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Impact of Domestic Market Integration on Regional Economic Performance: Evidence from Vietnam

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Abstract

This study investigates the relationship between market integration and regional economic growth in Vietnam using a panel of prices on traded goods across 30 provinces of Vietnam from 2005 to 2018. The results show that a simple index of market integration is a successful proxy for the market integration level. In addition, the market integration index tends to decrease gradually from 2005 to 2018, suggesting strong evidence for market integration among Vietnam's provinces. Moreover, a convergence model and spatial econometrics show evidence of a significant positive relationship between market integration and regional economic growth. This study also demonstrates that regional income growth in a given Vietnam province is positively associated with income of its neighboring provinces.

Keywords: market integration, gross regional domestic product, domestic market, emerging market, Vietnam.

JEL Codes: C21; O11; R11

1. Introduction

Market integration and its associated expansion of economic growth have been studied extensively; however, this topic has mostly focused on developed countries with less attention being given to developing nations (Bekaert et al., 2007; Behrens, 2011; Góes & Matheson, 2017). Furthermore, studies on market integration frequently show inconsistent results. For example, some studies confirm the strong existence of market integration in developed countries, such as Bekaert (2007) and Góes and Matheson (2017). In contrast, other studies using a different setting argue the existence of a gap between rich and poor economies and no existence of economic integration trends (Turganbayev, 2016; Borozan, 2017).

Inter-provincial economic linkages are widely documented using economic spillover analysis. Empirical findings from several studies show a relationship between market integration and regional economic growth. In particular, Bai et al. (2012) reveal that an increase in per capita gross domestic product (GDP) growth is associated with an increase in market potential in China. This result is supported by the findings of Young et al. (2008) for the United States' market and Ma and Jia (2015) for the Chinese market. However, the strength of this relation depends on the different characteristics of a country (Siebern, 2000).

Vietnam has experienced rapid economic growth since 2007 (World Bank, 2011). According to Esiyok and Ugur (2018), the annual average growth rate of Vietnam's real per capita GDP during 1990–2017 was 5.5%. However, the factors behind such a high growth rate are an ongoing debate. Various studies suggest Vietnam's high growth rates are a result of economic reform policies (World Bank, 2011; Vu & Nghiem, 2016), FDI inflows (Van Le & Nguyen, 2018), an increase in production factors (Vu & Nghiem, 2016), initial economic conditions at a regional scale (Ertur et al., 2006), and growth-promoting effects of broader inter-provincial economic integration (Esiyok & Ugur, 2018).

This study investigates the contribution of Vietnam's domestic market integration to its regional economic growth focusing on a decline in regional fragmentation and an increase in regional economic growth caused by Vietnam's domestic market-oriented integration. We posit that the market of Vietnam provides an excellent case study for the following reasons. First, Vietnam is representative of an emerging market exhibiting regional disparities even though Vietnam's economic status has increased rapidly over the past few years (Esiyok & Ugur, 2018). As proposed by Esiyok and Ugur (2018), Vietnam's regional development is uneven; however, the economic relationship among the regions, especially big cities and economic areas, is increasingly tightening. Second, Vietnam has the unique features of a socialist-oriented market economy. Third, Vietnam's economic reforms have led to significant income elevation among the regions of the country. These conditions were of concern when Vietnam became an official member of the World Trade Organization in 2007. Therefore, it is appropriate for investigating the impact of market integration on the regional economic performance in Vietnam.

Based on the literature on regional integration and regional economic growth, the present study extends the scope beyond previous work. In particular, we first present a simple market integration index based on thirty Vietnamese provinces between 2005 and 2018. Following Hong et al. (2019), the market integration index is constructed based on an interaction between a pair of regions and their commodity prices. A higher value of the market integration index means a lower level of market integration. Next, to evaluate the effect of the market integration on regional economic growth, we utilize a β-convergence model innovated by Barro et al. (1992). Several spatial econometrics β-convergence models are employed in this study, including a fixed effect model, spatial autoregressive model, and a spatial error model following LeSage and Pace (2010) and Hong et al. (2019).

The main results of this study are summarized as follows. We find a gradual decrease in the market integration index level, which is evidence for increasing market integration in Vietnam from 2005 to 2018. Moreover,

a positive relationship between market integration and regional economic growth based on β-convergence models is also demonstrated. These findings suggest that increasing market integration contributes to the observed high regional economic growth in Vietnam from 2005 to 2018. Additionally, we argue that highly pronounced spatial spillover effects are a transmission mechanism over the study period. We also argue that market integration is likely to improve regional economic growth. In addition, the results of this study are consistent with those of Bekaert (2007) and Fall (2019) for the United States and China, respectively. The present study differs from several previous ones, such as Vu and Nghiem (2016), Esiyok and Ugur (2018), Van Le and Nguyen (2018), and Vo et al. (2020), from the perspectives of empirical findings and empirical design. Regarding the empirical findings, this study applies a method suggested by Hong et al. (2019) to calculate the market integration index for Vietnam based on provincial data. For the empirical design, the relationship between market integration and regional economic growth is investigated using β-convergence models, which are employed using a fixed effect model, spatial autoregressive model, and a spatial error model. Thus, this study contributes to the understanding of the effect of market integration on regional economic growth in Vietnam, a country representative of other emerging economies.

The remainder of this study is organized into four sections. Section 2 presents the data and methodologies utilized for our analysis. Section 3 provides the results and discussion. Lastly, Section 4 presents the conclusions.

2. Methods and Data

2.1 Methods

2.1.1 Market Integration Index

In this section, the index of domestic market integration in Vietnam is calculated based on a method suggested by Parsley and Wei (2001),

Lu and Chen (2006), and Hong et al. (2019), which applies provincial variances of relative price metrics as a proxy for the indicator of price convergence. Particularly, the calculation procedure of market integration has three steps as below (Hong et al., 2019).

$$\left|\Delta Q^{k}_{i,j,t}\right| = \left|\ln\left(P^{k}_{i,t}/P^{k}_{i,t-1}\right) - \ln\left(P^{k}_{j,t}/P^{k}_{j,t-1}\right)\right| \quad (1)$$

$$q^{k}_{i,j,t} = \left|\Delta Q^{k}_{i,j,t}\right| - \left[\sum_{i}^{n}\sum_{j}^{n}\left|\Delta Q^{k}_{i,j,t}\right|/n(n-1)\right] \quad (2)$$

$$MI = var(q^{k}_{i,j,t}) \quad (3)$$

where $P^{k}_{i,t}$ ($P^{k}_{i,t-1}$) is the logarithmic relative price of commodity k in region i and period t (t-1); $P^{k}_{j,t}$ ($P^{k}_{j,t-1}$) is the price of the commodity k in region j and period t (t-1); n represents the number of provinces at period t; and var($q^{k}_{i,j,t}$) denotes variance of $q^{k}_{i,j,t}$. The $\left|\Delta Q^{k}_{i,j,t}\right|$ in Equation (1) can be considered as the fluctuation in the relative price of product k between provinces i and j at time t. According to Ke (2015), a different price of the same good between two places equals the transport cost in a unified market. Because transport cost is relatively stable, a small fluctuation of $\left|\Delta Q^{k}_{i,j,t}\right|$ indicates a low degree of market segmentation between provinces i and j. Therefore, given the fluctuations in $\left|\Delta Q^{k}_{i,j,t}\right|$, the variance, var($q^{k}_{i,j,t}$), summarizes the price fluctuations of all commodities caused by market fragmentation between provinces i and j at time t. In other words, a smaller value of $q^{k}_{i,j,t}$ results in higher market integration between the two regions i and j. Hence, the market integration index also has a negative relationship to market integration.

2.1.2 Beta-Convergence Estimation

Following LeSage and Pace (2010) and Hong et al. (2019), we conduct empirical tests using three models to investigate the effect of market integration on regional economic growth: first, a β-convergence model with panel data and fixed effects (FE); second, a spatial autoregressive model (SAR); and third, a spatial error model (SEM). In particular, we first

introduce a baseline β-convergence model following Barro et al. (1992). Regional economic growth is calculated based on the gross regional domestic product of a province (Bekaert, 2007; Fall, 2019). The equation below presents the β-convergence model with panel data and fixed effects.

$$\ln\left(GRDP_{t+m,i}/GRDP_{t,i}\right)= \alpha_i + \beta \ln\left(GRDP_{t,i}\right) +\varepsilon_{t,i} \qquad (4)$$

where i (i = 1, …, n) are the regions in our sample; t (t = 1, …, T) represent the periods, m denotes the periodic interval for the growth rate calculation; and $GRDP_{t,i}$ is the gross regional domestic product of province i during period t. $GRDP_{t+m,i}$ is the gross regional domestic product of province i in an individual period (i.e., from t to t + m). From Equation (4), the coefficient, β, can be interpreted as an indicator of regional economic growth convergence. For instance, a negative β indicates convergence between two provinces.

Next, we utilize a SAR model to directly investigate the relationship between market integration and economic growth. The SAR is a spatial model including a spatially lagged term of the dependent variable following Equation (5):

$$\ln\left(GRDP_{t+m,i}/GRDP_{t,i}\right)= \alpha_i + \rho \sum_j^n w_{i,j} \ln\left(GRDP_{t+m,i}/GRDP_{t,i}\right) + \beta \ln\left(GRDP_{t,i}\right) +\varepsilon_{t,i} \quad (5)$$

where $w_{i,j}$ is the value of the entry (i,j) in the reciprocal matrix. In this study, following Hong et al. (2019), we construct the weighting matrix ($w_{i,j}$) based on the level of market integration between regions i and j. The coefficient, ρ, is the autoregressive coefficient based on the relationship between provinces. From Equation (5), the relationship between market integration and regional economic growth follows from the suggestion that the spatial regression model adds a spatial lag vector that reflects average market integration from neighboring regions to explain variation in market integration across regions. Intuitively, the model states that market integration in each region is related to the average market integration from its neighboring regions. The average strength of this relationship is determined during the estimation using the scalar

parameter, ρ. Thus, the relationship of regional markets affecting economic growth can be investigated based on this suggestion: if ρ is positive (negative) and statistically significant, regional economic growth between regions is highly integrated with each other's markets and has mutually positive (negative) impacts. On the other hand, the relationship between market integration and regional economic growth can also be observed by following the suggestion that an increase (decrease) of compared with that in Equation (4) leads to a convergence (divergence) trend of a province that is highly integrated with other markets. In other words, a positive spatial autocorrelation of regional economic growth reflects an economic improvement of one region thanks to the economic growth of its neighbor.

We next utilize SEM as an alternative way to achieve our research goal to evaluate the relationship between market integration and economic growth. In detail, this model accounts for spatial dependence in the error terms rather than in the dependent variable following Equation (6):

$$\ln\left(GRDP_{t+m,i}/GRDP_{t,i}\right)= \alpha_i + \beta \ln\left(GRDP_{t,i}\right) + \varepsilon_{t,i}\varepsilon_{t,i} = \lambda \sum_j^n w_{i,j}\varepsilon_{t,i} + \eta_{t,i} \quad (6)$$

where $w_{i,j}$ is the value of the entry (i,j) in the reciprocal matrix. The construction of matrix $w_{i,j}$ in Equation (6) is same as that in Equation (5). λ is the autocorrelation in the error term. The relationship between market integration and regional economic growth in Equation (6) can be investigated based on the β value as in Equation (5). This means that an increase (decrease) of β, compared to itself in Equation (4), leads to a convergence (divergence) trend of a province which is highly integrated with other markets.

2.2 Data

The sample is a panel of thirty Vietnam provinces with the highest average GRDP contributions to the GDP of Vietnam over 14 years from 2005 to 2018. Data at the provincial level are collected from the Statistical Yearbooks for the 30 provinces and the General Statistics Office (GSO) for the period of 2005 to 2018. The consumer price indices by category and

region are used to calculate the index of market integration. The consumer price index categories include: food and foodstuff; beverages and cigarettes; garments, footwear, and hats; housing and construction materials; household appliances and goods; medicine and health care; traffic; postal services and telecommunications; education services; culture, entertainment, and tourism; and other goods and services. Table 1 gives information about the characteristics of the variables in detail.

Table 1: Summary Statistics

Index	Mean	Median	Std	Minimum	Maximum
GRDP	106,268.67	52,856.49	17,3191.48	4,640.20	1,159,441.50
Food and foodstuff	101.79	102.26	1.94	97.79	103.43
Beverage and cigarette	101.56	101.32	1.37	99.42	103.70
Garment, footwear, hat	101.11	100.85	1.55	99.32	103.43
Housing and construction materials	102.27	101.10	2.53	99.65	107.03
Household equipment and goods	101.20	100.94	1.23	99.94	103.75
Medicine and health care services	123.78	106.93	24.41	100.29	163.15
Transport	99.83	100.29	7.11	87.45	107.56
Post and Communication	99.85	99.82	0.27	99.49	100.39
Education	106.98	106.86	3.68	103.69	115.50
Culture, sport, entertainments	101.10	101.25	0.69	100.35	102.24
Other consumer goods and services	102.54	102.47	1.16	100.85	104.40

Note: The table provides summary statistics for the variables used in the analysis, including the mean, median, standard deviation (std), minimum, and maximum of each index. GRDP data (2005=100) is reported in (billion VND).

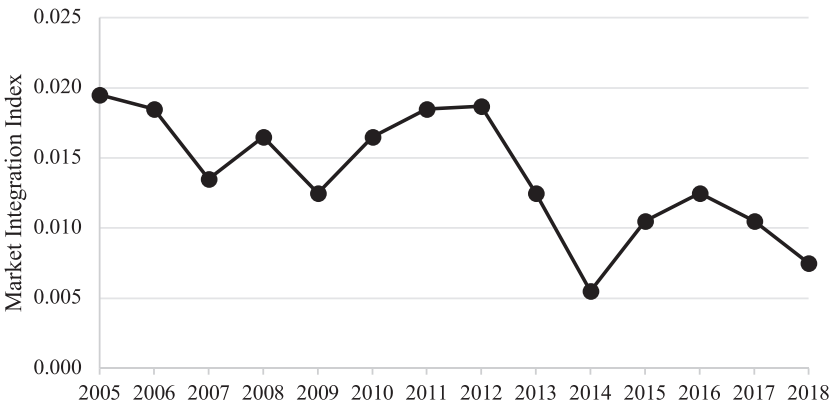
Sources: Provincial Statistical Yearbooks 2005-2018 by Provincial Statistics Office.

3. Results

3.1 Domestic Market Integration Index

This sub-section reports the domestic market integration index based on the provincial variance of relative prices. Figure 1 shows the average market integration of 30 Vietnamese provinces from 2005 to 2018.

Figure 1: Index of Market Integration in Vietnam (2005–2018)



Source: Authors' calculations.

As can be seen in Figure 1**,** market integration for the entire period (2005–2018) exhibits a decreasing trend. The market integration index values rank from 0.006 to 0.02; however, from 2005 to 2011, it fluctuates with the highest (0.02) and lowest values (0.013) in 2005 and 2009, respectively. The market integration index then dramatically decreased from 0.019 in 2012 to 0.006 in 2014. Moreover, a gradual decreasing trend over the whole period, with a difference between the highest and lowest values of 0.013, suggests that most provinces in Vietnam have tended to become more integrated and that the number of linked provinces has tended to increase.

There are two main reasons leading to the fluctuation of market integration in the period of 2005 to 2018, especially after 2012. The first reason is the integration of Vietnam's economy into the international economy. In fact, Vietnam became an official member of the World Trade Organization (WTO) in 2007. Being a member of the WTO, Vietnam had significant pressure to transform the state administration to allow for more freedom of business. The private economic sector experienced a turning point with the establishment of more than 60,000 new businesses in 2007 (Vu-Thanh, 2017). The private sector has contributed significantly to the improvement of Vietnam's economy. In fact, the largest contribution to Vietnam's GDP during 2010-2018 (approximately 40.6%) came from the private sector. The Vietnam Nation Assembly Congress in 2011 also suggests that the restructuring of state enterprises and the improvement of the business environment in Vietnam motivate enterprises to enhance their business quality and to design their business strategies in order to effectively reach long-term targets, as well as improve the quality of labor resources. It has been suggested that developing a policy which encourages the effective usage of investment capital for infrastructure construction and aiming to reduce transportation costs between regions is essential (Vu-Thanh, 2017).

The second reason is related to foreign direct investment (FDI). Vietnam has become one of the most favorable destinations of FDI, especially after Vietnam's accession to the WTO in 2007. For instance, FDI in Vietnam reached $71.7 billion U.S. dollars after only one year as a member of the WTO. In 2018, Vietnam attracted $35 billion in FDI and became the most attractive destination in the ASEAN region for foreign investors. The effect of FDI on Vietnam's economy can be divided into three main types, including the FDI effect on economic growth (Van Le & Nguyen, 2018), the spillover effects from FDI to local firms (Vo et al., 2020), and job creation and poverty reduction (Vo et al., 2020). Thus, FDI holds an important role in improving the efficiency and income equity among regions in Vietnam, as FDI contributes to an increase in economic opportunities (Van Le & Nguyen, 2018).

3.2 Market Integration and Regional Economic Growth

This sub-section analyzes the relationship between market integration and regional economic growth. The main purpose of this study is to investigate whether Vietnam's market integration is closely related to regional economic growth as suggested by Bekaert (2007) and Fall (2019). Thus, several spatial econometrics convergence frameworks during 2005–2018 are used to achieve this goal. Following Tian et al. (2010) and Hong et al. (2019), three models are considered, as discussed in Section 2. The fixed effect model results are regarded as the benchmark results. Therefore, a contribution of market integration to Vietnam's regional economic growth is verified using the significant value of . Table 2 presents results of the relationship between the market integration and regional economics growth**.**

Table 2: Relationship between Market Integration and Regional Economic Growth

Parameters	Model 1 Baseline FE	Model 2 FESAR	Model 3 FESEM
β	-0.023*** (0.013)	-0.009** (0.229)	-0.012** (0.238)
ρ		0.393*** (0.000)	
λ			0.425** (0.000)
R^2	0.016	0.091	0.129
Log-likelihood	627.912	639.862	651.131

Notes: Numbers in parentheses are standard errors. ***, **, and * represent statistically significant coefficients at the 1, 5, and 10% levels, respectively.

Source: Authors' calculations.

In models 1 to 3 in Table 2, the β coefficient is negative and statistically significant, which provides evidence of a trend towards convergence in the process of regional economic growth. Specifically, the values of β in Models 1, 2, and 3 are −0.023 (significant at the 1% level), −0.009 (significant at the 5% level), and −0.012 (significant at the 5% level), respectively.

The single most striking observation to emerge from the results is that market integration is positive and significantly affects economic growth regardless of the estimated model. In particular, the results of Model 2 indicate that the value of the ρ coefficient is positive (0.393) and statistically significant at the 1% level. This result suggests that regional economic growth between regions with highly integrated markets has mutually positive impacts. This finding is supported by an increase of the β value in Model 2 compared to that in Model 1. For example, the values of β in Models 1 and 2 are −0.023 (significant at 1% level) and −0.009 (significant at 5% level), respectively. When moving to Model 3, the same result is also observed. This finding is consistent with that of Esiyoka and Ugur (2018), revealing a significant positive relationship between growth and conditional convergence in Vietnamese provinces, and is also supported by the work of Bekaert (2007) and Fall (2019). In addition, the results for λ in Model 3 exhibit a positive and statistically significant result at conventional levels.

Overall, market integration has a positive association with Vietnam's regional economic growth. Additionally, this impact can be explained by several factors, including regional development policy and key economic zones of the country. This view is supported by the findings of Vinh et al. (2020), which mentions that the economic scale of host provinces is possibly affected by capital and the labor force from neighboring provinces. In other words, local GRDP is positively influenced by capital and labor resources of neighboring provinces. Indeed, Vietnam's key economic zones are located in large urban areas, such as Ho Chi Minh and Hanoi cities, or other areas having

abundant natural resources, such as Quang Ninh province and Da Nang city, and the impact of these economic zones on their neighboring provinces is also confirmed by Vinh et al. (2020) and Van Le and Nguyen (2018).

The gradual increase of domestic market integration can be observed via two basic factors. The first one is a decreasing differences in commodity price indexes among regions. The commodity price indexes are collected from the General Statistics Office (GSO) statistical yearbooks for the period of 2012−2018. Table 3 presents commodity price indexes across six regions in Vietnam.

Table 3: Regional Commodity Price Indexes

Regions	2012	2013	2014	2015	2016	2017	2018
Red River Delta	100	100	100	100	100	100	100
Northern Midland and Mountainous region	102.32	103.02	102.99	104.77	101.34	101.41	100.54
North Central and Central Coast	98.17	99.37	100.09	101.90	100.33	100.43	99.50
Central Highlands	101.32	100.60	100.81	103.85	101.12	101.01	100.41
Southeast	103.35	103.05	103.96	104.31	101.73	101.88	101.53
Mekong Delta	96.39	95.62	95.73	96.29	98.29	98.56	98.15

Note: This table shows the yearly commodity price indexes of all six economic regions in Vietnam.

Source: Data are collected from the GSO Statistical Yearbooks covering the period 2012-2018.

It can be seen from Table 3 that the differences in commodity price indexes among regions tends to decrease over the years from 2012 to 2018. Specifically, in 2012, the highest and lowest differences in living costs among the regions was 3.61% (between the Mekong River Delta and the Red River Delta) and 1.32% (between the Central Highlands and the Red River Delta), respectively. However, the value for 2018 was 1.77% (between the Mekong River Delta and the Red River Delta) and 0.03% (between the Central Highlands and the Red River Delta) for the highest and lowest differences in the living cost among the Vietnamese regions, respectively.

The second factor is an increase in commodity trade among the regions. Data on commodity trade among the regions are collected from the General Statistics Office (GSO) statistical yearbooks for the period of 2007, 2011, 2013, and 2015−2018. Table 4 presents commodity trade among the regions.

Table 4: Regional Commodity Trade in Vietnam (VND Billions)

Regions	2007	2011	2013	2015	2016	2017	2018
Whole country	53,957	82,470	97,587	111,964	124,332	136,287	154,258
Red River Delta	21,051	35,096	43,891	49,672	55,325	61,579	69,349
Northern Midland and Mountainous region	2,437	3,261	3,780	4,385	4,726	5,199	6,033
North Central and Central Coast	9,364	12,362	13,909	15,801	17,261	18,715	20,114
Central Highlands	1,509	3,087	4,085	4,463	5,384	6,149	6,608
Southeast	14,213	21,598	24,200	29,080	32,303	34,682	41,573
Mekong Delta	5,383	7,066	7,724	8,565	9,333	9,963	10,580

Source: Data are collected from the GSO statistical yearbooks covering the period of 2007, 2011, 2013, and 2015−2018.

As shown in Table 4, the amount of goods traded by locality tend to increase gradually throughout the country from 2007 to 2018. For the whole country between 2011 and 2018, commodity trade increased by 53% and 186%, respectively, compared to itself in 2007. In addition, the amount of goods trade between regions has increased steadily. Particularly, in Table 4, the growth rate in commodity trade of the Central Highlands, a region showing the highest growth rate in Vietnam, increased 338% by 2018 compared to its baseline in 2007. Moreover, the Mekong River Delta experienced the lowest growth rate with an increase of 97% in 2018 in comparison to its growth rate in 2007.

3.3. Additional Tests

The analysis in this sub-section further verifies the robustness of the results on market integration along with regional economic growth using alternative empirical models. Table 5 presents a test procedure that considers the lagged and squared weighted matrices (discussed in section 2.1.2). Note that the procedures applied for these analyses are similar to that reported in Table 2. In general, Table 5 reports the results of the β-convergence estimation considering the lagged weighting matrix (panel A) and squared weighting matrix (panel B).

Table 5: Robustness Checks with Lagged and Square Weight Matrix Models.

Parameters	Panel A: Lagged weight matrix		Panel B: Square weight matrix	
	FESAR Lagged W	FESEM Lagged W	FESAR W^2	FESEM W^2
β	-0.008* (0.228)	-0.011* (0.235)	-0.008* (0.197)	-0.0010* (0.217)
ρ	0.361*** (0.000)		0.388*** (0.000)	
λ		0.419** (0.000)		0.437** (0.000)
R^2	0.080	0.103	0.085	0.112
Log-likehood	630.162	630.112	630.232	630.712

Note: Numbers in parentheses are standard errors. ***, **, and * represent the statistically significant coefficients at the 1, 5, and 10% levels, respectively.
Source: Authors' calculations.

Panel A of Table 5 shows that the convergence estimation remains negative and statistically significant in the FESAR and FESEM models when the first-order lagged matrix is used. Similar results are also obtained in panel B showing results for the specification using the squared weighting matrix.

These findings further provide evidence for the spatial dependence of economic growth between provinces in Vietnam and are also consistent with the results in Table 2. Therefore, it is obvious that there is a strong positive and significant relationship between market integration and regional economic growth in Vietnamese provinces.

4. Conclusion

This study investigates the impact of market integration on regional economic growth in Vietnam from 2005 to 2018. The results show a negative and significant coefficient, implying that the market integration process has contributed considerably to Vietnam's regional economic growth. In addition, the existence of positive spillover effects is found between the domestic regions which are strengthened by market integration. In other words, the economic growth of a region is helpful for other regions if they are highly integrated. Additionally, the developed regions contribute more to market integration compared to the others. Most of the regions are involved in the market integration process during our sample period from 2005 to 2018.

Overall, based on a macroscopic perspective, this study shows that significant market integration has contributed to Vietnam's regional economic growth. Future studies may help to expand the understanding of the relevant issues by exploring microeconomic evidence, such as decision-making processes of local governors or raising awareness of the effects of market integration on regional economic growth.

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