ERIA Discussion Paper Series

No. 469

Impacts of FDI Presence and Product Sophistication on the Demand for Skilled and Unskilled Labour: Evidence from SMEs in Viet Nam

Quang Hoan TRUONG[#][§]

Institute for Southeast Asian Studies,
Viet Nam Academy of Social Sciences (VASS)

Van Chung DONG

Viet Nam Academy of Social Sciences (VASS)

February 2023

Abstract*: This study employs data from the Viet Nam Enterprise Survey (VES) for 2007 and 2011) to examine the effect of foreign direct investment (FDI) and product sophistication as well as the interaction between these two factors on the skilled and unskilled labour demand on Viet Nam's small and medium-sized enterprises (SMEs). It finds that the FDI presence in the same industry but different regions – and FDI in the same region but different industries – has a positive effect on the skilled labour demand and a negative impact on the unskilled labour demand. FDI in the same industry has a negative effect on the skilled labour demand and an advantageous impact on the unskilled labour demand. The product sophistication index is found to positively affect the skilled labour demand but decreases the demand for unskilled labour. When interacting with product sophistication, FDI presence in the same industry and region positively affects the skilled labour demand. The study also finds the opposite impacts of different types of FDI presence as well as the interaction between FDI presence and product sophistication on the demand for highly, medium-, and basic-skilled labour. Thus, it is important to consider the opposite effects of different types of FDI and the interaction between FDI presence and product sophistication on SME labour demand by skills level.*

Keywords: FDI presence; Product sophistication; SMEs; Skilled and unskilled labour demand; Viet Nam

JEL Classification: F15; F23; J23

---

1. Introduction

Foreign firms' activities can have various effects on both the home and host countries. With respect to firm labour skills, there are several channels through which foreign direct investment (FDI) presence can raise the demand for skilled labour in host countries. First, given their alleged superior technological knowledge, foreign affiliates have a higher demand for skilled labour, which can affect the demand for skilled labour in domestic firms (Souare and Zhou, 2016). Second, foreign affiliates may generate spillover effects of technological knowledge to domestic firms within the same industry via technical connections, business model learning, and enhanced competition, which increases the demand for skilled labour in locally owned firms, further raising the aggregate demand for skills and increasing wage inequality between skilled and unskilled labour (Souare and Zhou, 2016). Third, domestic firms can become suppliers of foreign firms' input materials or take advantage of foreign firms' output. The strong linkages between domestic firms and FDI firms provide favourable conditions for domestic firms to expand their production and to deeply engage in supply chains, which increases total labour demand (Nguyen et al., 2020).

There are also some channels through which FDI presence may not bring skills upgrades nor increase the demand for skilled labour. FDI firms may focus on taking advantage of cheap labour rather than training for their employees in host countries, leading to unchanged demand for skilled labour in host countries. In addition, when linkages between foreign and domestic firms are low, foreign firms are too dependent on imported materials or exports, leading to minimal changes in domestic firm demand for labour (Nguyen et al, 2020).

Along with FDI, product sophistication is another factor that affects demand for skilled and unskilled labour. More specifically, product sophistication can displace labour by reducing or eliminating the demand for particular goods and/or services in sectors that specialise in traditional activities (Dao et al., 2017; Adam et al., 2021). Product sophistication may also reduce employment within highly automatable occupations through the introduction of machines and robots (Acemoglu and Restrepo, 2020). Yet automation may also increase the need for occupations that require complex tasks (Autor and Salomons, 2018).

Very few empirical studies have investigated the impact of production sophistication on the demand for skilled and unskilled labour in developing countries at both the aggregated and disaggregated levels. Moreover, few studies have explored the effects of both FDI and product sophistication – as well as the interaction between these two factors – on the demand for skilled and unskilled labour, which is a crucial determinant of improvements in firm labour productivity. The most relevant work on this theme is that of Jia and Lopez (2020); using data on Chilean manufacturing, they investigated the role of product sophistication on the magnitude of FDI spillovers on the demand for both skilled and unskilled labour. They found that the presence of multi-national corporations increases the demand for highly skilled labour, while it decreases the demand for unskilled labour for firms located in the same industry and region as well as for firms located in the same region but operating in different industries. These effects are more substantial for firms that produce less sophisticated products.

Among emerging and developing countries, Viet Nam has been considered a preferred destination for FDI and a successful example of an export-led growth economy. Data from the General Statistics Office (GSO) of Viet Nam show that inward FDI into the country increased significantly from $8.0 billion in 2010 to roughly $15.5 billion in 2018.[1] In comparison, according to data from ASEANstats of ASEAN Secretariat, inward FDI into Viet Nam in 2018 was much higher than that in many ASEAN countries such as Thailand ($13.1 billion), Philippines ($9.9 billion), and Malaysia ($7.6 billion).[2] With respect to trade, data from the United Nations Comtrade Database show that total trade between Viet Nam and the rest of the world grew rapidly from $13 billion in 1995 to $518 billion in 2019.[3] This has resulted in a huge extension of the trade to the gross domestic product (GDP) ratio (i.e. trade openness) of Viet Nam, from 74.7% in 1995 to 152.2% and 210.4% in 2010 and 2019, respectively.[4] The country has made significant efforts to increase the contribution of sophisticated products, particularly electronic goods, to total exports, from 35.4% in 2015 compared to 7.9% in 2000.[5]

---

[1] https://www.gso.gov.vn/en/px-web/?pxid=E0411&theme=Investment
[2] ASEAN Secretariat, 'ASEANstats', https://data.aseanstats.org/indicator/FDI.AMS.TOT.INF
[3] United Nations, 'United Nations Comtrade Database', https://comtrade.un.org/data/
[4] World Bank, 'World Bank Development Indicators'.
https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS
[5] World Bank, 'World Integrated Trade Solution (WITS)', https://wits.worldbank.org/

However, from a long-term perspective, the dependence on labour-intensive production activities with low productivity and low value added will make it difficult for the economy and firms to sustain growth and development as well as to overcome the danger of the 'middle-income trap' (Herr, Schweisshelm, and Truong, 2016; Taguchi, Nguyen, and Pham, 2019). Historically, the average growth rate of real GDP per capita in Viet Nam during the last decade has not been sufficient for a quick catch-up; despite improvements, the ratio of skilled labour to the total labour force has remained modest (Table 1). Indeed, Viet Nam's labour productivity is amongst the lowest in the Asia–Pacific region – it is 15 times lower than in Singapore, 11 times lower than in Japan, 10 times lower than in the Republic of Korea, 5 times lower than in Malaysia, and 2.5 times lower than in Thailand (ILO, 2014).

It is worth noting that Viet Nam has a downward trend in its labour productivity growth. During 2002–2007, labour productivity increased by an average of 5.2% per year, but decreased to 3.3% between 2008 and 2013 (ILO, 2014). In Viet Nam, small and medium-sized enterprises (SMEs) play a major role, accounting for 98% of all enterprises, 40% of GDP, and the creation of 1.2 million jobs in 2016 (Dezan Shira and Associates, 2020). Given this context, Viet Nam offers an interesting and relevant case study to examine the effects of FDI presence and product sophistication on the demand for skilled and unskilled labour in SMEs.

Table 1: Scale and Ratio of Trained Workers According to Technical Expertise, 2007–2016

Expertise	2007	2010	2014	2015	2016	Growth on Average (% per year)
Scale (millions of labourers)	8.18	7.44	9.99	10.96	11.39	3.88
Share in total labour force (%)	17.37	14.63	18.59	20.29	20.92	
Elementary level	3.89	1.89	2.87	3.27	3.19	–0.42
Intermediate level	6.83	5.12	5.31	5.39	5.31	–1.14
College level	1.91	1.97	2.64	3.01	3.19	7.88
University and post-graduate level	4.74	5.65	7.76	8.62	9.23	9.81

Source: GSO of Viet Nam, 'Survey of Labour and Occupation in various years', https://www.gso.gov.vn/en/employment/

By using data from the Viet Nam Enterprise Survey (VES) for 2 years[6] (i.e. 2007 and 2011) and examining the demand for skilled and unskilled labour, this study discerns an important factor that affects labour productivity in Vietnamese SMEs, in particular, and the sustainability of Viet Nam's economic growth as a whole. It contributes to the literature in several ways. First, it is amongst the first to investigate the separate effects of FDI and product sophistication on Vietnamese SMEs' demand for skilled and unskilled labour. Second, it is amongst the first to consider the role of sophistication in the effect of FDI presence on Vietnamese SMEs' demand for skilled and unskilled labour. Third, it investigates the heterogeneity in the effects of FDI presence and product sophistication on Vietnamese SMEs' labour demand at different educational levels.

2.   Literature Review

Theoretical and empirical studies have found that the employment effects of FDI inflows can be positive for one country but negative for others, depending on the characteristics of the inflows and host economies.

Wu (2001) found that FDI does not increase the relative demand for skilled labour; thus, countries such as China attract FDI that takes advantage of cheap unskilled labour. This type of FDI usually results in relatively labour-biased technology transfers that employ more unskilled workers. In the United Kingdom, Bailey and Driffield (2007) found that the effects on demand for unskilled labour are negative but are positive for skilled labour. In a Brexit case, Bailey, Driffield, and Kispeter (2019) found that leaving a single market in the United Kingdom makes it more difficult for European businesses to invest in the United Kingdom's economy, putting almost 20% of current jobs – including relatively 'good jobs' – in the country at risk.

Piva and Vivarelli (2004) used a panel of manufacturing firms in Italy to investigate the impact of three possible determinants – research and development (R&D), organisational change, and FDI – on the ratio of skilled to unskilled workers. They found that the FDI impact is positive and mildly significant for white-collar workers and negative for blue-collar workers. Focussing on Poland, Crino (2005) discovered that in manufacturing industries, increasing (decreasing) FDI stocks are

---

[6] GSO of Viet Nam, 'Viet Nam Enterprise Survey (VES) in various years', unpublished data.

associated with higher (lower) shares of skilled labour in total wage bills and employment. However, in the transport equipment sector, the share of skilled labour in total employment is negatively correlated with the presence of FDI. Waldkirch, Nunnenkamp, and Bremont (2009) used a panel of almost 200 manufacturing industries spanning 1994–2006 in Mexico to estimate the effect of FDI and its interaction with major industry characteristics, such as skills and capital intensity and the propensity to export on demand for blue- and white-collar workers. They detected that FDI has a positive and significant effect on the employment of both blue- and white-collar workers. In more capital-intensive industries, they found that the employment effect of FDI remains positive only for blue-collar workers. Other notable studies of the effect of FDI on the labour market and labour skills include Feenstra and Hanson (1997), Harrison and Hanson (1999), Grasseni (2004), Fajnzylber and Fernandes (2009), and Bandick and Hansson (2009).

It can be observed from the literature that inward FDI or foreign affiliate presence has various and sometimes conflicting effects on the relative demand for skilled labour. Therefore, there is a need for more empirical studies on this topic.

Meanwhile, several works have introduced the measure of economic complexity to explain structural transformations and economic growth as a process of information development and learning how to produce and to export more complex products (Hidalgo and Hausmann, 2009; Abdon and Felipe, 2011; Tacchella et al., 2013). Another strand of recent literature examined factors that determine the sophistication of exports in countries, especially developing countries (Minondo, 2010; Córcoles, Díaz-Mora, and Gandoy, 2014; Eck and Huber, 2016; Tran, Truong, and Dong, 2020). There are few studies investigating the impact of product sophistication on the demand for skilled and unskilled labour, of which empirical evidence has shown that the effects can be both negative and positive. For instance, some studies found that the production of high-value sophisticated products requires human capital to complement physical capital, leading to an increase in the demand for high-skilled labour and a decline in low-skilled labour demand (Young and Zuleta, 2016; Arif, 2021; Adam et al., 2021). However, due to the introduction of new machines and robots, employment in industries producing more sophisticated products could be reduced (Acemoglu and Restrepo, 2020).

Several studies have examined economic development issues, such as exports and FDI in Viet Nam (McCaig, 2011; Nguyen, 2015; Nguyen and Truong, 2022; Yang, 2019; Ha, Holmes, and Hassan, 2020; Tran et al., 2020; Truong and Dong, 2021; Dong and Truong, 2022), but little research has focussed on the role of FDI and product sophistication on Vietnamese SMEs' demand for skilled and unskilled labour. In particular, there are no studies on the interaction between sophistication and FDI presence in the demand for skilled and unskilled labour for Vietnamese SMEs. The most relevant study is that of Nguyen et al. (2020), which assessed the impacts of FDI on the demand for aggregate employment and skilled labour in Viet Nam during 2011–2015 using panel data from all 63 Vietnamese provinces and the fixed-effects technique with robust standard errors. It found adverse effects of FDI on the demand for both aggregate employment and skilled labour in Viet Nam. Interestingly, the absolute magnitude of the effect on the employment of skilled labour is considerable. However, that study was based on a database of provincial and aggregate employment levels and did not consider the role of product sophistication nor interaction between FDI presence and product sophistication in Vietnamese SMEs' demand for skilled and unskilled labour.

To partially fill this research gap, this study employs data from the VES for 2007 and 2011 to examine the effect of FDI presence and product sophistication as well the interaction between these two factors on the skilled and unskilled labour demand in Vietnamese SMEs. This study also examines the effect on labour demand by education level.

3. Methodology and Data

3.1. Empirical Specification

To explore the effects of FDI presence and product sophistication on skilled (unskilled) labour demand, an empirical specification was developed originating from the approach proposed by Berman, Bound, and Grilliches (1994). First, the relationship between labour demand and presence of foreign factors and product sophistication is considered separately to scrutinise the impact of each element on the demand for labour by SMEs in Viet Nam. The estimation equation takes a logarithmic form as follows:

$$LD_{it} = \Phi_1 + \Phi_2 \frac{K_{it}}{Y_{it}} + \Phi_3 Y_{it} + \Phi_4 T_{it} + \Phi_5 F_{it} + \Phi_6 X_{it} + \eta_t + \tau_i + \epsilon_{it}. \qquad (1)$$

$$LD_{it} = \varphi_1 + \varphi_2 \frac{K_{it}}{Y_{it}} + \varphi_3 Y_{it} + \varphi_4 T_{it} + \varphi_5 SP_{it} + \varphi_6 X_{it} + \eta_t + \tau_i + \varepsilon_{it}. \qquad (2)$$

where, i and t denote individual firm and yearly time period; LD is the ratio of skilled (unskilled) labour demand of a firm; K and Y are capital stock and value-added output, respectively; T acts as a proxy of technology level; F is a vector of FDI presence; SP represents the index of product sophistication; X is a vector of firm characteristics, such as age or type of ownership (e.g. state-owned or private); η and τ are time fixed effects and individual fixed effects; and ϵ and ε are error terms. A labourer is considered skilled if he/she obtains a certificate of above conventional training education (i.e. intermediate education) and unskilled otherwise. These two estimation specifications are also in line with the theoretical approach of Bentolila and Saint-Paul (2003) and the seminal applications of Young and Tackett (2018), Souare and Zhou (2016), and Adam et al. (2021), where labour demands are multiplicative.

However, the labour demand variable (LD) in the above model differs from these studies in several respects. First, the ratio of skilled (unskilled) labourers to the aggregate labourers of a firm is considered rather than the absolute number of skilled (unskilled) labourers, as in Jia and Lopez (2020), Adam et al. (2021), and Arif (2021). It is straightforward to find that the total demand for labour increases with the process of production expansion or new investments, but this trend is not ensured for the growth ratio of either skilled or unskilled labourers. This depends on the aspects of expansion that require either a high or low demand by professionals. Intuitively, considering the ratio of skilled (unskilled) labour demand helps capture the trend and actual growth of not only general labour demand but also the specific demand of skilled and unskilled labourers. Second, the ratio of skilled (unskilled) labourers is preferred relative to the ratio of the wage bill, as shown by Young and Tackett (2018) and Souare and Zhou (2014). For SMEs in developing countries such as Viet Nam, the wage gap (income gap) between labourers in the same group is not quite characteristic. Thus, the ratio of skilled (unskilled) labour demand in the wage bill, to some extent, may not appropriately represent the situation of the country of interest. In addition, different levels of skilled (unskilled) labour demand are considered to distinguish the differences amongst tiers of labourers in the same group, which have been considered carefully in the literature.

As mentioned by Jia and Lopez (2020), firms with foreign investors tend to

produce products with relatively high indices of product sophistication. The main reason is that foreign firms enjoy significant advantages over their domestic counterparts, such as capital, human resources, management skills, and technology. Thus, it is necessary to examine the cross-effects of FDI presence and product sophistication on labour demand. To do so, these two factors are incorporated into the model as follows:

$$LD_{it} = \zeta_1 + \zeta_2 \frac{K_{it}}{Y_{it}} + \zeta_3 Y_{it} + \zeta_4 T_{it} + \zeta_5 SP_{it} + \zeta_6 F_{it} + \zeta_7 SP_{it} F_{it} + \zeta_8 X_{it} + \eta_t + \tau_i$$
$$+ \theta_{it}. \tag{3}$$

where, $SP_{it}F_{it}$ measures the cross-effect of FDI and product sophistication on the labour demand of firm, θ is the disturbance term, and others remain.

Note that $SP_{it}F_{it}$ in this model is different from that in Jia and Lopez (2020), because a dummy variable is not created for product sophistication, then weighted by the presence of foreign investment. In the literature, either a low or high index of product sophistication is associated with foreign investor participation. This is because not all foreign investors have higher technology and higher management levels, especially in developing countries such as Viet Nam. From this perspective, weighting the FDI factor by the absolute value of product sophistication to consider the cross-effects on changing labour demand is more appropriate.

3.2. Variables and Data

This study employs firm-level data from the VES, conducted annually by the General Statistics Office of Viet Nam. It is a national survey compiled across all 63 provinces. The survey uses a census of all registered firms active in the domestic market. This study focusses on small and medium-sized domestic manufacturing firms; therefore, SMEs are limited to those with fewer than 200 employees, which is in line with the definition of SMEs introduced by the GSO in 2018. For the quality of labour (unskilled and skilled), the survey questions include information about employees' education and training in nine categories. Specifically, if labourers are listed in the categories of basic labour, untrained labour, primary labour, and 'trained but not having a certification', then they are considered as unskilled labourers; if labourers hold college certificates or above, they are indexed as skilled labourers.

The VES provides information about firms' number of labourers for all years, but the information for skilled labourers is available only in three data sets for 2001, 2007,

and 2011, with detailed information on training. Table 2 briefly presents a summary of the VES for 2001, 2007, and 2011. Owing to the lack of available data, 2007 and 2011 are estimated. Note that the longitudinal data for 2007 and 2011 are estimated, and 2007 and 2011 are also estimated separately. In addition, all firms are excluded with inconsistent data from the raw survey data, such as fewer-than-zero total number of labourers, negative revenue, and negative total assets. The manufacturing sector is the focus; detailed sectors are presented in Appendix 1.

Table 1: Summary of the Vietnam Enterprise Survey

Statistic	2001	2007	2011
Total firms	44,546	146,110	303,764
SMEs	43,152	143,938	300,259
Workers (per firm)	33.1	24.2	33.1
Females (per firm)	7.5	5.8	15.12
Males (per firm)	25.6	18.4	40.19
Foreign firms	1,938	4,280	8,525
Domestic firms	39,350	136,870	290,340
State firms	27,027	8,419	15,342
Private firms	14,261	132,731	283,523

SMEs = small and medium-sized enterprises.
Source: GSO of Viet Nam, 'Viet Nam Enterprise Survey (VES) in various years', unpublished data.

Trade and other related data at the product level used in this study were retrieved from the World Integrated Trade Solution (WITS) database[7] and World Bank Development Indicators.[8] Note that the names of the products of SMEs use the International Standard Industrial Classification (ISIC) codes at the 4-digit level, which corresponds to trade data codes collected from the WITS. Thus, the compatibility of the different data sources used in this study allows the creation of specific firm-industry data.

To generate product sophistication, first, the approach proposed by Hausmann,

---

[7] World Bank, 'World Integrated Trade Solution (WITS)', https://wits.worldbank.org/
[8] World Bank, 'World Bank Development Indicators',
  https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

Hwang, and Rodrik (2007) is followed, as is the construction at the firm level introduced by Eck and Huber (2016). The product sophistication index is:

$$SP_{kt} = \sum_k \frac{Sales_{ikt}}{\sum_k^K Sales_{ikt}} \sum_i \frac{\left(\frac{x_{ik}}{X_i}\right)}{\sum_i \left(\frac{x_{ik}}{X_i}\right)} INC_i, k = 1, \dots K, \qquad (4)$$

where, *Sales* represent the total sales of a firm; x is the export; while X is the total export; *INC* is income per capita; and *i, k,* and *K* denote country, product, and industry, respectively.

For the presence of FDI, the framework of Jia and Lopez (2021) is followed. The specifications are:

$$F_{ijlt} = \frac{\sum_{i \in j,l}(D_{ijlt}V_{ijlt}) - D_{ijlt}V_{ijlt}}{\sum_{i \in j,l} V_{ijlt}}, \qquad (5.1)$$

$$F_{j-lt} = \frac{\sum_{i \in j}(D_{ijlt}V_{ijlt}) - \sum_{i \in j,l}(D_{ijlt}V_{ijlt})}{\sum_{i \in j} V_{ijlt} - \sum_{i \in j,l} V_{ijlt}}, \qquad (5.2)$$

$$F_{-jlt} = \frac{\sum_{i \in l}(D_{ijlt}V_{ijlt}) - \sum_{i \in j,l}(D_{ijlt}V_{ijlt})}{\sum_{i \in l} V_{ijlt} - \sum_{i \in j,l} V_{ijlt}}, \qquad (5.3)$$

where, *i, j, l,* and *t* denote firm, industry, location, and time, respectively; *D* is a dummy variable that shows the presence of foreign investors (taking value 1, other 0); and *V* measures the value added of a firm. F_{ijlt}, F_{j-lt}, and F_{-jlt} are measures of FDI in the same industry and region, same industry but different regions, and same region but different industries, respectively.

To some extent, as traditionally shown, the FDI variables in the model play a role similar to the spillover effect of the FDI sector. However, the variables of the presence of foreign ownership in this approach can do better, because they can explain the relationship between FDI and labour demand through economic agglomeration. Table 3 provides an explanation of considered variables. Tables 4, 5, and 6 summarise descriptive statistics for all variables in the estimations for 2007 and 2011 and the longitudinal data for these 2 years.

Table 2: Explanation of Variables

Notation	Meaning
Unskilled labour ratio	Ratio of unskilled labourers over total labourers in firm
Skilled labour ratio	Ratio of skilled labourers over total labourers of firm
Skilled labour	Total skilled labourers of firm
Unskilled labour	Total unskilled labourers of firm
High-skilled labour	Total highly educated labourers of firm, who obtained bachelor's degrees and above
Medium-skilled labour	Total medium-educated labourers of firm, who had some college or a TVET degree
Basic-skilled labour	Total basic-educated labourers of firm, who obtained basic education degree or below
K/Y	Ratio of capital stock over value-added output (revenue)
Revenue	Value-added output (revenue of firm)
Technology	Ratio of capital over labour, considered as the proxy of technology level
SP	Product sophistication
F51	Presence of FDI (equation 5.1), measure of FDI in the same industry and region.
F52	Presence of FDI (equation 5.2), measure of FDI in same industry but different regions
F53	Presence of FDI (equation 5.3), measure of FDI in same region but different industries
Ownership	If firms are stated-owned firms, they take a value of 1, otherwise 0.
EX	Export dummy, if firms export, they take a value of 1, otherwise 0.
Age	Firm's age, which is calculated from a firm established to 2007 for year of 2007, and 2011 for year of 2011.

FDI = foreign direct investment, TVET = technical and vocational education and training.
Source: Authors.

Table 3: Summary of Variables, 2007

Variable	Obs	Mean	Std. Dev.	Min	Max
Skilled labourers	22,279	30.471	40.437	1	200
Unskilled labourers	22,279	2.744	6.559	1	150
Highly skilled labourers	22,279	25.533	36.298	1	200
Medium-skilled labourers	22,279	7.637	14.957	1	199
Basic-skilled labourers	22,279	0.045	0.37	1	25
K/Y	22,279	14.598	1,096.153	0	150,942
Revenue	22,279	10,152.589	47,585.975	1	2,730,931
Technology	22,279	219.24	1,115.266	0	108,890.19
SP	22,279	0.277	1.614	0	49.327
F51	22,279	0.086	0.038	0	0.177
F52	22,279	0.086	0.038	0	0.177
F53	22,279	0.081	0.029	0	0.153
Ownership	22,279	0.046	0.21	0	1
EX	22,279	0.376	0.484	0	1
Age	22,279	22.869	0.906	1	62

Source: Authors.

Table 4: Summary of Variables, 2011

Variables	Obs	Mean	Std. Dev.	Min	Max
Skilled labourers	42,103	10.689	19.108	1	200
Unskilled labourers	42,103	20.622	31.414	1	200
Highly skilled labourers	42,103	4.591	11.609	1	197
Medium-skilled labourers	42,103	8.396	16.322	1	196
Basic-skilled labourers	42,103	18.324	29.829	1	200
K/Y	42,103	20.599	710.099	0	106,299
Revenue	42,103	17,024.039	109,854.56	1	10,185,151
Technology	42,103	630.143	3,216.682	0	305,032.63
SP	42,103	0.186	1.227	0	49.755
F51	42,103	0.068	0.033	0	0.134
F52	42,103	0.068	0.033	0	0.134
F53	42,103	0.068	0.025	0	0.245
Ownership	42,103	0.032	0.175	0	1
EX	42,103	0.149	0.356	0	1
Age	42,103	24.57	0.364	1	66

Source: Authors.

Table 5: Summary of Variables, 2007 and 2011

Variables	Obs	Mean	Std. Dev.	Min	Max
Skilled labourers	64,382	17.535	29.885	1	200
Unskilled labourers	64,382	14.436	27.066	1	200
Highly skilled labourers	64,382	11.838	25.363	1	200
Medium-skilled labourers	64,382	8.134	15.867	1	199
Basic skilled labourers	64,382	11.998	25.642	1	200
K/Y	64,382	18.522	863.443	0	150,942
Revenue	64,382	14,646.215	93,199.494	1	10,185,151
Technology	64,382	487.952	2,689.808	0	305,032.63
SP	64,382	0.218	1.374	0	49.755
F51	64,382	0.074	0.034	0	0.177
F52	64,382	0.074	0.034	0	0.177
F53	64,382	0.072	0.027	0	0.245
Ownership	64,382	0.037	0.188	0	1
EX	64,382	0.227	0.419	0	1
Age	64,382	23.327	0.694	1	66

Source: Authors.

4. Estimation Results

Estimations based on equations (1) and (2) are provided for the share of skilled (unskilled) labour in Vietnamese SMEs using longitudinal data for 2007 and 2011 (Table 7). Columns (1) and (2) provide estimation results for the effect of FDI presence and product sophistication separately. Column (3) presents estimation for all factors, including the interaction between FDI and product sophistication. Estimations for 2007 and 2011 are provided in Appendixes 2 and 3. In general, there is consistency in the signs and magnitudes of the coefficients between these two approaches. Thus, these analyses are based on estimations using longitudinal data.

Table 6: Estimation Results for Skilled and Unskilled Labour Demand, 2007 and 2011

Variable	Skilled Labour Ratio			Unskilled Labour Ratio		
	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0001***	0.0001***	0.0001***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.3452***	0.3487***	0.3340***	0.3126***	0.3008***	0.3150***
	(0.0025)	(0.0028)	(0.0026)	(0.0026)	(0.0028)	(0.0026)
Technology	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−46.9908***		−96.1750***	107.0863***		103.9915***
	(13.2655)		(38.2164)	(37.6784)		(38.9568)
F52	66.2419***		90.8623***	−128.7183***		−105.8597***
	(37.4311)		(38.3884)	(37.8445)		(39.1297)
F53	0.1608**		0.9143***	-0.6475**		−0.4896**
	(0.9115)		(0.9296)	(0.9143)		(0.9346)
SP		0.0495***	0.0150*		−0.0126***	−0.0019**
		(0.0036)	(0.0077)		(0.0036)	(0.0078)
SPF51			72.2663***			−51.3438***
			(37.5617)			(37.9771)
SPF52			73.4480***			−52.2827***
			(37.6427)			(38.0586)

	(1)	(2)	(3)	(4)	(5)	(6)
SPF53			0.2713**			−0.4160**
			(0.1983)			(0.1993)
Ownership	0.2076***	0.3653***	0.1896***	−0.0902***	−0.2816***	−0.0848***
	(0.0253)	(0.0268)	(0.0253)	(0.0254)	(0.0274)	(0.0254)
Age	0.4018***	0.1476***	0.4012***	0.3170***	0.6070***	0.3161***
	(0.0077)	(0.0076)	(0.0077)	(0.0078)	(0.0078)	(0.0078)
EX	−0.7040***	−0.6472***	−0.7120***	−0.1027***	−0.1707***	−0.0996***
	(0.0118)	(0.0125)	(0.0118)	(0.0119)	(0.0128)	(0.0119)
Constant	−1.4005***	−0.8046***	−1.3171***	−0.9240***	−1.5953***	−0.9406***
	(0.0394)	(0.0294)	(0.0401)	(0.0395)	(0.0301)	(0.0403)
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes
Observations	62,417	62,417	62,417	62,417	62,417	62,417
R-squared	0.4095	0.3356	0.4126	0.4257	0.3294	0.4261

Notes:
1. Standard errors in parentheses.
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors.

With respect to the effect of FDI presence, the estimation results show that FDI presence in the same industry and region (F51) has a negative impact on Vietnamese SMEs' demand for skilled labour but a positive effect on the share of unskilled labour. This is possibly because FDI firms in same industry and region take advantage of cheap labour rather than of training for their employees in host countries, leading to unchanged demand for skilled labour in host countries. In addition, when linkages between foreign and domestic firms are low, foreign firms are too dependent on imported materials or exports, leading to minimal changes in domestic firm demand for skilled labour (Nguyen et al., 2020). FDI flows in same industry but different regions (F52) reduce the unskilled labour share while increasing the skilled labour share. Likewise, the presence of FDI in the same region but different industries (F53) has an advantageous effect on the demand for the skilled labour share, while it has a disadvantageous effect on the unskilled labour demand. However, the magnitude of the effect of FDI presence in same region but different industries is much lower than that of FDI presence in same industry but different regions.

In terms of product sophistication, the product sophistication index positively affects the demand for the skilled labour share while negatively influencing the demand for the unskilled labour share. This shows that the production of high-value sophisticated products requires human capital to complement physical capital, leading to an increase in the demand for highly skilled labour (Young and Zuleta, 2016; Arif, 2021).

Estimates in Column (3) show that FDI in the same region and industry (SPF51) positively affects the demand for skilled labour, which is the opposite when considering the effect of FDI presence in same region and industry. This implies that the effect of FDI presence in the same industry and region on the skilled labour demand can be positive in industries producing more sophisticated products. There is a positive effect on the skilled labour demand and a negative effect on the unskilled labour demand when there is an interaction of product sophistication with FDI presence in the same industry but different regions (SPF52) and FDI in the same region and different industries (SPF53). It should be noted that when interacting with product sophistication, the positive effect of FDI presence in the same industry but different regions on skilled labour demand is lower. This means that FDI presence in the same

16

industry but different regions generates a lower demand for skilled labour in industries producing more sophisticated products.

In addition, when interacting with product sophistication, FDI presence in the same region and industry has a negative effect on the demand for unskilled labour, which is the opposite when the effect of FDI presence in the same industry and region is considered. This means that the higher the sophistication level of the sector, the lower the effect of FDI presence in the same industry and region on the demand for skilled labour. The negative effect of the product sophistication index as well as of the interaction between FDI and product sophistication on the demand for unskilled labour indicates that product sophistication can displace labour by reducing or eliminating the demand for particular goods and/or services in sectors that specialise in traditional activities (Dao et al. 2017; Adam et al., 2021).

With respect to firm characteristics, the ratio of capital stock to value-added output has a positive effect on the demand for both skilled and unskilled labour in Vietnamese SMEs. The same observation can be made for the effect of revenue. These expected results show that growing revenue helps Vietnamese SMEs expand their production capability, thereby increasing the demand for skilled and unskilled labour. The estimation shows that technology level (i.e. capital–labour ratio) has lower demands for both skilled and unskilled labour. However, the magnitude of this effect is relatively small. A positive relationship is noted between ownership status and skilled labour demand, indicating that state-owned firms tend to have a higher demand for skilled labour than private firms. The effects are larger when including only product sophistication in the model, suggesting that state-owned SMEs in sectors producing more sophisticated products tend to have a higher demand for skilled labour (Column (2)).

Meanwhile, state-owned SMEs are found to have a lower demand for unskilled labour. This also indicates that private SMEs have a higher demand for unskilled labour, which may be appropriate for their technology capabilities. The estimation shows that firm age has a positive effect on demand for both skilled and unskilled labour. These results indicate that SMEs with more experience can easily expand their production and business activities, leading to an increase in labour demand. Firms that participate in export activities decrease their demand for skilled and unskilled labour,

of which the negative effect on skilled labour demand is higher than that on unskilled labour demand. This is possibly because these firms tend to restructure their labour sources to be more effective in the international market.

Next, the effect of FDI presence and product sophistication on the demand for skilled labour at different educational (skills) levels are estimated (highly, medium-, and basic-skilled) for the longitudinal data for 2007 and 2011 (Table 8). Columns (1) and (2) show estimation results for the effect of FDI presence and product sophistication separately. Column (3) presents estimations for all factors, including the interaction between FDI presence and product sophistication. Appendices 4 and 5 provide separate estimation results for 2007 and 2011, respectively. The results of these two approaches are relatively consistent.

Table 7: Estimation Results for Labour Demand by Educational Levels, 2007 and 2011

Variable	Highly Skilled Labourers			Medium-Skilled Labourers			Basic-Skilled Labourers		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.2727***	0.2779***	0.2589***	0.3120***	0.3068***	0.3026***	0.2166***	0.2067***	0.2275***
	(0.0027)	(0.0030)	(0.0028)	(0.0022)	(0.0023)	(0.0023)	(0.0027)	(0.0031)	(0.0027)
Technology	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−38.5098***		−20.8270***	−43.4872***		−53.8749***	45.6542***		50.4203***
	(44.5812)		(45.4458)	(19.8108)		(20.7093)	(43.4841)		(44.5584)
F52	63.9937***		46.7882***	45.4493***		56.0091***	−72.1384***		−77.1177***
	(44.7556)		(45.6268)	(19.9553)		(20.8595)	(43.6572)		(44.7382)
F53	1.3848		0.5828	3.3056***		2.6623***	−9.5206***		−9.0335***
	(0.9601)		(0.9782)	(0.7956)		(0.8118)	(0.9528)		(0.9722)
SP		0.0645***	0.0319***		0.0424***	0.0131*		−0.0553***	−0.0158**
		(0.0039)	(0.0081)		(0.0029)	(0.0067)		(0.0040)	(0.0081)
SPF51			−52.9247***			−41.5383***			85.6067***
			(21.6185)			(67.7374)			(81.1205)
SPF52			54.2821***			41.5824***			−86.0755***
			(21.7037)			(37.8081)			(81.2052)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SPF53			0.1744**			0.2569**			−0.2445**
			(0.2086)			(0.1731)			(0.2074)
Ownership	0.3665***	0.5807***	0.3444***	0.0432*	0.0649***	0.0299	−0.1966***	−0.4573***	−0.1799***
	(0.0267)	(0.0292)	(0.0266)	(0.0221)	(0.0221)	(0.0221)	(0.0265)	(0.0301)	(0.0265)
Age	0.2819***	−0.0621***	0.2809***	0.2793***	0.2308***	0.2775***	0.2484***	0.6571***	0.2494***
	(0.0082)	(0.0083)	(0.0081)	(0.0068)	(0.0063)	(0.0068)	(0.0081)	(0.0086)	(0.0081)
EX	−0.6353***	−0.5584***	−0.6449***	−0.3250***	−0.3168***	−0.3301***	0.2217	−0.1293***	−0.2288***
	(0.0125)	(0.0137)	(0.0124)	(0.0103)	(0.0103)	(0.0103)	(0.0124)	(0.0141)	(0.0124)
Constant	−1.4666***	−0.6098***	−1.3710***	−1.4563***	−1.2423***	−1.3817***	−0.2142***	−1.4091***	−0.2913***
	(0.0415)	(0.0321)	(0.0422)	(0.0344)	(0.0242)	(0.0350)	(0.0412)	(0.0330)	(0.0420)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	62,417	62,417	62,417	62,417	62,417	62,417	62,417	62,417	62,417
R-squared	0.3457	0.2111	0.3505	0.3661	0.3647	0.3688	0.4079	0.2333	0.4104

Notes:
1. Standard errors in parentheses.
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors.

FDI presence in the same industry and region (F51) has a negative effect on the demand for highly and medium-skilled labour. In the full model, the negative effect of FDI presence in the same industry and region on highly skilled labour demand is lower. In contrast, there is a positive relationship between FDI presence in the same industry and region and the demand for basic-skilled labour. FDI presence in the same industry but different regions (F52) has an advantageous effect on the demand for highly and medium-skilled labour while negatively affecting basic-skilled labour demand. The presence of FDI in the same region but different industries (F53) increases the demand for medium-skilled labour while negatively affecting the basic-skilled labour demand. An effect of FDI presence in same region but different industries on the demand for highly skilled labour is not found.

With respect to product sophistication, estimation results show that this variable has a positive effect on the demand for highly and medium-skilled labour. This effect is in line with the estimation result in Table 7, reconfirming that in industries producing more sophisticated products, the demand for highly skilled labour is greater. On the contrary, there is a negative nexus between the product sophistication index and basic-skilled labour demand. In all models, the effect of product sophistication is significantly lower than that of FDI presence.

When interacting between FDI variables and product sophistication, FDI presence in the same industry and region (SPF51) has a negative effect on the highly and medium-skilled labour demand. The estimates suggest that FDI presence in same industry and region decreases SME demand for highly and medium-skilled labour for more sophisticated products. On the contrary, the interaction between FDI presence in the same region and industry and product sophistication index positively affects the demand for basic-skilled labour. The interaction between product sophistication index and FDI presence in the same industry but different regions (SPF52) has a positive impact on the demand for highly and medium-skilled labour. This indicates that the effect of FDI presence in the same industry but different regions on the highly and medium-skilled labour demand is greater for more sophisticated products.

In contrast, the interaction between FDI in the same industry but different regions negatively affects the demand for basic-skilled labour. This suggests FDI presence in the same industry but different regions decreases the demand for basic-skilled labour in

more sophisticated products. The estimation of FDI presence in the same region but different industries interacting with the product sophistication index (SPF53) has a positive effect on the highly and medium-skilled labour demand, showing that FDI in the same region but different industries increases the demand for highly and medium-skilled labour for more sophisticated products. On the contrary, this interaction negatively affects the demand for basic-skilled labour.

In terms of firm characteristics, the ratio of capital stock to revenue has a positive effect on demand for all skills levels, but the magnitude of the effect is very small. The estimation also shows the advantageous impact of revenue on SME demand for all skills levels. These expected results again indicate the effect of revenue on expanding SME production capability, thereby increasing their labour demand at all skills levels.

The SME technology level negatively affects demand for highly, medium-, and basic-skilled labour, but the magnitude of the effect is very small. Variable ownership increases the demand for highly and medium-skilled labour, demonstrating that state-owned firms tend to use highly skilled labour. In contrast, variable ownership has a negative effect on SME demand for basic-skilled labour, indicating that state-owned SMEs tend to decrease basic-skilled labour.

In the full model, firm age increases the demand for highly skilled labour. There is also a positive nexus between firm age and demand for medium- and basic-skilled labour in all models. Again, these results suggest that SMEs operating longer have a higher labour demand at all skills levels to expand their production and business activities. The estimation shows that the export status of SMEs has a negative effect on the demand for highly and medium-skilled labour. When only considering FDI presence, there is no effect of a firm's export status on basic-skilled labour. However, when interacting FDI presence with the product sophistication index, firm export status negatively affects the basic-skilled labour demand.

5. Conclusions

The study employs firm-level data from the VES for 2007 and 2011 to investigate the effect of FDI presence and product sophistication as well as the interaction between these two factors on Vietnamese SMEs' demand for skilled and unskilled labour. FDI in the same industry and region has a negative effect on the skilled labour demand while increasing the unskilled labour demand. Meanwhile, FDI presence in the same industry but different regions – and FDI in the same region but different industries – has a positive effect on the demand for skilled labour while decreasing the unskilled labour demand. When interacting with the product sophistication index, FDI presence in the same industry and region positively affects the skilled labour demand. This suggests that the effect of FDI presence in the same industry and region in the skilled labour demand can be positive in sectors with more sophisticated products.

Meanwhile, in sectors with more sophisticated products, the effect of FDI presence in the same industry and on the unskilled labour demand becomes negative. When interacting with the product sophistication index, the magnitude of the positive effect of FDI in the same industry but different regions and FDI in same region but different industries is significantly smaller.

The effect of FDI presence and product sophistication index and the interaction between these two factors on Vietnamese SMEs' demand for highly, medium-, and basic-skilled labour is also examined. Results show that FDI presence in the same industry but different regions positively affects the demand for highly and medium-skilled labour while decreasing the demand for basic-skilled labour. FDI in the same region but different industries is found to positively affect the medium-skilled labour demand while decreasing the basic-skilled labour demand. When interacting with the product sophistication index, FDI presence in the same region but different industries has an advantageous effect on the highly skilled labour demand. This study finds a positive effect of firm ownership and age on the skilled labour demand and a negative impact on the unskilled labour demand.

In terms of policy implications, the estimations indicate that while attracting FDI may help increase the productivity of domestic firms through spillovers, it is important to consider the differential effects of FDI on SME labour demand at different skills levels. The attraction of FDI may generate higher demand for skilled labour in different

industries and regions. This suggests that policies should aim to support the development of skilled labour in SMEs when there is FDI presence in different regions and industries. When there is FDI presence in the same industry and region, this support may still be useful regarding more sophisticated products.

FDI can also reduce employment opportunities for low-skilled or unskilled labour. Thus, while attracting FDI, the government should also consider the negative effect of FDI on the employment of less-skilled workers. This has become increasingly important when most export industries in Viet Nam are labour-intensive. Likewise, higher product sophistication in manufacturing sectors may also reduce the employment opportunities of low-skilled labour, which requires improvement in skills training programmes. In addition, while trying to improve labour skills, it may also be necessary to have measures to protect the employment of less-skilled labour.

For future studies, the effect of FDI presence and product sophistication should be investigated as well as the interaction between the two factors on labour skills at the sectoral level (e.g. within manufacturing sectors or between the manufacturing and services sectors). Future studies should also focus on comparing the effect on labour skills in industries with high FDI presence and low FDI presence as well as comparing the effects on labour demand in SMEs and large firms.

References

Abdon, A. and J. Felipe (2011), 'The Product Space: What Does It Say about the Opportunities for Growth and Structural Transformation of Sub-Saharan Africa?' *Levy Economics Institute Economics Working Papers,* No. 670, Annandale-on-Hudson, New York: Bard College.

Acemoglu, D. and P. Restrepo (2020), 'Robots and Jobs: Evidence from US Labor Markets', *Journal of Political Economy,* 128(6), pp.2188–2244.

Adam, A., A. Garas, M.S. Katsaiti, and A. Lapatinas (2021), 'Economic Complexity and Jobs: An Empirical Analysis', *Economics of Innovation and New Technology*, https://doi.org/10.1080/10438599.2020.1859751.

Arif, I. (2021), 'Productive Knowledge, Economic Sophistication, and Labour Share', *World Development*, 139, 105303.

ASEAN Secretariat, 'ASEANstats', https://data.aseanstats.org/indicator/FDI.AMS.TOT.INF

Autor, D. and A. Salomons (2018), 'Is Automation Labor-Displacing? Productivity Growth, Employment, and the Labor Share', *National Bureau of Economic Research (NBER) Working Papers,* No. 24871, Washington, DC: NBER.

Bailey, D. and N. Driffield (2007), 'Industrial Policy, FDI and Employment: Still Missing a Strategy', *Journal of Industry, Competition and Trade*, 7(3-4), pp.189–211.

Bailey, D., N. Driffield, and E. Kispeter (2019), 'Brexit, Foreign Investment and Employment: Some Implications for Industrial Policy?' *Contemporary Social Science*, 14(2), pp.174–88.

Bandick, R. and P. Hansson (2009), 'Inward FDI and Demand for Skills in Manufacturing Firms in Sweden', *Review of World Economics*, 145(1), pp.111–31.

Bentolila, S. and G. Saint-Paul (2003), 'Explaining Movements in the Labour Share', *The BE Journal of Macroeconomics*, 3(1), pp.1–33.

Berman, E, J. Bound, and Z. Grilliches (1994), 'Changes in the Demand for Skilled Labour within U.S. Manufacturing: Evidence from the Annual Survey of

Manufactures', *Quarterly Journal of Economics*, 109(2), pp.367–97.

Córcoles, D., C. Díaz-Mora, and R. Gandoy (2014), 'Product Sophistication: A Tie that Binds Partners in International Trade', *Economic Modelling,* 44(S1), pp.33–41.

Crino, R. (2005), 'Wages, Skills, and Integration in Poland, Hungary and the Czech Republic: An Industry-Level Analysis', *Transition Studies Review*, 12(3), pp.432–59.

Dao, M.C., M.M. Das, Z. Koczan, and W. Lian (2017), 'Why Is Labor Receiving a Smaller Share of Global Income? Theory and Empirical Evidence', *International Monetary Fund (IMF) Working Papers,* No. 17/169, Washington, DC: IMF.

Dezan Shira and Associates (2020), 'Vietnam Issues Investment Incentives for SMEs', *Vietnam Briefing*, 29 April.

Dong, C.V. and H.Q. Truong (2022), 'Determinants and Potential of Seafood Trade: Evidence from a Transitional Economy', *Foreign Trade Review*, https://journals.sagepub.com/doi/10.1177/00157325221077003

Eck, K. and S. Huber (2016), 'Product Sophistication and Spillovers from Foreign Direct Investment', *Canadian Journal of Economics,* 49(4), pp.1658–84.

Fajnzylber, P. and A.M. Fernandes (2009), 'International Economic Activities and Skilled Labour Demand: Evidence from Brazil and China', *Applied Economics*, 41(5), pp.563–77.

Feenstra, R.C. and G.H. Hanson (1997), 'Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras', *Journal of International Economics*, 42(3-4), pp.371–93.

GSO of Viet Nam**,** 'Survey of Labour and Occupation in various years', https://www.gso.gov.vn/en/employment/

GSO of Viet Nam, 'Viet Nam Enterprise Survey (VES) in various years', unpublished data.

Grasseni, M. (2004), 'Technology, MNEs Activity and Italian Skill Upgrading', *Departmental Working Papers,* No. 25, Milan: Department of Economics, Management and Quantitative Methods, Università degli Studi di Milano.

Ha, V., M.J. Holmes, and G. Hassan (2020), 'Does Foreign Investment Benefit the Exporting Activities of Vietnamese Firms?', *The World Economy,* 43(6), pp.1619–46.

Harrison, A. and G. Hanson (1999), 'Who Gains from Trade Reform? Some Remaining Puzzles', *Journal of Development Economics*, 59(1), pp.125–54.

Hausmann, R., J. Hwang, and D. Rodrik (2007), 'What You Export Matters', *Journal of Economic Growth* ,12(1), pp.1–25.

Herr, H., E. Schweisshelm, and M.H.V. Truong (2016), 'The Integration of Vietnam in the Global Economy and Its Effects for Vietnamese Economic Development', *Global Labour University Working Papers,* No. 44, Geneva: International Labour Organization (ILO).

Hidalgo, C.A. and R. Hausmann (2009), 'The Building Blocks of Economic Complexity', *Proceedings of the National Academy of Sciences*, 106(26), pp.10570–5.

International Labour Organization (ILO) (2014), 'Education-Business Mismatch Worsens Already Low Workforce Quality and Productivity', Ha Noi: ILO Country Office for Viet Nam.

Jia, W. and R.A. López (2021), 'Foreign Direct Investment, Product Sophistication, and the Demand for Skilled and Unskilled Labour in Chilean Manufacturing', *The Journal of Development Studies*, 57(1), pp.70–87.

McCaig, B. (2011), 'Exporting Out of Poverty: Provincial Poverty in Vietnam and US Market Access', *Journal of International Economics,* 85(1), pp.102–13.

Minondo, A. (2010), 'Exports' Quality-Adjusted Productivity and Economic Growth', *The Journal of International Trade and Economic Development,* 19(2), pp.257–87.

Nguyen, H.H. and Q.H. Truong (2022), 'The Nexus between Inward Foreign Direct Investment and Global Value Chains in Developing Countries: A Case Study of Viet Nam', *Economic Research Institute for ASEAN and East Asia (ERIA) Discussion Paper Series,* No. 418, Jakarta: ERIA.

Nguyen, V.C. (2015), 'The Impact of Trade Facilitation on Poverty and Inequality: Evidence from Low- and Middle-Income Countries', *The Journal of International*

Trade and Economic Development, 24(3), pp.315–40.

Nguyen, T.Q., L.T.K. Tran, P.L. Pham, and T.D. Nguyen (2020), 'Impacts of Foreign Direct Investment Inflows on Employment in Vietnam', *Institutions and Economies,* 12(1), pp.37–62.

Piva, M. and M. Vivarelli (2004), 'The Determinants of the Skill Bias in Italy: R&D, Organisation or Globalisation?' *Economics of Innovation and New Technology*, 13(4), pp.329–47.

Souare, M. and B. Zhou (2016), 'Foreign-Affiliate Presence and Skilled Labour Demand', *International Economics and Economic Policy,* 13(2), pp.233–54.

Tacchella, A., M. Cristelli, G. Caldarelli, A. Gabrielli, and L. Pietronero (2013), 'Economic Complexity: Conceptual Grounding of a New Metrics for Global Competitiveness', *Journal of Economic Dynamics and Control,* 37(8), pp.1683–91.

Taguchi, H., M.D. Nguyen, and S.D. Pham (2019), 'The Involvement in Global Value Chains and Its Policy Implication: Evidence of Vietnam', *Social Science Review*, 156, pp.103–18.

Tran, T.H., Q.H. Truong, and V.C. Dong (2020), 'Determinants of Product Sophistication in Viet Nam: Findings from the Firm–Multi-Product Level Microdata Approach', *ERIA Discussion Paper Series,* No. 314, Jakarta: ERIA.

Truong, Q.H. and V.C. Dong (2021), 'Spillover Effects of Foreign and Domestic Exporting Firms on Export Decisions of Local Manufacturing Firms: Evidence from Viet Nam', *ERIA Discussion Paper Series,* No. 410, Jakarta: ERIA.

United Nations, 'United Nations Comtrade Database', https://comtrade.un.org/data/

Waldkirch, A., P. Nunnenkamp, and J.E.A. Bremont (2009), 'Employment Effects of FDI in Mexico's Non-Maquiladora Manufacturing', *The Journal of Development Studies,* 45(7), pp.1165–83.

World Bank, 'World Bank Development Indicators', https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

World Bank, 'World Integrated Trade Solution (WITS)', https://wits.worldbank.org/

Wu, X. (2001), 'The Impact of Foreign Direct Investment on the Relative Return to Skill', *Economics of Transition,* 9(3), pp.695–715.

Yang, C.H. (2019), 'Foreign Entrants and Domestic Entrepreneurship: Evidence from Vietnam', *Review of Development Economics,* 23(4), pp.1725–47.

Young, A.T. and H. Zuleta (2016), 'Golden Rules of Wages', *Southern Economic Journal*, 83(1), pp.253–70.

Young, A.T. and M.Y. Tackett (2018), 'Globalization and the Decline in Labour Shares: Exploring the Relationship beyond Trade and Financial Flows*', European Journal of Political Economy*, 52, pp.18–35.

Appendixes

Appendix 1: Manufacturing Sectors at the 2-Digit Level in
Vietnam Economic Survey

Code	Sector
10	Mining of coal and lignite; extraction of peat
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction
12	Mining of uranium and thorium ores
13	Mining of metal ores
14	Other mining and quarrying
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harnesses, and footwear
20	Manufacture of wood and of products of wood and cork, except furniture
21	Manufacture of paper and paper products
22	Publishing, printing, and reproduction of recorded media
23	Manufacture of coke, refined petroleum products, and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office, accounting, and computing machinery
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television, and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches, and clocks

Source: Authors.

Appendix 2: Estimation Results for Skilled and Unskilled Labour Demand, 2007

Variable	Skilled Labour Ratio			Unskilled Labour Ratio		
	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.3378***	0.3383***	0.3389***	0.2225***	0.2119***	0.2106***
	(0.0040)	(0.0041)	(0.0041)	(0.0032)	(0.0032)	(0.0033)
Technology	−0.0000***	−0.0000***	−0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−90.4515*		−39.2915*	63.7805*		71.2035***
	(82.9887)		(56.0306)	(82.9418)		(39.3827)
F52	91.5421*		32.1106*	−64.9364*		−43.0006***
	(83.6839)		(06.7878)	(83.4930)		(39.9803)
F53	2.0692**		1.6148***	−2.9366*		−6.4288***
	(2.1498)		(2.4567)	(1.7045)		(1.9389)
SP		0.0020**	0.0063***		−0.0399***	−0.0490***
		(0.0039)	(0.0135)		(0.0031)	(0.0107)
SPF51			−30.0373**			27.2371***
			(42.4124)			(28.7211)
SPF52			30.4922			−127.1056
			(32.5029)			(58.7925)
SPF53			0.4670***			−0.4059*
			(0.2985)			(0.2356)
Ownership	0.0907***	0.0906***	0.0911***	0.0597**	0.0559**	0.0534**
	(0.0297)	(0.0297)	(0.0297)	(0.0236)	(0.0235)	(0.0235)
Age	0.3293***	0.3294***	0.3293***	0.0824***	0.0806***	0.0807***
	(0.0080)	(0.0080)	(0.0080)	(0.0064)	(0.0063)	(0.0063)
EX	−2.0051***	−2.0047***	−2.0049***	−0.4889***	−0.4926***	−0.4916***
	(0.0152)	(0.0152)	(0.0152)	(0.0121)	(0.0120)	(0.0120)

Constant	−0.1340	−0.0587	−0.1242	−0.5487***	−0.6531***	−0.3673***
	(0.0905)	(0.0408)	(0.1019)	(0.0718)	(0.0322)	(0.0804)
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes
Observations	22,212	22,212	22,212	22,212	22,212	22,212
R-squared	0.7545	0.7545	0.7545	0.4162	0.4205	0.4216

Notes:
1. Standard errors in parentheses.
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors.

Appendix 3: Estimation Results for Skilled and Unskilled Labour Demand, 2011

Variable	Skilled Labour Ratio			Unskilled Labour Ratio		
	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.2685***	0.2623***	0.2596***	0.3191***	0.3210***	0.3215***
	(0.0026)	(0.0027)	(0.0027)	(0.0032)	(0.0032)	(0.0033)
Technology	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−34.3196**		−59.9517**	30.4065*		73.3019**
	(33.1307)		(44.1920)	(46.4649)		(48.5961)
F52	34.5129*		59.8775**	−29.4370**		−72.4471**
	(33.9554)		(45.0198)	(47.4658)		(49.6028)
F53	1.4377**		1.3499**	−0.7648**		−0.6090***
	(0.9552)		(0.9654)	(1.1594)		(1.1741)
SP		0.0462***	0.0218**		-0.0139***	−0.0160**
		(0.0039)	(0.0105)		(0.0048)	(0.0128)
SPF51			−53.2568***			59.0336**
			(46.4022)			(78.0500)
SPF52			53.5318***			−59.9454*
			(46.8245)			(78.5636)
SPF53			0.0160**			−0.0243**
			(0.2247)			(0.2732)
Ownership	0.1228***	0.1126***	0.1078***	0.1653***	0.1681***	0.1694***
	(0.0291)	(0.0291)	(0.0291)	(0.0353)	(0.0354)	(0.0354)

Age	0.1592***	0.1486***	0.1486***	0.1776***	0.1809***	0.1811***
	(0.0133)	(0.0133)	(0.0133)	(0.0162)	(0.0162)	(0.0162)
EX	−0.4244***	−0.4172***	−0.4132***	−0.1638***	−0.1661***	−0.1668**
	(0.0146)	(0.0146)	(0.0146)	(0.0177)	(0.0177)	(0.0177)
Constant	−0.7188***	−0.6317***	−0.6508***	−0.7750***	−0.8547***	−0.8020***
	(0.0437)	(0.0336)	(0.0441)	(0.0531)	(0.0408)	(0.0537)
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes
Observations	40,205	40,205	40,205	40,205	40,205	40,205
R-squared	0.3691	0.3712	0.3718	0.3649	0.3649	0.3651

Notes:

1. Standard errors in parentheses.

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors.

Appendix 4: Estimation Results for Labour Demand by Educational Level, 2007

Variable	Medium–Skilled Labourers			Medium–Skilled Labourers			Medium–Skilled Labourers		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	-0.0000	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.3236***	0.3296***	0.3307***	0.3129***	0.3043***	0.3035***	0.0047***	0.0035***	0.0034***
	(0.0045)	(0.0047)	(0.0047)	(0.0038)	(0.0039)	(0.0039)	(0.0004)	(0.0004)	(0.0004)
Technology	−0.0001***	−0.0001***	−0.0001***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−10.1716*		−64.7573*	−65.2106		−58.5460*	61.6889***		42.5780***
	(47.2591)		(72.9245)	(55.9433)		(46.7449)	(52.5560)		(54.9063)
F52	10.0684*		35.7260*	−64.9330		30.3293*	−61.8827***		−32.8311***
	(48.0469)		(43.7817)	(56.5996)		(47.4583)	(52.6317)		(54.9885)
F53	0.1625		2.5054	−1.1351		4.1003*	−0.0315		−0.2789**
	(2.4358)		(2.7814)	(2.0294)		(2.3145)	(0.2339)		(0.2666)
SP		−0.0223***	0.0006		0.0320***	0.0287**		0.0042***	0.0083***
		(0.0044)	(0.0153)		(0.0036)	(0.0127)		(0.0004)	(0.0015)
SPF51			−78.4660**			20.9946**			−39.8390***
			(27.2726)			(55.9068)			(12.1972)
SPF52			78.0515**			−11.0321**			39.9679***
			(27.3751)			(55.9920)			(12.2070)
SPF53			0.4377			−0.1847			−0.1333***
			(0.3380)			(0.2813)			(0.0324)

Ownership	0.1291***	0.1315***	0.1331***	–0.0495*	-0.0528*	–0.0548*	0.0120***	0.0115***	0.0115***
	(0.0337)	(0.0337)	(0.0337)	(0.0281)	(0.0280)	(0.0280)	(0.0032)	(0.0032)	(0.0032)
Age	0.2964***	0.2974***	0.2972***	0.1546***	0.1532***	0.1533***	0.0025***	0.0023***	0.0023***
	(0.0091)	(0.0091)	(0.0091)	(0.0076)	(0.0076)	(0.0076)	(0.0009)	(0.0009)	(0.0009)
EX	–1.7772***	–1.7753***	–1.7756***	–1.0194***	–1.0222***	–1.0215***	–0.0028*	–0.0032*	–0.0032*
	(0.0173)	(0.0173)	(0.0173)	(0.0144)	(0.0144)	(0.0144)	(0.0017)	(0.0017)	(0.0017)
Constant	–0.3729***	–0.3770***	–0.5019***	–0.6823***	–0.6939***	–0.5287***	–0.0147	–0.0122***	0.0013
	(0.1025)	(0.0462)	(0.1154)	(0.0854)	(0.0384)	(0.0960)	(0.0098)	(0.0044)	(0.0111)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	22,212	22,212	22,212	22,212	22,212	22,212	22,212	22,212	22,212
R-squared	0.6747	0.6751	0.6753	0.5694	0.5709	0.5712	0.0318	0.0356	0.0375

Note:
1. Standard errors in parentheses.
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors.

Appendix 5: Estimation Results for Labour Demand by Educational Level, 2011

Variables	Highly Skilled Labour			Medium-Skilled Labour			Basic–Skilled Labour		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
K/Y	0.0000***	0.0000***	0.0000***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Revenue	0.1818***	0.1726***	0.1689***	0.2644***	0.2594***	0.2566***	0.2885***	0.2912***	0.2926***
	(0.0025)	(0.0025)	(0.0025)	(0.0028)	(0.0028)	(0.0029)	(0.0034)	(0.0035)	(0.0035)
Technology	0.0000	−0.0000	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
F51	−20.9200*		−46.8701**	−34.4224**		−69.1132**	34.4010**		41.2198**
	(31.5899)		(21.5827)	(33.7081)		(35.0941)	(44.8780)		(42.0886)
F52	27.5749**		47.6753**	15.5388		70.1496*	−33.6867**		−40.7318**
	(32.3627)		(32.3561)	(34.5822)		(35.9721)	(45.9592)		(43.1760)
F53	1.1290		1.0971*	1.6730*		1.6086**	−1.4371***		−1.4487**
	(0.8952)		(0.9020)	(1.0125)		(1.0240)	(1.2524)		(1.2680)
SP		0.0680***	0.0402***		0.0379***	0.0070		−0.0199***	−0.0274**
		(0.0037)	(0.0098)		(0.0042)	(0.0112)		(0.0052)	(0.0138)
SPF51			−70.2148**			−42.0056**			22.4349**
			(36.7853)			(55.2929)			(92.2961)
SPF52			70.6855**			41.9809**			−23.9896**
			(37.1798)			(55.7408)			(92.8507)
SPF53			0.1254**			0.0622			−0.3430**
			(0.2099)			(0.2383)			(0.2951)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ownership	0.2286***	0.2135***	0.2069***	0.1807***	0.1723***	0.1675***	0.0754**	0.0795**	0.0823**
	(0.0273)	(0.0272)	(0.0272)	(0.0309)	(0.0308)	(0.0308)	(0.0382)	(0.0382)	(0.0382)
Age	0.1053***	0.0897***	0.0897***	0.1713***	0.1626***	0.1625***	0.1318***	0.1366***	0.1373***
	(0.0125)	(0.0125)	(0.0124)	(0.0141)	(0.0141)	(0.0141)	(0.0175)	(0.0175)	(0.0175)
EX	−0.4211***	−0.4107***	−0.4051***	−0.3118***	−0.3058***	−0.3018***	−0.1505***	−0.1539***	−0.1560***
	(0.0137)	(0.0136)	(0.0136)	(0.0155)	(0.0155)	(0.0155)	(0.0191)	(0.0191)	(0.0192)
Constant	−0.7047***	−0.5939***	−0.6099***	−1.0673***	−1.0082***	−1.0056***	−0.6390***	−0.7387***	−0.6787***
	(0.0410)	(0.0314)	(0.0412)	(0.0464)	(0.0356)	(0.0468)	(0.0573)	(0.0441)	(0.0579)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	40,205	40,205	40,205	40,205	40,205	40,205	40,205	40,205	40,205
R-squared	0.2695	0.2756	0.2772	0.3141	0.3155	0.3162	0.3085	0.3087	0.3090

Note:
1. Standard errors in parentheses.
2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: Authors.

ERIA Discussion Paper Series

No.	Author(s)	Title	Year
2022-39 (No. 468)	Araba SEY	Availability of Gender-Disaggregated Data on the ASEAN Digital Economy	January 2023
2022-38 (No. 467)	Yose R. DAMURI and Deni FRIAWAN	RCEP and Indonesia: Economic Reform and Prospects for Implementation	January 2023
2022-37 (No. 466)	Lurong CHEN	The Indo-Pacific Partnership and Digital Trade Rule Setting: Policy Proposals	December 2022
2022-36 (No. 465)	Araba SEY	Gender Security and Safety in the ASEAN Digital Economy	December 2022
2022-35 (No. 464)	Araba SEY and Sara KINGSLEY	Women and Leadership in the ASEAN Digital Economy: Mapping the Rhetorical Landscape	December 2022
2022-34 (No. 463)	Upalat KORWATANASAKUL and Tran Thi HUE	Global Value Chain Participation and Labour Productivity in Manufacturing Firms in Viet Nam: Firm-Level Panel Analysis	October 2022
2022-33 (No. 462)	Fusanori IWASAKI and Keita OIKAWA	The Role of the Economic Research Institute for ASEAN and East Asia (ERIA) in Promoting the Regional Comprehensive Economic Partnership (RCEP)	October 2022
2022-32 (No. 461)	Mie OBA	Japan and the Regional Comprehensive Economic Partnership (RCEP)	October 2022
2022-31 (No. 460)	Chandra T. PUTRA	Global Value Chain Indicators: A Survey and Application to RCEP	October 2022
2022-30 (No. 459)	Cassey LEE	Economic and Technical Cooperation in the Regional Comprehensive Economic Partnership: Focus Areas and Support for Small and Medium-sized Enterprises	October 2022
2022-29 (No. 458)	Joseph Wira KOESNAIDI and Yu Yessi LESMANA	Trade Remedies Chapter	October 2022
2022-28 (No. 457)	Toshiyuki MATSUURA	Investment Liberalisation in East and Southeast Asia	October 2022
2022-27 (No. 456)	Christopher FINDLAY, Xianjia YE, and Hein ROELFSEMA	RCEP and Modern Services	October 2022
2022-26 (No. 455)	Archanun KOHPAIBOON and Juthathip JONGWANICH	Restrictiveness of RCEP Rules of Origin: Implications for Global Value Chains in East Asia	October 2022
2022-25 (No. 454)	Shiro ARMSTRONG and Peter DRYSDALE	The Implications of the Regional Comprehensive Economic Partnership (RCEP) for Asian Regional Architecture	October 2022

ERIA discussion papers from the previous years can be found at:

http://www.eria.org/publications/category/discussion-papers