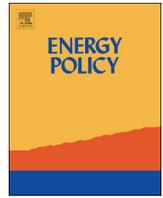




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Permanent and transitory oil volatility and aggregate investment in Malaysia



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HIGHLIGHTS

- Examines the role of oil volatility in Malaysia's aggregate investment.
- Makes distinction between permanent and temporary volatility using CGARCH.
- Both volatility components depress investment.
- Permanent volatility has larger adverse effects.
- Results are robust to alternative model specifications.

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ABSTRACT

This paper investigates the relation between aggregate investment and oil volatility and its permanent and transitory components for a developing country, Malaysia. In the paper, the components generalized autoregressive conditional heteroskedasticity (CGARCH) model is utilized to decompose conditional oil volatility into permanent oil volatility and transitory oil volatility. Respectively reflecting fundamental-driven and random shifts in oil volatility, they are expected to exert differential effects on aggregate investment. Adopting a vector autoregression (VAR) framework to allow feedback effects between aggregate investment and its determinants, the paper documents evidence supporting the adverse effects of conditional oil volatility, permanent oil volatility and transitory oil volatility on aggregate investment and real output. Interestingly, contrary to the findings for the developed markets (US and OECD), the real effects of permanent oil volatility tend to be stronger. These findings are reasonably robust to variable specification and measurements in the VAR system. Hence, there is an indication that heightened oil volatility accounts for the slumps in Malaysia's aggregate investment after the Asian financial crisis.

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1. Introduction

The importance of domestic investment in a macroeconomy is well noted not only as a driver for long term economic growth but also as a main factor accounting for aggregate fluctuations. Like several other Asian countries, Malaysia witnessed a sudden drop in various spheres of its domestic activities during the 1997/1998 Asian crisis, among which include real output, domestic consumption and domestic investment. After recording a decade-long of miraculous growth from 1987 to 1997, Malaysia's real GDP stumbled and contracted by more than 7% in 1998. Real consumption, which registered an average growth of 6.5% per year from 1991 to 1997, suffered a severe contraction by more than 16% in 1998. The drop in the real investment was even more alarming in terms of its magnitude as well as its

persistence. During 1991–1997, the annual growth of real investment was 11.6% on average. In 1998, it nosedived by more than 50%. This drastic drop seems to be lasting. While real GDP and real consumption managed to record average growth rates of respectively 4.9% and 6.0% from 1999 to 2011, the real investment only grew at a rate of 3.4% during the same period.¹ Thus, in looking ahead at Malaysia's long term growth prospect and outlook, a key question that needs to be addressed is: what explains the slumps in Malaysia's investment?

As posited by the neoclassical theory of investment, aggregate investment is a function of real income and cost of capital. The model, however, may not be adequate to account for Malaysia's investment performance post Asian crisis. As the aforementioned macroeconomic

¹ Alternatively, we can also manifest the slumps in Malaysia's domestic investment after the Asian crisis based on the ratio of gross fixed capital formation to GDP, or the investment ratio. From 1991 to 1997, the average yearly investment ratio was slightly above 40%. It then dipped to 26.8% in 1998 and has remained low since at an annual average ratio of roughly 22–23% from 1999 to 2011.

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performance indicators would suggest, the uptrend in real gross domestic product has not been accompanied by a proportionate rise in the nation's aggregate investment. Adding to this, the growth of real investment remains low despite the low interest rate environment that has shaped the country's monetary scene ever since the Asian crisis. In other words, for the case of Malaysia, the explanation of its investment slump may lay elsewhere. Here, we contend that the well documented uncertainties arising from particularly oil price escalation and its heightened uncertainty during recent years may provide an explanation. This contention has a basis in the irreversible theory of investment which views (i) investment decisions to be irreversible and (ii) possibility of postponing investments in line with the real option of waiting (Bernanke, 1983; Pindyck, 1991; Ingersoll and Ross, 1991). According to the theory, uncertainty increases the option value of waiting and hence depresses current investment.

Accordingly, motivated by this contention, the present paper empirically analyses the roles oil price volatility plays in explaining Malaysia's aggregate investment behavior. The paper adds to the literature by considering potential differential investment implications of permanent and temporary volatilities. The two components are viewed to be driven by different sources, with the permanent volatility to arise from shifts in fundamentals and the temporary volatility from random events or shocks. Since the shifts in fundamentals are generally expected, the permanent volatility should have no discernible impacts on investment (Ahmed et al., 2012). Moreover, insurance should be more readily available for firms to cope with permanent volatility (Byrne and Davis, 2005b). By contrast, the random nature of the temporary volatility is expected to lead the firms to be more conservative or to postpone investments in line with the option value of waiting. Accordingly, making distinction of the nature of uncertainty is important for better understanding the uncertainty – investment links.

Apart from attempting to address Malaysia's investment slumps post crisis, the analysis has relevance for various reasons. First, although the role of uncertainty in macroeconomic performance has been widely investigated (Episcopos, 1995; Federer, 1993, 1996; Guo and Kliesen, 2005; Ahmed and Wadud, 2011; Ahmed et al., 2012; Ng, 2012), the macroeconomic importance of oil price uncertainty, permanent and transitory, has been largely absent for a developing country like Malaysia. Thus, the present analysis fills this gap in the literature by providing a developing country's perspective on the uncertainty – investment link. Second, as Malaysia has implemented various policy measures to revive private investment and to again place the private sector at the driver seat of its development process, e.g. through the recently launched economic transformation program (ETP) and recently tabled annual federal budget,² identifying whether oil price volatility and its components have explained its investment behavior should be essential for designing various relevant policies including stabilization, financial and energy policies. And finally, the findings from the present study should also prove useful for other developing countries that have experienced similar behavior of aggregate investment.

In the analysis, we adopt a components generalized autoregressive conditional heteroskedasticity (CGARCH) model developed by Engle and Lee (1999) to decompose conditional oil volatility into its permanent and transitory components. Then, the obtained volatility measures are included as additional determinants of investment behavior. The dynamics of aggregate investment is addressed using a reduced-form vector autoregression (VAR) model. As a preview to the results, we find oil volatility regardless of its nature to have

adverse effects on aggregate investment and real output. Contrary to the findings for the developed markets, the adverse implications of permanent volatility seem stronger. We also find evidence that real interest rate tends to drop following oil price shocks but is likely to increase in responses to oil volatility shocks. These results appear reasonably robust to variable specification and measurements in the VAR model.

The rest of the paper is organized as follows. As a precursor to the analysis, we provide a brief background information. Then, Section 3 reviews related literature. The next two sections detail the empirical approach and present estimation results. Finally, Section 6 contains a summary of the main findings and some concluding remarks.

2. Background information

Malaysia is one of the vibrant and open economies within ASEAN, whose positive macroeconomic performance was interrupted only by the 1985 and 1997/1998 recessions. At the time of its independence in 1957, Malaysia was an agricultural-based economy. Since the early 1980s, it has developed its way to be an industrial-based economy and aimed at reaching a developed country status by 2020. In the process, Malaysia has depended heavily on imported intermediate and capital goods for its industrialization process. As the oil price may play a role through a nation's trade matrix as demonstrated by Abeysinghe (2001), oil price variations may have repercussions on Malaysia's capital formation, an issue that deserves investigation. Moreover, Malaysia's current status as a net exporter of oil but with narrowed gap between domestic oil consumption and oil production over the years provides further motivation to undertake this study. More specifically, with the ratio of domestic oil consumption to oil production to increase steadily from 0.42 in 1990 to 0.60 in 2000 and to 0.80 in 2009 (Ibrahim and Said, 2012), there is a need to look at Malaysia's energy policy such that the adverse impacts of oil price volatility can be curtailed.

In their early stage of economic development, Malaysian was reliant primarily on fossil fuel for most of energy need. When Malaysia formulated its first energy policy, concern over efficient utilization of energy and the need for energy development to take account of environmental issues were fundamental. The Energy Policy of 1979, the National Depletion Policy of 1980 and the Four Fuel Diversification Policy of 1981, have provided the impetus for the development of energy supply. Since then the focus in the energy sector has shifted to the sustainable development of non-renewable resources and the diversification of energy sources. The Four Fuel Diversification Policy identified the country's preferred energy mix as oil, natural gas, coal and hydro power. In 2001, the government articulated the Five Fuel Policy, adding renewable resources and linking this to sustainability and efficiency.

More recently, Malaysia has set itself a key strategic objective of becoming a regional energy hub. Speaking at the opening ceremony of the 17th Asia Oil and Gas Conference in Kuala Lumpur, Malaysia's Prime Minister Najib said the energy sector plays a pivotal role in the Malaysian economy with oil and gas contributing to more than 40% of the country's national income. Based on a report from Malaysian Petroleum Resources Corp., Malaysia has its role as an energy consumer and a regional hub for energy trading. In cooperation with Singapore, with its strong financial and IT sectors, Malaysia – a key exporter of oil and gas to Japan – is striving to become a global center of the energy industry. As suggested in the report, Malaysia is a bridge between the markets of Europe and those of China and the rest of Asia. Until now, Malaysia has developed as an oil and gas producer, but economic growth has pushed domestic demand to the point where supply capacity will

² With the main objective to propel Malaysia to become a high-income developed nation, the ETP identifies 12 national key economic areas to be led mainly by the private sector while the public sector provides a facilitating role in the process. The 2013 budget recently tabled by Malaysia's prime minister also sets "boosting investment activity" as one of five focus areas.

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