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Factors influencing the participation of Vietnamese enterprises in global value chains: Insights from the manufacturing and processing sectors

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Abstract

This research aims to investigate the factors that impact the participation of companies in Vietnam's Manufacturing and Processing sector in the Global Value Chain (GVC). We employ panel data analysis with a dataset of 387,994 observations from 107,125 enterprises in this industry spanning 2011-2020. Both Ordinary Least Squares (OLS) and Generalized Moment Method (GMM) are used to assess the factors affecting the industry's GVC engagement. The Arellano-Bond test checks for autoregressive processes of order one (AR(1)) or order two (AR(2)) in the model to see if the idiosyncratic error term exhibits serial correlation. The Sargan test checks for over-identifying restrictions in the statistical model. The results reveal that the ratio of large enterprises" exerts the most significant positive influence on the participation of Vietnamese enterprises in the GVCs, closely followed by "Institutional and policy environment." Conversely, HHI, TFP, and GDP growth rates show significant negative impacts. For Foreign Direct Investment (FDI), horizontal spillovers are positive and statistically significant. However, significant results also show a negative coefficient in the *Backward GVC* and a positive one in the *Forward GVC*. From these findings, we point out some important policy implications: (1) the government should strengthen favorable conditions for the participation of large enterprises and leading SMEs; (2) It is necessary to improve the institutional and policy environment and refine policies to attract FDI, especially with a focus on promoting forward linkages to facilitate greater engagement of the enterprises in the GVCs.

Keywords: Backward GVC, Engagement in GVC, Forward GVC, Generalized method of moments, Global value chain, Processing and Manufacturing sector.

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1. Introduction

In recent decades, significant transformations in the global economic context have initiated a fundamental restructuring of worldwide production and trade. This transformation has restructured industries and economies, fostering the emergence of GVCs. For emerging economies, GVCs have emerged as a catalyst for expediting industrialization [1, 2] and enhancing productivity and value addition [3-7]. Simultaneously, participation in GVCs has played a pivotal role in promoting inclusive growth by generating employment opportunities [8, 9] and facilitating the development of export and innovation capabilities [10-15]. Furthermore, engagement in GVCs has proven instrumental in elevating the technological prowess of enterprises, thereby contributing to the augmentation of human resource quality [16-18].

Vietnam is actively participating in global economic integration and experienced an annual growth rate of 14.3% in indirect exports during 2010-2019. Vietnam stands out as the regional leader in indirect exports, surpassing $160 billion in turnover in 2019. This figure is notably 4.3 times higher than that of the Philippines, a country with a similar economic size and development level. Consequently, Vietnam has emerged as a prominent player in the global value chain (GVC) sector and is increasingly considered a top alternative to China for labor-intensive manufacturing [19].

Although Vietnam's economy has significant trade openness and successfully attracts FDI, the level of participation in global GVCs of Vietnamese enterprises is still much lower than that of some other ASEAN countries [20]. Vietnam's GVC participation index fluctuated from 41% to 62% from 1990 to 2018, mainly due to changes in the backward GVC participation index [21]. The M&P sector has the highest level of participation in global GVCs among the sectors of the Vietnamese economy [21]. However, Vietnamese enterprises mainly participate in the GVCs in low-value-added segments such as processing and assembly [22, 23]. The contribution of the M&P sector to GDP is still minimal compared to other countries in the region [24]. Vietnam's M&P sector activities are still mainly based on backward rather than forward linkages. Therefore, enterprises need to participate more deeply in GVCs to improve productivity [25, 26].

Numerous studies worldwide have explored the factors influencing a sector's participation in GVCs [27, 28]. However, in the case of Vietnam, research in this area has primarily focused on a national level [27, 28]. At the enterprise level, a study conducted by Vu, et al. [29] highlights the role of information technology in creating favorable conditions for micro, small, or medium-sized enterprises to operate within a higher-quality business environment and engage with GVCs. Nonetheless, this study also underscores that such benefits may not extend to micro-enterprises operating within lower-quality business environments, limiting their capacity to integrate into GVCs.This paper aims to investigate the factors influencing GVC participation in Vietnam's M&P sector. It explores the impact of policies, the broader macroeconomic environment, and internal enterprise-related factors on GVC engagement in this sector. In light of these findings, the paper puts forward policy recommendations for the government to address these factors and enhance the positioning of enterprises within GVCs. The research endeavours to address the following questions: (i) What are the key factors influencing GVC participation among enterprises in Vietnam's M&P industry? (ii) How can businesses operating in this sector leverage opportunities to participate more effectively in GVCs?

The structure of this study is as follows: Section 2 provides a literature review of participation in GVCs, measuring value in GVCs, and factors affecting GVC participation. Section 3 describes the methodology and data, focusing on model specification, calculation variables, the method of estimation, and data resources. Section 4 presents estimation results and discussion. The last section is the conclusion and implications.

2. An overview of GVC and Factors Influencing Participation in GVC

2.1. Measuring Value in Global Value Chains

Several studies use the measure of *vertical specialization*[1] to gauge a country's competitiveness in GVCs. Hummels, et al. [30] and Hummels, et al. [31] estimated vertical specialization separately for intermediate and final goods to arrive at the relative competitive position of a country in the value chains. Although this is a better measure than the *import content of exports*, more is needed to capture the extent of participation of different countries in GVCs and their relative gains [32].

When assessing trade within GVCs as a proportion of global trade, two commonly employed metrics are Backward GVC participation and Forward GVC participation. Backward GVC involvement indicates that a nation's exports include value-added elements that were previously imported. Conversely, Forward GVC participation suggests that a country's exports are not entirely consumed by the importing nation; instead, they become integrated into the importing country's exports to other nations [33].

In practical terms, Backward GVC participation, known as the "buyer" perspective in GVCs, pertains to the proportion of "Foreign value-added content of exports" relative to the total exports of an economy. It reflects the economy's imports of intermediates to produce its exports. Forward GVC participation, representing the "seller" perspective in GVC participation, corresponds to the proportion of "domestic value added sent to third economies" in the total export of an economy. It encapsulates the domestic value added in inputs dispatched to third economies for subsequent processing and eventual export within the supply chains [34-36].

While GVC participation shares a connection with export and import activities, it fundamentally differs from these concepts. SMEs can participate in GVCs by (i) exporting goods or services directly to companies abroad or providing inputs to local companies that produce for export, or (ii) sourcing inputs from foreign suppliers to produce goods and services for domestic consumption and export [16]. The decisions of firms to engage in the global market through exporting and importing primarily emphasize their involvement without placing significant emphasis on the allocation of

[1] Vertical specialization occurs when a country uses imported intermediate inputs to produce exported goods. This definition captures the idea that countries link sequentially to produce the final goods.

value-added in production chains. In contrast, GVC directly centers on the tangible allocation of value-added behind transactions. In their study, Lu, et al. [37] employed the foreign value-added ratio (FVAR), calculated as the ratio of foreign value-added to total exports, to assess the extent of GVC participation among firms [37].

This study adopts the conceptual framework introduced by Borin and Mancini [33] and utilizes the Stata module developed by Belotti, et al. [38]. Consequently, we compute backward GVC participation using the Stata module by Belotti, et al. [38] and assess forward GVC participation at the sector level using OECD's Inter-Country Input-Output (ICIO) data.

2.2. Factors Affecting Enterprise Participation in GVC

2.2.1. Policies and Macroeconomic Environment

Shepherd [39] demonstrates that trade policies are pivotal in determining GVC participation. Additionally, the impact of service trade barriers has increased for enterprises involved in GVCs. As outlined by Urata [40] international economic policies characterized by restrictions, such as import protection and regulations on inward Foreign Direct Investment (FDI), have the potential to limit opportunities for Small and Medium Enterprises (SMEs) to participate in Global Value Chains (GVC). The high costs associated with intermediate raw materials or import input, along with other regulatory constraints, diminish the competitiveness of enterprises in the global market, posing challenges to their participation in GVCs. Fernandes, et al. [41] demonstrate the significance of factor endowments, geographical location, political stability, open trade policies, foreign direct investment, and the strength of domestic industrial capacity in influencing participation in Global Value Chains (GVCs).

Dollar and Kidder [42] reveal that the quality of institutions affects comparative advantage, which in turn influences participation in GVCs. Ge, et al. [43] highlight that insufficient institutions pose a significant obstacle to the development of Global Value Chains (GVCs) and regional integration in the countries associated with the "One Belt and One Road" (OBOR) initiative.

At the industry level, Dollar, et al. [44] and Ge, et al. [43] found a positive correlation between GVC participation and various indicators of institutional quality. Besides, Ramadan and Ahmad [45] showed a significant negative relationship between business environmental uncertainty and the performance of SMEs in the manufacturing industry. Research by Govori [46] and Govori [47] emphasizes the significant influence of external factors, including access to finance, competition, corruption, and government policies, on the growth and development of small and medium enterprises in Kosovo. The influence of the business environment and institutional factors on business operations and participation in GVCs has also been found in other studies ADB [48]; Bamber, et al. [49]; Cusolito, et al. [50]; Das, et al. [51]; Gaganis, et al. [52]; Korwatanasakul and Paweenawat [53]; Reddy and Sasidharan [54]; Rocha [55] and World Bank and OECD [56].

Shepherd [39] indicates that a country's macroeconomic conditions, such as inflation, can affect investment decisions made by leading firms. A key issue for lead firms within value chains pertains to their ability to enforce supplier contracts [39]. According to Angawati and Kurniawati [57], inflation and exchange rates have a negative and significant impact on exports in the 5 ASEAN countries, meaning that if inflation or exchange rate in a country increases, exports will decrease. Inflation has a negative and significant effect on exports in the ASEAN region [58]. The results of Silalahi, et al. [59] show that in the near term, the inflation variable exhibits a noteworthy adverse impact, whereas over the long term, there is a substantial positive effect. Similarly, Oduor, et al. [60] found that a unit increase in inflation reduces manufacturing value-added by 0.19269 units. On the other side, the research results of Okpe and Ikpesu [61] show that inflation positively affects food imports and negatively affects food exports in Nigeria. Bulut and Yaşar [62] indicate that exports at the lowest levels are positively impacted by economic growth; however, the impact of economic growth on exports is insignificant as export volume rises. A positive correlation is observed between inflation and exports when the export volume is high; however, no significant relationship is evident as exports continue to increase. Consequently, it is imperative to take into account the macroeconomic factors inherent to a country, and these factors should be considered in the context of international trade activities.

2.2.2. Firm Characteristics

Leading enterprises within a sector play an important role in the participation of sectors in GVC activities. These prominent enterprises can be identified based on firm size, technological level, labour productivity, etc. As demonstrated [63],only highly productive firms can become exporters. Urata [40] emphasizes the importance of competitiveness for enterprises engaged in GVCs. High labour productivity, the distinctiveness, or high quality of their products or services, and cost effectiveness are a few factors that affect SMEs' competitiveness[16, 37, 64]. In contrast, Korwatanasakul [65] indicates that labour productivity does not insignificantly impact GVC participation, a result consistent with the research conducted by Arudchelvan and Wignaraja [66] in the case of Malaysia.

Conversely, as noted by Mendoza [67], total factor productivity (TFP) emerges as a noteworthy determinant of small and medium enterprises' entry into GVCs. In contrast, the critical factor for large enterprises is their engagement in research and development (R&D) activities. An innovation strategy empowers enterprises to achieve higher product and process innovation levels, thus positively impacting their overall performance. Similar findings align with conclusions in studies [16, 68-71]. The productivity of leading enterprises can serve as the driving force for exports within their respective sectors, further motivating other enterprises to participate more deeply in GVCs. Nevertheless, do large enterprises in the industry create more supportive conditions for participation in GVCs? To address this question, two proxies, namely the proportion of large enterprises relative to the total number of enterprises in the sector and the sector's industrial concentration index, were used to assess the impact of independent variables on sector-level GVC participation. If this

indicator proves statistically significant with positive coefficients, it suggests that more large enterprises in the sector contribute positively to the sector's participation in GVCs, and vice versa.

The scale of the enterprise (firm size) also influences the GVC participation. Urata and Baek [72] found a positive correlation between firm size and GVC involvement. Similarly, Shepherd [39] also found a strong relationship between export performance and firm size. These findings are consistent with other studies [16, 37, 53, 66, 67, 73-75].

Enterprises with a longer operating history tend to accumulate more experience in production, import, export, and participating in GVCs. As the number of years of operation increases, SME performance improves Kinyua [76]. Mendoza [67] highlights that firm age and TFP are key factors influencing SMEs' participation in GVCs. Conversely, in contrast with the research mentioned above,Wignaraja [75] and Lu, et al. [37] found a significantly negative relationship, while Harvie, et al. [77] and Urata and Baek [72] did not find any statistically significant relationship.

2.2.3. FDI Spillover Effects

Foreign direct investment (FDI): Shepherd [39] indicates that the importation of intermediate products and inward FDI both have a positive impact on in-depth trade participation, while the importation of intermediate products alone also positively contributes to trade participation. Qiang, et al. [78] demonstrate that FDI has been the primary driver of GVC expansion over recent decades. Urata and Baek [72] observed that the FDI share as a percentage of GDP has a positive impact on GVC participation. Similarly, Nguyen and Truong [27] also present evidence that FDI inflows into Vietnam have a positive impact on the country's participation in GVCs in both forward and backward linkages. On the other hand, the role of net FDI inflows is found to be negative with India's participation in GVCs [79].

3. Methodology and Data

3.1. Model Specification

Building upon a literature review and considering the determinants impacting an industry's involvement in the GVC, this paper proposes a model to evaluate the effects of these factors within Viet Nam's M&P sector in the following form:

$$GVC_{jt} = \beta_0 + \beta_1 PO_t^P + \beta_2 MA_t^P + \beta_3 F\_CHA_{i,j,t}^P + \beta_4 S\_CHA_{i,j,t}^P + u_{i,j,t} + \varepsilon_{i,j,t} \quad (1)$$

In which *GVC* presents GVC participation, we focus on the GVC, Backward GVC, and Forward GVC of sector j at year t; *PO* stands for policies to support and promote firms. PCI (Provincial Competitiveness Index) serves as a proxy for this variable; *MA* represents macroeconomic stability. In this model, we employ the inflation-adjusted index as a proxy for macroeconomic stability, which is calculated by taking current-price regional GDP divided by the base-year regional GDP; *F_CHAR* is firm characteristics, including metrics such as TFP, HHI (Herfindahl-Hirschman Index), and ratio of a large firm in the sector; *S_CHAR* denotes sector characteristics. Our analysis assesses the impact of FDI on a sector's participation in GVCs by examining FDI involvement in the sector and the extent of FDI spillover effects on domestic enterprises; *I* and *j* are firm i in sector j in province p at year t and *P* denotes *province*.

3.2. Calculation Variables

3.2.1. Calculation GVC Participation

Many research studies have computed the GVC using the Input-Output (IO) table. The IO model, initially devised by Leontief [80] serves as a framework to depict and examine economic production and consumption relationships. The national IO tables primarily differentiate between domestic and foreign inputs from a specific country. Accordingly, the OECD developed the Inter-Country Input-Output Table (ICIO). The ICIO database is a versatile and flexible analytical instrument, facilitating the measurement of different dimensions of economic linkages between countries.

This paper relies on the approach outlined by Belotti, et al. [38] using the EORA MRIO to measure GVC participation as follows:

$$GVC_{sr} = GVCbackward_{sr} + GVCforward_{sr} \quad (2)$$

$$GVCbackward_{sr} = \frac{V_s(I-A_{ss})^{-1}\sum_{j\neq s}^{G} A_{sj}B_{js}E_{sr} + \sum_{t\neq s}^{G} V_t B_{ts} E_{sr}}{V_N E_{sr}} \quad (3)$$

$$GVCforward_{sr} = \frac{V_s(I-A_{ss})^{-1}A_{sr}(I-A_{rr})^{-1}\left(\sum_{j\neq r}^{G} Y_{rj} + \sum_{f\neq r}^{G} A_{rj}\sum_{k}^{G}\sum_{l}^{G} B_{jk}Y_{kl}\right)}{u_N E_{sr}} \quad (4)$$

Where, *s* and *r* are indices representing two countries, "country s" and "country r"; GVC_{sr} signifies the GVC-related trade share in total exports between country s and country r; $GVCbackward_{sr}$ denotes the backward GVC participation between country s and country r; $GVCforward_{sr}$ represents the forward GVC participation between country s and country r; *A* represents the OECD's Inter-Country Input-Output (ICIO) table; *B* is the inverse Leontief matrix of "A," calculated as "B = (I - A)$^{(-1)}$, where "I" is a unit matrix; V_s stands for the domestic value added of country s; *E* is a vector representing the net exports of country s to country r; $u_N E_{sr}$ signifies the total exports of country s to country r.

3.2.2. Calculation TFP

Building on the method that Olley and Pakes [82] originally developed, Levinsohn and Petrin [81] proposed the semi-parametric approach to calculate TFP. This semi-parametric method considers the following equation:

$$y_{it}^j = \alpha + \beta_l l_{it}^j + \beta_m m_{it}^j + \beta_k k_{it}^j + \omega_{it}^j + \varepsilon_{it}^j \quad (5)$$

Here y_{it}^{j} represents the output, l_{it}^{j} stands for labor input, m_{it}^{j} denotes raw materials (intermediate input), and k_{it}^{j} represents the value of intermediate input and capital. ω_{it}^{j} represents TFP productivity and ε_{it}^{j} is the model noise The error terms ω_{it}^{j} and ε_{it}^{j} are a standard, homogeneous, and mutually independent component of the distribution. Indices *i*, *j*, and t indicate enterprise *i*, sector *j*, and year *t*, respectively.

Econometric economists do not observe the productivity component ω_{it}^{j}, but the plant managers are aware of it, and it significantly influences plant operations. In contrast, the component ε_{it}^{j} exerts no discernible impact on plant decision-making, indicating unpredictable shocks with an average effect of zero on performance after input selection.

TFP in model (2) is determined based on two components that are not observed ω_{it}^{j}, ε_{it}^{j}. Hence: $TFP_{it} = \omega_{it} + \varepsilon_{it}$

Thus, based on model (5), TFP can be calculated as follows:

$$\boldsymbol{TFP_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_m m_{it} - \hat{\beta}_k k_{it}} \quad (6)$$

3.2.3. Calculation of FDI Diffusion Channels for Domestic Enterprises

In line with the argument of Aitken and Harrison [83] it is suggested that FDI generates spillover effects through horizontal spillover, backward spillover, and forward spillover [83]. FS_{ijt} indicates the proportion of capital owned by the i^{th} FDI enterprise within the overall capital of enterprises operating in sector *j* and at time *t*;

Horizontal$_{jt}$ *(Hor*$_{jt}$*)* ***(Horizontal Spillover)*** indicates the level of foreign investor involvement in the industry. The formula is expressed in the following form:

$$Hor_{jt} = \frac{\sum_i FS_{ijt} L_{ijt}}{\sum_i L_{ijt}} \quad (7)$$

Backward (Back$_{jt}$*)* represents the level of participation of foreign enterprises in industries providing inputs to FDI enterprises. As such, it reflects the degree of cooperation between domestic and FDI enterprises. Its calculation is outlined as follows:

$$Back_{jt} = \sum_{k\ if\ k \neq j} \gamma_{ikt} * Hor_{kt} \quad (8)$$

Where γ_{jk} is the share of the sector *j's* output supplied to sector *k*, it is derived from the I-O matrix. In the calculations γ_{jk}, input variables provided internally are not calculated because they are already expressed in *the Hor*$_{jt}$ *variable*. Therefore, the greater the participation of the foreign side in industries receiving inputs from industry *j* and the greater the share of intermediate products supplied to industries with the presence of multinational enterprises, the greater the value of this variable.

Forward (For$_{jt}$*)*: This variable represents the case of FDI enterprises providing input materials to domestic enterprises inside the same industry. The formula for calculating the Forward variable is as follows:

$$For_{jt} = \sum_{lif\ l \neq j} \delta_{ikt} * Hor_{lt} \quad (9)$$

Where the ratio δ_{ikt} (drawn from IO tables) denotes the inputs that enterprises in industry *j* purchased from enterprises in the upstream industry *l*, inputs purchased within the same industry ($l \neq j$) are excluded, as these values have already been captured by *Hor*$_{jt}$.

3.2.4. Calculation HHI

The term "HHI" refers to the Herfindahl–Hirschman Index proposed by Hirschman [84]. HHI measure of market concentration, calculated as the square root of the sum of the squares of the market share of each participant in the market [84] A higher HHI value implies higher specialization or concentration, while a lower HHI value implies greater diversification. So,

$$HHI = \sum_{i=1}^{n} w_{i,j,t}^{2} \quad (10)$$

In which, *w* is the ratio of the sale value of firm i^{th} in sector *j* in year *t* divided by the total sale of sector *j* in year *t*.

3.3. Data Resources

The General Statistics Office (GSO)'s annual National Enterprise Survey served as the source of data on businesses. This survey serves the purpose of collecting information on businesses to aid in the management, administration, assessment, and forecasting of the socio-economic situation. Additionally, it assists in the formulation of policies and plans for overall economic development, both at the national and local levels. For this particular study, we have utilized enterprise data specifically from the M&P industry, covering the years 2011-2020. The criteria for classifying businesses by size are based on the regulations outlined in Government Decree No. 80/2021/ND-CP, dated August 26, 2021. Data on the Provincial Gross Domestic Product are taken from the Provincial Statistical Yearbook for the period from 2011 to 2020.

Information regarding the Provincial Competitiveness Index (PCI) has been retrieved from the Annual Report titled "The Vietnam Provincial Competitiveness Index," which is published by the Vietnam Chamber of Commerce and Industry (VCCI).

The GVC data in this study has been computed utilizing the equations outlined in this paper (Equations 2, 3, 4) and leveraging the Eora Global Supply Chain Database as the data source. This database provides a time series of high-resolution input-output tables, along with corresponding environmental and social satellite accounts, covering 190 countries and categorized into 26 sectors. This study specifically focuses on the M&P sector in Vietnam during 2011-2020. This sector encompasses various industries, including food and beverages, textiles and wearing apparel, wood and paper,

petroleum, chemical and non-metallic mineral products, metal products, electrical and machinery, transport equipment, and other manufacturing.

Table 1 presents the variables used in the model, the meaning of the variables, and the corresponding data sources.

Table 1.
Meaning and source of variables.

Variables	Meaning	Source
gvc	Global value chain participation indicator	Calculation from EORA MRIO
Backwardgvc	Backward global value chain participation indicator	Calculation from EORA MRIO
Forwardgvc	Forward global value chain participation indicator	Calculation from EORA MRIO
Hhi	Herfindahl–Hirschman index	Calculation from GSO's VES data
ratio of LF	Total large firm/Total firm by sector	Calculation from GSO's VES data
Firmage	The number of years in operation	Calculation from GSO's VES data
Tfp	Total factor productivity	Calculation from GSO's VES data
Hori	Horizontal spillover	Calculation from GSO's VES data
Back	Backward	Calculation from GSO's VES data
For	Forward	Calculation from GSO's VES data
Lgdp	Log of provincial gross domestic product	The PGDP data is sourced from the provincial statistic yearbook
Lcpi	Log of GDP deflator (Which is calculated by dividing nominal GDP by the real GDP)	The GDP data is sourced from the annual statistical yearbook (GSO - General statistics office)
Lpci	Log of provincial competitiveness index	The PCI data is sourced from VCCI (Vietnam chamber of commerce and industry)

Table 2 describes the statistical values of the variables used in the model, including a total number of observations, mean value, standard deviation, and min, max values.

Table 2.
Statistical description of variables.

Variable	Obs.	Mean	Std. dev.	Min	Max.
gvc	387994	1069	1050	121	3616
Backwardgvc	387994	953	1004	101	3463
Forwardgvc	387994	116	56	17	262
hhi	387994	0.0049	0.0062	0.0014	0.2379
ratio of LF	387476	0.0553	0.0611	0.0039	0.3333
Firmage	387994	0.2903	1.0299	0.0000	9.0000
Tfp	387994	2.9300	0.7818	-4.6669	9.0661
Hori	387904	0.0172	0.0024	1.0000	0.0000
Back	387904	0.0120	0.0177	0.0022	0.9304
For	387904	0.0103	0.0139	0.0015	0.5698
Lgdp	387994	15.1695	0.1801	14.8856	15.4224
Lcpi	387994	5.5045	0.1009	5.2900	5.6423
Lpci	387994	4.1291	0.0639	3.8093	4.3187

3.4. Estimation Methodology

Model (1) is a static econometric model. Accordingly, the article proceeds to estimate this model in the form of panel data, employing both the Fixed Effect Model (FE) and Random Effect Model (RE). After obtaining the results of these two estimation methods, the paper conducts the Hausman test to determine the appropriate model selection. However, the time lag in research data can affect various economic relationships. When estimating a static model, there's a risk of overlooking the lagged effects of variables within the model, which can introduce bias into the model's estimation, as noted by scholars such as Bond [85], Baum [86], Greene [87] and Baltagi [88].

Starting from the model (1), a dynamic model can be built as follows:

$$GVC_{jt} = \beta_0 + \gamma GVC_{jt-1} + \beta_1 PO_t^P + \beta_2 MA_t^P + \beta_3 F\_CHA_{i,j,t}^P + \beta_4 S\_CHA_{i,j,t}^P + u_{i,j,t} + \varepsilon_{i,j,t} \quad (11)$$

Where, the coefficient γ represents the effect of the one-year lag of GVC on GVC at year t. The definitions of other variables remain as previously described.

Model (1') is referred to as a dynamic model. It's worth noting that Model (1') may have an endogeneity problem. The paper uses the Generalized Method of Moments (GMM), an instrumental variable approach that Anderson and Hsiao [89]

introduced, to address this issue. The GMM method has two commonly used estimation techniques: the first is Difference GMM (denoted D-GMM), proposed by Arellano and Bond [90] and Ahn and Schmidt [91]. The second is System GMM (denoted S-GMM), proposed by Blundell and Bond [92]. The difference between these estimation methods lies primarily in the selection of instrumental variables, which is based on different criteria.

4. Estimation Results and Policy Discussion

Based on the dataset collected and calculated for Vietnam's manufacturing and processing sector from 2011-2020, this paper conducts estimations using both static models and fixed and random effect estimation methods. Subsequently, a Hausman test is performed to determine the appropriate model selection. The test results indicate that the fixed effect model is used for analyzing and assessing the influence of factors on GVC. Details of these results are presented in Part 1 of the table below. In particular, the columns of the static model estimation results (1), (2), and (3) illustrate the influence of factors on GVC, Backward GVC, and Forward GVC, respectively. Moving forward, this paper estimates the dynamic model using the GMM. The outcomes of the dynamic model estimation are presented in Part 2 of the table below. Specifically, columns (4), (5), and (6) in Part 2 show the influence of factors on GVC, Backward GVC, and Forward GVC in a dynamic model, respectively.

Overall, the results obtained from both the static and dynamic model estimates (Table 3) exhibit a relatively consistent pattern in terms of the signs of the coefficients. In dynamic models, the lag of the independent variable is considered a control variable in the model for other explanatory variables. The initial value of sectors participating in the global value chain has an impact on the subsequent growth rate of participation in the global value chain. This finding provides evidence of conditional convergence during the integration period, and each industry in a country will eventually reach its steady-state level of participation in the global value chain. The estimated coefficient implies that a 1% lower initial level of sectors' participation in *GVC*, *Backward GVC*, and *Forward GVC* results in an increase in the growth rate of sectors' participation in GVC by 0.27, 0.38, and 0.5 percentage points, respectively.

Table 3.
Factors affecting GVC participation.

Variables	Static model			Dynamic model		
	(1)	(2)	(3)	(4)	(5)	(6)
	GVC	BackwardGVC	ForwardGVC	GVC	BackwardGVC	Forward GVC
L.lgvc				-0.3602***		
				(0.0086)		
L.lbackwardgvc					-0.5011***	
					(0.0085)	
L.lforwardgvc						-0.2366***
						(0.0181)
lback	-0.9130***	-0.8378***	-1.2475***	-0.9658***	-0.9173***	-1.0205***
	(0.0103)	(0.0108)	(0.0076)	(0.0964)	(0.0988)	(0.0777)
lfor	0.0693***	0.0044	0.4345***	0.0068	-0.0484**	0.3353***
	(0.0031)	(0.0033)	(0.0023)	(0.0190)	(0.0195)	(0.0155)
hhi	-3.7326***	-4.1856***	-1.9512***	-2.3948***	-2.7741***	-0.6199**
	(0.0864)	(0.0909)	(0.0643)	(0.3869)	(0.4107)	(0.2989)
ratio of LF	6.2582***	6.9248***	2.7335***	4.8076***	5.2484***	2.1552***
	(0.0164)	(0.0172)	(0.0122)	(0.1121)	(0.1166)	(0.0655)
firmage	0.0125***	0.0141***	0.0103***	0.0166***	0.0199***	0.0139***
	(0.0005)	(0.0005)	(0.0003)	(0.0011)	(0.0012)	(0.0007)
tfp	0.0001	0.0002	0.0029***	0.0058***	0.0067***	0.0054***
	(0.0004)	(0.0004)	(0.0003)	(0.0005)	(0.0006)	(0.0004)
lhori	0.8842***	0.8554***	0.9537***	0.9361***	0.9337***	0.7200***
	(0.0103)	(0.0109)	(0.0077)	(0.0920)	(0.0941)	(0.0741)
lgdp	-0.6507***	-0.8664***	0.5307***	-1.1482***	-1.4983***	0.4255***
	(0.0058)	(0.0061)	(0.0043)	(0.0174)	(0.0187)	(0.0145)
lcpi	1.1421***	1.3151***	0.4477***	2.4361***	2.7636***	1.1750***
	(0.0108)	(0.0114)	(0.0081)	(0.0327)	(0.0353)	(0.0194)
lpci	0.2265***	0.2574***	-0.0859***	0.1599***	0.2632***	-0.3056***
	(0.0074)	(0.0078)	(0.0055)	(0.0119)	(0.0133)	(0.0085)
Constant	14.9468***	17.6974***	-2.5405***	24.3495***	29.6969***	0.1699
	(0.0696)	(0.0732)	(0.0517)	(0.2280)	(0.2491)	(0.1481)
Observations	387,994	387,994	387,994	165,739	165,739	165,739
R-squared	0.4340	0.4722	0.5625			
Number of id	107,125	107,125	107,125	48,342	48,342	48,342

Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05

From the regression results, we can draw some observations on the impact of factors on the participation of manufacturing enterprises in Vietnam in the GVC as follows:

The Imperfect Market Competition: The results show that the HHI variable has a significant and negative correlation in all models. This result highlights that imperfect market competition causes adverse effects on Vietnam's processing and manufacturing industry's participation in the GVC. This also means that the market of the M&P industry is highly monopolistic and characterized by significant barriers that hinder the entry and participation of small and medium-sized enterprises (SMEs). This finding corroborates previous conclusions [53, 74, 93-95].

The Role of Large Firms: The LF variable has significant and positive effects in all models. This implies that a higher ratio of large enterprises in a sector positively influences the sectors' participation in the GVC. This positive impact of LF suggests that enterprises with greater scale, labour productivity, and technology powers will have more advantages when participating in the global value chain. The result aligns with earlier research findings [16, 39, 53, 63, 66, 67, 72], etc.

The Experience in the industry: The number of years a business has been in operation shows a positive and statistically significant impact on GVC participation. This resultshows that businesses with longer operational histories in the industry are more likely to engage in the GVC. This finding diverts from some previous studies [37, 72, 75] while aligning with others [67].

The Total factor productivity: TFP exhibits statistical significance in all models. However, our research contrasts the effects of TFP on GVC participation. In the GVC and backward GVC participation models, the TFP coefficient is negative, indicating that TFP in Vietnam's manufacturing sector does not significantly affect the value added of imported inputs for intermediate or final goods and services production. Conversely, in the forward GVC participation model, the TFP coefficient is positive, suggesting that TFP in Vietnam's manufacturing sector can positively influence the supply of final or intermediate goods to partner economies. These findings are not fully covered in prior research [16, 67, 70].

The Spillover Effects: Regarding the impact of FDI on the participation of industries in GVC, the positive and statistically significant coefficients of horizontal spillover in all models imply that horizontal spillover from FDI enterprises to domestic enterprises in the same industry promotes the industry's participation in GVC. However, the negative and statistical significance coefficient in the Backward variable indicates that the backward vertical spillover from FDI enterprises does not positively affect the industry's GVC participation. In contrast, forward vertical spillover from FDI enterprises, which involves supplying raw materials, parts, or finished products to newly emerging local or regional markets, promotes the sector's participation in GVC. These results exhibit variations compared to prior studies [27, 39, 72, 78].

Economic growth (GDP) and inflation: The GDP growth variable represents the province's economic growth. The coefficient of the GDP growth variable is negative in the backward GVC model and positive in the forward GVC model. These results imply that economic growth promotes industries that supply goods to other countries but does not significantly affect the input's value-added. Similarly, the lcpi_iLvariable has significant and positive effects in all models. This shows that positive inflation and low inflation rates will create positive effects on the GVC participation of Vietnamese manufacturing and processing enterprises. Previous studies about GDP growth and inflation have not analyzed in depth the impact of these variables on the industry's participation in the GVC.

The policy factors (PCI): Provincial policies, represented by the PCI variables, have a partially positive impact on promoting sectors' participation in GVCs. This finding underscores the role of provincial policies in encouraging industry involvement in the global value chain. Additionally, it suggests that the business environment within the provinces also contributes to sectors' engagement in the global value chain. These results resonate with earlier research findings [39, 42, 43, 56, 70].

5. Conclusion and Implication

This study shows that the competitive business environment, institutions, policies, enterprise size, TFP, age of the enterprise, and FDI all impact the participation of the processing industry manufacturing in Vietnam in the GVC.

Vietnam should provide more specific solutions for the M&P industry to enhance its participation in GVCs. These solutions are related to maintaining macroeconomic stability, improving the business environment, and implementing policies to support M&P enterprises.

Firstly, the role of leading enterprises or the number of large enterprises in an industry plays a crucial role in promoting the industry's participation in GVCs. Therefore, developing leading enterprises should be considered as one of the strategies to promote deeper industry participation in GVCs.

Secondly, improving the institutional and business environment and completing policies to support small and medium enterprises is the next important solution to promote the participation of Vietnam's M&P industry in GVCs.

Thirdly, the significant role of FDI enterprises in Vietnam's economic development has been evident in recent years. FDI enterprises also play a critical role in promoting the participation of Vietnam's industries in GVCs. Therefore, attracting FDI capital needs to be more appropriate in the current context. It is necessary to focus on FDI-oriented policies to promote forward links.

Fourthly, the role of technology within Vietnamese enterprises in exporting goods is another essential factor. Vietnamese enterprises should continue to improve their technology, and they require support from the government to enhance and innovate their technology.

Fifthly, improving total factor productivity, increasing labor productivity, and enhancing the quality of human resources are necessary steps. These factors have a positive impact on the participation of Vietnam's M&P industry in

GVCs. Improving the quality of education and training is necessary to respond: to today's changing contexts and to foster stronger links between educational institutions and businesses.

Finally, in the current global economic context, combined with Vietnam's participation in numerous trade agreements, import and export standards are becoming increasingly strict. Therefore, both the government and enterprises need to meet these standards to promote Vietnam's imports and exports in the coming time.

However, several other factors affecting GVC participation have not been considered in this study. These factors include export market information systems, access to financial markets, linkages between relevant parties, and the availability of input materials. We hope to explore these factors further in future studies.

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