Premature deindustrialization risk in Vietnam

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Abstract

Purpose – This study aims to examine the premature deindustrialization risk in Vietnam.
Design/methodology/approach – This study uses a manufacturing–income relationship to conduct an empirical estimation. The latecomer index is adopted in the regression model to identify a downward shift of latecomer's relationship.
Findings – The empirical analysis indicates that there is a risk of premature deindustrialization in the Northern Midlands and Mountain Areas. The provinces with low trade openness or foreign direct investment may experience risk of premature deindustrialization.
Practical implications – This study proposes technology diffusion as a policy direction to prevent premature deindustrialization. Furthermore, the Vietnamese government should improve the business environment in the Northern Midlands and Mountain Areas by promoting and attracting export-oriented foreign direct investment.
Originality/value – This study is the first to examine premature deindustrialization in Vietnam based on provincial-level data.

Keywords Premature deindustrialization, Vietnam, Technology diffusion, Latecomer index
Paper type Research paper

1. Introduction

Premature deindustrialization is an economic phenomenon in developing countries that occurs when manufacturing reaches a peak at a much lower income level and share than early industrializers in terms of employment and output (Dasgupta and Singh, 2007; Rodrik, 2016). According to Petty–Clark's Law, deindustrialization and the transition to a service economy have been considered as proof of development (Clark, 1940). However, the recent premature

JEL Classification — O11, O14, O25, O53

Corrigendum: It has come to the attention of the publisher that the article "Premature deindustrialization risk in Vietnam" by Yuta Tsukada, published in *Journal of Asian Business and Economic Studies*, Vol. 30, No. 3, https://doi.org/10.1108/JABES-04-2022-0082, contained ambiguous statements that could lead to misconceptions. As a result, the author and Editor have agreed that appropriate amendments should be made to the manuscript.

'Vietnam may face an increase in its social instability...' has been amended to 'Vietnam may face a decrease in its labor movement...'

'Although there are many mountainous regions in the Northern Midlands and Mountain Areas, some of these provinces border China. Therefore, the "China Plus One" movement can be a great opportunity for the Northern Midlands and Mountain Areas, specifically, and for Vietnam as a whole.' has been amended to 'Many mountainous regions in the Northern Midlands and Mountain Areas of Vietnam would benefit from prioritized policies that encourage Multinational Enterprises investing in Asia to focus more on these disadvantaged areas.'

The author sincerely apologises for any phrasing which may have led to misunderstandings among readers.

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deindustrialization in developing countries constrains their development by removing all the channels that accelerate economic growth, such as economies of scale, learning by doing and unconditional labor productivity convergence (Kaldor, 1967; Rodrik, 2013, 2016).

According to Dasgupta and Singh (2007), Latin American and African economies have experienced "pathological" deindustrialization. Additionally, Rodrik (2016) noted that Latin American and Sub-Saharan African countries have suffered from premature deindustrialization, while Asian countries with comparative advantages in manufacturing have been insulated from this trend. However, recent research has found that some Asian countries have been experiencing bad deindustrialization (Andriyani and Irawan, 2018; Islami and Hastiadi, 2020; Rasiah, 2011; Taguchi and Tsukada, 2022).

Among the Association of South East Asian Nations (ASEAN), the Vietnamese economy has performed well. The average GDP growth rate of Vietnam between 2011 and 2020 was 6.0%, which was lower than Lao PDR (6.8%), Myanmar (6.2%) and Cambodia (6.1%). However, it was the highest among the ASEAN-5 (Indonesia, Malaysia, the Philippines, Thailand and Vietnam). Over the last decade, per capita gross domestic product (GDP) increased from USD 1,525 to USD 2,786. This stable development has been brought about by the expansion of manufacturing, as shown by the increase in manufacturing output (12.4% in 2011 to 17.4% in 2020) and employment (13.9% in 2011 to 21.1% in 2020). Vietnam's growth can be attributed to its manufacturing sector.

However, the question arises as to how seriously premature deindustrialization will affect Vietnam. From an economic perspective, Vietnam may lose its manufacturing advantage (for example, scale economies, learning by doing and unconditional convergence), and its growth may come to a halt. From a political perspective, Vietnam may face a decrease in its labor movement, as noted in Rodrik (2016). This poses a serious challenge to the country's economy.

Although this study follows the concept and empirical framework of premature deindustrialization proposed by Rodrik (2016), it differs from previous studies. First, this study examines the risk of premature deindustrialization in Vietnam based on provincial-level data. It focuses on manufacturing output since output deindustrialization tends to occur more frequently in developing countries than in developed countries. However, this study does not consider employment, which is common in both categories. Second, during the early 2000s, Indonesia's manufacturing ratio peaked, when its per capita GDP was approximately USD 1,000 (Andriyani and Irawan, 2018). Despite Vietnam's per capita GDP being USD 2,786 in 2020, no study has yet been conducted on the premature deindustrialization risks in Vietnam. In the early stages of industrialization, it may be difficult to derive a clear inverted U-shaped curve in terms of the manufacturing ratio and per capita GDP (or GRP). In order to overcome this obstacle, this study uses the Latecomer Index (LAC Index) with reference to Taguchi and Tsukada (2022). The annual LAC Index is calculated by comparing a country or province's GDP (or GRP) per capita with that of a benchmark country or province. The LAC Index's adoption in empirical estimations can identify the downward shift of latecomers' manufacturing–income relationship. This is the symptom of premature deindustrialization. Third, this study analyzes the premature deindustrialization risk and proposes a policy direction to mitigate or avoid it.

The remainder of this study is structured as follows. In Section 2, we review the literature on premature deindustrialization. Section 3 empirically analyzes the data to examine the risk of premature deindustrialization in Vietnam. Finally, Section 4 proposes policy directions, and Section 5 concludes the study.

2. Literature review and contribution

This section reviews the literature related to premature deindustrialization.

In the literature, premature deindustrialization is defined as an economic phenomenon in which developing countries transition into service economies without undergoing a comprehensive industrialization experience. In other words, premature deindustrialization

is characterized by a reduced level of industrialization in developing countries, whereas the advanced countries have already been in the post-industrialization phase of development for decades (Dasgupta and Singh, 2007; Rodrik, 2016; Taguchi and Tsukada, 2022).

Dasgupta and Singh (2007) focused only on employment, not output, and noted that deindustrialization is not necessarily a pathological phenomenon. For instance, in India, the services related to information and communication technology (ICT) have been regarded as a new growth engine. Similarly, East Asian countries have avoided pathological deindustrialization through government support for science and technology to knowledge-based industries and services. In contrast, Latin America and Africa have been experiencing a pathological situation. It is because they have specialized in their current comparative advantage rather than their long-term dynamic comparative advantage.

Rodrik (2016) refined the argument of premature deindustrialization by describing it as the early contraction of manufacturing employment and output in developing countries through a theoretical model and empirical estimation. Rodrik (2016) presented a simple two-sector model, which divided the economy into manufacturing and non-manufacturing, resulting in a different outcome between a closed economy and a small open economy. He assumed net manufacturing exports (x) to be exogenous and manufacturing price (Pm) to be endogenous in a closed economy, whereas in a small open economy, which remains a price taker in the world market, Pm to be exogenous and x to be endogenous. In this model, a closed economy is represented by advanced countries, and a small open economy is represented by developing countries that liberalize trade. Under globalization, all countries experience a decline in the relative manufacturing price ($Pm < 0$) when the global supply of manufacturers exceeds that of non-manufacturers with manufacturing-technological progress. In this case, price-takers with less technological progress in manufacturing (an increase in $\theta_m - \theta_n$ is smaller than a decrease in Pm) suffer declines in the manufacturing output share. Only countries with sufficient productivity growth in manufacturing to offset the relative price decline (having a comparative advantage in manufacturing) can avoid premature deindustrialization, as shown in Table 1.

Rodrik (2016) also provided empirical estimations and identified the following results. Late industrializers achieve lower peak industrialization levels (measured by the share of manufacturing employment and output) as compared to early industrializers, at lower income levels (the post-1990 peak income levels are around 40% of the pre-1990 ones). Latin American and Sub-Saharan African countries have been hit hard by premature deindustrialization among the developing countries. However, Asian countries with comparative advantages in manufacturing have managed to avoid this trend.

Effects on	Technology shock $\theta_m - \theta_n > 0$	Trade shock $dx < 0$	Domestic demand shock
(1) Closed economy			
Employment share	−	−	−
Real output share	+	−	−
Effects on	**Technology shock $\theta_m - \theta_n > 0$**	**External price shock $Pm < 0$**	**Domestic demand shock**
(2) Small open economy			
Employment share	+	−	0
Real output share	+	−	0

Table 1.
Effects of shocks on manufacturing

Note(s): θ_m and θ_n: productivity of manufacturers and non-manufacturers, respectively; dx: Net exports of manufactured goods; and Pm: Prices of manufactured goods
Source(s): Rodrik (2016)

There have been several regional or country-specific studies on premature deindustrialization. For Latin America, Castillo and Neto (2016) argued that Argentina, Brazil and Chile faced premature deindustrialization due to their specialization in commodities, resource-based manufacturing and low productivity services. According to Imbs (2013), deindustrialization in Sub-Saharan Africa has been associated with the rising importance of extractive activities. These studies support the existence of premature deindustrialization and Dasgupta and Singh's (2007) as well as Rodrik's (2016) analysis.

However, some studies identified the existence of premature deindustrialization in Asian developing countries. For instance, Rasiah (2011) confirmed that Malaysia has been experiencing negative deindustrialization. Furthermore, Andriyani and Irawan (2018) as well as Islami and Hastiadi (2020) reported premature deindustrialization in Indonesia. Additionally, Taguchi and Tsukada (2022) implied that there was a risk of premature deindustrialization in Asian countries, particularly in South Asian countries.

3. Empirical analysis on the risk of premature deindustrialization

This section illustrates an empirical analysis to verify the risk of premature deindustrialization in Vietnam.

3.1 Observation on trends in the share of manufacturing output by Vietnamese province

The observation covers 63 provinces in Vietnam. Figure 1 shows their manufacturing–income relationship, with nominal GRP per capita on the horizontal axis and the real manufacturing ratio on the vertical axis. The provincial data are retrieved from a statistical yearbook published by the General Statistics Office in Vietnam. Real GRP and real manufacturing output are converted to a single time series version (2010 constant price) according to the UN's backcasting method for the National Accounts Main Aggregates Database. When time-series overlap for at least one year, the overlapping year is used to create a ratio that is applied backwards to the previous version of the time-series. Table 2 shows the data coverage for each province and regional classification.

Figure 1 shows that manufacturing–income trajectories vary by region and province. For example, as per capita GDP increases in the Red River Delta and Mekong River Delta provinces, the real manufacturing ratio also increases. In contrast, manufacturing–income trajectories in some provinces of Northern Midlands and Mountain Area as well as Central Highlands tend to shift downward. This implies the possibility of premature deindustrialization risk. Therefore, these shifting patterns need to be further assessed econometrically using the LAC index, controlling for income and demographic trends.

3.2 Econometric analysis: methodology

This subsection conducts an economic analysis to verify the risk of premature deindustrialization in Vietnam. The regression model is derived from Rodrik (2016) and Taguchi and Tsukada (2022) but modified for analytical reasons as follows:

$$man_{it} = \gamma_0 + \gamma_1 \ln PCY_{it} + \gamma_2 (\ln PCY_{it})^2 + \gamma_3 \ln POP_{it} + \gamma_4 (\ln POP_{it})^2 + \varphi_1 LAC_{it} + \varphi_2 LAC_{it} * d00 + \varphi_3 LAC_{it} * d10 + f_i + f_t + \varepsilon_{it} \quad (1)$$

where the subscripts i and t denote provinces and years, respectively; *man* stands for the real manufacturing ratio; *PCY* and *POP* show a province's per capita GRP and population size, respectively; *LAC* denotes the Latecomer index; *d00* and *d10* represent time dummies for 2000–2018 and 2010–2018, respectively; f_i and f_t show a time-invariant province-specific fixed effect and a province-invariant time-specific fixed effect, respectively; ε_{it} denotes a residual error term; $\gamma_{0...4}$ and $\varphi_{1...3}$ stand for estimated coefficients and *ln* shows a logarithm form.

The LAC index represents the level of development in a particular province. In a given year, it is computed by the ratio of the GRP per capita of a certain province to that of the benchmark province (TP. Ho Chi Minh). The significance and sign of the LAC index (φ) coefficient are critical for identifying premature deindustrialization risk. A significantly positive φ may indicate the existence of a premature deindustrialization risk. It implies that a province's later development is linked with a lower manufacturing ratio, which indicates a downward shift of manufacturing–income relationship. This downward shift suggests that a manufacturing ratio of a latecomer province peaks at a lower income level than that of the

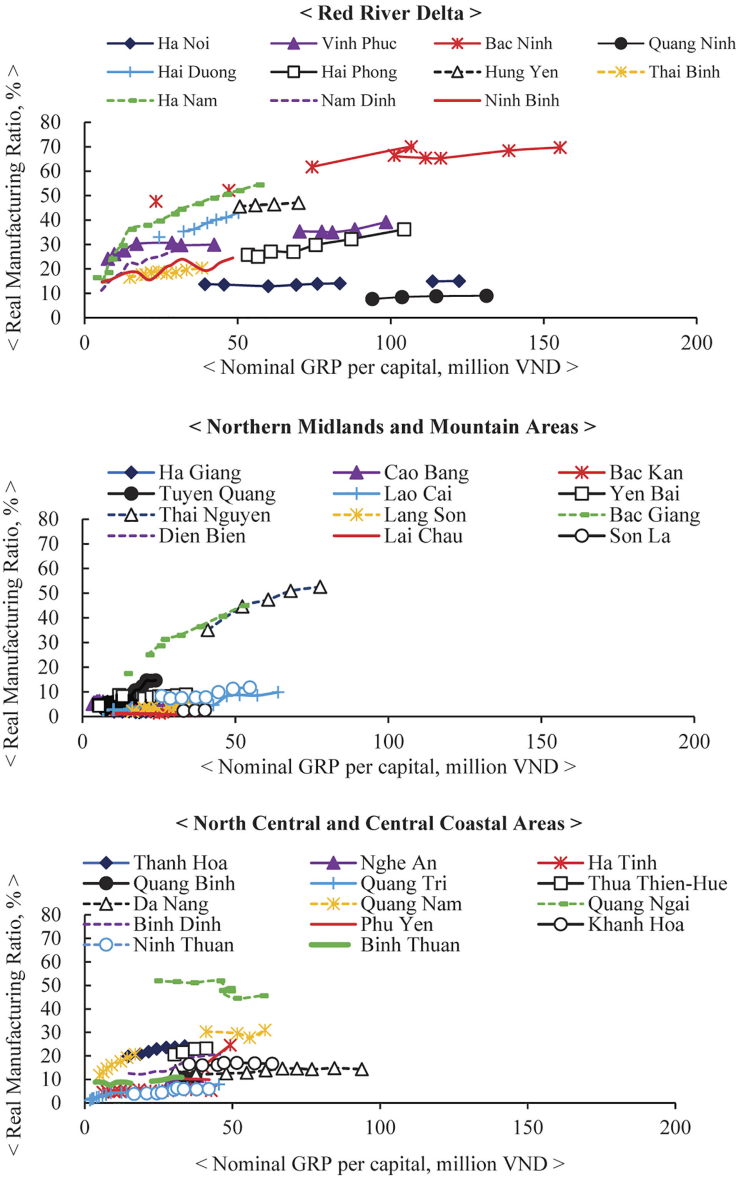
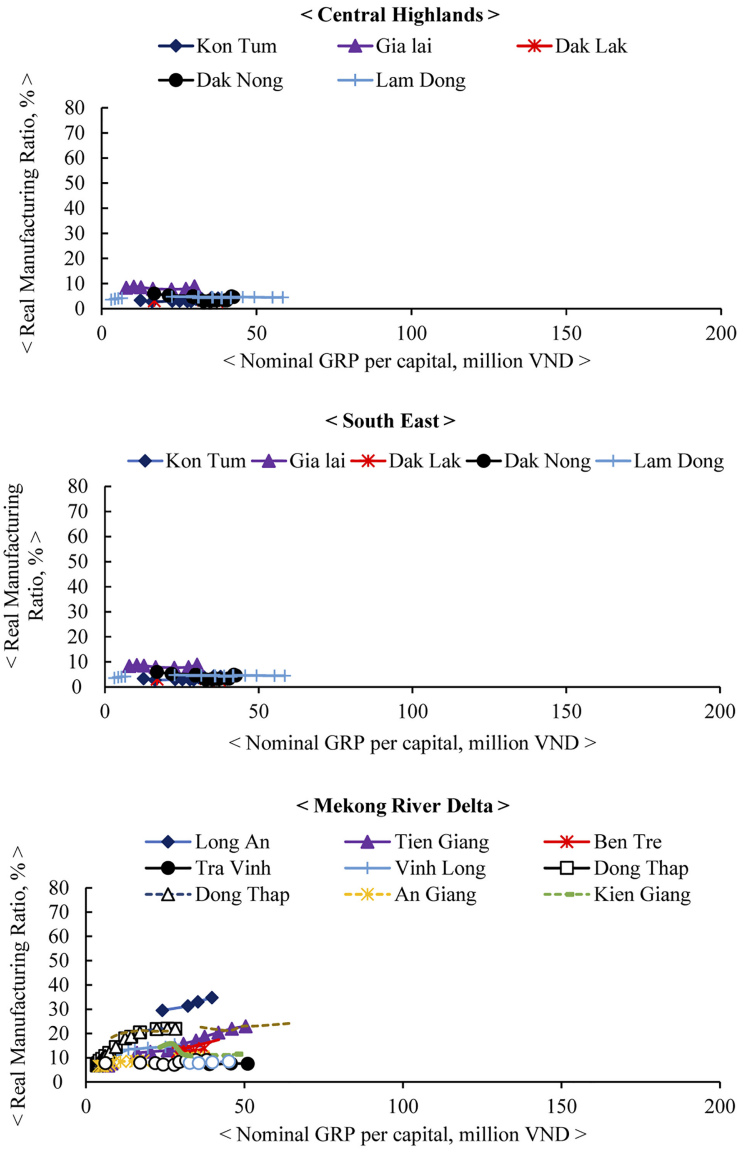


Figure 1.
Trends in manufacturing by Vietnamese provinces



Source(s): General Statistics Office

Figure 1.

benchmark province. The equation contains the LAC index cross-terms and time dummies for 2000–2018 (*d00*) and for 2010–2018 (d10) since the latecomer's effect appears to be affected by globalization.

In general, the Hausman-test statistic is utilized to differentiate between a fixed-effect and a random-effect (Hausman, 1978). However, this study emphasizes the existence of exogenously given province-specific and time-specific factors. For example, consider that geography, endowments and history differ across provinces and are correlated with

Region	Province	Data coverage
Red River Delta	Hanoi	2008–2013, 2017–2018
	Vĩnh Phúc	2004–2018
	Bắc Ninh	1997–2018
	Quảng Ninh	2015–2018
	Hải Dương	2010–2017
	Hai Phong	2012–2018
	Hưng Yên	2015–2018
	Thái Bình	2010–2018
	Hà Nam	1999, 2005–2018
	Nam Định	2005–2018
	Ninh Bình	1999, 2003–2018
Northern Midlands and Mountain Areas	Hà Giang	2010–2018
	Cao Bằng	2002–2015
	Bắc Kạn	2009–2018
	Tuyên Quang	2004–2018
	Lào Cai	2005, 2007–2018
	Yên Bái	2005, 2009–2018
	Thái Nguyên	2014–2018
	Lạng Sơn	2010–2018
	Bắc Giang	2010, 2012–2018
	Phú Thọ	–
	Điện Biên Phủ	2017–2018
	Lai Châu	2010–2018
	Sơn La	2016–2018
	Hòa Bình	2011–2018
North Central and Central Coastal Areas	Thanh Hóa	2011–2018
	Nghệ An	2015–2018
	Hà Tĩnh	2006–2018
	Quảng Bình	2017–2018
	Quảng Trị	1995–2018
	Thừa Thiên Huế	2015–2018
	Da Nang	2009–2018
North Central and Central Coastal Areas	Quảng Nam	2004–2018
	Quảng Ngãi	2010–2018
	Bình Định	2009–2018
	Phú Yên	2015–2018
	Khánh Hòa	2012–2018
	Ninh Thuận	2010–2018
	Bình Thuận	2002–2014
Central Highlands	Kon Tum	2009–2018
	Gia Lai	2007–2013
	Đắk Lắk	2010–2018
	Đắk Nông	2009–2018
	Lâm Đồng	1999–2018
South East	Bình Phước	2000, 2003–2005, 2007–2010, 2015–2018
	Tây Ninh	2000–2014
	Bình Dương	2002–2018
	Đồng Nai	2010–2018
	Bà Rịa–Vũng Tàu	2007–2018
	TP. Ho Chi Minh	1992–2018
Mekong River Delta	Long An	2010–2013
	Tiền Giang	2005–2018
	Bến Tre	2015–2018
	Trà Vinh	2014–2018
	Vĩnh Long	2000–2012
	Đồng Tháp	2000–2013
	An Giang	2001–2018
	Kiên Giang	2015–2018
	Can Tho	2005–2018
	Hậu Giang	2014–2018
	Sóc Trăng	2005–2010, 2012–2018
	Bạc Liêu	2015–2018
	Cà Mau	2011–2014

Source(s): General Statistics Office

Table 2.
Regional classification and data coverage

manufacturing output ratios. Furthermore, consider the possibility that economic fluctuations due to external shocks affected manufacturing activity in Vietnam. Then, a specification that does not account for these effects would lead to an inefficient estimation. They should be controlled by equipping country-specific and time-specific fixed effects.

The descriptive statistics for the data are presented in Table 3.

3.3 Econometric analysis: results and discussions

Table 4 reports the estimation results. In all the cases, $\gamma_1 < 0$ and $\gamma_2 > 0$ holds significantly.

This does not indicate the existence of an inverted U-shaped relationship between a country's manufacturing output ratio and its GRP per capita. It may be because of the following two reasons. First, Vietnam is an emerging country classified as a lower middle income country and undergoing industrialization. Second, the sample periods for several provinces are too short to determine a clear inverted U-shaped pattern.

The coefficients for the LAC index (LAC) with the post-2000 dummies and without time-dummy are not significant. Only the LAC index coefficients with the post-2010 dummy are positive, but the level of confidence is 90%. These results indicate no sign of a premature deindustrialization risk in Vietnam. The subsequent estimations focus on the regional analysis.

Table 5 reveals the estimation results by dividing Vietnam's provinces into six regions (Red River Delta, Northern Midlands and Mountain Areas, North Central and Coastal Area, Central Highland, South East and Mekong River Delta) based on the General Statistics Office classification. Essentially, this division is intended to observe the difference in premature deindustrialization risks across regions and indications of bad deindustrialization precisely.

According to the estimation results, in the Red River Delta and Central Highland, $\gamma_1 > 0$ and $\gamma_2 < 0$, hold significantly a 95% confidence level and a 99% confidence level, respectively. This indicates that an inverted U-shaped relationship exists between a province's manufacturing output ratio and its GRP per capita. However, in the Northern Midlands and Mountain Areas, γ_1 is negative with a 95% confidence level, and γ_2 is positive without a confidence level. This indicates that an inverted U-shaped relationship does not exist in this region. This may be the case since Northern Midlands and Mountain Areas is the most emerging region as shown in Table 3 and in the process of undergoing industrialization.

The LAC index coefficients for the Northern Midlands and Mountain Areas are positive, with a 99% level of confidence. The level of confidence is only 90% in North Central and Central Coastal Areas. However, the Mekong River Delta is negative, with a 95% level of confidence. These results imply that premature deindustrialization risk in Vietnam varies across regions, and the Northern Midlands and Mountain Areas is highly exposed to the risk of premature deindustrialization.

The results of the analysis thus far can be summarized as follows. There is no reason to conclude that Vietnam is facing the risk of premature deindustrialization. However, that risk has become apparent in a few regions, especially in the Northern Midlands and Mountain Areas, where measures must be taken to promote industrialization.

According to Rodrik (2016), the primary cause of premature deindustrialization in developing countries was a lack of technological advancement in manufacturing sector compared to advanced countries. This could only be prevented in countries with sufficient productivity growth. In developing countries, it can be challenging for local enterprises to promote technology advancement on their own. There is no alternative but to rely on technology diffusion from advanced countries. Previous studies have suggested that trade and foreign direct investment promoted technology diffusion in developing countries (Blomström and Sjöholm, 1999; Chuang and Lin, 1999; Coe *et al.*, 1997; Kokko, 1994; Sjöholm, 1999; Takii, 2005; Todo, 2008; Van Biesebroeck, 2005).

Table 6 reports the estimation outcomes based on Equation (1). This estimation categorizes provinces into three groups (upper, middle and lower) based on their trade

Table 3.
Descriptive statistics

Region			Whole Country					Red River Delta		
Variables	Obs.	Median	Std. Dev.	Min.	Max.	Obs.	Median	Std. Dev.	Min.	Max.
man(real, %)	562	12.03	14.10	0.70	70.06	103	25.14	15.20	7.67	70.06
PCY(million VND)	562	28.77	36.66	1.82	304.85	103	35.88	34.88	3.18	155.43
POP(thousand)	562	1162.80	1427.49	294.60	8598.70	103	1188.90	1547.59	786.20	7520.70
LAC	562	0.30	0.46	0.17	5.79	103	0.37	0.26	0.19	1.09
Region			Northern Midlands and Mountain Areas					North Central and Central Coastal Areas		
Variables	Obs.	Median	Std. Dev.	Min.	Max.	Obs.	Median	Std. Dev.	Min.	Max.
man(real, %)	116	5.38	11.17	0.70	52.59	124	11.22	11.80	1.11	51.88
PCY(million VND)	116	22.22	14.57	3.35	77.68	124	30.65	18.45	1.82	93.83
POP(thousand)	116	735.60	323.72	294.60	1691.80	124	1194.25	746.08	534.90	3544.40
LAC	116	0.24	0.09	0.17	0.54	124	0.29	0.11	0.19	0.66
Region			Central Highlands					South East		
Variables	Obs.	Median	Std. Dev.	Min.	Max.	Obs.	Median	Std. Dev.	Min.	Max.
man(real, %)	44	4.33	1.77	2.76	8.96	74	17.83	15.73	3.51	63.51
PCY(million VND)	44	30.22	13.50	3.09	58.51	74	43.48	74.28	3.97	304.85
POP(thousand)	44	1094.70	447.54	431.80	1919.20	74	1730.80	2599.49	682.90	8598.70
LAC	44	0.30	0.06	0.20	0.42	74	1.00	0.99	0.25	5.79

Region			Mekong River Delta		
Variables	Obs.	Median	Std. Dev.	Min.	Max.
man(real, %)	101	12.00	6.45	6.51	34.75
PCY(million VND)	101	28.02	14.56	3.44	64.90
POP(thousand)	101	1312.50	392.54	768.40	2164.20
LAC	101	0.30	0.06	0.20	0.46

Source(s): General Statistics Office

man	(1)	(2)	(3)
ln PCY	−81.913*** (−3.526)	−81.907*** (−3.521)	−65.373*** (−2.622)
(ln PCY)^2	2.603*** (3.866)	2.603*** (3.861)	2.07*** (2.825)
ln POP	325.189*** (4.348)	324.822*** (4.123)	320.691*** (4.079)
(ln POP)^2	−11.229*** (−4.202)	−11.216*** (−3.973)	−11.089*** (−3.936)
LAC	−1.375 (−0.993)	−1.298 (−0.243)	−0.748 (−0.140)
LAC*d00		−0.078 (−0.015)	1.385 (0.264)
LAC*d10		*3.343** (1.810)*	
Province Fixed Effects	Yes	Yes	Yes
Period Fixed Effects	Yes	Yes	Yes
Number of Provinces	62	62	62
Number of Observation	562	562	562

Note(s): ***, **, * denote the rejection of null hypothesis at the 99%, 95% and 90% level of significance in the coefficients. *T*-statistics are in parentheses
Source(s): Author estimation

Table 4.
Estimation results: real manufacturing

man	Red River Delta	Northern Midlands and Mountain Area	North Central and Central Coastal Area
ln PCY	118.882** (2.614)	−87.422** (−2.391)	131.970 (1.239)
(ln PCY)^2	−3.148** (−2.235)	1.714 (1.331)	−5.076 (−1.360)
ln POP	118.035 (0.479)	−1074.734*** (−4.814)	−1007.294** (−2.246)
(ln POP)^2	−3.312 (−0.380)	39.192*** (4.539)	36.375** (2.198)
LAC	19.211 (1.027)	*122.931*** (2.837)*	*159.278* (1.748)*
Province fixed effects	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes
Number of provinces	16	13	14
Number of observation	103	116	124

man	Central Highland	South East	Mekong River Delta
ln PCY	131.797*** (3.521)	−21.033 (−0.115)	118.382* (1.830)
(ln PCY)^2	−3.781*** (−3.095)	−1.043 (−0.186)	−1.456 (−0.592)
ln POP	100.043 (0.736)	−1399.734 (−1.535)	−4687.829*** (−5.489)
(ln POP)^2	−3.933 (−0.714)	54.630 (1.695)	168.146*** (5.579)
LAC	4.025 (0.092)	14.156 (1.268)	*−162.547** (−2.010)*
Province fixed effects	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes
Number of provinces	5	5	13
Number of observation	44	47	101

Note(s): ***, **, * denote the rejection of null hypothesis at the 99%, 95% and 90% level of significance in the coefficients. *T*-statistics are in parentheses
Source(s): Author estimation

Table 5.
Estimation results: real manufacturing by region

openness and foreign direct investment. Trade openness is calculated as the ratio of trade value (export plus import) to GRP. Human interaction is one of the main routes for technology diffusion. Therefore, foreign direct investment is measured as the number of investments per capita. Moreover, data on trade statistics and foreign direct investment are retrieved from the General Statistical Office and Vietnam Customs.

Based on the estimation results regarding trade openness and foreign direct investment, the coefficients for the LAC index (LAC) are negative in the upper 1/3 of provinces. Conversely, those in the lower 1/3 of provinces are positive with a 99% confidence level. According to Table 7, Northern Midlands and Mountain Areas are included in these lower 1/3 groups.

man	Trade openness Upper1/3	Middle1/3	Lower1/3
ln PCY	−130.178** (−2.102)	−16.22150 (−0.463)	−4.932 (−0.209)
(ln PCY)^2	6.159*** (2.994)	0.542150 (0.530)	−0.878 (−1.164)
ln POP	841.332*** (5.140)	−165.2390 (−0.730)	7.691 (0.063)
(ln POP)^2	−27.972*** (−4.687)	4.795 (0.557)	−0.707 (−0.154)
LAC	*−117.547*** (−4.116)*	−1.391 (−1.217)	*111.554*** (4.304)*
Province fixed effects	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes
Number of provinces	20	21	21
Number of observation	192	197	173

man	FDI number Upper1/3	Middle1/3	Lower1/3
ln PCY	62.781 (1.388)	−26.788 (−0.665)	94.641*** (2.887)
(ln PCY)^2	−0.911 (−0.700)	0.405 (0.280)	−3.909*** (−3.968)
ln POP	374.34*** (2.716)	−123.135 (−0.478)	−68.062 (−0.534)
(ln POP)^2	−10.544** (−2.130)	2.570 (0.271)	2.491 (0.516)
LAC	*−8.341*** (−2.808)*	49.860 (0.968)	*131.286*** (3.261)*
Province fixed effects	Yes	Yes	Yes
Period fixed effects	Yes	Yes	Yes
Number of provinces	20	21	21
Number of observation	191	201	170

Table 6.
Estimation results: Real manufacturing by trade openness and FDI number

Note(s): ***, **, * denote the rejection of null hypothesis at the 99%, 95% and 90% level of significance in the coefficients. *T*-statistics are in parentheses
Source(s): Author estimation

In light of these analyses, it appears that the provinces that receive more export-oriented foreign direct investment are less exposed to the risk of premature deindustrialization, while those that receive less export-oriented foreign direct investment are more at risk.

Perkins and Vu (2009) observed that industrial investment by foreign enterprises was concentrated in specific locations, specifically around the Hanoi–Haiphong area and Ho Chi Minh City, and this was attributed to weak transport infrastructure in Vietnam.

4. Policy direction

Based on the analyses and discussion in Section 3, the Vietnamese government should improve the business environment of the Northern Midlands and Mountain Areas to attract more export-oriented foreign direct investments and prevent premature deindustrialization. Both the soft and the hard aspects of the business environment should be improved. The soft side includes land access and tenure, time costs, as well as informal charges as improvement points, while the hard side includes not only the infrastructure that has been denoted by Perkins and Vu (2009), but also the development of industrial parks, as shown in Figures 2 and 3.

Many mountainous regions in the Northern Midlands and Mountain Areas of Vietnam would benefit from prioritized policies that encourage Multinational Enterprises investing in Asia to focus more on these disadvantaged areas.

5. Conclusion

This study examined the risk of premature deindustrialization in Vietnam using provincial level data. Based on Rodrik (2016), the manufacturing–income relationship is estimated.

The contributions of this study are highlighted as follows. First, this study focuses on Vietnam, which has never been analyzed in the context of premature deindustrialization.

Region	Province	Trade openness	FDI number
Red River Delta	Hanoi		
	Vĩnh Phúc		
	Bắc Ninh		
	Quảng Ninh		
	Hải Dương		
	Hai Phong		
	Hưng Yên		
	Thái Bình		
	Hà Nam		
	Nam Định		
	Ninh Bình		
Northern Midlands and Mountain Areas	Hà Giang	Lower	Lower
	Cao Bằng	Lower	
	Bắc Kạn	Lower	Lower
	Tuyên Quang	Lower	Lower
	Lào Cai		
	Yên Bái	Lower	Lower
	Thái Nguyên		
	Lạng Sơn		
	Bắc Giang		
	Phú Thọ		
	Điện Biên Phủ	Lower	Lower
	Lai Châu	Lower	Lower
	Sơn La	Lower	Lower
	Hòa Bình		
North Central and Central Coastal Areas	Thanh Hóa		
	Nghệ An	Lower	Lower
	Hà Tĩnh		
	Quảng Bình	Lower	Lower
	Quảng Trị		Lower
	Thừa Thiên Huế		
	Da Nang		
North Central and Central Coastal Areas	Quảng Nam		
	Quảng Ngãi	Lower	
	Bình Định	Lower	
	Phú Yên	Lower	
	Khánh Hòa		
	Ninh Thuận	Lower	
	Bình Thuận		
Central Highlands	Kon Tum		Lower
	Gia Lai	Lower	Lower
	Đắk Lắk		Lower
	Đắk Nông	Lower	Lower
	Lâm Đồng	Lower	
South East	Bình Phước		
	Tây Ninh		
	Bình Dương		
	Đồng Nai		
	Bà Rịa–Vũng Tàu		
	TP. Ho Chi Minh		

(*continued*)

Table 7.
Classification by trade openness and FDI number

Region	Province	Trade openness	FDI number
Mekong River Delta	Long An		
	Tiền Giang		
	Bến Tre		
	Trà Vinh	Lower	
	Vĩnh Long	Lower	
	Đồng Tháp		Lower
	An Giang	Lower	Lower
	Kiên Giang	Lower	Lower
	Can Tho		
	Hậu Giang		Lower
	Sóc Trăng		Lower
	Bạc Liêu		Lower
	Cà Mau		Lower

Table 7. **Source(s):** General Statistics Office, Vietnam Customs

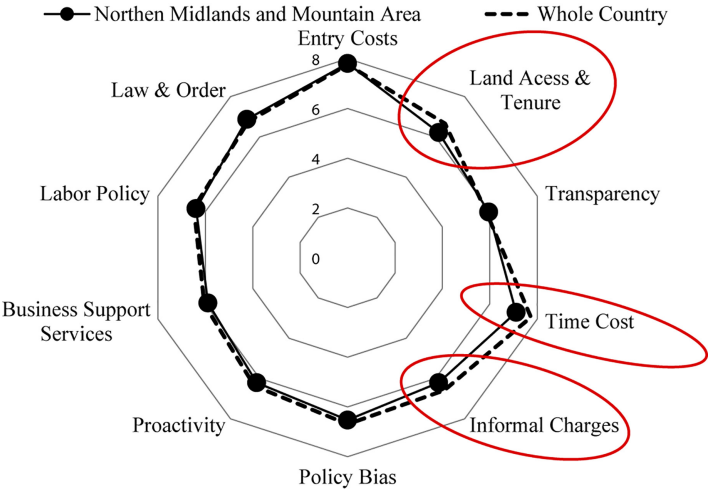


Figure 2. Provinces competitiveness index

Source(s): PCCI

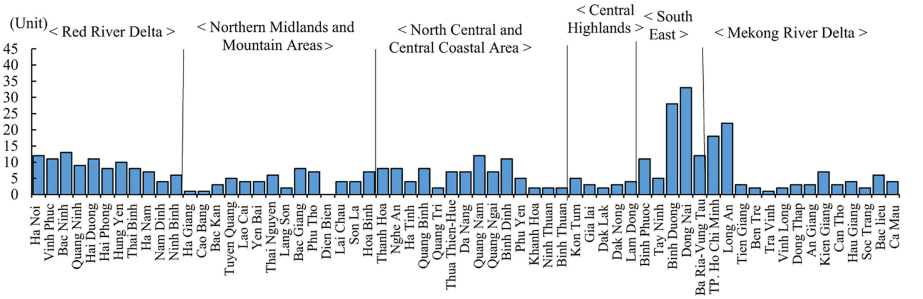


Figure 3. Industrial park

Source(s): JETRO, Japan ASEAN Centre

Second, the LAC index, which in a given year is expressed as the ratio of a province's GRP per capita relative to that of a benchmark province, is adapted in the estimation in order to allow identification of downwards shift in latecomers' manufacturing–income relationship. Third, an approach to avoid premature deindustrialization is proposed from the perspective of technology diffusion.

The main findings from the empirical estimations are summarized as follows. First, the estimation results suggested that although it could not be concluded that Vietnam is facing premature deindustrialization risk, this risk is becoming apparent in the Northern Midlands and Mountain Areas. Second, provinces with a low level of trade openness or foreign direct investment are at a risk of premature deindustrialization. Several provinces in the Northern Midlands and Mountain Areas exhibit these characteristics. Third, to prevent premature deindustrialization, the Vietnamese government needs to improve both the soft and hard sides of business environment in the Northern Midlands and Mountain Areas and encourage export-oriented foreign direct investments.

This study provided an empirical analysis and several policy implications. In the future, it will be necessary to make more specific policy recommendations based on case studies in each of these regions.

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