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Author(s): Chong-Sup Kim and Seungho Lee
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Different Paths of Deindustrialization: Latin American and Southeast Asian Countries from a Comparative Perspective*

Chong-Sup Kim and Seungho Lee

This paper looks from a comparative perspective at different paths of deindustrialization taken by Latin American and Southeast Asian countries. Using a sample of 112 developing countries over the period between 1990 and 2012, it is analyzed how each deindustrialization source has affected the deindustrialization paths of the two country groups. It is found that, the 'inverted-U' relationship between the share of value added by manufacturing in total GDP and per capita income; the continuous downward slope of the inverted-U curve; the Dutch Disease effect; and the emergence of China as a major player in the world trade scene have affected the deindustrialization paths of the two country groups with different timings, speeds, and degrees.

Keywords: deindustrialization, Latin America, Southeast Asia

1. INTRODUCTION

Since the beginning of the 1970s, many advanced economies have experienced a continuous decline in the share of manufacturing in their GDP and employment, a phenomenon called deindustrialization. At present, manufacturing sector constitutes only a small fraction of GDP and employment in most of those economies that have traditionally been referred to as industrial countries. Since the 1990s, a number of developing countries including those in the Third World have been following a similar pattern, also embarking on the phase of deindustrialization. Indeed, concerns have been raised over the lack of dynamism in manufacturing sector reflected in the falling share of manufacturing in GDP and employment in these countries.

Nevertheless, this paper begins by arguing that deindustrialization should not always be considered a negative phenomenon but rather a natural consequence of the industrial dynamism in a developed economy, following the arguments set forth by Rowthorn and Wells (1987). While acknowledging that deindustrialization is a universal phenomenon that most countries experience at a certain stage of economic development, it has to be understood that the factors that cause deindustrialization differ widely across countries, thereby dictating different deindustrialization paths. There are factors of deindustrialization that influence most countries and those that affect only a limited number of countries. In addition, although given a similar combination of deindustrialization forces in effect, when these forces become effective, how rapidly they advance deindustrialization, and to what extent they remain effective also vary greatly across individual cases.

This paper attempts to look from a comparative perspective at different paths of

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deindustrialization taken by two different groups of countries, Latin America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela) and Southeast Asia (Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, and Vietnam). The research begins by identifying two sources of deindustrialization that affect the majority of countries at a certain point over the course of economic development: the 'inverted-U' relationship between the share of value added by manufacturing in total GDP and per capita income; and continuously declining relationship between per capita income and the share of value added by manufacturing in total GDP. In addition to these, there are two additional deindustrialization forces that influence only a limited group of countries: the Dutch Disease effect; and the emergence of China as a major player in the world trade scene.

Using a sample of 112 developing countries over the period between 1990 and 2012, this paper shows how each source of deindustrialization mentioned above has affected the deindustrialization paths of the two different groups of Latin American and Southeast Asian countries with different timings, speeds, and degrees. Throughout this paper, deindustrialization is analyzed solely from the point of view of manufacturing added as a percentage of GDP.

The paper is organized as follows. The following section will illustrate main findings of the existing literature on the determinants of deindustrialization. This discussion provides the basis for the theoretical framework of this paper. In the ensuing section, empirical models that the authors have formulated based on the theoretical framework will be submitted and the empirical results will be presented and discussed. Concluding remarks are provided to sum up the paper in the final section.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Table 1 shows how manufacturing value added as a percentage of GDP has evolved between 1990 and 2010 in various country groups. Since the beginning of the 1990s, approximately 200 countries in the world have on average experienced a continuous decline in the share of manufacturing in their GDP. The OECD countries, those that have traditionally been referred to as industrial countries, have not been an exception, also showing a deindustrializing trend over the time period. A similar phenomenon is observed in a sample of 112 developing countries overall.

The interest of this paper lies in the different paths of deindustrialization taken by Latin American and Southeast Asian countries over the time period mentioned. At an aggregate level, Latin America has seen its manufacturing value added as a percentage of GDP decreasing continuously since 1990. However, Southeast Asian countries show a different trend, witnessing their manufacturing value added as a percentage of GDP increasing until 2005 but declining since then. The purpose of this paper it to find factors that can explain such different trajectories of deindustrialization of Latin American and Southeast Asian countries from 1990 to 2012.

The existing literature acknowledges that deindustrialization should not always be considered a negative phenomenon but rather a natural consequence of the industrial dynamism in a developed economy (Rowthrorn, 1994; Rowthorn and Wells, 1987; Palma, 2005). While recognizing that the inverted-U relationship between the share of manufac-

Table 1. Evolution of manufacturing value added as a percentage of GDP (%)

	1990	1995	2000	2005	2010
World	15.5	15.1	14.0	13.3	12.7
OECD countries	19.9	19.9	18.8	16.8	15.5
Developing countries	16.2	15.5	14.3	14.0	13.3
Latin America	19.8	18.3	18.2	17.2	15.7
Southeast Asia	16.2	17.5	18.2	19.0	17.5

Source: World Bank (2014).

turing in employment and per capita income found by Rowthorn is an important factor of deindustrialization, Palma argues that deindustrialization is not a mere result of this single relationship but a consequence of the interaction of distinct phenomena. Having categorized the inverted-U relationship as the first deindustrialization force, he maintains that there are additional processes at work that lead countries to de-industrialize.

The first source of deindustrialization mentioned in this paper is identified by Rowthorn. He finds that a decline in manufacturing employment occurs when countries reach a certain level of per capita income. In other words, the trajectory of the process of economic development follows the inverted-U relationship between the share of manufacturing in employment and per capita income. As per capita income increases, the share of employment occupied by manufacturing first rises, then at a certain level of per capita income stabilizes, and finally falls. The second source of deindustrialization mentioned in this paper is identified by Palma. According to him, there is a continuously declining relationship between per capita income and the share of manufacturing in employment over time. It is argued that the inverted-U relationship is not stable over time but follows a continuous downward slope, regardless of whether or not countries have reached the turning point of the inverted-U curve.

Palma also maintains that, in addition to the two sources of deindustrialization mentioned beforehand, several countries are affected by a third deindustrialization force: the Dutch Disease effect. It has to be emphasized that this phenomenon is only observed in a particular group of countries, for example, those abundant in natural resources that generate a trade surplus in primary commodities and finance their trade deficits in manufacturing with it. This group of countries tends to witness a reduction in the share of manufacturing in employment that is greater than what has been expected given the previous two sources of deindustrialization mentioned in effect.

There is indeed an ample literature on this relationship. Matsuyama (1992) analyzes how dependence on primary sector leads to deindustrialization using a simple framework. In his model, only two sectors exist: agriculture and manufacturing. Agricultural sector directly makes use of the factors of production that otherwise would be employed in manufacturing sector. Thus, a trade surplus in the agricultural sector eventually leads to deindustrialization. Having criticized that his model neglects the existence of a resource sector such as oil production that makes use of very little labor and thus does not directly draw employment from manufacturing, Sachs and Warner (1995) extend Matsuyama's framework by dividing the economy into three sectors: a tradable natural resource sector, a tradable manufacturing sector, and a non-traded sector. Higher natural resource endowment leads to higher demand

for non-tradable goods and this consequently results in less allocation of factors of production to the manufacturing sector. Thus, when there are natural resources in a country, tradable production is concentrated in the natural resource sector rather than the manufacturing sector, and capital and labor that otherwise might be employed in manufacturing are pulled into the non-traded sector. Therefore, when an economy is significantly dependent upon natural resources for exports, its manufacturing sector tends to shrink and the non-traded goods sector tends to expand.

This paper identifies the emergence of China as a major player in the world trade scene as another source of deindustrialization affecting a certain group of countries, for example, those who have increasingly expanded bilateral trade links with China in various forms. There is a growing quantity of literature on the impact of China on developing countries caused by the growth of bilateral trade with China (Gallagher and Porzecanski, 2011; Hogfang and Linglan, 2010; Jenkins, 2009; Phillips, 2006; UNCTAD, 2002). There is a consensus in the existing literature that the continued growth and rapid structural transformation of China alongside its increasing integration into the world market since the 1990s carries important consequences for the production and trade structures of many developing countries.

The existing literature points out that the impact of China's rapid industrial development has been particularly significant in terms of its increasing demand for primary products. However, it is argued that it is hard to determine whether this has truly been beneficial for those countries associated with the commodity boom caused by China (Gallagher and Porzecanski; Jenkins). According to them, whether China will be a sustained source of demand for their primary commodities in the long run and how long commodity prices will remain high is one thing, but another thing is that, even if China's demand for their exports and their prices remain high it is possible that it contributes to an incentives structure that fuels a process of deindustrialization in the countries associated with a rise in natural resources exploitation. This seems to be the case for a number of Latin American countries. On the contrary, it appears that China does not pose a serious threat for industrial sectors of a handful of countries. For example, a number of Southeast Asian countries are becoming increasingly integrated with China through the development of production networks in manufacturing sectors which have created a regional division of labor and substantial intra-industry trade and investment flows. As exports to China are mainly manufactured goods in this case, the China effect can lead to industrialization rather than deindustrialization.

Many developing countries have also witnessed a rapid increase of Chinese presence in their domestic manufactured goods markets. The recent rise in imports from China has become a matter of growing concern due to the possibility of competition with locally produced manufactured goods that could generate a deindustrialization force. Furthermore, Jenkins adds that, contrary to some popular perceptions, imports from China are not predominantly of low-technology manufactured goods. There is a significant volume of imports that are of medium-technology goods and high-technology goods. According to him, the share of high-technology imports from China has been increasing while that of low-technology has tended to fall. Nevertheless, although imports from China are mostly manufactured goods, if these are not final goods to be consumed but intermediate goods for additional assembly or processing, its effect on the manufacturing sector may potentially be positive.

A meaningful analysis that studies the varying implications of the rise of China on developing countries' manufacturing sectors given the different nature of production and

trade structures and economic profiles across regions is lacking. This paper argues that, given such context, the volume and composition of bilateral trade flows with China have important and different implications for manufacturing sectors of Latin American and Southeast Asian countries. Especially, different compositions of bilateral trade flows between the two regions and China are striking.

3. EMPIRICAL MODELS AND RESULTS

In order to assess how each deindustrialization force mentioned in the previous section has affected deindustrialization paths of Latin American and Southeast Asian countries over the study period, cross-country time-series regression analysis is conducted with several models that are to follow.

Regression (1) includes GDP, natural logarithm of per capita income (World Bank, 2014) and GDP^2, the square of natural logarithm of per capita income as independent variables. The results of regression (1) confirm the inverted-U relationship between the share of manufacturing in employment and per capita income suggested by Rowthorn, although in this paper manufacturing value added as a percentage of GDP is used as a dependent variable instead of the share of manufacturing in employment. The regression results in Table 2 suggest that, with the coefficient on GDP being 16.54 and GDP^2 being -1.01, manufacturing

Table 2. Cross-country time-series regressions 1990-2012

Dependent variable: Manufacturing value added as a percentage of GDP		
	(1)	(2)
Constant	-50.04	-43.84
	(5.52)	(5.38)
GDP	16.54***	14.90***
	(1.59)	(1.55)
GDP^2	-1.01***	-0.86***
	(0.11)	(0.11)
Y9497		-0.96*
		(0.50)
Y9801		-1.89***
		(0.50)
Y0205		-2.74***
		(0.50)
Y0609		-4.77***
		(0.51)
Y1012		-5.77***
		(0.59)
Observations	2157	2157
R^2	0.15	0.21

standard errors in parentheses

*statistically significant at 10% level, ** at 5% level, and *** at 1% level

Table 3. Evolution of per capita income ($)

	1990	1995	2000	2005	2010
Latin America	1797	2926	3339	3765	6550
Southeast Asia	653	994	927	1311	2323
Developing countries	1192	1374	1475	2125	3440

Source: World Bank (2014).

value added as a percentage of GDP increases with per capita income first but begins to decline when countries reach a certain level of per capita income. In this regression, for an average country in the sample, the level of per capita income from which manufacturing value added as a percentage of GDP begins to decrease is estimated to be $3300.

As emphasized earlier, this inverted-U relationship is almost universally observed in countries over the long term course of economic development. During what is referred to as industrialization phase, manufacturing value added as a percentage of GDP increases, mainly as a result of the transfer of the weight of value added in total GDP from agriculture to manufacturing and services. During the next phase, alongside a continuing contraction of value added share of agriculture and an expansion of the share of services in total GDP, the share of manufacturing stabilizes. Finally, a new phase emerges in which value added in manufacturing as a percentage of GDP begins to fall. In the meantime, services continue to be the main source of value added absorption. This phase is commonly referred to as the deindustrialization phase.

As can be seen in Tables 1 and 3, Latin American countries overall had already embarked on the process of deindustrialization in 1990, despite the fact that their average level of per capita income in 1990 and 1995 was lower than the per capita income level from which manufacturing value added as a percentage of GDP is expected to decrease for an average country in the sample in regression (1). Latin America surpassed the estimated turning point of the inverted-U curve of $3300 only in 2000. Due to the average level of per capita income lower than the critical value of $3300 throughout almost the entire study period, it was expected that Southeast Asia overall would not experience deindustrialization at all from 1990 to 2010. However, Southeast Asia had begun to deindustrialize in 2005, even though they still had not reached the critical value of $3300 in 2010. The relationship between deindustrialization and per capita income is rather unclear. This suggests that the fact that they had reached the per capita income level from which the inverted-U curve begins to slope downward does not always lead to deindustrialization. There must have been other sources at play that have been affecting the paths of deindustrialization of Latin American and Southeast Asian countries.

Regression (2) adds time dummy variables to regression (1), where, for example, Y9497 is a dummy variable where Y9497=1 if the year is 1994~1997, and 0 otherwise. The results of regression (2) seem to provide a partial answer to the puzzle of Latin American deindustrialization between 1990 and 2000 that cannot solely be explained by the inverted-U relationship between manufacturing value added as a percentage of GDP and per capita income. The inverted-U relationship revealed in regression (1) is not stable over time but follows a continuous downward slope for an average country in the sample, regardless of whether or not countries have reached the turning point of the inverted-U curve. Indeed, the coefficient on year dummies decreases over the time period between 1990 and 2012.

Table 4. Cross-country time-series regressions 1990-2012

Dependent variable : Manufacturing value added as a percentage of GDP			
	(3)	(4)	(5)
Constant	-35.20	-102.11	-29.51
	(5.81)	(13.87)	(5.84)
GDP	14.44***	32.57***	12.18***
	(1.62)	(3.85)	(1.63)
GDP^2	-0.86***	-2.06***	-0.72***
	(0.11)	(0.26)	(0.11)
PRI	-0.08***	0.98***	0.06***
	(0.01)	(0.21)	(0.01)
GDP*PRI		-0.29***	
		(0.06)	
GDP^2*PRI		0.02***	
		(0.00)	
LA			2.60***
			(0.47)
SEA			4.82***
			(0.49)
CAEE			2.02***
			(0.49)
MENA			-0.70
			(0.56)
Observations	1460	1460	1460
R^2	0.35	0.36	0.41

All specifications include year dummy variables
standard errors in parentheses
*statistically significant at 10% level, ** at 5% level, and *** at 1% level

However, it seems that the increasing share of manufacturing value added in GDP in Southeast Asian economies from 1990 to 2005 still cannot be explained by the second source of deindustrialization. The effect of the second source of deindustrialization had probably been felt by Southeast Asia only after 2005.

Regression (3) adds PRI as additional independent variable to regression (2). This is a proxy for primary commodity dependence of a country for exports, that is, dependence on the products that are categorized as SITC 0, 1, 2, 3, and 4 as a percentage of total exports at SITC one-digit level (Author's calculations, based on United Nations Statistics Division in 2014). It is shown in the results of regression (3) that primary commodity dependence as a percentage of a country's total exports is on average negatively related to manufacturing value added as a percentage of GDP of that country. This implies that the Dutch Disease force has also been at work as an additional deindustrialization force, affecting significantly those with high dependence on resources-based sectors for exports.

As can be seen in Table 5, Latin American countries have been far more dependent upon resources-based sectors for their exports than Southeast Asian countries overall. Latin

Table 5. Evolution of primary commodity dependence as a percentage of total GDP

	1990	1995	2000	2005	2010
Latin America	58.8	65.7	60.8	60.0	59.3
Southeast Asia	36.5	24.1	20.2	25.5	26.8
Developing countries	50.8	58.4	51.9	52.5	50.7

Source: World Bank (2014).

America as a region has recorded primary commodity dependence considerably higher than an average developing country, while Southeast Asian countries have recorded primary commodity dependence much lower than an average developing country. It appears that the Dutch disease effect has much contributed to the different paths of industrialization taken by the two country groups. Whereas Latin American countries have been heavily affected by the deindustrialization force of the Dutch Disease since the beginning of the time period, Southeast Asian countries seem to have been much less affected by it on average over the study period, thereby leaving more room for industrialization between 1990 and 2005.

Regression (4) is run with two interaction terms, GDP*PRI and GDP^2*PRI. The results of regression (4) reveal another interesting point regarding the interaction between manufacturing value added, per capita income and primary commodity dependence. The two interaction terms, GDP*PRI and GDP^2*PRI, when introduced, decrease the coefficient on GDP and increase that on GDP^2 respectively as PRI increases. This implies that more dependence on resources-based sectors for exports further reduces the level of manufacturing value added associated with each per capita income level and the level of per capita income from which the share of manufacturing value added in GDP begins to fall. This seems to provide an additional explanation for Latin American countries' early deindustrialization given their per capita income, deeper degree of it throughout the study period. Again, Southeast Asian countries seem to have been much less affected by it on average over the study period.

Regression (5) includes regional dummy variables to regression (3) in order to capture overall fixed effects that are time-invariant across each region responsible for the difference in manufacturing value added as a percentage of GDP between five different regions, Latin America, Southeast Asia, Central Asia or Eastern Europe, Middle East or North Africa, and Sub-Saharan Africa, with Sub-Saharan African countries serving as a baseline category.

In addition to the three deindustrialization forces already mentioned, this paper identifies the recent emergence of China as a major player in the world trade scene as another source of deindustrialization for a particular group of countries. Nowadays, it is hard to think of a region where Chinese influence is absent. The continued growth and rapid structural transformation of China alongside its increasing integration into the world market since the 1990s carries important consequences for the production and trade structures of many developing countries including Latin American and Southeast Asian economies. This paper measures the impact of China on their manufacturing sectors only from a viewpoint of bilateral trade with China. From this perspective, the degree of China effect ultimately depends on how much and what they export to and import from China. Indeed, the growth and composition of bilateral trade flows with China have fed concerns about deindustrialization in many developing economies.

Table 6. Chinese exports and imports from/to the world and their share in the world

	1990	1995	2000	2005	2010
Exports ($ billion)	62.1	148.8	249.2	762.0	1577.8
Share in the world (%)	2.0	3.1	4.0	7.6	10.9
Imports ($ billion)	53.3	132.1	225.1	660.0	1396.0
Share in the world (%)	1.6	2.7	3.6	6.4	9.5

Source: Author's calculations, based on United Nations Statistics Division.

The recent increase in Chinese share in the world trade has been exceptional. China has experienced dramatic export and import booms over the past two decades. Table 6 shows that Chinese exports surged from $62.1 billion in 1990 to $249.2 billion in 2000 and $1.5 trillion in 2010, increasing China's share from 2.0 percent of total world exports in 1990 to 4.0 percent in 2000 and 10.9 percent in 2010. Imports also rose from $53.3 billion in 1990 to $225.1 billion in 2000 and 1.3 trillion in 2010, increasing China's share from 1.6 percent of total world imports in 1990 to 3.6 percent in 2000 and 9.5 percent in 2010.

Table 7. Cross-country time-series regressions 1990-2012

Dependent variable: Manufacturing value added as a percentage of GDP				
	(6)	(7)	(8)	(9)
Constant	-36.49	-38.26	-37.99	-38.16
	(5.97)	(5.75)	(5.73)	(5.70)
GDP	13.98***	14.59***	14.67***	14.88***
	(1.66)	(1.59)	(1.59)	(1.58)
GDP^2	-0.84***	-0.92***	-0.93***	-0.94***
	(0.11)	(0.11)	(0.11)	(0.11)
PRI	-0.05***	-0.05***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
CHINAEXP	-0.05**	-0.10***	-0.16***	-0.12***
	(0.02)	(0.02)	(0.03)	(0.02)
CHINAIMP	-0.11***	-0.05	-0.07**	-0.12***
	(0.04)	(0.03)	(0.04)	(0.04)
CHINAGL		14.12***	11.71***	9.80***
		(1.11)	(1.34)	(1.45)
CHINAEXP*CHINAGL			0.55***	
			(0.18)	
CHINAIMP*CHINAGL				0.79***
				(0.17)
Observations	1361	1343	1343	1343
R^2	0.44	0.50	0.50	0.50

All specifications include year and regional dummy variables
standard errors in parentheses
*statistically significant at 10% level, ** at 5% level, and *** at 1% level

Regression (6) includes two additional variables to regression (5), CHINAEXP, Chinese share as a percentage of a country's total exports (Author's calculations, based on United Nations Statistics Division), CHINAIMP, Chinese share as a percentage of a country's total imports (Author's calculations, based on United Nations Statistics Division). It measures the impact of higher trade share with China on the dependent variable. The results of regression (6) imply that more dependence on China for exports and imports in terms of trade share on average negatively affect manufacturing value added as a percentage of GDP of a country.

The reason why higher trade share with China negatively affects manufacturing value added as a percentage of GDP of an average country in the sample mainly stems from the exporting and importing structures of China. Table 8 shows how the exporting structure of the country has evolved over time, following the Standard International Trade Classification one-digit classification. In all years, the three key sectors are manufactured goods classified chiefly by material, machinery and transport equipment, and miscellaneous manufactured goods. These three sectors add up to 79.2% of total exports in 1995, 84.7% in 2000, 88.6% in 2005, and 89.2% in 2010, showing that the weight of the three sectors of total exports has increased over time. The evolution of machinery and transport equipment exports has been impressive. It accounted 21.1% of total exports in 1995 but 49.5% in 2010. Thus, the story is quite straightforward when the impact of imports from China on manufacturing sectors of developing countries is concerned. Products that are imported from China are mainly manufactured goods as indicated in the exporting structure of China. They may create competition with locally produced manufactured goods generating a deindustrialization force. Although imports from China are mostly manufactured goods, if these are not final goods to be consumed but intermediate goods that are for additional assembly or processing, its effect on the manufacturing sector may potentially be positive.

Table 9 shows how the importing structure of the country has changed over time. Crude materials except food and fuel and mineral fuels, lubricants and related materials have increased their share whereas manufactured goods classified chiefly by material has lost its share over time. China has increasingly become more dependent upon raw materials for its imports. A large share of machinery and transport equipment in total imports that has been quite stable over time is due to the existence of considerable intra-industry trade. The results of Table 8 and 9 reflect that China has turned into a regional production center and

Table 8. Evolution of exporting structure of China (% of total exports)

	1995	2000	2005	2010
Food and live animals	6.7	4.9	3.0	2.6
Beverages and tobacco	0.9	0.3	0.2	0.1
Crude materials except food and fuel	2.9	1.8	1.0	0.7
Mineral fuels, lubricants and related materials	3.6	3.2	2.3	1.7
Animal and vegetable oils and fats	0.3	0.0	0.0	0.0
Chemicals products	6.1	4.9	4.7	5.5
Manufactured goods classified chiefly by material	21.7	17.1	16.9	15.8
Machinery and transport equipment	21.1	33.1	46.2	49.5
Miscellaneous manufactured goods	36.4	34.5	25.5	23.9
Commod. & transacts. Not class. Accord. To kind	0.2	0.2	0.2	0.1

Source: Author's calculations, based on United Nations Statistics Division.

Table 9. Evolution of importing structure of China (% of total exports)

	1995	2000	2005	2010
Food and live animals	4.6	2.1	1.4	1.5
Beverages and tobacco	0.3	0.2	0.1	0.2
Crude materials except food and fuel	7.7	8.9	10.6	15.2
Mineral fuels, lubricants and related materials	3.9	9.2	9.7	13.5
Animal and vegetable oils and fats	2.0	0.4	0.5	0.6
Chemicals products	13.1	13.4	11.8	10.7
Manufactured goods classified chiefly by material	21.8	18.6	12.3	9.4
Machinery and transport equipment	39.9	40.8	44.0	39.4
Miscellaneous manufactured goods	6.1	5.6	9.2	8.1
Commod. & transacts. Not class. Accord. To kind	0.6	0.8	0.3	1.3

Source: Author's calculations, based on United Nations Statistics Division.

manufacturing point for re-exports. While China is a major export market for many developing countries, the composition of exports to China varies considerably across countries. As can be seen in the importing structure of China, some have become more dependent upon raw materials while some have tended to rely more on manufactured goods for exports to China along the growth of China over the past decades. Intuitively, if exports to China mainly stem from resources-based sectors, the possibility of deindustrialization may be greater, and if a country's exports to China are concentrated in manufactured goods, its effect on the manufacturing sector may be positive.

The rise of China as a major trade player and consequent increase in Chinese share in total exports and imports have clearly acted as an impetus for deindustrialization for an average developing country in the sample. However, what Table 10 shows is rather puzzling: it is shown that Chinese share as a percentage of total exports and imports has on average been greater for the Southeast Asian group than the Latin American group. If one follows the logic derived from the results of regression (6), a bigger weight of China in total trade is expected to generate a bigger deindustrialization force. Nevertheless, as it was mentioned before, Southeast Asia has witnessed its manufacturing value added as a percentage of GDP increasing until 2005, whereas Latin America has seen its manufacturing value added as a percentage of GDP decreasing continuously since 1990. This suggests that, despite the fact that China acts as an apparent deindustrialization force for an average country in the sample as shown in regression (6), depending on the composition of bilateral trade flows with her, the China effect could act as an industrialization force for a certain group of countries. The difference in the composition of bilateral trade flows with China indeed carries significantly different consequences for the manufacturing sectors of many developing countries.

Given the additional need to capture the effect of the difference in trade composition with China on manufacturing value added as a percentage of GDP, a variable that measures the share of intra-industry trade in total trade, regression (7) adds another independent variable, CHINAGL, weighted Grubel-Lloyd index at Standard International Trade Classification one-digit level between a country and China (Author's calculations, based on United Nations Statistics Division in 2014), to regression (6). The regression results of regression (7) suggest that intra-industry trade with China is overall positively related to the dependent variable.

Table 10. Evolution of Chinese share as a percentage of total exports and imports (%)

	1990		1995		2000		2005		2010	
	Ex	Im	Ex	Im	Ex	Im	Ex	Im	Ex	Im
Latin America	1.1	0.4	1.6	1.0	1.4	2.8	3.0	6.6	5.2	13.7
Southeast Asia	1.3	3.1	2.1	3.8	2.8	5.9	4.9	10.1	6.7	13.2
Developing countries	1.1	1.3	1.5	1.8	2.2	3.6	3.8	6.4	5.2	11.2

Source: Author's calculations based on United Nations Statistics Division.

With the introduction of the variable capturing the effect of intra-industry trade with China, the coefficient on SEA decreases significantly to a level below that on LA.

Now, one should turn to the question of how trade with China has affected the manufacturing sectors of Latin American and Southeast Asian countries in different ways. For several Latin American economies, the emergence of China has truly led to an unseen demand for their exports. However, this trade relationship is not without problems when one looks at the composition of their exports to China. Table 11 shows the composition of exports of the top four Latin American exporters to China in 2006 and 2011. It is clear that these countries have heavily relied on traditional resources-based sectors for exports to China. This can represent the troubling scenario for their manufacturing sectors, especially of the majority of South American countries that have been unable to compete in the world market for manufactured products. Indeed, the exporting structure of Latin American countries to China has contributed to an incentives structure that fuels a process of deindustrialization in the countries associated with a rise in natural resources exploitation.

At the same time, the rapid growth in imports from China over the past decades has been seen as a factor contributing to deindustrialization in a number of Latin American countries, negatively affecting prices, production, and employment of their manufacturing sectors. Table 12 shows the composition of imports of the top four Latin American importers from

Table 11. Composition of selected Latin American countries' exports to China (%)

	Argentina		Brazil		Chile		Peru	
	06	11	06	11	06	11	06	11
Food and live animals	3	4	2	4	5	3	21	17
Beverages and tobacco	0	2	1	1	0	0	0	0
Crude materials except food and fuel	44	73	70	75	57	34	69	68
Mineral fuels, lubricants and related materials	26	7	10	11	0	0	4	1
Animal and vegetable oils and fats	19	9	1	2	0	0	0	0
Chemicals products	2	2	3	1	1	1	0	1
Manufactured goods classified chiefly by material	6	2	8	3	36	61	4	12
Machinery and transport equipment	0	0	5	2	0	0	0	0
Miscellaneous manufactured goods	0	0	0	0	0	0	0	0
Commod. & transacts. Not class. Accord. To kind	0	0	0	0	0	0	0	0

Source: Author's calculations based on United Nations Statistics Division.

Table 12. Composition of selected Latin American countries' imports from China (%)

	Chile		Mexico		Paraguay		Peru	
	06	11	06	11	06	11	06	11
Food and live animals	0	1	1	1	0	0	1	1
Beverages and tobacco	0	0	0	0	0	0	0	0
Crude materials except food and fuel	0	0	0	0	0	0	1	1
Mineral fuels, lubricants and related materials	0	0	0	0	0	0	1	0
Animal and vegetable oils and fats	0	0	0	0	0	0	0	0
Chemicals products	4	5	3	4	6	6	9	7
Manufactured goods classified chiefly by material	17	18	10	10	4	8	23	23
Machinery and transport equipment	33	41	69	70	74	62	45	50
Miscellaneous manufactured goods	45	35	15	13	17	24	21	19
Commod. & transacts. Not class. Accord. To kind	0	0	2	2	0	0	0	0

Source: Author's calculations, based on United Nations Statistics Division.

China in 2006 and 2011. One can see that imports from China to these countries are highly concentrated in manufactured goods. The type of goods imported from China is the reverse of that noted for Latin American exports to China in Table 10. Given the composition of Chinese imports penetrating Latin American markets, there is a possibility of Chinese competition displacing locally produced manufactured goods.

When one considers the trade relationship between Southeast Asian economies and China, the point of discussion about possible impacts of the emergence of China changes substantially. Although it is equally true that bilateral trade between the two sides has grown at exceptionally high rates over the past decades, its relationship is characterized by the existence of a significant volume of intra-industry trade between the two sides, contrary to that between China and Latin American countries in which inter-industry trade is dominant.

Table 13 shows the composition of exports of the top four Southeast Asian exporters to China in 2006 and 2011. Compared to the top four Latin American exporters to China in Table 10, these economies have relied considerably more on manufacturing sectors for exports to China, with the exception of Vietnam. The composition of imports of the top four Southeast Asian importers from China in 2006 and 2011 that can be seen in Table 14 is not too different from that of the top four Latin American importers. Imports from China to Southeast Asian countries are also mostly manufactured goods. The similar composition of Southeast Asian countries' exports and imports to and from China implies that a significant volume of intra-industry trade exists between the two sides.

The dominant portion of the intra-industry trade between China and Southeast Asian economies is a result of regional production sharing networks or the division of labor between the two sides. Ando and Kimura (2003) point out that vertical intra-industry trade is especially noteworthy, where transactions are characterized by back-and-forth trade links in which a number of countries in the region participate in various stages of single production chains. For example, a country can participate in the production network in various forms: exporting primary inputs, importing inputs for assembly, exporting intermediate goods for additional processing by third country, or importing intermediate inputs for additional processing and exporting final goods. The most important source of complementarity between intra-industry trade within the regional production network between China and

Table 13. Composition of selected Southeast Asian countries' exports to China (%)

	Malaysia		Philippines		Vietnam		Thailand	
	06	11	06	11	06	11	06	11
Food and live animals	1	1	1	2	14	15	8	8
Beverages and tobacco	0	0	0	0	1	1	0	0
Crude materials except food and fuel	10	9	3	9	34	22	16	24
Mineral fuels, lubricants and related materials	3	6	3	3	32	25	8	4
Animal and vegetable oils and fats	14	16	0	2	0	0	0	0
Chemicals products	10	9	1	4	4	6	19	21
Manufactured goods classified chiefly by material	8	9	5	6	4	11	7	12
Machinery and transport equipment	48	47	86	50	4	13	38	29
Miscellaneous manufactured goods	5	3	0	1	3	5	2	3
Commod. & transacts. Not class. Accord. To kind	1	0	0	24	4	4	0	0

Source: Author's calculations based on United Nations Statistics Division.

Table 14. Composition of selected Southeast Asian countries' imports from China (%)

	Indonesia		Malaysia		Vietnam		Thailand	
	06	11	06	11	06	11	06	11
Food and live animals	6	5	4	5	3	2	2	3
Beverages and tobacco	1	1	0	0	0	0	0	0
Crude materials except food and fuel	1	2	1	1	2	2	1	1
Mineral fuels, lubricants and related materials	17	3	0	0	9	8	0	0
Animal and vegetable oils and fats	0	0	0	0	0	0	0	0
Chemicals products	14	12	5	9	13	12	9	12
Manufactured goods classified chiefly by material	23	21	11	16	42	28	25	22
Machinery and transport equipment	30	49	69	58	25	41	55	52
Miscellaneous manufactured goods	7	7	7	9	5	5	8	9
Commod. & transacts. Not class. Accord. To kind	0	0	2	1	0	1	0	0

Source: Author's calculations based on United Nations Statistics Division.

Table 15. Evolution of weighted Grubel-Lloyd index

	1990	1995	2000	2005	2010
Latin America	0.09	0.10	0.10	0.13	0.10
Southeast Asia	0.28	0.36	0.37	0.32	0.32
Developing countries	0.17	0.12	0.14	0.13	0.12

Source: Author's calculations based on United Nations Statistics Division.

Southeast Asian economies lies in the proximity of these economies to one another. Because of low transport costs and low trade barriers between the two sides, growth in trade with China has tended to favor an expansion in intra-industry trade between China and Southeast Asian economies.

Table 15 shows that Southeast Asian countries have been far more dependent upon intra-industry trade in total trade with China than Latin American countries overall, following the Standard International Trade Classification one-digit classification. The Southeast Asian group has recorded weighted Grubel-Lloyd index significantly higher than an average developing country, while Latin America as a region has recorded weighted Grubel-Lloyd index slightly lower than an average developing country. It appears that the share of intra-industry trade in total trade with China has greatly contributed to the different paths of industrialization taken by the two country groups. Results of regression (7) show that, whereas both exporting to China and importing from China are overall negatively related to manufacturing value added as a share of GDP of a country, intra-industry trade is positively related to the dependent variable. As the coefficient on CHINAGL is much bigger than those on CHINAEXP and CHINAIMP, a significant share of intra-industry trade in total trade can cancel the negative effects of exporting to China and importing from China on the manufacturing sector of a country. Southeast Asian countries are able to cancel the negative effects of exporting to China and importing from China due to the significant volume of intra-industry trade, while Latin American countries are not able to do so because of the absence of intra-industry trade link with China.

This becomes clear when an interaction term between CHINAEXP or CHINAIMP and CHINAGL is introduced. Regression (8) and regression (9) respectively include CHINAEXP*CHINAGL and CHINAIMP*CHINAGL to regression (7). The results of regression (8) show that, when the interaction term is introduced, the coefficient on CHINAEXP increases as CHINAGL increases. This implies that, if the share of intra-industry trade in total trade with China exceeds a threshold level, the sign of the coefficient on CHINAEXP can be reversed. The trend is similar when another interaction term is introduced. The results of regression (9) show that, when the interaction term between CHINAIMP and CHINAGL is introduced, the coefficient on CHINAIMP also increases as CHINGL increases. Similarly, after exceeding a threshold level, the sign of the coefficient on CHINAIMP can be reversed.

The recent emergence of China as a major player in the world trade scene, the last source of deindustrialization identified in this paper has different implications for Latin American and Southeast Asian countries. It appears that the China effect has acted as a significant deindustrialization force for the Latin American group over the study period, thereby reinforcing the previous three forces of deindustrialization. On the contrary, trade with China seems to have played a key role in Southeast Asian industrialization between 1990 and 2005, cancelling the deindustrialization forces imposed by the previous three sources. It was only after 2005 when the industrializing China effect became dominated by the other sources of deindustrialization.

4. CONCLUDING REMARKS

Even though deindustrialization is a natural phenomenon that most countries experience at a certain stage of economic development, different countries are affected by different

combinations of deindustrialization forces. This paper first distinguishes between the factors of deindustrialization that influence most countries and those that affect only a limited number of countries. Then it is posited that, although given a similar combination of deindustrialization forces in effect, when these forces become effective, how rapidly they advance deindustrialization, and to what extent they remain effective also vary greatly across individual countries. These hypotheses are confirmed through empirical results presented in this paper demonstrating different paths of deindustrialization between 1990 and 2012 taken by two different groups of countries, Latin American and Southeast Asian countries. This paper examines how the different sources of deindustrialization mentioned have influenced the varying deindustrialization paths of the two groups over the study period.

The inverted-U relationship between manufacturing value added as a percentage of GDP and per capita income has had limited effects on both country groups. The first source of deindustrialization has only begun to become significantly effective in the Latin American group since 2000. For Southeast Asian countries, it seems to have had little effect throughout the entire time period examined. This implies that there must have been other sources at play that have been affecting the paths of deindustrialization of Latin American and Southeast Asian countries. The second source of deindustrialization introduced in this paper which is the continuous downward slope of the inverted-U curve seems to have contributed to the Latin American deindustrialization over the entire study period. Nevertheless, the increasing share of manufacturing value added in GDP in Southeast Asian economies from 1990 to 2005 still remains unexplained. It seems that the second source of deindustrialization has been cancelled out by some other industrialization forces.

It appears that the Dutch disease effect has contributed significantly to the different paths of deindustrialization of the two country groups. Whereas Latin American countries have been heavily affected by the deindustrialization force of the Dutch Disease since the beginning of the time period, Southeast Asian countries seem to have been much less affected by it on average. Also, it is found that more dependence on primary sector further reduces the level of manufacturing value added associated with each per capita income level and the level of per capita income from which manufacturing value added begins to fall. This seems to provide an additional explanation for Latin American countries' early deindustrialization given their per capita income, deeper degree of it throughout the time period, and the reverse trend observed in Southeast Asian economies.

The recent emergence of China as a major player in the world trade scene has had different implications for Latin American and Southeast Asian countries. After all, it is the difference in the composition rather than volume of bilateral trade flows with China that carries contrasting consequences for the two regions' manufacturing sectors. This paper shows that the share of intra-industry trade in exports and imports with China has contributed immensely to the different paths of industrialization taken by the two country groups. The China effect has acted as a significant deindustrialization force for the Latin American group over the study period, thereby reinforcing the previous three sources of deindustrialization. On the contrary, trade with China seems to have played a key role in Southeast Asian industrialization between 1990 and 2005, cancelling the deindustrialization forces imposed by the previous three sources. It was only after 2005 when the industrializing China effect became dominated by the other sources of deindustrialization.

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Chong-Sup Kim, Professor, Graduate School of International Studies, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Korea, Tel: +82-2-880-5812, E-mail: chongsup@snu.ac.kr

Seung-ho Lee, Ph.D. Candidate, Graduate School of International Studies, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Korea, E-mail: zyperssen@snu.ac.kr