



IMPACTS OF INTERNATIONAL OIL PRICE CHANGES ON VIETNAM'S ECONOMY - AN INPUT-OUTPUT STUDY

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ABSTRACT

In this paper we investigate the impacts of international oil price changes on Vietnam's economy by using an input-output analysis. The goals of our study are: 1. establishing a price sub-model and output sub-model in the input-output analysis framework; 2. analyzing impacts on both price and output sectors. The result shows that impact in the long run is much higher than in the short run. While the 10% increase in petroleum prices experiences negative results, the 5% increase in prices shows a positive effect, implying that a small change in oil prices may enjoy resource reallocation efficiency. In the short run the manufacturing sector will suffer if electricity and public utility prices reflect a 10% increase in oil prices.

Keywords: Vietnam's economy, An input-output analysis, Oil prices, Short run, Long run TNR 10 n.

1. INTRODUCTION

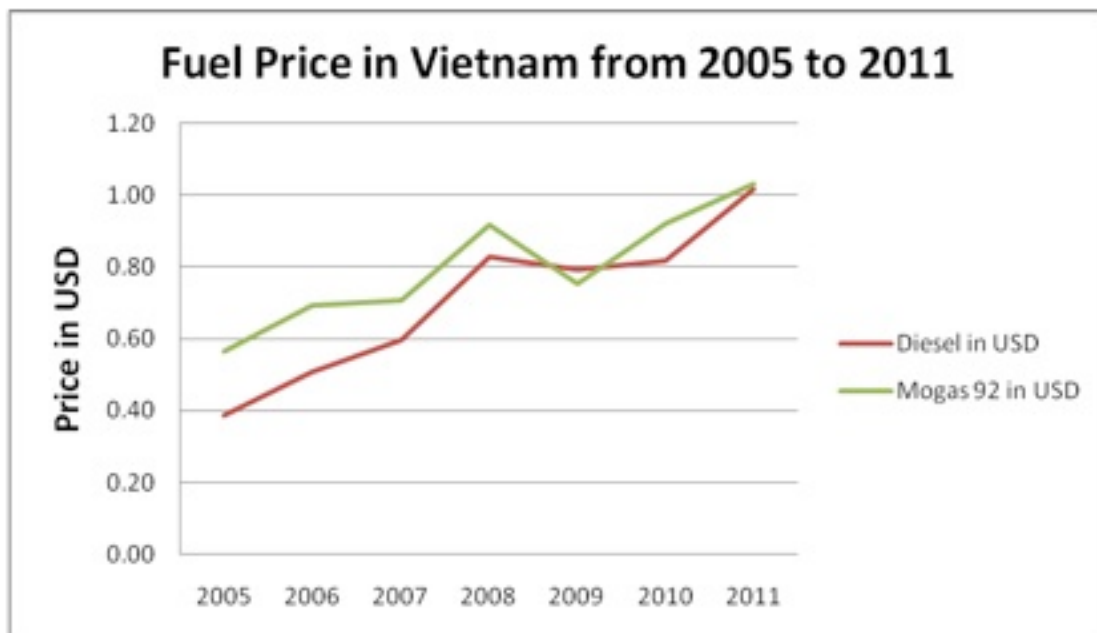
A large proportion of the existing research focuses on oil price-macroeconomic relationships in Western and developed economies, particularly for the United States. With respect to Asian and developing countries, the following results have been observed. The impact of oil price shocks on inflation appear to be limited to the short-run for six Asian countries; namely Japan, Malaysia, the Philippines, Singapore, South Korea and Thailand (Cunado and Gracia, 2005). Additionally, the inflationary impact of the oil price shocks was found to be more significant than the impact on economic growth for the Asian countries. Finally, they also identified that the relationship between oil price and the macro economy was less significant in Malaysia, the only oil-exporting country. Although this suggests that the macroeconomic response of oil exporting countries may differ from oil-importing countries, the theory was not established and more research is required to substantiate it. For India, the results show that oil price shocks Grangercause output growth and additionally, inflation rates rise with increases in real oil prices (Kumar, 2005). Although there are a number of singular country studies, there seems to lack a comprehensive cross-country comparative study for the ASEAN, Asian-Oceanic and South Asia region as a whole.

Fuel is the indispensable element of people's lives and all economic activities in Vietnam. Given the giant volume of motorbikes and cars moving on the road, the price of oil, gas and petroleum is always among the most frequently discussed - and probably gossiped - topics in Vietnam. If you plan to move to Vietnam for a while and run a vehicle, maybe it is time that you consider joining the club too.

Generally speaking, Vietnam fuel market is a competitive market with many suppliers, but it is also under monitor by the government which often determines the price ceiling and the price stabilizing fund. Among petroleum suppliers, Vietnam National Petroleum Corporation - or Petrolimex - is dominating the retailer market with about 60% of the market share, followed by Military Petroleum Corporation and Comeco Company.

The fuel cost in Vietnam has dramatically increased in the recent years, due to the rise in the global petrol price and mutual pressure of the economy. In 2005, the price for both diesel and Mogas 92 gasoline was kept artificially low level at roughly 5,000 - 7,500 VND per liter (40 – 60 cent at that time, about \$1.52 per gallon). After 2005, the rise in the global fuel price and high rate of inflation in Vietnam caused the price of fuel in the domestic market to rise rapidly, although the government has already offset the losses to the suppliers.

Figure-1. Fuel Price in Vietnam from 2005-2011



In 2008, there was a new record for Mogas 92 when it peaked 19,000 VND per liter (around 0.9 USD at that time) and also one another peak for the diesel oil price of 15,450 VND per liter (0.8 USD). However, the signal of the recovery of the global economy has caused the petrol price in Vietnam as well as Vietnam to decrease in a considerable rate until it reached another peaks in 2011 with 21,000 VND per liter (about 3.78 USD per gallon) for diesel and 21,300 VND per liter

(3.89 USD per gallon) for Mogas 92. Mogas 95 currently stands at 21,800 VND per liter, though this market only caters for more luxurious vehicle owners.

In addition, although the fuel price in Vietnam has risen significantly in recent years, it is still lower than many countries in the nearby or other areas. For example, the cost for gasoline in Vietnam now is stable in the level of 1.03 USD, much lower than China (1.2 USD), Laos (1.3 USD), Germany (1.42 USD), England (1.92 USD). However, given the average income of Vietnamese, continuous rise in oil price presents a major challenge, especially for those newly migrating to the city or those living on a budget.

Table-1. presents a comprehensive summary of the existing literature as discussed above.

Author	Year	Countries observed	Macroeconomic Variables	Conclusions		
Hamilton	1983, 1996, 2003	USA	GDP	Significant negative relationship		
Gisser and Goodwin	1986			Negative and relatively stable relationship		
Burbridge and Harrison	1984	5 OECD countries	Several	Substantial initial impact on macroeconomic indicators; also a declining impact of oil price shocks		
Jiménez-Rodríguez and Sánchez	2005	Several	GDP	Significant impact on macroeconomy		
Gounder and Bartlett	2007	New Zealand	GDP and inflation	Direct relationship for GDP, indirect relationship with inflation		
Papapetrou	2001	Greece	GDP	Significant negative causal relationship		
Hooker	1996	USA		Changing and unstable oil price-macroeconomic relationship		
Moik et al.	1990, 1994	Several	Several	Declining oil price-macroeconomic relationship		
Abeyasinghe and Wibisono	2000					
Chang and Wong	2003	Singapore	GDP, inflation and unemployment	Marginal impact on macroeconomic indicators		
Blanchard and Galí	2007	Several	GDP and inflation	Changing impact of oil prices		
Barsky and Kilian	2001, 2004	USA	GDP	Limited impact of oil price shocks		
Kilian	2009			Little or no impact of oil price shocks		
Ferdener	1996			Asymmetric relationship		
Lastic and Mignon	2006			USA and Europe		
Canado and Gracia	2005	6 Asian countries	Inflation	Significant pass through effect to inflation		
Fuhrer	1995	USA			Significant impact on inflation	
Hooker	2002				Modest impact on inflation	
Barsky and Kilian	2004				Declining impact on inflation	
LeBlanc and Chinn	2004	Several			Short run effect on inflation	
Lescaroux and Mignon	2008				Significant impact on inflation	
Chen	2009				6 Asian countries	Significant relationship
Canado and Gracia	2005					India
Loungani	1986	USA			Unemployment	Lagged effect on unemployment
Burbridge and Hamilton	1984	5 OECD countries				
Darbiv	1982	Several				
Hamilton	1983	USA	Long run relationship			
Gisser and Goodwin	1986					
Liri	1996					
Doerul	2010	Turkey				
Carruth et al.	1998	USA				

2. OVERVIEW ASIA OIL DEMAND

Table-2. World Crude oil prices 1996 – 2011

US dollars per barrel				
Year	\$ money of the day		\$ 2011 year	
1996	20.67		29.63	1996
1997	19.09		26.76	1997
1998	12.72		17.55	1998
1999	17.97		24.26	1999
2000	28.50		37.22	2000
2001	24.44		31.05	2001
2002	25.02		31.29	2002
2003	28.83		35.25	2003
2004	38.27		45.57	2004
2005	54.52		62.80	2005
2006	65.14		72.69	2006
2007	72.39		78.53	2007
2008	97.26		101.61	2008
2009	61.67		64.66	2009
2010	79.50		82.00	2010
2011	111.26		111.26	2011

Since the end of the 1980s, Asia has achieved startling economic development. Oil demand increased annually, with consumption of five hundred thousand to one million barrels daily from 1990 to 1997. Oil demand in Asia then grew sluggish until 2002 due to the Asian economic crisis and the burst of the IT bubble in the United States. In 2003 and 2004, demand again increased to around one million barrels per day due to economic conditions primarily in China. Under these circumstances, the economy was exposed to the abnormally high prices of 2004 and 2005, and the oil market report of the International Energy Agency (IEA) predicted lower oil demand in 2005 (Figure 4.3). According to the Chinese statistics, net oil imports in 2005 were lower than those of the previous year, and this appears to be due to the effect of the soaring prices. On the other hand, there is data that tells of active economic growth in 2005, and so it is difficult to draw a conclusion. Furthermore, Asian oil demand in 2006 and 2007 is expected to increase over the 2005 level.

Long-term Increase in Asia's Oil Imports It is predicted that the rapid expansion of net oil imports by Asia will continue over the long term due to the bullish increase in demand for oil accompanying economic development (Figure 4.4). In the 1980s, Japan was the primary oil importer, but throughout the 1990s, oil imports by China, East Asia, and South Asia grew and are currently double the amount of Japan's imports. Henceforth oil imports by this region are fore- cast to expand to just less than three time those of Japan by 2010, just over four times by 2020, and just under six times by 2030. What this signifies is that dependence on Middle Eastern oil will quantitatively further increase. Oil imports from the Middle East quantitatively doubled from 1985 to 2004, and it is possible that they will further double between the current time and 2030. To the extent that dependence on the Middle East increases, the occurrence of any emergency situation in that region that obstructs the supply of oil will have a grave impact.

3. THE EMPIRICAL MODEL

The energy input-output typically determines the total amount of energy required to deliver a product to final demand, both directly at the energy consumed by an industry's production process and in directly as the energy embodied in that industry's (Miller and Blair, 1985). An input-output model is constructed from observed data for a particular economic area - a nation, a region, a state, etc. The economic activity in the area must be divisible into a number of segments or producing sectors (Ji Chou Nai-Fong Kuo, 2005).

3.1. The Basic Model

$$1 = \frac{P_i}{P_j} = \sum_{i=1}^n \frac{P_i}{P_j} q_{ij} + \frac{V_i}{P_j} = \sum_{i=1}^n a_{ij} + \bar{V}_j \tag{1}$$

$$P^* = A' P^* + V \tag{2}$$

$$(I - A') P^* = V \tag{3}$$

$$P^* = (I - A')^{-1} \bar{V} \tag{4}$$

Where V_j represents sector j 's value-added per dollar output

The purpose of this paper is to simulate the impacts of international oil prices. The change in oil prices is not actually the factor of value-added. Hence, we have to adjust eq. (1). According to Miyazawa (1995), we suppose sector n is crude oil, and then eq. (1) can be expressed as:

$$P_j = \sum P_i q_{ij} + P_n q_{nj} + V_j \tag{5}$$

Where P_j is the price of sector j , q_{ij} is the physical-units input coefficient, and v_j represents the value-added coefficient

From the equation (4) we have:

$$P^* = (I - A')^{-1} \epsilon P_n q_{nj} + V \tag{6}$$

Term P^* represents the normalized price vector, but does not include the crude oil sector, A' is the physical-unit input coefficient matrix (not including the crude oil sector), q_{nj} is the ratio of crude oil as sector j 's intermediate input to j 's output, and P_n is the price of crude oil. When the price of crude oil changes, the impact of other sectors' prices can be measured as follows:

$$\Delta P^* = (I - A')^{-1} q_{nj} \Delta P_n \tag{7}$$

$$a_{ij} = X_{ij} / X_j = (P_i / P_j) q_{ij} \tag{8}$$

FROM E.q 6, 7 we have:

$$a_{ij}^* = \left(\frac{P_i^{**}}{P_j^{**}} \right) a_{ij} = (P_i + \Delta P_i / P_j + \Delta P_j) a_{ij}$$

When crude oil prices increase will impacts final demand such as household consumption, capital formation, government expenditures, exports, and imports.

The output effects of crude oil price changes as follows:

$$\Delta X = \epsilon (I - A^*)^{-1} \Delta F.$$

Since the intermediate input consists of important domestic products, the A matrix can be divided into import matrix M and domestic product matrix D :

$$A = M + D$$

The A matrix and D matrix represent the long-run effect and short-run effect in our study, respectively.

4. RESEARCH RESULT

Table 5 shows the impacts of output change from the change in final demand caused by the price changes. The impact in the long run is much higher than in the short run. While the 10% increase in petroleum prices experiences negative results, the 5% increase in prices shows a positive effect, implying that a small change in oil prices may enjoy resource reallocation efficiency. Such a kind of efficiency gain is much obvious in the long run than in the short run. Among sectors, public utility, manufacturing, and transportation sectors benefit from the change of oil prices, and the other 7 sectors suffer in the long run. In the short run the manufacturing sector will suffer if electricity and public utility prices reflect a 10% increase in oil prices.

Table-3.The long-run Price effect - 13 Sectors (D matrix) from 1996-2007

	A Matrix					
	2007		2000		1996	
	5%	10%	10%	5%	5%	10%
Crops	0.00003	0.00005	-0.00101	-0.00051	-0.00003	-0.00007
others agricultur	0.00002	0.00004	-0.00066	-0.00033	-0.00003	-0.00006
Retail and whole	-0.00001	-0.00001	-0.00036	-0.00018	-0.00001	-0.00002
Mining	0.00033	0.00066	-0.00044	-0.00022	-0.00002	-0.00003
Processed foods	0.00000	-0.00001	0.00048	0.00024	-0.00005	-0.00011
Textiles and clotl	0.00001	0.00002	-0.00022	-0.00011	-0.00003	-0.00007
Wood and paper	0.00004	0.00008	-0.00040	-0.00020	-0.00003	-0.00005
Chemicals	0.00056	0.00113	-0.00023	-0.00012	-0.00003	-0.00006
Machinery	0.00000	0.00001	-0.00011	-0.00005	0.00000	0.00001
Other manufact	0.00004	0.00008	-0.00037	-0.00019	0.00001	0.00002
Construction and	0.00015	0.00030	0.00011	0.00005	0.00014	0.00027
busines and othe	0.00000	0.00000	0.00036	0.00018	-0.00001	-0.00002
Government	0.00001	0.00002	-0.00051	-0.00026	-0.00001	-0.00003

Table-4.The short-run Price effect - 13 Sectors (D matrix) from 1996-2007

	2007		2000		1996		
	Direct+indirect	direct	direct	Direct+in direct	Direct+indirect	Direct+in direct	Direct+in direct
	10%	10%	5%	10%	5%	10%	5%
Crops							
others agricultural	0.00260	0.00031	0.00016	0.000283	0.000141	0.000010	0.000005
Retail and wholesale trade, tourism and private servise	0.00297	0.00032	0.00016	0.000344	0.000172	0.000009	0.000005
Mining	0.00315	0.00021	0.00010	0.000603	0.000302	0.000017	0.000009
Processed foods	0.00258	0.00037	0.00018	0.000342	0.000171	0.000040	0.000020
Textiles and clothing	0.00650	0.00028	0.00014	0.001444	0.000722	0.000015	0.000007
Wood and paper	0.00340	0.00035	0.00017	0.000591	0.000295	0.000037	0.000018
Chemicals	0.00353	0.00024	0.00012	0.000461	0.000230	0.000031	0.000016
Machinery	0.00192	0.00128	0.00064	0.001862	0.000931	0.000037	0.000018
Other manufacturing	0.00391	0.00023	0.00012	0.000406	0.000203	0.000030	0.000015
Cude oil, natural gas	0.00128	0.00036	0.00018	0.000995	0.000498	0.000085	0.000042
Construction and utilities	0.00843	0.00061	0.00030	0.000969	0.000484	0.000301	0.000151
busines and other services	0.00505	0.00012	0.00006	0.001142	0.000571	0.000014	0.000007
Government	0.00441	0.00019	0.00009	0.000304	0.000152	0.000022	0.000011

Table-5. Impacts on Sectoral Output - 13 Sectors (2007)

	A Matrix		Dmatrix	
	5%	10%	5%	10%
1 Crops	0.000	0.000	0.016	0.031
2 others agricultural	0.000	0.000	0.016	0.032
Retail and wholesale trade, tourism and private				
3 service	0.043	0.086	0.010	0.021
4 Mining	0.002	0.003	0.018	0.037
5 Processed foods	0.000	0.000	0.014	0.028
6 Textiles and clothing	0.000	0.000	0.017	0.035
7 Wood and paper	0.000	0.000	0.012	0.024
8 Chemicals	-0.045	-0.091	0.064	0.128
9 Machinery	-1.280	-2.559	0.012	0.023
10 Other manufacturing	0.004	0.008	0.018	0.036
11 Construction and utilities	0.051	0.101	0.030	0.061
12 busines and other services	0.028	0.057	0.006	0.012
13 Government	0.014	0.029	0.009	0.019

In order to catch the impact of oil prices on final demand, we estimate four items of demand for household consumption using the AIDS demand function, 14 sectors of demand for fixed investment using the neoclassical investment demand function, and the total export and import demand function. We also utilize the bridge matrix to convert the price effect to final demand in the destination and convert the change of final demand in the destination to final demand in origin for consumption and fixed investment. We then conduct a multiplier analysis of the impact of final demand change on output. The impact on the sectoral price is shown in Table 3 The long-run effect as shown in A Matrix is much higher than the short-run effect shown in the D Matrix; 10% effect is exactly double that of the 5% effect, implying the price sub-model is linear; and the effect on fares not reflecting oil price changes is smaller than fares reflecting oil price changes as expected, but the difference is not much. The public utility, transportation, and communications sectors are affected the most. In total, there is a 0.53% increase in total output prices with a 10% increase in petroleum prices and regulated prices, reflecting it in the long run.

5. CONCLUSION

The impact on the sectoral price is shown in Table 3 and table 4 the short-run effect as shown in D Matrix is much higher than the long-run effect shown in the A Matrix. Furthermore, the long-run effect of international change in 2000 is more clearly than 2007 and 1996 especially in agriculture and other agriculture.

For the short-run effect of international oil price change is show in table 4 we can see that when the oil price increase 5% the machinery sector look like strong increase compare with other sector. In 2007 when oil price change 5% the machinery sector increase 0.128, 0.064 in 2000 and 0.0931 in 1996. Other sectors look like not change clearly when oil price change during 1996 - 2007.

Table 5 shows the impacts of output change from the change in final demand caused by the price changes. The impact in the long run is much higher than in the short run.

In 1996 the international oil decrease from 29.63 US dollars per barrel in to 26.76 in 1997 and continue decrease 17.55 US dollars per barrel, the effect of oil price to 13 vietnam sectors is slightly, however when the international oil price increase dramatically from 24.26 US dollars per barrel in 1999 to 37.22 US dollars per barrel, the effect of oil price to 13 vietnam sectors is more clearly especially textile and closing as well as machinery.

In 2006 to 2007 the international oil price increase from 72.69 US dollars per barrel to 78 US dollars per barrel the whole of Vietnam economy are also affected by the increase of the oil international change.

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