981)	(1.123)	(0.989)	(0.992)
log(Employment Hours)	0.102	0.081	0.005	-0.002	0.161	0.138	0.000	-0.015	-0.066	-0.085	0.036	0.026
	(0.061)	(0.052)	(0.020)	(0.014)	(0.147)	(0.153)	(0.095)	(0.091)	(0.076)	(0.081)	(0.074)	(0.074)
log(BP)	0.237**		0.101*		0.456***		0.298		0.200***		0.119	
	(0.084)		(0.051)		(0.134)		(0.200)		(0.051)		(0.079)	
log(FP)		0.313**		0.119**		0.299**		0.200		0.148***		0.116
		(0.133)		(0.051)		(0.132)		(0.156)		(0.053)		(0.074)
Observations	459	459	459	459	384	384	384	384	1,333	1,333	1,333	1,333
R-squared	0.884	0.888	0.994	0.994	0.965	0.961	0.965	0.964	0.870	0.866	0.975	0.975

Notes: See notes at Table 2.

Neither forward nor backward participation in GVCs lead to process upgrading in fuels- mineral and manufacturing industries, while forward and backward participation in GVCs leads to product upgrading. The positive impact on product upgrading is consistent with the theory that GVC participation allows to enhance the product quality. As Kaplinsky and Morris (2012) note that GVC integration helps firms in developing countries move from simple to more complex products by integrating market access. This could be especially relevant in resource-rich MENA countries where participation in GVCs can lead to diversification and enhancement of their export portfolios. On the other hand, the lack of process upgrading in fuels-mineral and manufacturing industries through GVC participation might be due to the role of absorptive capacity of MENA countries. As Cohen and Levinthal (1989) highlight that the ability to exploit external knowledge (a key aspect of process upgrading) is contingent on the industry's level of prior related knowledge and its capacity to apply new knowledge. In this context, this might hinder the development of requisite absorptive capacity thereby neutralizing the impact of GVC participation on process upgrading in these industries[7].

Like fuels and mineral industry, both forward and backward participation in GVCs improve product upgrading in manufacturing for MENA region. The coefficient on forward GVC on product upgrading suggests that firms are increasingly moving from basic products to more highly sophisticated, differentiated or highly value-added products. As manufacturing firms become more entrenched in forward GVC participation, there's an increased tendency towards diversifying their product lines and thereby fetching higher trade gains. Also, the backward GVC participation has substantial and significant positive impact on both product and process upgrading in manufacturing. The strong positive relationship between backward GVC participation and product upgrading indicates that imports play a crucial role in complexity of exported goods for manufacturing in MENA region (see, Coe et al., 1997; Grossman and Helpman, 1991)[8].

5. Conclusion

In this paper, we examine the role of GVCs on economic upgrading for a large sample of countries and industries derived from EXIOBASE-3 database. Our study underscores the significant role of GVC participation in driving economic upgrading across various industries. For the full sample, both forward and backward GVC participation notably enhance both product and process upgrading in all three main sectors of the economy. However, our results

[7] Since we have added human capital into our model as a country-covariate, the insignificant effects of both types of GVCs on process upgrading in fuels-minerals and manufacturing industries are still persistent for the MENA region. This result could imply that the arguments on the lack of absorptive capacity are empirically robust even if we control the best choice of country control related to the domestic capacity of knowledge absorption. The authors can provide these results upon request.

[8] We have conducted several robustness checks using an additional covariate (human capital), lags of dependent variables and alternative product upgrading measure. Firstly, we use labor productivity (calculated as value-added per worker) as an alternative measure for process upgrading. Our estimates suggest that both types of GVCs have significantly positive impacts on labor productivity (process upgrading) for our full sample. Also, for the MENA region, the empirical results are in line with our baseline results. More specifically, both types of GVCs have insignificant effects on product upgrading in fuels-minerals and manufacturing industries of MENA region. These results clearly validate the original estimates in our paper. Secondly, we have re-estimated our baseline specifications including human capital and lags of independent variables into our model. The results are in line with the initial outcomes of our paper. These results can be obtained from the authors upon request.

differ considerably for the MENA region, especially for the process upgrading. Our results indicate that GVC participation benefits the agriculture sector in terms of both product and process upgrading. However, the fuels-minerals and manufacturing industries, despite benefiting from product upgrading through both backward and forward participation, fail to affect process upgrading.

We have some policy implications which can be drawn from our empirical results. For the full sample, it is imperative for policymakers to facilitate GVC integration in all industries. In the MENA region, the notable positive impact participation in GVCs on economic upgrading within the agriculture sector necessitates policy interventions that bolster market access and facilitate the importation of high-quality inputs. Conversely, the observed lack of process upgrading in the fuels, minerals, and manufacturing sectors in the MENA region highlights an urgent need for policies focused on building absorptive capacity. Improving the ability of these industries to utilize new knowledge might lead to reap higher gains from GVCs for higher economic upgrading. This, in turn, would promote economic upgrading across various industries, thereby contributing to the overall economic development of MENA region.

References

Aitken, B., Hanson, G. H., & Harrison, A. E. (1997). Spillovers, foreign investment, and export behavior. Journal of International economics, 43(1-2), 103-132.

Altun, A., Turan, T., & Yanikkaya, H. (2023). Do Turkish firms benefit from GVC participation?. International Journal of Emerging Markets, forthcoming.

Amador, J., & Cabral, S. (2016). Global value chains: A survey of drivers and measures. Journal of Economic Surveys, 30(2), 278-301.

Banga, K. (2022). Impact of global value chains on total factor productivity: The case of Indian manufacturing. Review of Development Economics, 26(2), 704-735.

Bisztray, M., Koren, M., & Szeidl, A. (2018). Learning to import from your peers. Journal of International Economics, 115, 242-258.

Blalock, G., & Gertler, P. J. (2004). Learning from exporting revisited in a less developed setting. Journal of development economics, 75(2), 397-416.

Blalock, G., & Veloso, F. M. (2007). Imports, productivity growth, and supply chain learning. *World Development*, *35*(7), 1134-1151.

Braunerhjelm, P., & Thulin, P. (2008). Can countries create comparative advantages? R&D expenditures, high-tech exports and country size in 19 OECD countries, 1981–1999. International Economic Journal, 22(1), 95-111.

Coe, D. T., Helpman, E., & Hoffmaister, A. W. (1997). North-south R & D spillovers. The economic journal, 107(440), 134-149.

Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: the two faces of R & D. The economic journal, 99(397), 569-596.

Constantinescu, C., Mattoo, A., & Ruta, M. (2019). Does vertical specialisation increase productivity?. The World Economy, 42(8), 2385-2402.

Criscuolo, C., & Timmis, J. (2017). The relationship between global value chains and productivity. International Productivity Monitor, 32, 61-83.

De Marchi, V., & Alford, M. (2022). State policies and upgrading in global value chains: A systematic literature review. Journal of International Business Policy, 5(1), 88-111.

De Vries, G., Chen, Q., Hasan, R., & Li, Z. (2019). Do Asian countries upgrade in global value chains? A novel approach and empirical evidence. Asian Economic Journal, 33(1), 13-37.

Ernst, D. (2000). The Economics of Electronics Industry: Competitive Dynamics and Industrial Organization (No. 07). East-West Center, Economics Study Area.

Feenstra, R. C., Ma, H., & Xu, Y. (2019). US exports and employment. Journal of International Economics, 120, 46-58.

Gao, X., Li, C., Elahi, E., Abro, M. I., & Cui, Z. (2023). Technological Innovation, Product Quality and Upgrading of Manufacturing Value Chain: Empirical Evidence from China. Sustainability, 15(9), 7289.

Gereffi, G., & Lee, J. (2016). Economic and social upgrading in global value chains and industrial clusters: Why governance matters. Journal of business ethics, 133(1), 25-38.

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. Review of international political economy, 12(1), 78-104.

Giles, J. A., & Williams, C. L. (2000). Export-led growth: a survey of the empirical literature and some non-causality results. Part 1. The Journal of International Trade & Economic Development, 9(3), 261-337.

Grossman, G. M., & Rossi-Hansberg, E. (2008). Trading tasks: A simple theory of offshoring. American Economic Review, 98(5), 1978-1997.

Grossman, G. M., & Helpman, E. (1991). Trade, knowledge spillovers, and growth. European economic review, 35(2-3), 517-526.

Halpern, L., Koren, M., & Szeidl, A. (2015). Imported inputs and productivity. American Economic Review, 105(12), 3660-3703.

Hausmann, R., Hwang, J., & Rodrik, D. (2007). What you export matters. Journal of economic growth, 12, 1-25.

Humphrey, J., & Schmitz, H. (2002). How does insertion in global value chains affect upgrading in industrial clusters?. Regional studies, 36(9), 1017-1027.

Jangam, B. P., & Rath, B. N. (2021). Do global value chains enhance or slog economic growth?. Applied Economics, 53(36), 4148-4165.

Kaplinsky, R., & Readman, J. (2005). Globalization and upgrading: what can (and cannot) be learnt from international trade statistics in the wood furniture sector?. Industrial and Corporate Change, 14(4), 679-703.

Kaplinsky, R., & Morris, M. (2012). The structure of supply chains and their implications for export supply. In Trade Infrastructure and Economic Development (pp. 170-203). Routledge.

Kowalski, P., Lopez Gonzalez, J., Ragoussis, A., & Ugarte, C. (2015). Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies (No. 179). OECD Publishing.

Kummritz, V. (2016). Do Global Value Chains Cause Industrial Development? (No. 01-2016). Centre for Trade and Economic Integration, The Graduate Institute.

Kummritz, V., Taglioni, D., Winkler, D. E. (2017). Economic upgrading through global value chain participation: which policies increase the value added gains? (No. 8007). The World Bank.

Lall, S. (2000). The Technological structure and performance of developing country manufactured exports, 1985-98. Oxford development studies, 28(3), 337-369.

Lim, S., & Kim, S. W. (2022). Global agricultural value chains and employment growth. Journal of the Agricultural and Applied Economics Association, 1(4), 402-418.

Loecker, J. D. (2013). Detecting learning by exporting. American Economic Journal: Microeconomics, 5(3), 1-21.

Marcato, M. B., & Baltar, C. T. (2020). Economic upgrading in global value chains: concepts and measures. Rev. Bras. Inov, 19(e020002), 1-25.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. econometrica, 71(6), 1695-1725.

Milberg, W., & Winkler, D. (2013). Outsourcing economics: global value chains in capitalist development. Cambridge University Press.

Montalbano, P., & Nenci, S. (2022). Does global value chain participation and positioning in the agriculture and food sectors affect economic performance? A global assessment. Food Policy, 108, 102235.

Nadvi, K. (2008). Global standards, global governance and the organization of global value chains. Journal of economic geography, 8(3), 323-343.

Nouira, R., & Saafi, S. (2022). What drives the relationship between export upgrading and growth? The role of human capital, institutional quality, and economic development. Journal of the Knowledge Economy, 13(3), 1944-1961.

Ndubuisi, G., & Owusu, S. (2021). How important is GVC participation to export upgrading?. The World Economy, 44(10), 2887-2908.

Ndubuisi, G., & Owusu, S. (2023). Trade for catch-up: examining how global value chains participation affects productive efficiency. Journal of Productivity Analysis, 59(2), 195-215.

Neilson, J., Pritchard, B., & Yeung, H. W. C. (2014). Global value chains and global production networks in the changing international political economy: An introduction. Review of International Political Economy, 21(1), 1-8.

Obasaju, B. O., Olayiwola, W. K., Okodua, H., Adediran, O. S., & Lawal, A. I. (2021). Regional economic integration and economic upgrading in global value chains: selected cases in Africa. Heliyon, 7(2).

Pray, C. E., & Fuglie, K. O. (2015). Agricultural research by the private sector. Annu. Rev. Resour. Econ., 7(1), 399-424.

Pahl, S., & Timmer, M. P. (2020). Do global value chains enhance economic upgrading? A long view. The journal of development studies, 56(9), 1683-1705.

Ponte, S., & Ewert, J. (2009). Which way is "up" in upgrading? Trajectories of change in the value chain for South African wine. World development, 37(10), 1637-1650.

Salomon, R. M., & Shaver, J. M. (2005). Learning by exporting: new insights from examining firm innovation. Journal of Economics & Management Strategy, 14(2), 431-460.

Stadler, K., Wood, R., Bulavskaya, T., Södersten, C. J., Simas, M., Schmidt, S., ... & Tukker, A. (2018). EXIOBASE 3: Developing a time series of detailed environmentally extended multi-regional input-output tables. Journal of Industrial Ecology, 22(3), 502-515.

Sturgeon, T. J., & Kawakami, M. (2011). Global value chains in the electronics industry: characteristics, crisis, and upgrading opportunities for firms from developing countries. International Journal of Technological Learning, Innovation and Development, 4(1-3), 120-147.

Taglioni, D., & Winkler, D. (2016). Making global value chains work for development. World Bank Publications.

Tian, K., Dietzenbacher, E., & Jong-A-Pin, R. (2022). Global value chain participation and its impact on industrial upgrading. The World Economy, 45(5), 1362-1385.

Whitfield, L., Staritz, C., Melese, A. T., & Azizi, S. (2020). Technological capabilities, upgrading, and value capture in global value chains: Local apparel and floriculture firms in Sub-Saharan africa. Economic Geography, 96(3), 195-218.

Wiryawan, B. A., Aginta, H., & Fazaalloh, A. M. (2023). Does GVC participation help industrial upgrading in developing countries? New evidence from panel data analysis. The Journal of International Trade & Economic Development, 32(7), 1112-1129.

Wu, L., Chen, G., & Peng, S. (2021). Human Capital Expansion and Global Value Chain Upgrading: Firm-level Evidence from China. China & World Economy, 29(5), 28-56.

Yanikkaya, H., & Altun, A. (2020). The impact of global value chain participation on sectoral growth and productivity. Sustainability, 12(12), 4848.

Yanikkaya, H., Altun, A., & Tat, P. (2022). Does the Complexity of GVC Participation Matter for Productivity and Output Growth?. The European Journal of Development Research, 34(4), 2038-2068.

Zhang S (2023) Impact of industrial robot applications on global value chain participation of China manufacturing industry: Mediation effect based on product upgrading. PLoS ONE 18(11). https://doi.org/10.1371/journal.pone.0293399

Zhou, Y. (2018). Human capital, institutional quality and industrial upgrading: global insights from industrial data. Economic Change and Restructuring, 51, 1-27.

Appendix

A1. Country list

Table A1. Country list

Austria	Slovenia	**RoW Middle East: Countries included**
Belgium	Slovakia	United Arab Emirates
Bulgaria	Great Britain	Bahrain
Cyprus	United States	Egypt, Arab Rep.
Czechia	Japan	Israel
Germany	China	Iraq
Denmark	Canada	Iran, Islamic Rep.
Estonia	Korea (Republic of)	Jordan
Spain	Brazil	Kuwait
Finland	India	Lebanon
France	Mexico	Oman
Greece	Russia	Palestine
Croatia	Australia	Qatar
Hungary	Switzerland	Saudi Arabia
Ireland	Turkey	Syrian Arab Republic
Italy	Taiwan	Yemen, Rep.
Lithuania	Norway	
Luxembourg	Indonesia	
Latvia	South Africa	
Malta	RoW Asia and Pacific	
Netherlands	RoW America	
Poland	RoW Europe	
Portugal	RoW Africa	
Romania	RoW Middle East	
Sweden		