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Gloria A. Cubinar , Ma. Julieta P. Soliven and Estela T. De Guzman

For additional information, please contact:

Author's name	:	Gloria A. Cubinar
Designation	:	Statistician III
Affiliation	:	National Statistics Office (NSO)
Address	:	Solicarel Bldg. II R. Magsaysay Blvd., Sta. Mesa, Manila
Tel. no.	:	716-3924 / 713-7065
E-mail	:	G.Cubinar@census.gov.ph
Co-author's name	:	Ma. Julieta P. Soliven/Estela T. De Guzman
Designation	:	Statistician IV/Director III
Affiliation	:	National Statistics Office (NSO)
Address	:	Solicarel Bldg. II R. Magsaysay Blvd., Sta. Mesa, Manila
Tel. no.	:	716-3924 / 713-7064
E-mail	:	J.Soliven@census.gov.ph / E.deGuzman@census.gov.ph

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ABSTRACT

Using the 2000 Asian International Input and Output Table (2000 AIO), this paper aims to examine the economic interdependency of Philippines and China, the impact of inducing Philippine exports to China and the industrial structure of the two countries.

Inducement of production on final demand showed that the Philippine economy is oriented towards exports while Chinese economy leaned to investments. Furthermore, inducing Philippine exports to China needs a 1.29 dollar of production to satisfy the export requirements to China, while 2.38 dollar of production is needed in the Chinese economy to meet the exports demand to the Philippines.

The effect on the inducement of final demand further revealed that machinery (including electronic products); and trade and transport sectors have great potential in strengthening the trade relationship with China as these sectors recorded the highest output requirements induced by Philippines' exports to China.

I. Introduction

China's ascendancy and accession to the World Trade Organization (WTO) in 2001 has brought tremendous opportunities and challenges to the world trading system. Its rapid economic growth provided incomes and potential market for a variety of goods and services.

Li Kun-wang and Song Li-gang (2006) undertook a collaborative investigative analysis on the extent of China's contribution to the trade expansion of its major trading partners in the Asia Pacific region between 1990 and 2003. In their paper, they examined how China has played an important role in enhancing the expansion of its trading partners, basically through increasing China imports from the Asia Pacific region economies. Results showed that China has played an increasingly important role in the rapid development of economies in the Asia Pacific region since 1990. The increasing shares of the East Asian economies in China's import in contrast to the declining shares of the United States and the European Union show that the trend towards intra-East Asian trade has been strengthened in recent years. The emerging Chinese economy with strong trade orientation has played a fundamental role in enhancing this tendency towards closer economic integration in the East Asian region as evident by its share in China's import increasing from 41 percent in 1990 to

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[2] Both Statistician IV and Director III, respectively of Industry and Trade Statistics Department, Philippine National Statistics Office

55 percent in 2003. Furthermore, the paper assessed the possible impact of the establishment of bilateral Free Trade Arrangement (FTA), the ASEAN plus China, on exports to China by running a simulation analysis employing the CGE (computable general equilibrium) model. The simulation results show that the trade liberalization between China and ASEAN will enhance considerably ASEAN'S exports to China, especially significant to Philippines and Thailand. Thus, this paper aims to examine the economic interdependency of Philippines and China through the use of 2000 Asian International Input-Output Table (AIO) compiled by the Institute of Developing Economies (IDE)-JETRO.

II. Findings from 2000 Asian International Input-Output Table

Supply and Demand Structure

Table 1 reveals that the supply and demand situation of China derived from the Asian International Input-Output Table is about 21 times higher than that of the Philippines. On the supply side, the domestic output of China is made up of 93.2 percent of total supply, showing a higher share than that of 80.1 percent of the Philippines. However, the proportion of imports to total supply for the Philippines stood at 19.9 percent, higher by 13.1 percentage points to 6.8 percent recorded by China. This implies that the Philippines' supply requirements are more oriented towards import as compared to China. The same holds true on the demand side where the proportion of domestic demand in China is higher than in the Philippines. However, the share of exports to total demand in the Philippines is about 27.6 percent higher than the China's recorded share of 9.0 percent.

Although both countries are greatly dependent on their domestic production, their economy differs in terms of their dependency to foreign sector. As noted, the import and export dependence of the Philippines registered a share of 19.9 percent and 27.6 percent in 2000, respectively, while only 6.8 percent and 9.0 percent, respectively in China. These findings revealed that the dependency to foreign sector both on the supply and demand is clearly manifested on the Philippine economy rather than in the Chinese economy.

Table 1. Philippines and China Supply and Demand Situation: 1995 & 2000
(Values are in million US dollars)

	Philippines		China	
	1995	2000	1995	2000

Total Supply	141,827	152,535	1,874,521	3,111,142
Domestic	121,230	122,234	1,759,518	2,900,021
Imports	20,597	30,301	115,003	211,121
Total Demand	141,827	152,535	1,874,521	3,111,142
Domestic	116,274	110,471	1,702,467	2,831,832
Intermediate	48,009	48,478	1,039,731	1,784,507
Final	68,266	61,994	662,736	1,047,325
Export	25,553	42,063	172,054	279,310

Output Structure

The production structure shown in Table 2 revealed that the manufacturing sector comprised the bulk of the total production for both China and Philippines. Industries of machinery; textile and leather and products thereof; metal products and chemical products contribute to the huge production of the manufacturing sector in China, while food, beverages and tobacco; machinery and petroleum and petroleum products in the Philippines. Interestingly, China's gross outputs are oriented towards industry sector while that of the Philippines are leaned to services sectors.

Table 2. Gross Outputs by 7-Sector Classification: 2000
(Value in million US dollars)

Sector	China		Philippine	
	Value	Percent	Value	Percent
Agriculture, Livestock, Forestry & Fishery	311,929	10.03	13,131	8.61
Mining and Quarrying	96,224	3.09	818	0.54
Manufacturing	1,617,137	51.98	65,187	42.74
Electricity, Gas and Water	115,955	3.73	5,839	3.83
Construction	267,649	8.60	8,189	5.37
Trade and Transport	245,646	7.90	21,285	13.95

Sector	China		Philippine	
	Value	Percent	Value	Percent
Services	456,601	14.68	38,086	24.97
Total Output	**3,111,142**		**152,535**	

Input and Demand Structure

Findings revealed that the production cost in terms of usage of intermediate inputs in the Philippines is on the average 51.6 cents for every dollar worth of output while in China, they spent on the average 64.1 cents. This translates to a 24.2 percent higher from the Philippines expenditures to intermediate inputs. However, China's primary inputs relative share to total inputs is only 35.9 percent. This is lower by 25.8 percent from the Philippines recorded relative share of 48.4 percent. The increase in the primary inputs or GVAR of the Philippines is mainly due to the increase in the share of operating surplus while wages and salary for China.

By 76-sector classification, 42 sectors in the Chinese economy recorded more than 70 percent intermediate inputs with other electronics and electronic products the highest with 83.1 percent. On the other hand, se ctors that have high primary inputs for China are finance and insurance; non -food crops; and forestry.

On the Philippine side, 23 sectors showed intermediate inputs of more than 70 percent, the highest of which is non-ferrous metal with 78.0 percent. The sector with the least intermediate inputs is real estate with 17.3 percent but showed the highest primary input of 82.7 percent.

Total intermediate or industry demand for goods and services in 2000, on the other hand, is 42.8 percent for the Philippines while that of China is 59.4 percent. This implies that the required industry demand for goods and services of China is higher than the required industry demand in the Philippines.

By 24-sector classification, one-thirds (33.3%) of China's industries have recorded more than 80 percent share in the intermediate demand to total output, while only 7 (29.2%) industries in the Philippines.

As a consequence for a low intermediate demand for goods and services, final demand is high. This is very notable in construction sector of China. The same also holds true in the Philippines.

Gross Value Added

In China, wages and salary accounted for the largest percent share among the components of value added, while operating surplus got the bulk share in the Philippines. Wages and salary ranked second in the Philippines.

Percentage share to value added and their corresponding gross value added ratios for indirect taxes less subsidies and depreciation of fixed capital in China is notably higher than the recorded percentage shares of the Philippines.

Final Demand

Final demand for goods and services in 2000 is shown in Table 3. As noted, China's final demand is driven by gross domestic fixed capital formation and exports while that of the Philippines is led by exports, although private and government consumptions still constitute the bulk of the total final demand for both countries.

Table 3. Composition of Final Demand: 2000
(Values are in million US dollars)

Type of Final Demand	China		Philippines	
	Value	Percent	Value	Percent
Private consumption	518,730	39.10	41,830	40.20
Government consumption	141,151	10.64	9,931	9.54
Gross domestic fixed capital formation	370,119	27.90	10,229	9.83
Increase in stocks	(6,770)	(0.51)	4	0.00
Statistical error	24,095	1.82	-	-
Exports	300,525	22.65	41,727	40.1
Statistical discrepancy	(21,215)	(1.60)	336	0.32
Total	**1,326,635**	**100.00**	**116,523**	**100.00**

Export and Import Structure

Table 4 shows the contribution of merchandise exports to the country's gross export receipts for China and Philippines. As noted, manufacturing sector contributed the highest share in merchandise export goods for both countries. This is due to the double-digit shares to total export receipts in China of machinery; textiles, leather and the products thereof; and other manufacturing products, while the bulk of the exports receipts in the Philippines is accounted by the manufacturing of machinery and other manufacturing products. On the other hand, non-merchandise export goods and services for both countries are highly affected by trade and transport; and services sectors.

Table 4.China and Philippine Exports and Imports by Type of Commodities at 7-sector: 2000 (Value in thousand US dollars)

Sector		Export Structure				Import Structure			
		China		Philippines		China		Philippines	
		Value		Value		Value		Value	
Merchandise		**244,196,146**	**7.4**	**30,147,807**	**1.7**	**170,412,962**	**0.7**	**23,814,193**	**8.6**
1	Agriculture, livestock, forestry and fishery	4,720,167	.9	798,613	.6	3,885,861	.3	974,797	.01
2	Mining and quarrying	4,344,351	.8	374,693	.2	3,671,411	.1	101,718	.4
3	Manufacturing	235,131,628	6.3	28,974,501	6.1	162,855,690	5.6	22,737,678	5.5
Non-Merchandise		**35,114,256**	**2.6**	**11,915,414**	**8.3**	**40,705,816**	**9.3**	**6,486,423**	**1.4**
4	Electricity, gas and water supply	591,467	.7	-	.0	3,995,845	.8	904,725	.8
5	Construction	301,066	.9	-	.0	13,948,486	4.3	1,177,410	.9
6	Trade and transport	27,325,538	7.8	8,055,775	6.7	6,555,606	6.1	1,881,183	.9
7	Services	6,896,185	9.6	3,859,639	2.8	16,205,879	9.8	2,523,105	0.6
TOTAL		**279,310,402**		**42,063,221**		**211,118,778**		**30,300,616**	

Furthermore, import structures between the two countries do not differ much as its percentage shares of merchandise and non-merchandise imports goods are almost similar. This pattern also holds true in the imports of manufactured goods. Manufacturing of machinery which includes electronics provided the boost to the total merchandise imports for both countries.

Services sector, on the other hand, contributed the highest percent share among the non-merchandise type of imports for both countries. However, China's percent share is higher by 26.5 percentage points as compared to Philippines percent share.

<u>Interdependency on Inputs and Demand</u>

The dependency of the Philippines' intermediate demand on China's intermediate input is about 1.0 percent; higher than the 1995 recorded percentage shares of 0.9 percent. Although the intermediate demand of the manufacturing (1.7 percent); and mining and quarrying (2.5 percent) sectors still depended on China's intermediate input, the dependence is much lower than in 1995. Moreover, dependence of the agriculture, livestock, forestry and fishery sector's intermediate demand to China's intermediate inputs increased to 1.2 percent from the 1995 percentage share of only 0.1.

With regards to the Philippines intermediate input, dependency on China's intermediate inputs revealed increases except for the construction sector where a decrease of 1.5 percentage points from the 1995 percentage share is noted.

Meanwhile, China's dependency to the Philippines' intermediate inputs is very low ranging from a low of 0 percent to a high of only 0.1 percent.

<u>Effect of Final Demand on Production</u>

The total (direct and indirect) effect of induced production in the Philippines for 2000 amounted to US$152.02 billion that was generated directly and indirectly by the final demand for goods and services worth US$103.72 billion. This indicates that for every dollar of final demand, the Philippine economy is required to produce 1.47 dollar of production. On the other hand, induced production generated directly and indirectly by the Philippines export demand to China is US$1.54 billion, which means that the Philippine economy is required to produce 1.29 dollar of production to meet the Philippines' dollar of export requirements to China. Furthermore, 63.3 percent of the Philippines' total production was induced by the domestic final demand while 35.7 percent and only 1.0 percent was induced by the Philippines export demand to ROW and China, respectively.

In China, the total induced production is US$3,161.75 billion, of which 76.7 percent are induced by domestic final demand; 23.2 percent by the China's exports to ROW; and only 0.1 by the China's exports demand to Philippines'. This amount is due to direct and indirect effect of China's final demand worth US$1,347.85 billion, which indicates that for every dollar of final demand, the Chinese economy is required to produce 2.35 dollar of production. Induced production generated by the China's export demand to Philippines, on the other hand, is US$2.03 billion, which means that the Chinese economy had to produce 2.38 dollar of production in order to meet the China's dollar of export demand to Philippines. Interestingly, total exports induced production per unit of final demand is much higher than its domestic final demand.

Services, construction and machinery sectors recorded the highest total output requirements induced by China's domestic final demand, while machinery and chemical products recorded the highest total output requirements induced by the China's export to Philippines.

Services; food, beverages and tobacco; and trade and transport sectors in the Philippines recorded the highest total output requirements induced by the domestic final demand while machinery and trade and transport sectors recorded the highest total output requirements induced by the Philippines' export to China.

Effect of Final Demand on Value Added

The China's total (direct and indirect) effect on the induced productions on consumption, investment and exports are more labor-intensive as its compensation shares to value added are highest among the factor shares considered with 57.9 percent, 51.7 percent and 47.7 percent, respectively.

On the Philippine side however, the effect of the induced productions on the consumption, investments and exports are seen in operating surplus component with 54.3 percent, 56.2 percent and 52.1 percent, respectively. Meanwhile, export commodities induced higher net indirect taxes in both countries.

Effect of Final Demand on Imports

The impact of final demand on import requirements in the production of goods and services totaled to US$215.04 billion. Of this, about 36.3 percent of the total induced import requirements are induced by consumption; 31.4 percent by investment; and 29.0 percent by export. As noted, the import requirement of the Philippines from China is only 0.1 percent of the total import requirements.

Furthermore, China's import multiplier is 0.160, which means that the Chinese economy needs 16 units of imports per 100 units of final demand. Moreover, the exports demand exhibited higher import multiplier than the domestic final demand. This implies that the production of export goods is highly dependent on imports. Sectors of machinery, other agricultural products and chemical products recorded the highest import requirements in China.

Import requirements of the Philippines, on the other hand, amounted to US$30.24 billion, of which 62.8 percent of the total is export-induced while 9.2 percent and 28.0 percent are induced by investment and consumption, respectively. China's import requirement, on the other hand, is only 2.0 percent of the Philippines' total import requirements where the bulk share is due to the import requirements of petroleum and petroleum products.

For the Philippine economy, it needs 29 units of imports per 100 units of final demand as its import multiplier is 0.2916. Just like China, import multiplier of the exports demand is much higher than the import multiplier of the domestic consumption, which means that the production of the exports goods are highly import dependent.

Of the 24 sectors considered, services; petroleum products and chemical products recorded the highest import requirements in the Philippines.

<u>Backward and Forward Linkages</u>

Backward linkages of China and the Philippines for 2000 by 24-sector classification showed that, about two-thirds of the Chinese sectors have recorded index dispersion of more than 1.0, with transport equipment sector topped the list with 1.493. This was followed by metal products (1.450) and construction (1.411) sectors. Forestry sector, on the other hand, recorded the least index of 0.845, which means that this sector has less influence on the economy as a purchaser of raw materials, being one of the labor intensive sectors.

Meanwhile, only food, beverages and tobacco sector had the highest index of dispersion of 1.005 in 2000 in the Philippines.

With regards to the relative sensitivity and influence of each of the 24 sectors in 2000 in China, the top three sectors that manifested the highest index of sensitivity are chemical products (2.258), services (2.206), and trade and transport (2.159). This indicates that an increase in the output of this sector will create the highest degree of cyclical effect on the entire system. On the other hand, the top three sectors with high sensitivity indices in the Philippines are seen in the services (1.802); trade and transport (1.419); and petroleum and petroleum products (1.153).

Degree of Self-Sufficiency

Self-sufficiency rates for China and Philippines are 104.5 percent and 112.5 percent, respectively. This means that both economies are able to meet the total requirements of the industries, final consumers and investment as well. Sectors that did not pass the 100 percent mark to be self-sufficient in China are forestry and fishery, while livestock and poultry in the Philippines. This implies that these sectors need to import to satisfy their total requirements and the requirements of the final consumers as well as investments.

III. Summary and Conclusion

Based on the input-output analysis, China's supply and demand requirements are generally satisfied by the domestic production while for the Philippines, it is influenced by the import and export production.

In the output structure, manufacturing and services sectors comprised the bulk of their source of production, while mining and quarrying contributed the least for both countries.

Merchandise exports goods and imports goods dominated the export and import structure, respectively led by manufacturing sector. Non-merchandise goods, on the other hand, showed the supremacy of trade and transport and services sectors over the other sectors for both countries.

Industrial interdependence in China is much higher than in the Philippines as its intermediate demand is 59.4 percent as compared with only 42.8 percent. As a result, final demand is higher in the Philippines than in China. Furthermore, China's final demand is driven by the gross domestic fixed capital formation or investments while Philippines' final demand is led by exports, although private and government consumptions still constitute the bulk of total final demand for both countries.

About two-thirds of the 24 sectors considered in China had demonstrated a relatively high usage of raw materials and supplies, while only food, beverages and tobacco sector in the Philippines.

On the other hand, services and trade and transport sectors recorded the highest sensitivity index for both countries which imply that this sector is relatively important as suppliers of raw materials and supplies needed in the production; hence they will be most affected by the expansion in the system. Other sectors that recorded highest sensitivity index are chemical products in China and petroleum and petroleum products in the Philippines.

Dependency of the Philippines intermediate demand on China's intermediate input could be seen in the mining and quarrying; manufacturing; and agriculture, livestock, forestry and fishery sectors but still very low although it improved slightly over the 1995 level. China's share on the Philippines' intermediate input, on the other hand is likewise very low ranging from a low of 0 percent to high of 0.1 percent.

On the input side, dependency of the Philippines to China's intermediate inputs is seen in the construction and manufacturing sectors while China's dependency to Philippines intermediate inputs is observed in the manufacturing and services sectors. As noted, both countries revealed very low dependency.

As to the inducement of production on final demand, China's output requirement is 2.35 dollars per unit of dollar final demand while that of the Philippines is only 1.47 dollars. The shares of investment induced production are much higher in China than the recorded share of the Philippines while exports induced production is higher in the Philippines than in China. This supports the earlier findings that the Philippine economy is more oriented towards exports while China's economy leaned more to investments; although consumption induced production still constitutes the largest share in production for both countries.

Inducing Philippine exports to China revealed that Philippine economy is required to produce1.29 dollar of production to satisfy the export requirements to China, while 2.38

dollar of production is needed in the Chinese economy to meet the export demand to the Philippines.

The effect on the inducement of final demand further revealed that sectors like machinery and trade and transport have great potential in strengthening the trade relationship with China as these sectors recorded the highest output requirements induced by Philippines' exports demand to China.

On the effect of final demand on value added, findings show that Philippines' consumption-induced, investment-induced and export-induced is seen in the operating surplus components while for China, the effect is more labor-intensive as its compensation shares to value added are highest among the factor shares considered. Moreover, export goods induced a higher production of net indirect taxes in both countries.

With regards to the inducement of final demand with imports, results showed that both economies are driven by the export-induced goods, which imply that the production of export goods are highly import dependent. Sectors that recorded higher import requirements are petroleum and petroleum products and chemical products in the Philippines while machinery, other agricultural products and chemical products in China.

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