Economic Structure's Change Based on the Relationship between Domestic Final Demand and Production, Value Added and Import

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Authors' contributions

This work was carried out in collaboration between all authors. Author BT designed the study, calculated results, analyzed and wrote the first draft of the paper. Author NVP prepared and synthesize data, described data through charts. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Annual GDP growth rate in the period of 2000 – 2006 averaged to 7.5% and the inflation was approximately 5%. In the period of 2007-2012, Vietnam's macroeconomic policy shifted to the aggregated demand management policy. This research used the Keynes – Leontief relation to estimate the impacts of some demand side factors to production, value added and import. Main results of the study pointed out that the demand-side's management is no longer suitable because the supply curve gradually approaches the horizontal axis, so that, any intervention on the demand side does not increase production, that only increase prices and deep trade deficit.
JEL classification numbers: C13, C32, C52, G10

1. INTRODUCTION

The annual GDP growth rate in the period of 2000 – 2006 averaged to 7.5% and the inflation was approximately 5%. In the period of 2007-2012, Vietnam's macroeconomic policy shifted

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to the final demand management policy – i.e., most of all policies involved in final demand (including final consumption, investment and export) like stimulating consumption, investment and other export supporting policies. In this period, the average GDP growth rate of the whole economy dropped to 5.9% and the average inflation increased to 13%. The Keynes – Leontief relation suggests that the increase in demand factors will stimulate the production, which then spread to income. Among the demand side factors including the intermediate demand and final demand are domestic products and imported products [1].

Vietnam's Import statistics shows that for many years, 60% of import was for production, 30% for savings and only 10% for final household consumption approximately. Therefore, in order to study the actual structure of the induced impacts from the final demand to value added and import, we need to consider the domestic final demand [2].

The suggestion by OECD regarding this issue provided a quantitative method of value added by exports (Trade in value added: Concepts, methodologies and challenges, 2012) [3]. Robert Koopman et al (2008) studied China in a working paper "How much of Chinese export is really made in China? Assessing Domestic value added when processing trade is pervasive". They analyze this case by quantifying the value added of crudely exported products and processed exported products [4].

This research quantified the influence of domestic final demand side factors on output, import, value added based on 2 Vietnam's I/O tables. This study was based on Vietnam I/O tables in 2000-2010 to analyze the change in the structure of the induced impacts for 2 periods. The 2000 I/O table represented for the 2000-2005 period and the 2010 I/O table represented for the 2006-2010 period that used 2000 as the base year. Normally, the year which compling the input - output table should be basic year, But Vietnam General Statistics Office always choose basic year arbitrary which does not based on any principles. Vietnam GSO used the year of1994 and 2010 as basic year but only for GDP, they didn't make for output. But they have production price index (PPI) for every year. So, that is why this research has to move the input - output table, the year of 2010 follows to price the year of 2000. Similar to price of basic year, the classification of input - output of years are not compatible, so we have to aggregate follow 15 sectors.

Two I/O tables are aggregated into 15 sectors for consistency and the convenient purpose as follows:

No.	Sectors
1	Agriculture
2	Fishery
3	Forestry
4	Mining
5	Agricultural product processing Industry
6	Consumption product processing Industry
7	Production Material Industry
8	Machinery and equipment processing product Industry
9	Gas and Water
10	Construction
11	Trade
12	Transportation
13	Post and Telecommunication
14	Financial and Real – estate Sector
15	Other service sectors

2. BASIC RELATIONSHIP OF LEONTIEF IS IN FORM

$$X = (I-A)^{-1}*Y \tag{1}$$

Where: X is the matrix of output induced by each component of final demand Y (C, I, net export) with C represented final consumption, I is the vector of gross capital formation. A is the matrix of coefficient of intermediate input [5]. Relationship (1) is shown as standard input-output system (competitive – import type), the input-output system is known as non-competitive – import type as below:

$$X = (I-A^d)^{-1}*Y^d \tag{2}$$

Where: A^d presented coefficient matrix of domestic intermediate input and Y^d represent domestic final demand (C^d, I^d, E).

From relationship (2), induced impact from domestic final demand to value added and import are indentified.

$$GVA = v* (I-A^d)^{-1}*Y^d \tag{3}$$

$$M = m* (I-A^d)^{-1}*Y^d \tag{4}$$

Where: v and m are coefficient vectors of value added and import, GVA is the vector of gross value added; M is the vector of import.
From equations (2,3) and (4), to identify induced impact coefficient of final demand to output, value added and import as below:

$$X*R_y^{-1} = R_x \tag{5}$$

$$GVA* R_y^{-1} = R_V \tag{6}$$

$$M* R_y^{-1} = R_M \tag{7}$$

Where:

R_y is a diagonal matrix with elements on the diagonal is the sum of final demand's factors. For example, there are 3 elements of domestic final demand as final consumption of domestic products (C^d), gross capital formation (I^d) and export (E), the diagonal entries of R_y will be $\sum_i C^d_i$; $\sum_i I^d_i$; and $\sum_i E_i$ respectively.
R_x presented output induced by each unit increase of final demand
R_v presented value added induced by each unit increase of final demand
R_M presented import induced by each unit increase of final demand

On the other hand, the equation (1) can be written as follows:

$$X - AX = C + I + E - M^p - M^c \tag{8}$$

Where: M^p is the import for intermediate input, M^c is the import of final products,

$$M = M^p + M^c$$

Expand the equation (8) :

$$X - A^d X - A^m X = C^d + I^d + E + C^m + I^m - M \qquad (9)$$

Where $AX = A^d X - A^m X$ where $A^m X = M^p$ and $M^c = C^m + I^m$. A^d Is matrix of intermediate consumption of domestic products, while C^m, I^m are the final consumption and gross capital formation vectors of domestic products, respectively.

The equation (9) can be formulated as follows:

$$X - A^m.X = A^d.X + C^d + I^d + E + C^m + I^m - M = TDD - M^p$$

Where: Total domestic demand (TDD) including intermediate expenditure, domestic final consumptions, and domestic gross capital formation and export (TDD)

TDD = $A^d.X + C^d + I^d + E$, we obtain:

$$X = (I - A^m)^{-1}. (TDD - M^p) \qquad (10)$$

Matrix $(I-A^m)^{-1}$ is the import multiplier matrix. Equations (10) presented the demand of import induced by domestic demand. The input-output table should be built as non-competitive import type in which intermediate demand and final demand have been separated into domestic products and import [6].

3. RESEARCH FINDINGS

Based on data from 2 Vietnam's I/O matrixes in 2000 and 2010, we found the significant changes of induced impact of domestic final demand to production. Table 1 shown:

-Total impact of household final consumption and gross capital formation on output declined by 14.1% and 17.1%, respectively. However, the impact of export increased strongly at 11.7%..

- A warning, although the export induced impact on production has increase but the share of value added in export decreased substantially to 13.3%; it means that value added in Vietnam's exports is decreasing and most of export products are crude, natural resources and outworked process. Therefore, Vietnam is considered as host country for other countries' export platform (i.e., Vietnam's export at this stage is just exporting for other countries) [7].

- Although the level of investment induced impact to production fell sharply (17.1%), it decreased the value added about 5.6%. It means 17.1% of investment is not for production. Therefore, investment's efficiency in the period of 2006-2011 was greater than in the period of 2000-2005. This result was supported by Incremental Capital-Output Ratio (ICOR) of Vietnam; investment performance through ICOR also shown ICOR of 2000-2005 period is about 5 and ICOR of 2006-2011 period increase about 7[1].

Noticeable that the household consumption expenditure induced impact to production and value added decreased sharply to 14.1% and 20.4% respectively in the period of 2006-2011.

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[1] *http://www.scienpress.com/Upload/JAFB/Vol%203_5_17.pdf*

However, the pervasive level of Investment and consumption does not increase the level of imports over the previous period. So, in this period, the intervention in aggregate demand size does not increase production and income that increase prices only?

With respect to the export, although export production increased approximately by 12%, share of value added in export decreased by 13.3% and more importantly, to spread a very strong increase in imports by 52%. It confirms that at this moment, Vietnam is exporting raw material, natural resources and processed products that caused a large trade deficit. Since 2000, Vietnam's economy has been always in high trade deficit; the total merchandise trade deficit reached at peak of over 18 billion US dollar in 2008.

For other developing countries like Vietnam, trade deficit is not really bad if the imported products are for domestic production and consumption [8]. However, in the fact that imports are mainly for FDI sector that has to import almost all of machines, accessories, and materials for export oriented production. Export products such as electronics, computers and accessorizes; mobiles and accessorizes; textiles, footwear… which are heavily processed assembly, low value added content, economic inefficiency and this can be revealed by studying trade deficit and GDP growth rate in the period 200-2012 (Appendix 03). Whether the trade deficit is small or large, GDP growth rate was still increasing in this period. In 2012, the trade surplus was 284 million US dollar, GDP growth rate achieved at 5.03% - a 12 year record low. The Import and Export of the FDI sector took the dominating role and was expanding their market share against the domestic sectors (Appendix 02-03). Export of domestic sector accounted for 52.98% in 2000, and then decreased to 36.93% in 2012; whereas the export of FDI sector increased from 47.02% in 2000 to 63.07% in 2012. The import structure also changed significantly when the domestic sector gave 24.9% of market share to FDI sector in the period 2000-2012.

The aforementioned analysis of the import and export can lead to an important conclusion as to "The self-ownership restructuring" of the Vietnam's economy. The production is increasingly dependent on import. Mostly imported goods cater for export and eventually Vietnam's economy becomes an outsourcing economy for other countries. That means levels of value added accounted for a small proportion in output of Vietnam economy [9].

Table 1. Induced impact coefficient of final demand to production and income
($\sum R_x$, $\sum R_v$, $\sum R_M$ calculated by equations (5,6,7)

	Year 2000			Year 2010		
	Final consumption	Gross capital formation	Export	Final consumption	Gross capital formation	Export
Induced impact from final demand to output	1.27	1.35	1.53	1.09	1.12	1.70
Percent changed				-14.1%	-17.1%	11.7%
Induced impact from final demand to income	0.60	0.43	0.69	0.48	0.41	0.59
Percent changed				-20.4%	-5.6%	-13.3%
Induced impact from final demand to import	0.22	0.39	0.31	0.19	0.37	0.48
Percent changed				-12.1%	-3.9%	52.0%

Source: Author's calculation base on I/O table published by Vietnam General Statistics Office in 2007 and 2010

After several years in Vietnam, the GDP growth rate and the structure of processing and manufacturing industries in GDP has been always the joy and sadness in the performance reports or science research projects at the national and local levels.

In terms of the economic structure and growth rate: the contribution of industrial sector to GDP increased from 29% in 2000 to about 33% in 2012; an annual increase of over 1% and average growth rate of the industry increase over 7% in the period of 2000-2012. A quick look at the above data seems to suggest a proud record of the industrialization and modernization process. A thorough analysis however revealed many hidden risks.

According to the Statistical Yearbook, the rate of investment to value added of the industrial groups from 2000 to present was always high. In 2000, this rate was about 41%, from 2007 to present, the average rate accounts for over 45%. Unfortunately, the rate of value added on production value of this sector declined; according to the I/O matrix table in 2000 by GSO, the rate for the whole industry (including mining and utility) was 27% but declined to 23% in recent years (the new I/O matrix table) and only for the processing and manufacturing industry, the value added rate decreased from 20% in the previous period to 17% in the current period [10]. It means that, when the product value is 100 units, the value added accounts for only 17 units and therefore, the sector is less effective, investment into the sector must increase to offset the inefficiency in the business production. This also shows that after 10 years of development, Vietnam's industrial sector is still a mainly processing industry.

This can be clarified when considering reflection of economic structure which reflect the relative importance of sector to the economy and the demand for import through domestic production spill-over effect rate and import spill-over effect rate through Vietnam's inter-sartorial table in 2000 and 2010 by Vietnam General Statistic Office as following:

**Table 2. Economic structure change through power of dispersion on production and import**

		Power of dispersion on production		Power of dispersion on import	
		2000	2010	2000	2010
1	Agriculture	0.932	1.138	0.883	0.911
2	Fishery	0.903	1.396	0.986	0.971
3	Forestry	0.842	0.970	0.858	0.936
4	Mining	0.906	0.813	0.851	0.948
5	Industry of processing agricultural products	1.443	0,885	0.883	0.898
6	Industry of processing consumption's product	1.208	0.906	1.137	1.289
7	Industry of processing production's tool	1.148	0.948	1.182	1.275
8	Industry of manufacturing and processing machinery and equipment.	1.042	0.940	1.326	1.253
9	Electricity, water and gas	0.816	0.900	0.938	0.846
10	Construction	1.179	0.927	1.231	1.214
11	Trading	1.012	0.847	1.009	0.886
12	Transportation	0.903	0.916	1.023	1.097
13	Post and telecommunication	0.840	0.970	0.924	0.847
14	Financial sectors and real estate business	0.943	0.948	0.912	0.836
15	Other service sectors	0.957	0.896	0.922	0.931

(Source: Author's calculation base on I/O table published by Vietnam General Statistics Office in 2007 and 2010)

On the table 2, industrial group is from the 4th to 9th which excluded mining and utility, the processing and manufacturing industry is from 5th to 8th. The above table also shows that, during the period of 2000s, the processing and manufacturing industry spillover effect rate to domestic production was quite good (all the industries valued of greater than 1, in which the agricultural processing industry had the highest rate at 1.443) but in the current period, the rate of all these industries are less than 1 (in which the agricultural processing industry fell the most from 1.443 to 0.885).

Most manufacturing sect oral group (except agricultural processing sector) and construction have power of import dispersion bigger than 1, that means the import requirement of these sectors bigger more than the average of all economic activity, in other hand, the average of import requirement for production higher than requirement of domestic products (1.04 and 0.9 respectively).

Although the import requirement of agricultural processing industry has the spill-over rate increased from 0.883 (year 2000) to 0.898 (year 2010) but power of dispersion to domestic production reduced from 1.44 (year 2000) to 0, 88 (year 2010). Other sectors such as consuming processing, material manufacturing processing sectors has the spillover effect coefficient on domestic production above 1 in the input – output table 2000 quickly reduced smaller than 1 in the input – output table 2010 but import requirements in all period more than 1. This suggests that the greater development of these sectors is, the larger trade deficit level is (See the picture below) and the intrinsic value of exports is virtual but the import is real. Therefore, we are exporting for other countries. However, the abnormal thing is that although the processing industry of agricultural products has the spill-over effect coefficient at high level in the last 20 years, it has no longer effect now. This is the only sector that has a short-term spill-over effect starting weaken quickly.
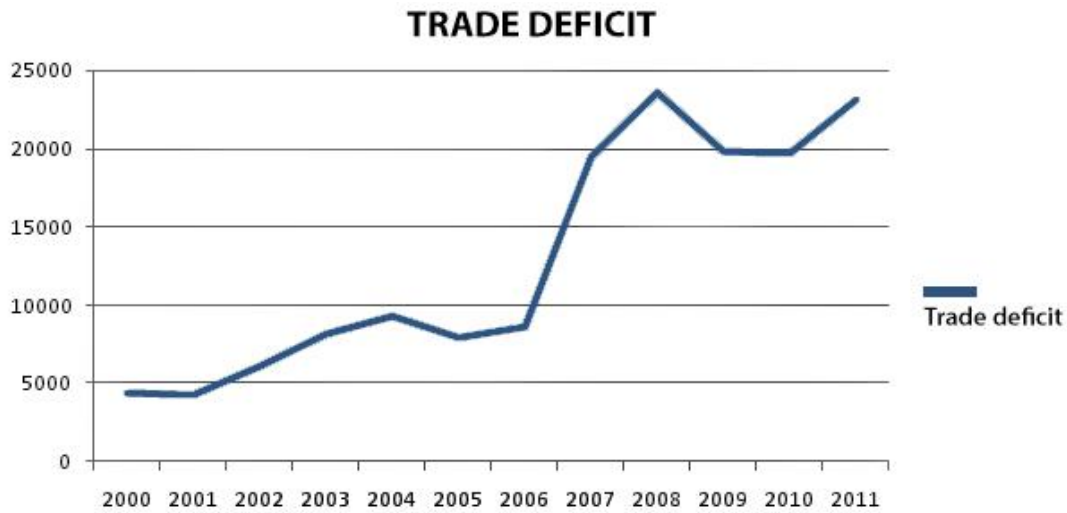
(Source: Vietnam GSO)

4. CONCLUSION

It can be seen from the above calculation that there is a trend of the economic structure to move from the Keynesian theory (the aggregate supply curve is horizontal – the demand

increase leads to the supply increase while the price remains unchanged) to the classical theory (the aggregate supply curve is vertical – the demand increase only causes the price to increase) [11]. It is also appropriate with the inflation trend in the past years of Vietnam (appendix 4). A certain reason for this trend is the nearly saturating development of the local amount of labor and resources [12]. It means that the encouraging policy should also focus on the technology and efficiency instead of only expanding the industries using crude material and labor as previously.

Now, the policy-makers and experts in Vietnam have strong thought about economic structure in the preferential rank of industry, services and agriculture. Our research shows that it seems to be a wrong structure, as the manufacturing group has not brought much value added but trade deficit.

5. POLICY RECOMMENDATIONS

Vietnam's demand management policy during the period of 2007 – 2012 seems inappropriate. Intervention on the aggregate demand does not induced to increase of production but only induced to rise of prices and trade deficit? The export incentives on a large scale may create little value added and promote more and more import.

In accordance with this paper and the previous research, we believe that there are three basic solutions, namely as:

1. Vietnam government needs to come from aggregate demand management policies to spirit on supply side
2. Improving the production efficiency and labor capacity, and
3. Considering the economic structure in priority order of service, agriculture, manufacturing and exploitation.

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COMPETING INTEREST

Authors have declared that no competing interests exist.

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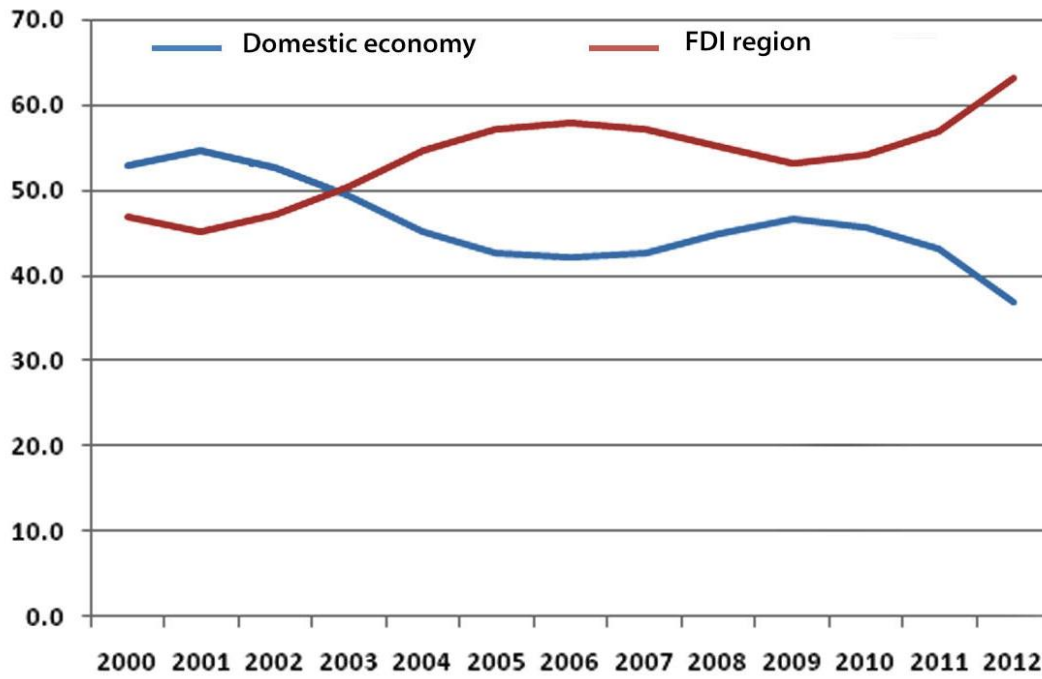
APPENDIX 1

TRADE DEFICIT AND GDP GROWTHIN PERIOD OF 2000-2012
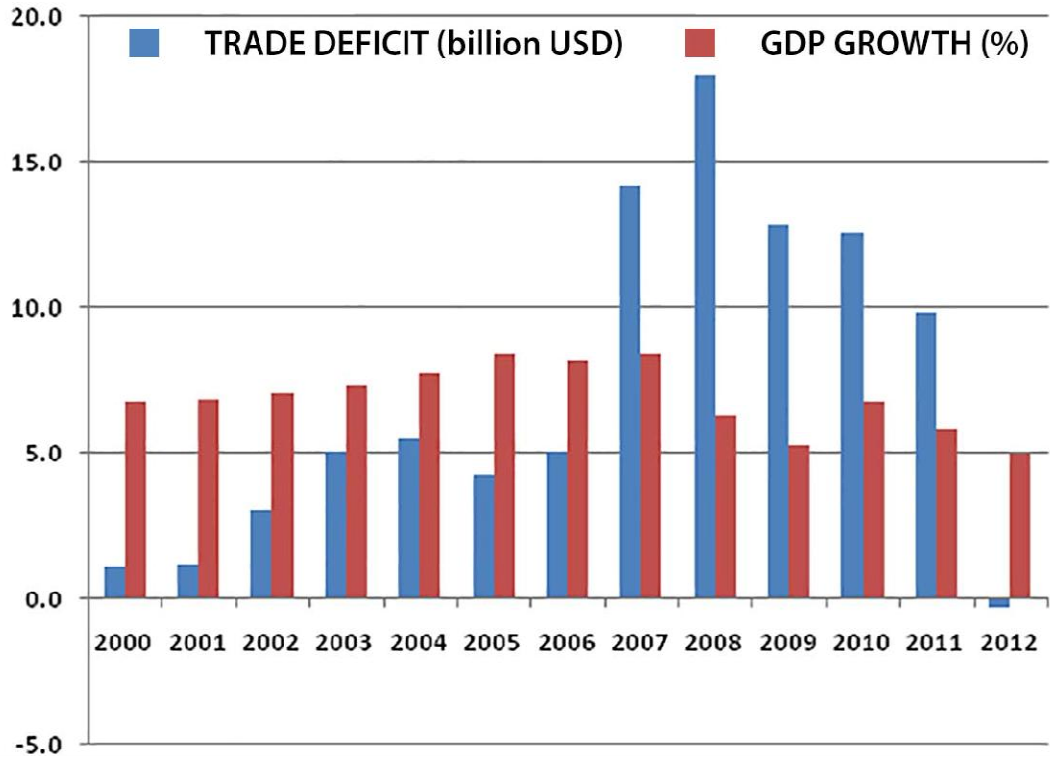
(Source: Vietnam GSO and calculation of the author)
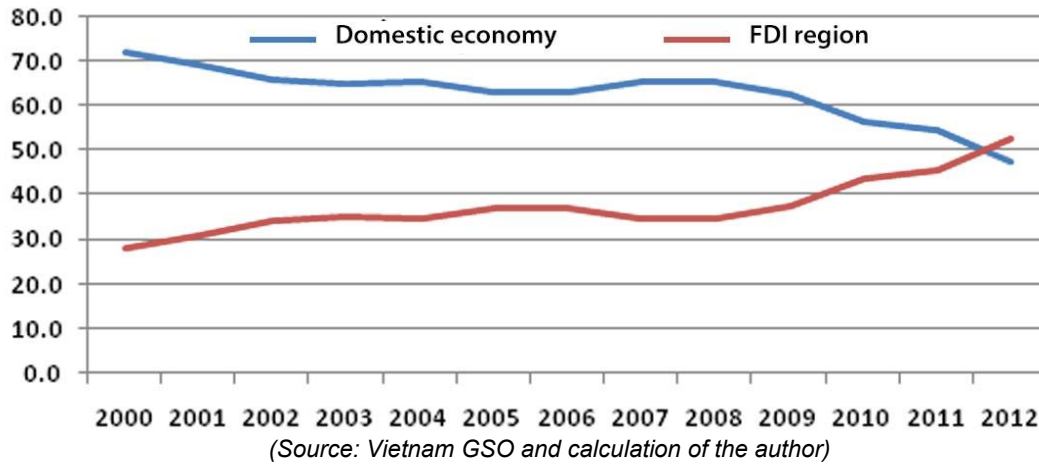
APPENDIX 2

STRUCTURE OF EXPORTING PRODUCTSIN PERIOD OF 2000-2012
Unit: Percent (%)
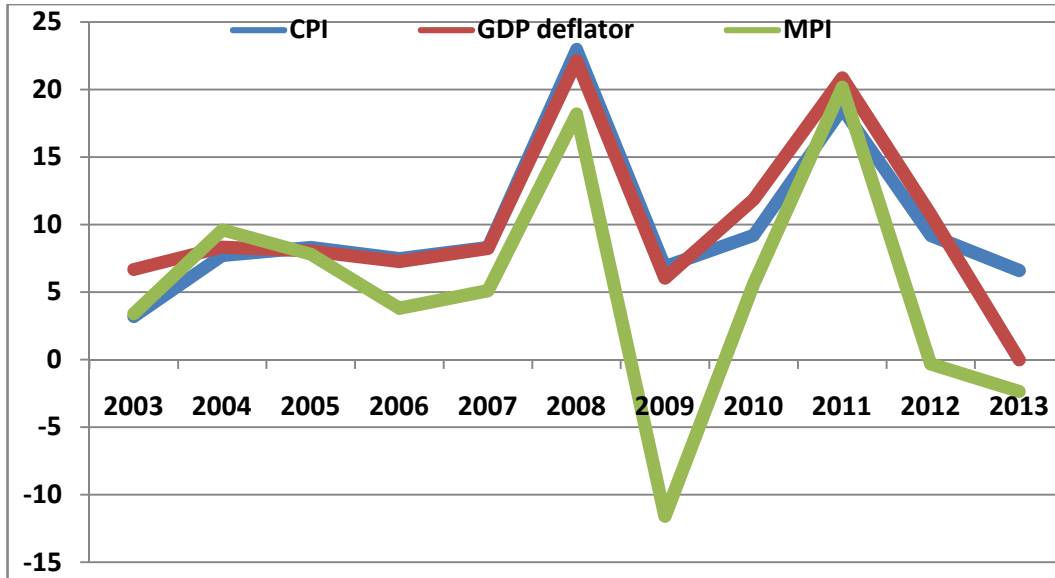

(Source: Vietnam GSO and calculation of the author)

APPENDIX 3

STRUCTURE OF IMPORTING PRODUCTS IN PERIOD OF 2000-2012
Unit: Percent (%)

(Source: Vietnam GSO and calculation of the author)

APPENDIX 4

Consumers price index, GDP deflator and import price index ò Vietnam from 2003-2013

(Vietnam GSO calculation of the author)