



World Oil Price Shocks in Macroeconomic ASEAN +3 Countries: Measurement of Risk Management and Decision-making a Linear Dynamic Panel Approach

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ABSTRACT

The increase in oil prices in the 1970s has had a quite significant impact over the decades since the rise in inflation has had an impact on hyperinflation, recession, lowered productivity and economic growth. The World Bank (2021) forecasts that oil prices will exceed US\$44 per barrel in 2021 and US\$50 per barrel in 2022, while several factors affect the World Bank's projections, including the persistence of economic issues in the coming years. The purpose of this paper was to empirically assess the impact of oil prices on ASEAN+3 inflation and economic growth. The framework that can be applied to linear dynamic panel data to achieve this goal is the First Difference-Generalized Moment Method (FD-GMM) estimator method. This study used panel data representing approximately 8 ASEAN+3 countries and annual data over the period 2011-2020. The findings of the study indicated that, over the period, increasing oil prices were associated with higher inflation, and higher economic growth in ASEAN+3. Another result was that higher inflation is related to lower economic growth. Lower and higher economic growth was related to decreased inflation. High inflation creates high costs of economic development and social prosperity, therefore that policymakers are expected to adopt policies that are not only good for the short term, but also good for the long term to establish long-term prosperity and long-term price stability. In addition, a variety of non-economic variables that affect global market price volatility should also be considered to reduce potential market risks.

Keywords: Oil Price Shock, Inflation, Production Growth, Economic Development, Econometrics

JEL Classifications: E31, E42, E63, F43, F62

1. INTRODUCTION

Energy plays an important and strategic role since it is an essential part of the circulation of the world's economy. Petroleum, as one of the world's energy sources, has been the energy with the highest level of consumption for the production process relative to other sources. The impact of rising world oil prices on inflation and economic growth at the beginning of the 1970s differed from those of the 2000s. In the 1970's, rising oil prices lead to high inflation, depression, low productivity and low or negative growth rates. The increase in oil prices in the early 2000s led to an increase in inflation, but was relatively much smaller than in the 1970s, and

global economic growth remained strong (Unalmis et al., 2010; Blanchard and Riggi, 2013; Baffes et al., 2015). Study findings from (Du et al., 2010; Basher et al., 2012; Mohaddes and Pesaran, 2016) concluded that the increase in oil prices is related positively to output and inflation in China and Indonesia.

The contribution of oil demand in ASEAN countries to total world is quite large, that is 32% in 2018, while the contribution of production to global production is quite low, and that is 7.4% (Pratiwi et al., 2020). During 2011-2020, the average growth in oil consumption in ASEAN countries has been 5.3% per year, while the average growth in oil production (supply) was only 0.5% per

year (<https://www.cnbcindonesia.com/news/20180710180246-16-22880/Largest-oil-importer-country-in-Southeast-Asia>, retrieved 12/11/2020). It means that there is a discrepancy of 2% per year between demand and oil production. Increasing oil consumption without sufficient oil supplies would increase the reliance of ASEAN countries on oil, especially ASEAN 3+ (Indonesia, Malaysia, and Singapore). The excessive dependence of ASEAN+3 countries on oil products would be detrimental to the countries in the region, particularly if there is a high enough increase in oil prices. This also contributes to the financial condition of the ASEAN + 3 regions, which is still emerging and which, of course, requires a lot of resources. In addition, the existence of ASEAN+3 economic integration, such as the ASEAN Economic Community (ASEAN Economic Community) in 2015, has triggered economic shocks in a country that may have an effect on other countries in the region (Figure 1).

The objective of this study is to examine the impact of global oil price shocks on inflation and economic growth in ASEAN+3 countries and the impact of inflation on economic growth and the impact of economic growth on inflation in ASEAN+3 countries; inflation in the previous year in ASEAN+3 countries and the impact of economic growth in the previous year on economic growth in ASEAN+3 countries.

2. LITERATURE REVIEW

Research conducted by Aisen and Veiga (2007); Nyangarika and Tang (2018); Bala and Chin (2018) have shown that the annual change in oil prices has a positive and statistically significant impact on inflation. In addition, foreign trade, which is a percentage of GDP, has a positive coefficient indicating that the greater the rate of openness to trade causes higher inflation. As far as economic performance is concerned, the results are as expected: real GDP growth, the real effective exchange rate has a negative effect. This is consistent with the intuition that inflation is associated with low growth and undervalued currency values. Real currency devaluation reduces inflation. The marginal effect of real GDP growth per capita and U.S. Treasury Bill rates is higher. Inflation increases when Treasury bill rate increases by 1% (Mishkin, 2004).

The positive impact of the global oil price shocks in Indonesia (Apriani, 2007) on output inflation, real exchange rates, and

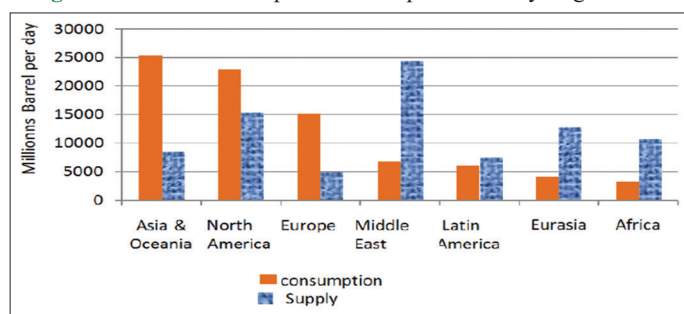
money supply also occurred in the ASEAN countries (Basnet and Upadhyaya, 2015; Dahalan et al. 2015; Kisswani, 2016) using the VAR approach, as well as the positive impact of the increase in oil prices due to the asymmetrical effect. Projections by Dahalan et al. (2015) also indicate that GDP responds adversely to increasing oil prices in the long run without having substantial short-term growth. While Malaysia and Indonesia are developing and exporting oil, while Singapore has a fast-growing oil refining industry, their contribution to the economy is relatively small, this means that the windfall revenues from the oil sector that Indonesia and Malaysia are earning will not be adequate to support the economic slowdown experienced by their neighbors and major trading partners.

Olomola et al. (2006); Iwayemi and Fowowe (2011) conducted researches on the effect of world oil price shocks on inflation, output, real exchange rates, and the money supply in Nigeria using the vector auto-regression (VAR) method. The research used quarterly data from 1970 to 2003. The findings suggested that global oil price shocks have a major influence on the actual exchange rate, but do not affect Nigeria's production and inflation. In contrast, it has been observed that the increase in world oil prices has strengthened people's welfare (Zaouali, 2007). This is due to the appreciation of the real exchange rate in Nigeria, which has an impact on the trade sector.

Using longer time periods and different countries, Salman et al. (2008) examined the short-term effect of changes in oil prices on the business cycle of the G-7 countries just using the co-integration test and the Granger Causality test. The data used was quarterly data for the period 1970: 1–2006: 4. Several facts have been established in this study: there is a short-term neutrality of real GDP as a consequence of shifts in oil prices in Italy, Japan and the United Kingdom. However, oil has had a real impact on economies of other G7 countries, particularly Germany and France. On the other hand, adjustments in government policies have played an important role in reducing the impact of high oil prices in Japan, Italy and France. In addition, the characteristics of the economies of the United States, the United Kingdom, Germany and Canada have influenced the role of oil impact in their business cycle. These differences suggest that fluctuations in oil prices have a time effect on the business cycle in several G-7 economies (Salman et al. 2008; Cologni and Manera, 2009; Engemann et al., 2010; Lee et al. 2012; Baffes et al. 2015; Sato et al. 2011; Dungey and Vehbi, 2015; Mohaddes and Pesaran, 2016; Jan van de Ven and Fouquet (2016) found that global oil price shocks are increasingly important to the stability of real market growth in a number of countries. It reflects an increase in reliance on world oil supplies associated with industrialization in these countries. Even the findings of Sato et al. (2011); found that the variance decomposition of suggests that global oil price shocks are a major cause of price volatility in most economies, followed by a shock to the United States. China's impact on domestic price levels is constant and is largely recorded in Hong Kong, reflecting the high degree of economic convergence between the two economies.

Ftiti et al. (2016) found that oil price shocks in periods of volatility in the global business cycle and/or financial turmoil have had an influence on the association between oil and economic

Figure 1: World Consumption and Oil production by Region 2018



Source: EIA, 2020 retrieved from [https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production?](https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production)

urbanization, ASEAN’s energy demand will more than triple during 2010-2035, creating tremendous pressure on energy supply and security (Shi, 2015).

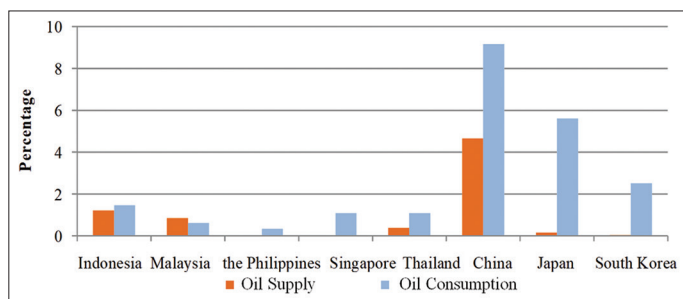
Meanwhile, oil intensity, which is the ratio of oil consumption per dollar of GDP (btu per GDP constant at the 2005 international dollar PPP) has decreased in almost all ASEAN+3 countries over the last 10 years. It indicates that there is public awareness of the consumption of petroleum per unit of output. Singapore has the highest oil intensity, far above other ASEAN+3 countries (Figure 4).

Table 4: Exports of Crude Oil and Processed Petroleum Products from ASEAN+3 Countries in 2010 and 2018

Countries	Crude oil exports products		Export of processed petroleum	
	2009	2017	2009	2017
Indonesia	372	337	16	23
Malaysia	344	390	46	59
The Philippines	20	4.4	25	24
Singapore	12	27	771	924
Thailand	43	33	24	27
China	102	59	234	285
Japan	0	0	87	68
South Korea	0	0	153	152

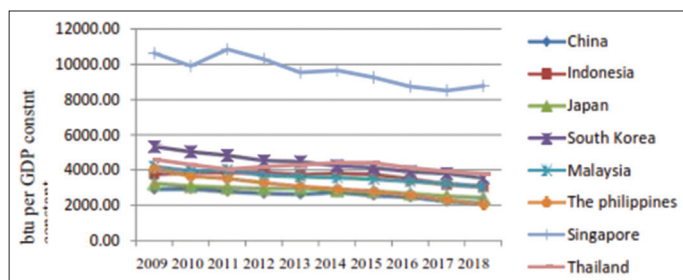
Source: EIA, 2020 retrieved from <https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production?>

Figure 3: Contribution of the consumption and production of oil of ASEAN+3 countries to the world in 2008



Source: EIA, 2020 retrieved from <https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production?>

Figure 4: Development of the crude oil intensity of ASEAN + 3 countries 2009-2018



Source: EIA, 2019 retrieved from <https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production?>

One of the factors behind the decline in oil intensity is the effort to reduce oil consumption and the technological changes that play a role in the business so that it is no longer too disrupted by the increase in oil prices, which is actually more service-based (Baumeister and Peersman, 2013; Shi, 2015). In general, the service industry requires less energy to produce than the manufacturing sector. Therefore, even though the price of oil is rising, its impact on the macroeconomics at this time would be smaller.

The use of fuel oil is increasingly widespread in developing countries due to the strengthening of economic growth, expanded use of transport and the development of industrial activities. Increased industrial activity eventually led to increased economic growth. The contribution of ASEAN + 3 countries to GDP in the industrial sector has seen positive average annual growth since 2009 to 2018. Japan experienced an average annual growth rate of 1.2% per year, followed by the Philippines and Indonesia at 4.5% per year. Malaysia, Singapore, Thailand and South Korea had an average growth rate of 5.1%, 5.2%, 6.1% and 6.8% respectively. China is an ASEAN+3 country with the highest annual average growth rate of 10% (EIA, 2019).

The improvement in aggregate demand also plays a role in increasing economic growth, so that the increase in oil prices, which has an effect on inflation, is not accompanied by a decline in economic growth as in the 1970s (Jan van de Ven and Fouquet, 2016). The economic structure of ASEAN+3 countries dominated by consumption is increasing aggregate demand, which in turn would increase economic growth. Almost all ASEAN+3 countries have economic structures driven by consumption (Lescaroux and Mignon, 2008; Dahalan et al., 2015; Pratiwi et al., 2020).

The increase in world oil prices would also trigger an increase in domestic goods prices, as most domestic firms also use oil as raw material for production. The increase in world oil prices would also result to an increase in domestic goods prices, as most domestic companies also use oil as raw material for production (Aisen and Veiga, 2007; Salman et al., 2008; Basher et al., 2012; Baffes et al., 2015; Baharumshah et al., 2016; Jan van de Ven and Fouquet, 2016; Alam et al., 2019). The impact on domestic goods prices would cause the real domestic exchange rate to depreciate against the US dollar. The depreciating domestic exchange rate makes domestic goods more competitive than foreign goods, increasing net exports. This raise in net exports will further improvement domestic production.

Under the free-floating exchange rate regime, the exchange rate is allowed to float according to the market mechanism (Kisswani, 2016). The nominal exchange rate in a country would be largely determined by the supply and demand of domestic exchange rates on the foreign exchange market (Olomola et al., 2006; Iwayemi and Fowowe, 2011; Basher et al., 2012; Kisswani, 2016). The strength of the exchange rate in the forex market is ultimately determined by the scale of the economy of the country. If the economy tends to be a small open economy, exchange-rate

goods more competitive than foreign goods. Economic growth has a negative and significant effect on inflation. High inflation is also characterized by a contraction in GDP where high inflation is associated with poor macroeconomic performance. Besides that, inflation has a disruptive and significant effect on economic growth. High inflation is having a negative impact on economic growth and social security. High inflation induces high social costs to be paid by governments, businessmen and society. An increase in the price level would reduce the stock of real money, which in turn contributes to a decrease in demand and output. In general, inflation increases the cost of produce and transport and decreases people's purchasing power, which has a negative impact on the economy.

Inflation and economic growth have been positively affected by inflation and economic growth in the previous year, but not significantly in ASEAN+3 countries. It implies that there is no persistent inflation, the insignificance suggests that current inflation is not influenced by inflation in the previous year (backward-looking), but is influenced by inflation expectations (forward-looking). However, to assess market risk due to world price volatility, multiple proxies, particularly those with current issues other than economic phenomena, for including the global pandemic that attacked most of the world's economic market activities in early 2020 also need to be considered in further study.

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