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# Measuring Production Efficiency Level of Vietnam for Inputs Imported from China

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**Abstract:** In recent years, many countries in ASEAN have depended significantly on products imported from China. This study presents the analysis of dependence level of inputs imported by Vietnam from China. Using production elasticity index as the measurement, the results of research shows that the imported inputs from China are effective for Vietnam's economy. In addition, in comparison to the inputs imported from other remaining countries in the world, the import from China brought higher production efficiency for Vietnam in most of the industries.

**Key words:** Economics trade, imported inputs, China, Vietnam, Thailand

## INTRODUCTION

Vietnam has depended significantly on goods and inputs imported from China (Doan *et al*., 2016). Also, this dependence is increasingly by time, especially, for the four sectors of the main export products of Vietnam (Table 1). However, the level and evolution by time as well as the impact of dependencies on the production and business so far seem still as vague estimates (Sheriff, 2010). To clarify the issues as mentioned, this study presents a method of measuring of Vietnam's production efficiency level for inputs imported from China. Based on specific data for the four key export industries in Vietnam in the period from 2000-2013, including seafood, agricultural products, garment and leather/footwear, the elastic index of imported inputs as outputs value has been proposed to measure the effective production level of Vietnam.

Table 1: Value of imported inputs from China and the remaining countries

| | Value of imported inputs (USD) | | |
|---|---|---|---|
| Industry | 2000 | 2006 | 2013 |
| **Fishery sector** | | | |
| China | 2,893,000 | 33,337,953 | 138,590,572 |
| The remaining countries | 153,728,000 | 656,123,405 | 2,938,478,351 |
| Total | 156,621,000 | 689,461,358 | 3,077,068,923 |
| **Agricultural sector** | | | |
| China | 105,463,000 | 306,146,195 | 1,238,703,271 |
| The remaining countries | 400,198,000 | 378,823,169 | 1,253,687,429 |
| Total | 505,661,000 | 684,969,364 | 2,492,390,700 |
| **Garment sector** | | | |
| China | 71,619,000 | 994,431,714 | 4,496,103,007 |
| The remaining countries | 1,493,484,000 | 2,785,878,560 | 6,790,122,963 |
| Total | 1,565,103,000 | 3,780,310,274 | 11,286,225,970 |
| **Leather and footwear sector** | | | |
| China | 17,332,000 | 228,687,353 | 674,551,352 |
| The remaining countries | 251,991,000 | 1,340,744,364 | 2,001,818,211 |
| Total | 269,323,000 | 1,112,057,011 | 2,676,369,563 |

## MATERIALS AND METHODS

To measure the efficiency production level of Vietnam for the inputs imported from China, the import elasticity factor as production value was used as calculation (Kee *et al*., 2008). Moreover, in order to distinguish the impact of the effects of the products imported from China and from other remaining countries in the world to Vietnam, the elasticity of import as production value as mentioned above is divided into two components (Beresford and Phong, 2000). The first component is production elastic as import value of inputs from particularly China and the second component is elastic production as import value of the inputs from the remaining countries in the world. This division allows comparison of production efficiency of Vietnam from the imported inputs of two components of the said countries.

The elasticity of imported inputs as production value of outputs is a percentage of change of inputs imported value to change the proportion of inputs. It is used by Eq. 1:

$$E = \frac{\Delta M_{T,0}}{\Delta Y_{T,0}} = \frac{\frac{M_T - M_0}{M_0}}{\frac{Y_T - Y_0}{Y_0}} \quad (1)$$

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Where:
M = Total value of imported inputs
Y = Production value of outputs
T = Time (year) to be calculated
0 = Origin year

According to Eq. 1, if production value of outputs increases of 1%, imported value of inputs shall be increased of E%. The increasing E% value implies the inefficiency production level when using imported inputs. We have the following equation:

$$M = M^{(C)} + M^{(W)} \quad (2)$$

Where:
$M^{(C)}$ = Inputs imported value from China to Vietnam
$M^{(W)}$ = Inputs imported value from the remaining countries in the world to Vietnam

Accordingly, change ratio (%) of M in year T compared to year 0 may be presented as follows:

$$\Delta M_{T,0} = \frac{M_0^{(C)}}{M_0}\Delta M_{T,0}^{(C)} + \frac{M_0^{(W)}}{M_0}\Delta M_{T,0}^{(W)} \quad (3)$$

From Eq. 1 and 3, we have:

$$\frac{\Delta M_{T,0}}{\Delta Y_{T,0}} = \frac{\frac{M_0^{(C)}}{M_0}\Delta M_{T,0}^{(C)} + \frac{M_0^{(W)}}{M_0}\Delta M_{T,0}^{(W)}}{\Delta Y_{T,0}} \quad (4)$$

$$E = E^{(C)} + E^{(W)} \quad (5)$$

Equation 4 both values of $M_0^{(C)}/M_0$ and $M_0^{(W)}/M_0$, respectively are the weights of the inputs value imported from China and other countries in the world in the total value of imported inputs to Vietnam. Thus, the obtained elastic levels Eq. 5 is calculated including weights corresponding to the relative importance of each imported component of inputs (or from China or other countries in the world) to Vietnam's economy. In case the value of E is >1, the production level is insufficient because an additional increase of 1% of outputs value leades to the increase of >1% of the value of imported inputs.

## RESULTS AND DISCUSSION

Based on the formula described as mentioned above, the calculation results of aggregated elasticity and component elasticity of the outputs value as imported value of inputs from China and other remaining countries in the world to Vietnam are summarized in Table 2.

Table 2: Elasticity of outputs values as imported value of inputs of Vietnam

| Industry | Year calculation | Year base | $E^{(C)}$ | $E^{(W)}$ | E |
|---|---|---|---|---|---|
| Fishery sector | 2006 | 2000 | 0.14 | 2.26 | 2.40 |
| | 2013 | 2006 | 0.10 | 2.08 | 2.17 |
| Agricultural sector | 2006 | 2000 | 1.26 | -0.13 | 1.13 |
| | 2013 | 2006 | 0.79 | 0.74 | 1.53 |
| Garment sector | 2006 | 2000 | 0.20 | 0.28 | 0.49 |
| | 2013 | 2006 | 0.44 | 0.50 | 0.94 |
| Leather and footwear sector | 2006 | 2000 | 0.38 | 1.57 | 1.95 |
| | 2013 | 2006 | 0.19 | 0.39 | 0.58 |

In general, the elasticity of outputs value as the value of imported inputs E of the both fisheries and agricultural products in the both stages of 6 year period (2006 vs. 2000 and 2013 vs. 2006) had a value >1. This showed the inefficiency level of production of Vietnam when using inputs imported for these industries.

As for the two agricultural and the garment industries, the elasticity E in the 6 year period increased later this showed the two industries imported inputs to produce in inefficiency and increasingly worse over time. In contrast, for the industry of leather or footwear, the elasticity value was down to 0.58 from 1.95, implying a significant improvement in the efficiency of production. As for the fishery sector, the value of elasticity E in the 6 year-period later, though declining, it was still >1, that means the fishery sector has also improved the efficiency of production but not high.

Calculation results of elasticity components of outputs value as the value of imported inputs from China and the remaining countries in the world to Vietnam also offer some rather quite critical assessment. Firstly, because elasticity $E^{(C)}$ in both phases of 6 year (2006 vs. 2000 and 2013 vs. 2006 were <1, except agricultural sector, the production efficiency of the three remaining sectors of Vietnam from imported inputs from China were all effective.

Secondly, the effective level was increasingly over time: $M^{(C)}$ of the later stage was also lower than those of the previous period. Even for the agricultural sector, although the first phase from 2000-2006, the production failed to get any efficiencies, the period from 2006-2013 later was more improved: the value of $E^{(C)}$ decreased from 1.26-0.79. As for the garment industry, although $E^{(C)}$ has increased, it was still <1. This indicated that production of garments from imported inputs from China remains effective.

Thirdly, compared to the import of inputs from other countries in the world, the import from China in both periods from 2000-2006 and from 2006-2013, brought production efficiency for Vietnam in most sectors except for agricultural production. Although, the level of efficiency in the production of imported inputs for the agricultural sector from other countries in the world in

the early stages was quite well ($E^{(W)}$ = -0.13), the performance was decreased in the later stage ($E^{(W)}$ = 0.74). In contrast, the elasticity $E^{(C)}$ of the value of imported inputs from China for this sector was reduced from 1:16-0.79, showed the positive trend in the production of agricultural products from non-efficiency to efficiency.

In summary, the findings showed that although Vietnam is dependent significantly on imported inputs from China, the production efficiency of outputs has improved in comparison with imported inputs from the remaining countries in the world.

## CONCLUSION

The values of imported inputs of the four main export sectors of Vietnam including fisheries, agricultural products, textiles-garment and leather/footwear in the period from 2000-2013 showed that the dependence of inputs of Vietnam imported from China was very significantly and increasingly. Besides, resolution of production elasticity as of value of imported inputs into production elasticity value of imported inputs from China and production elasticity value of imported inputs from the remaining countries in the world showed that the positive impact of the both components to production and business efficiency of Vietnam in each sector. The results showed that firstly, the production of Vietnam from China imported inputs are effective. Secondly, the level of production efficiency is gradually increasingly by time and thirdly, compared to imported inputs from other countries in the world, the import from China in both phases are effective for most of production sectors in Vietnam (excluding agricultural sector).

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