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China's Structural Change and the Impact on Korea's Industrial Growth*

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“Until 2014, demand for durable goods was at the heart of China’s domestic market growth. This, combined with the expansion of global value chains(GVC), contributed significantly to the rise of Korea’s key industries, particularly that of heavy and chemical products, including electrical and electronic devices. Today, however, China faces two concurrent challenges, a slowdown in growth and a structural shift in domestic demand to services. As a result, a considerably large impact will likely be felt across the Korean heavy and chemical industries, the biggest beneficiaries of the rapid increase in China’s domestic demand. Under the circumstances, Korea’s policy makers and industrial entities need to enhance their understanding of the changes in the Chinese economy and develop preemptive countermeasures by reforming existing business structures. Additionally, researchers must provide more in-depth studies on China’s evolving domestic market.”

I. Introduction

The extraordinary economic growth witnessed in China since the implementation of its open door policy in the late 1970s is slowly losing momentum. As for the causes,

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many believe that the contribution to growth will inevitably moderate as China reaches saturation point in terms of investment while production and exports face parallel problems of weakening demand due to the global economic slowdown and rising domestic labor costs, which is making it impossible to produce price-competitive goods.

In response, the Chinese government is seeking policy solutions to maintain a stable growth of 5-7%, rather than pursuing unrealistic growth targets. Its efforts include boosting investment demand through the “One Belt One Road” project, shifting its policy focus in exports from “size” to “strength,” and placing more emphasis on developing high value-added products through its advanced technical skills than on cheap labor.

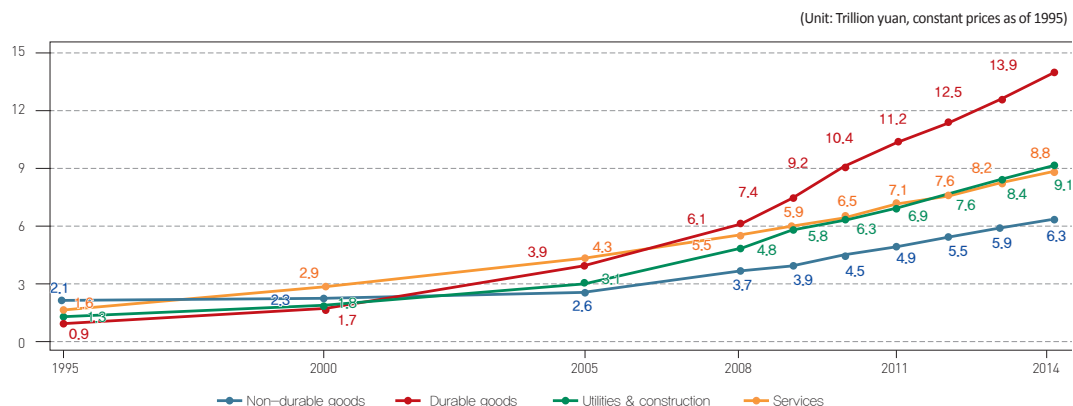
Furthermore, the role of domestic consumption has been put to the fore as a new growth impetus instead of investment and exports. China’s nominal income per capita recorded \$8,000 in 2015 with the capital region and urban eastern coastal areas earning double. This implies that China’s consumption base has grown large enough to generate new growth power. In fact, its vast population of 1.4 billion served as the basis for building the second largest domestic market in the world, following the US. And given China’s consumption patterns, its potential market will likely grow much larger in size.¹⁾ To put it another way, China is now changing from being the ‘world’s factory’ to the ‘world’s market.’

What are the implications of such structural changes in the Chinese economy for Korea? This study examines the growth in China’s domestic final demand over the past two decades, particularly focusing on the compositional changes. The impact on Korea’s industrial growth are then estimated with regards to the global division of labor or global value chain (GVC) involving China and Korea. Furthermore, projections are presented for Korean industries affected by China’s structural change, which has been apparent since late 2014. Finally, based on these projections, policy implications are suggested.

II . China’s Domestic Market Growth and Global Division of Labor

This section looks into the growth trajectory of China’s domestic demand market. On a nominal price basis, China’s domestic demand increased over ten fold from 6 trillion yuan in 1995 to 62.3 trillion yuan in 2014, expanding at an annual average rate of 9.4%. Such a dramatic growth, however, does not apply to all product items that comprise domestic demand. According to economic theories, most countries exhibit a large demand for non-durable goods such as agricultural products and clothing at the early stages of economic development, and as their economies advance, they experience an increasing demand for

1) As of 2014, the proportion of China’s domestic market in global domestic final demand is 13%, the second largest following the US (23%). Considering that the proportion of China’s was 2.4% in 1995 while that of the US’ was at 25.3%, China has grown at a much faster pace.

[Figure 1] China's Domestic Demand by Product Category

Note: Figures for 2012-14 are estimates (Refer to Chung (2015) for estimation process).
 Source: Author's calculation based on the OECD ICIO Table, CEIC China Premium Database and UN Comtrade.

durable goods such as machinery and motor vehicles. After the national income exceeds a certain level, the demand for services begins to rise at a comparatively faster rate.

[Figure 1] presents the changes in the size of China's domestic demand in four categories—non-durable goods, durable goods, utilities and construction, and services. The demand for non-durable goods is the largest in 1995 and the smallest in 2014, while the opposite is true for durable goods. A similar trajectory is also observed in the demand growth of 17 subcategories in 2014 (as of the previous year's prices); around 10% in durable goods, 6-9% in services, 8% in utilities and construction and 5-7% in non-durable goods.²⁾

What are the implications of such changes in the growth pattern of China's domestic demand for the Korean economy? To obtain a clear understanding, [Figure 2] estimates the impact generated by a 1% increase in China's domestic final demand (in each category) on Korea's output, value-added (GDP) and gross exports, using the input-output analysis model which reflects the formation of GVCs.³⁾

The results present two major findings. Firstly, the impact from a 1% increase in China's domestic final demand is more severe for Korea, regardless of product category. Secondly, the size of impact varies significantly for each product category. For instance, in 2014, a 1% increase in China's demand for durable goods would hike up Korea's output by 0.046%, roughly 15 times higher than in 1995. This would be followed by demand for services, utilities and construction and non-durable goods, which contradicts the pattern in 1995 when the largest impact was from the demand for durable goods.

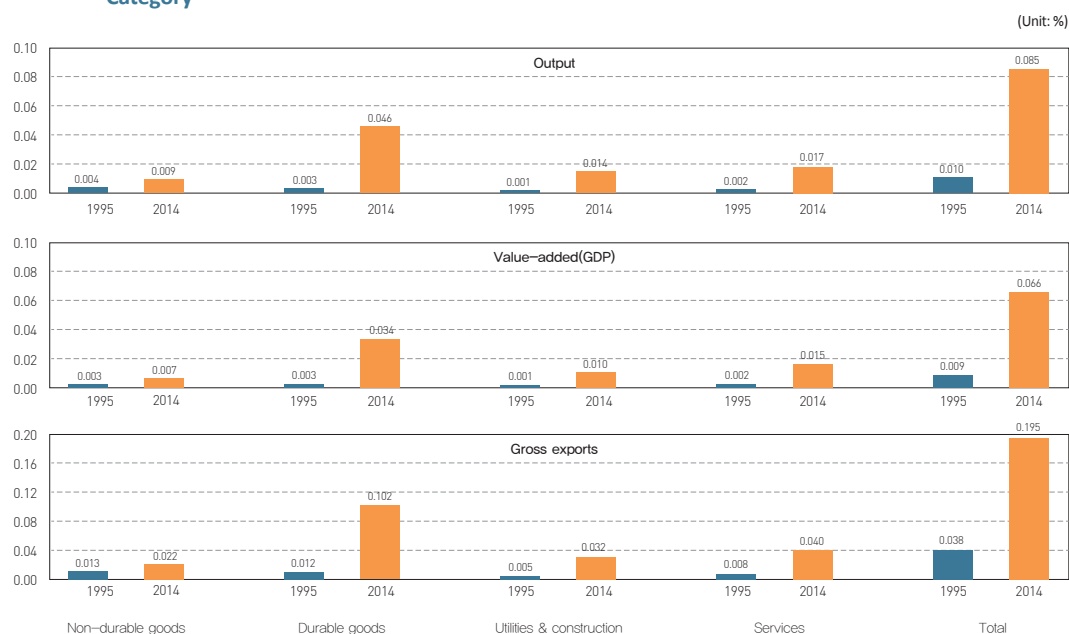
The root of the above two findings lay in the fact that GVCs involving China and Korea have become more active in recent years, particularly in the durable goods industry.

The rapid expansion in China's domestic market was led by the demand for durable goods until 2014.

2) Refer to Chung (2015) for further details on the 17 industrial subcategories and domestic demand growth in each industry.

3) Specifics on the model and estimation processes are too technical to be described in this paper. Here, it should be noted that the model used in the analysis has the limitation of assuming a strong production function and does not consider prices that are endogenously determined. Refer to Chung (2015) for further details.

[Figure 2] Korea's Aggregate Growth Rate on a 1% Increase in China's Domestic Final Demand by Product Category



Note: Figures for 2014 were calculated assuming the input-output structure in 2014 is identical to that in 2011.
Source: Author's calculation based on the OECD ICIO Table.

China's durable goods-led growth in the domestic market combined with the expansion of GVCs has contributed significantly to the growth of the Korean economy.

An expansion in a GVC strengthens the industrial relationship between countries and amplifies the impact of one country's demand on the other's production. Moreover, the industry for durable goods, among others, tends to create a larger spillover effect and brings about more stimuli to international trade than other industries as it engages with a broader range of industries and the production process is longer. Therefore, a 1% increase in China's durable goods demand may have a larger impact on Korea's production and exports.

The following analysis combines the results from [Figure 2] with the actual growth rate of China's domestic demand by product in 2014. Note that the actual growth rate (as of the previous year's prices) of China's total domestic demand is 7%. As such, in line with the second panel in [Figure 2], Korea's GDP would increase approximately 0.46% ($=0.066 \times 7$) if China's domestic demand by product rose uniformly by 7%. However, as already confirmed above, growth in domestic demand differs by product, and durable goods, which have the largest impact on Korea, showed the highest growth. Therefore, one can expect that the growth in China's durable goods-led domestic demand could increase Korea's GDP by more than 0.46%.⁴⁾ It can also be expected that Korean industries closely linked to China's domestic demand will be more affected than others. For instance, Korea's petrochemical, machinery, metals, electrical and electronics sectors may experience a larger impact as China's durable goods industry is a major buyer of Korea's intermediary and capital goods.

4) The same mechanism works in output and exports.

<Table 1> Korea's Industrial Growth Rate According to Actual Increases in China's Domestic Final Demand in 2014

(Unit: %)

Korean industries (category and subcategory)		Output/ Value-added	Gross exports	Korean industries (category and subcategory)		Output/ Value-added	Gross exports
Non-durable goods	Agriculture · Mining	0.34	0.59	Utilities and construction		0.17	0.40
	Food products	0.35	0.94	Services	Wholesale and retail trade · Hotels and restaurants	0.83	2.08
	Textiles	0.41	0.87		Transportation · Communications	0.80	1.55
	Wood · Paper	0.50	0.69		Finance	0.42	1.37
	Petrochemical products	1.20	1.86		Real estate	0.19	0.35
Durable goods	Machinery · Metals	0.84	1.37		Business services	0.69	0.37
	Computer · Electronic devices	2.46	3.52		Other services	0.07	1.21
	Electrical equipment	1.26	2.17	Total industry		0.79/ 0.61	1.81
	Motor vehicles	0.80	1.19				
	Other manufacturing	0.21	0.17				

Note: 1) Figures were calculated by applying China's domestic final demand's real growth rate by product to the estimation model, assuming the input-output structure in 2014 is identical to that in 2011.

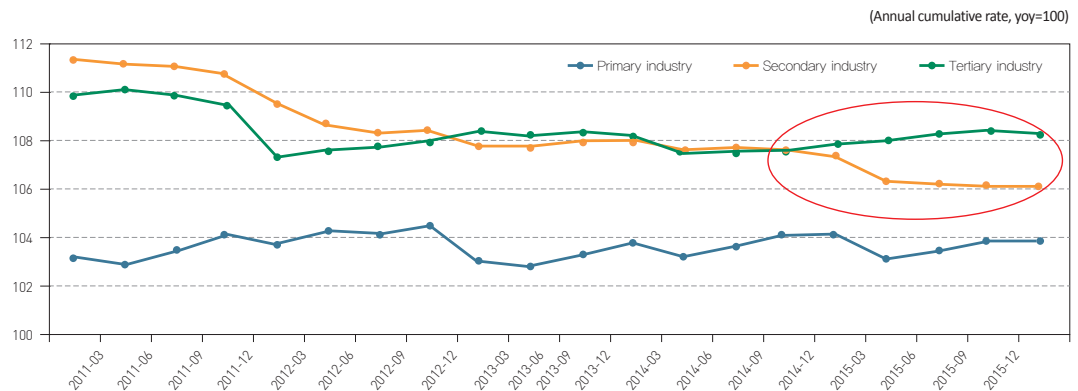
2) Growth rates of output and value-added are the same at industry level.

Source: Author's calculation based on the OECD ICIO Table.

<Table 1> shows the size of impact on Korean industries and the economy as a whole, estimated by applying the actual growth rate of China's domestic final demand by product in 2014. As expected, Korea's aggregate output and GDP advanced 0.79% and 0.61%, respectively, indicating a much larger impact than when assuming identical growth for all products in China's domestic demand.⁵⁾ Since Korea's real GDP growth rate for 2014 was 3.3%, this would mean that the contribution by China's domestic demand growth is as high as 18.5%. The estimation results at the industry level are also as expected: computer and electronic devices at over 2%; electrical equipment and petrochemical products at over 1%; and durable goods such as machinery, metals and motor vehicles also at a high rate. Of services sectors, wholesale and retail trade and transportation and communications experienced significant impact from the growth in China's domestic final demand. On the other hand, the non-durable goods industry, excluding petrochemical products, exhibited a low growth rate.

To recap, at least up until 2014, China's domestic final demand made strong progress led by the demand for durable goods, which in turn influenced the Korean economy significantly as both are closely tied in terms of division of labor. Additionally, it was also confirmed that there was a sizable difference in growth rate between Korean industries

5) In <Table 2>, output and value-added (GDP) rises at the same rate at each industry level, which is based on the assumption that the increase in the value-added is proportional to the rise in output. However, the size of industry may differ from each other in terms of output and value-added, respectively, and thus the growth rates of aggregate output and GDP may differ as they are expressed as a weighted sum.

[Figure 3] China's GDP Growth Rates by Industry

Source: CEIC, China Premium Database.

Korea's heavy and chemical industries were the biggest beneficiaries.

that were strongly and minimally affected by China's domestic demand. In particular, the heavy and chemical industries, including computers and electronic devices, were the biggest beneficiaries of China's demand increase.

III. Structural Changes in the Chinese Economy

While the previous section focused on through what mechanism and to what extent China's domestic demand growth influences Korean industries, the following will present projections for the impact from China's possible growth trajectory on the Korean economy. It should be noted, however, that the projections presume certain hypothetical future conditions, at the author's discretion.

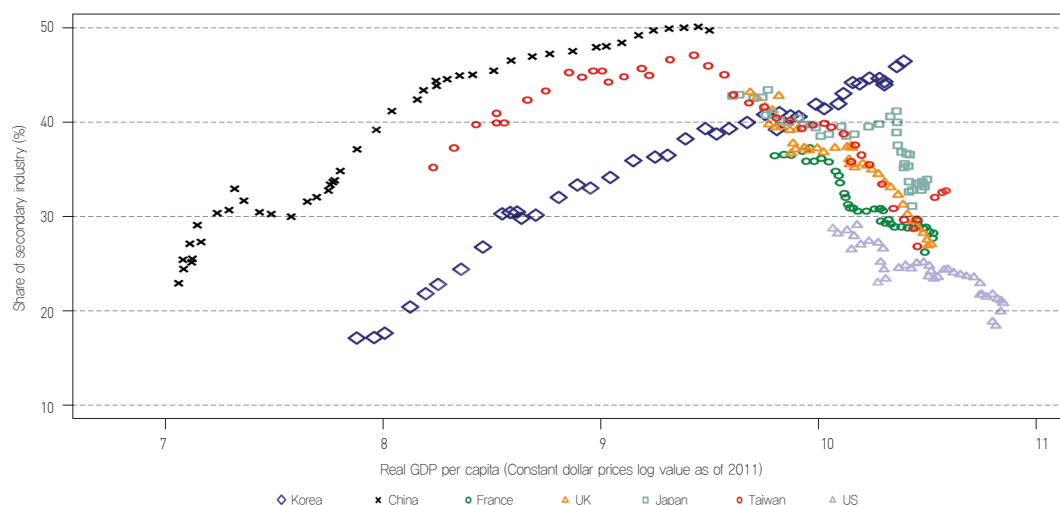
However, China is currently faced with two concurrent challenges, slowdown in growth and changes in its industrial structure, which are also occurring in the domestic market.

China is currently faced with two challenges, slowing growth and changes in industrial structure. The slow-paced growth is already a well-known fact, hence structural change will be the focal point of the following discussion. As shown above, until 2014, the growth rate in durable goods demand was the highest, followed by services and non-durable goods, indicating that there is little disparity in demand growth between the secondary and services industries.⁶⁾ However, looking at China's GDP growth on an annual cumulative basis in the primary, secondary and tertiary industries in [Figure 3], it can be seen that the growth in services exceeded that in the secondary industry by about 2%p. This points to an increased share of services and a decreased share of the secondary industry in the economy.

Of course, the growth rates by industry in terms of GDP in [Figure 3] do not correspond exactly with the growth rates in the domestic final demand market presented thus far. But, the discrepancies are not major as the contribution of China's net exports to economic

6) As of 2014, the proportion of each product demand in the domestic market is as follows: 17.1% for non-durable goods, 19.4% for durable goods, 26.2% for utilities and construction and 37.3% for services.

[Figure 4] Relation Between Real GDP Per Capita and Share of the Secondary Industry



Note: 1) Secondary industry includes mining, manufacturing, utilities and construction.

2) Surveyed period is 1970-2015 for China and 1970-2011 for other countries.

Source: Data on GDP per capita are from the World Development Indicator, and China's data on the share of the secondary industry's value-added are from the CEIC, while that on other countries are from the GGDC 10-Sector database.

growth is low.⁷⁾ Also, as the services industry involves only a small amount of transactions across borders while most of its products are consumed in the domestic market, it is expected that the GDP growth rates will be similar for both sides of production and domestic final demand.

Nevertheless, several factors can be attributed to the aforementioned changes. Above all, demand for durable goods usually takes a sharp downward turn when the economy shrinks. Another explanation is that investment constituted for about half of the demand in the secondary industry until 2014, but China is now faced with excessive investment, which may have acted to reduce it. Finally, as mentioned in the introduction, the relative growth in the demand for services may be the result of the government's efforts to boost consumption, and due to the fact that China's economy has grown large enough to have purchasing power in services.

The problem is that these factors will most likely persist as a constant source of change. In other words, the phenomenon in [Figure 3] may be a signal that China's domestic demand is about to undergo a structural transition, and if this continues, the impact on Korea will change dramatically. This is because, as confirmed in <Figure 1>, China's services demand contributes much less to Korea's growth than that in durable goods.

In fact, these structural changes in the Chinese economy are not unusual compared with other countries. [Figure 4] shows the relation between the real GDP per capita log value of ten major countries and share of the secondary industry; most countries that have

In fact, the shift in China's domestic demand towards services is a natural phenomenon given its current economic structure and income level.

7) Demand-side GDP = supply-side GDP – net exports (exports – imports). If net exports are 0, GDP calculated from the supply and demand side becomes equal. Latest estimates on the demand-side by industry were not available at the time of analysis, hence supply-side GDP is used, instead.

<Table 2> Changes in Korea's Industrial Growth Rate on Changes in China's Domestic Demand Growth by Product Category

Korean industries (category and subcategory)		Output/ Value-added (%)	Change from <Table 1> (%p)	Korean industries (category and subcategory)		Output/ Value-added (%)	Change from <Table 1> (%p)
Non-durable goods	Agriculture · Mining	0.24	-0.11	Utilities and construction		0.11	-0.06
	Food products	0.23	-0.12	Services	Wholesale and retail trade · Hotels and restaurants	0.55	-0.28
	Textiles	0.27	-0.14		Transportation · Communications	0.57	-0.23
	Wood · Paper	0.33	-0.17		Finance	0.28	-0.14
	Petrochemical products	0.81	-0.39		Real estate	0.13	-0.06
Durable goods	Machinery · Metals	0.55	-0.29		Business services	0.45	-0.24
	Computer · Electronic devices	1.44	-1.02		Other services	0.05	-0.02
	Electrical equipment	0.45	-0.44	Total industry		0.51/ 0.39	-0.28/ -0.22
	Motor vehicles	0.80	-0.35				
	Other manufacturing	0.12	-0.09				

Note: 1) Figures were calculated assuming China's domestic final demand growth rate by product is 7% in services, 6% in durable goods, 5.2% in utilities and construction and 5% in non-durable goods.

2) Change (%p) from <Table 1> equals <Table 2> values minus <Table 1> values.

Source: Author's calculation based on the OECD ICIO Table.

experienced structural change exhibit a diminishing share of the secondary industry when their income reaches a certain level, much like China today.⁸⁾

In order to predict the impact of China's structural shift towards domestic demand in services, this section adopts a scenario that assumes the real growth rate of China's total domestic demand is approximately 6% (based on the previous year's prices) with services growing at the fastest pace (7%) among the four categories; followed by durable goods (6%), utilities and construction (5.2%) and non-durable goods (5%). The assumed 6%-growth rate of China's total domestic final demand reveals that the real growth rate of China's domestic market could recede by approximately 1% from 2014 (7%).

Applying this growth rate and the same method used in <Table 1>, <Table 2> estimates the impact on each Korean industry. The relative decrease in impact is visible through a comparison of the impact on Korea from the assumed growth rate of each industry and the results in <Table 1>, assuming that all other conditions are controlled. Thus, two columns were added to show the changes from <Table 1>.

Although the actual growth rate in China's domestic market in 2014 contributed to the growth of Korea's aggregate output and GDP by 0.79% and 0.61%, respectively, under the above scenario, growth would be at 0.51% and 0.39%, which would mean a decrease of 0.22%p in GDP. When looking at the results by industry, that for computers and electronic

8) [Figure 4] shows that unlike other major countries, Korea witnessed a continued increase in the proportion of the secondary industry until recently. Such a trend may be related to the low value-added of Korea's services industry and requires further in-depth analysis to uncover the underlying causes.

China's slow growth and the structural shift in domestic demand will deal a heavy blow to Korea's key industries, whose growth has been largely attributed to China's strong demand.

devices would be hit the hardest with total production and value-added increasing 1.44%, down by 1.02%p. Also, as expected, the durable goods industry experienced significant impact, with machinery and metals, electrical equipment and motor vehicles exhibiting declines of around 0.29-0.44%p in output and value-added growth. As for services, since China's domestic demand for services expanded at a relatively higher rate than the demand for other products but lower than the 2014 growth rate, the overall impact is shown to be weaker in Korea. Of the non-durable sectors, the petrochemical industry, which relies heavily on exports to China, exhibited a 0.39%p drop in growth, while the others showed relatively smaller drops at the 0.1%p level.

To summarize, the overall growth momentum of the Korean economy will be dragged down if China's domestic market simultaneously experiences slow growth and servitization—structural shift towards services—and Korea's flagship industries will be hit particularly hard.

IV . Conclusion

With the fast rise of China's economy, consistent efforts have been made to seek proper response measures in recognition of the critical role its domestic market plays. However, little is yet known about how China's domestic market has grown and through what channels and to what extent Korea has been affected. As such, this study attempts to enhance the understanding of policy makers, researchers and entrepreneurs by analyzing the impact of the changes in the growth rate of China's domestic demand by product on Korea's industries from the perspective of GVCs. Of course, the above estimates may have been exaggerated or attenuated to some extent due to limitations in the available models and data and the degree of realism in the scenarios. Nevertheless, they still serve as valid tools in identifying the mechanism of the spillover effect and future trajectory.

The core message of this study is that if the series of recent events in China are regarded as being an integral part of the structural shift that takes place during a country's economic development, it would be possible to predict what changes China will exhibit in the future and thus help to preemptively develop the appropriate response measures. Indeed, it is an undeniable fact that China is entering the same phase of shifting towards services as advanced economies have done in the past. The only relevance here would be the speed at which China transitions as this will influence the impact to the Korean economy.

Accordingly, Korea's industries must work to establish countermeasures to effectively tackle the changes in China. In particular, the estimation results in this study suggest that the overall slowdown in China's domestic demand and its structural shift will exacerbate the oversupply problem faced by Korea's heavy and chemical industries; another reason

If the series of recent events in China are regarded as an integral part of the shift in the industrial structure, it would be possible to predict the direction of China's changes.

Korea's industries must be aware of the changes in the Chinese economy and develop countermeasures that include reforming business structures.

Simultaneously, more in-depth studies are needed on the changes in China's domestic market.

why Korea should push further for business restructuring and industrial upgrade. Additionally, policy makers, rather than focusing on extraneous issues such as the decline in exports to China, must look to understand the underlying factors behind the structural changes of China's economy while also providing incentives to businesses to help them prepare more fundamentally.

Finally, although this study offers valid guidance in obtaining a comprehensive understanding and setting a direction in the broader sense, in order to formulate concrete government policies and business strategies, more diverse studies are needed with regards to China's regional markets, consumers and investors⁹⁾ as China will continue to be one of Korea's largest markets.

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9) Recent relevant studies include Kim (2016) on Korea's e-commerce with China and Lee (2016) on the analysis of China's consumer market by region.