



The dynamics of economic growth, oil prices, stock market depth, and other macroeconomic variables: Evidence from the G-20 countries



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ABSTRACT

This paper examines the linkages between economic growth, oil prices, depth in the stock market, and three other key macroeconomic indicators: real effective exchange rate, inflation rate, and real rate of interest. We employ a panel vector autoregressive model to test Granger causality for the G-20 countries over the period 1961–2012. A novel approach to this study is that we clearly demarcate the long-run and short-run relations between the economic variables. The results show a robust long-run economic relationship between economic growth, oil prices, stock market depth, real effective exchange rate, inflation rate, and real rate of interest. In the long run, real economic growth is found to respond to any deviation in the long-run equilibrium relationship that is found to exist between the different measures of stock market depth, oil prices, and the other macroeconomic variables. In the short run we find a complex network of causal relationships between the variables. While the empirical evidence of short-run causality is mixed, there is clear evidence that real economic growth responds to various measures of stock market depth, allowing for real oil price movements and changes in the real effective exchange rate, inflation rate, and real rate of interest.

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1. Introduction

Oil is a non-renewable and strategic commodity, vital to the growth of all economies. Most G-20 countries, which have high oil consumption, are net oil importers. Therefore, as such, they pay close attention to oil prices, their own macroeconomic indicators (including economic growth), as well as their exchange rates against the US dollar – the international currency of oil. The purpose of this paper is to examine the linkages between real economic growth and real oil prices in the presence of three other key macroeconomic indicators of a modern economy which operate adjacently: the real effective exchange rate, the inflation rate, and the real rate of interest. We also investigate the significance of stock market depth as an additional variable which may affect and be affected by economic growth and the other macroeconomic

variables that we consider in this study. Since the concept of stock market depth is fairly broad,¹ we use three different indicators to characterize depth in the stock market: market capitalization (MAC), stock market turnover ratio (TUR), and stocks traded in the stock market (TRA). The covariates we consider have not been simultaneously used in previous research on the nexus between oil prices and economic growth, nor has there been a study on this topic for the G-20 countries.

Endogenous growth theory as articulated by Levine and Zervos (1996) and others, stress that stock market depth is key in nurturing long-run economic growth since it facilitates efficient inter-temporal allocation of resources, capital accumulation, and technological innovation. Levine (1991) in particular underscores the beneficial effects on investment and growth from the existence of depth in the stock market.

¹ Depth in the stock market may generally be defined in terms of a higher quantity, an improved quality, or an enhanced efficiency of the services offered by the market. These are of course defined in relation to the national income of a country to allow for different levels of country need and state of development.

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However, as Barro and Sala-i-Martin (1995) assert, the development of this market is endogenous since it is a regular part of the process of economic growth. Thus, while stock market depth may lead to economic growth, the latter itself may lead to stock market depth. The same logic applies to the relationship between economic growth and the other macroeconomic variables that we probe in this study. That is, these macroeconomic variables may impact economic growth and also be affected by economic growth.

In this paper we make an important contribution to the literature. We examine the nature of the causal link among a full range of relevant variables: these being economic growth, oil prices, real effective exchange rate, inflation rate, real rate of interest, and three different indicators to characterize depth in the stock market (MAC, TUR and TRA) simultaneously for the G-20 countries. Although the relationship between oil prices and economic activity has been extensively studied since the seminal work of Hamilton (1983), prior research has considered only a sub-set of the variables that we have chosen in this study. Typically, studies examine the causal relationship between oil prices and economic growth in the presence of one or two other economic variables. To wit, stock market considerations have often been ignored in considering the nexus between oil prices and economic growth. In all, despite the fact that the causal relationship between oil prices, economic growth and such variables as effective exchange rate, inflation rate, and real rate of interest have been scrutinized separately before, previous investigations have considered only a sub-set of these variables together. In other words, they have not all been considered in the same empirical model. If there are causal relationships between these variables, then the results of previous studies may lack validity due to the omission of other relevant variables. Thus, a novel feature of our study is that we examine the possible causal linkages between oil prices and economic growth conjointly with several other variables. We also consider the G-20² – a group of countries that has not heretofore received much attention in this literature. In addition, this group of countries is studied over a lengthy and contemporary span of time, namely over 1961–2012. We use panel cointegration and panel Granger causality tests in order to uncover relevant causal links among the variables. In contrast, previous studies offer less robust results since their shorter data span reduces the power of unit root and cointegration tests. Finally, a remarkable feature of this study is that we clearly demarcate the long-run and short-run relations between the economic variables.

The rest of this paper is organized as follows. Section 2 surveys the relevant literature. Section 3 describes the data and our variables. Section 4 delineates our empirical estimation strategy. Section 5 summarizes and discusses our results. The final section concludes with some policy implications.

2. Review of the literature

This section reviews three strands of the literature, each relating to the Granger-causal relationship between: economic growth and stock market depth; economic growth and oil prices; and economic growth and other macroeconomic variables.

2.1. Causality between stock market depth and economic growth

The notion that stock market depth is one of the basic determinants of economic growth is forwarded in Beck and Levine (2004), Calderon and Liu (2003), Levine (1997), and Graff (2003). Subsequent research concentrates in identifying the exact nature of the relationship between the two variables (see, for instance, Arestis, Demetriades, & Luintel,

2001; Atje & Jovanovic, 1993; Bosworth, 1975; Cheng, 2012; Enisan & Olufisayo, 2009; Hou & Cheng, 2010; Kar, Nazlioglu, & Agir, 2011; Nieuwerburgh, Buelens, & Cuyvers, 2006; Nowbutsing & Odit, 2009; Singh, 1997). This interest stems primarily from the inherent policy implication; however, empirical studies on the relationship between stock market depth and economic growth do not provide any clear-cut answer and currently there is no consensus among economists about the nature of this relationship. Three possible relationships have been emphasized in the empirical literature on the causal link between stock market depth and economic growth.

The first relationship is described by a supply-leading hypothesis, which suggests the presence of unidirectional causality from stock market depth to economic growth. Several studies support this hypothesis. For instance, Kolapo and Adaramola (2012) employed multivariate Granger causality approach (over the period 1990–2010) and found evidence in favor of a unidirectional causality from stock market depth to economic growth for Nigeria. Similarly, support for this hypothesis is found in Enisan and Olufisayo (2009) for the Sub-Saharan African countries (1980–2004), Nieuwerburgh et al. (2006) for Belgium (1830–2000), and Tsouma (2009) for mature and emerging markets (1991–2006).

The second relationship is described by a demand-following hypothesis which implies the presence of unidirectional causality from economic growth to stock market depth. The studies that support this hypothesis are Kar et al. (2011) for MENA countries (1980–2007), Panopoulou (2009) for five³ countries (1995–2007), Liu and Sinclair (2008) for China (1973–2003), Odhiambo (2008) for Kenya (1969–2005), Ang and McKibbin (2007) for Malaysia (1960–2001), and Liang and Teng (2006) for China (1952–2001).

The third possible relationship is characterized by a feedback hypothesis which intimates the existence of bidirectional causality between economic growth and stock market depth. The studies that lend support to this hypothesis are Cheng (2012) for Taiwan (1973–2007), Hou and Cheng (2010) for Taiwan (1971–2007), Darrat, Elkhail, and McCallum (2006) for emerging markets (1970–2003), Caporale, Howells, and Soliman (2004) for Argentina, Chile, Greece, Korea, Malaysia, the Philippines and Portugal (1977–1998), Wongbangpo and Sharma (2002) for ASEAN countries (1985–1996), and Huang, Yang, and Hu (2000) for the United States, Japan and China (1992–1997).

2.2. Causality between oil prices and economic growth

The second strand of the literature examines the direction causality between economic growth and oil prices. Like the previous case, three possible relationships have been emphasized in the empirical literature on the causal link between oil price and economic growth.

The first relationship is a supply-leading hypothesis, which hints at the presence of unidirectional causality from oil price to economic growth.⁴ The studies that lend support to this hypothesis are Benhmad (2013) for the United States (1947–2007), Lee and Chiu (2011) for industrialized countries (1965–2008), Filis (2010) for Greece (1996–2008), and Rafiq, Salim, and Bloch (2009) for Thailand (1993–2006). The second relationship is a demand-following hypothesis, which suggests the presence of unidirectional causality from economic growth to oil price. The studies by Akhmat and Zaman (2013) for South Asia (1975–2010), Herrerias, Joyeux, and Girardin (2013) for China (1995–2009), Chu and Chang (2012) for a group of six countries, namely Canada, France, Germany, Japan, the United Kingdom and the United States (1971–2010), Hanabusa (2009) for Japan (2000–2008),

² The consideration of this group, in comparison to earlier studies, has three advantages: 1) it increases the sample size and power of the test; 2) it allows heterogeneity among the countries; and 3) it permits us to check the robustness of the empirical results through a vector error-correction model (VECM).

³ Austria, Belgium, France, Germany and the Netherlands.

⁴ Higher oil prices resulted higher costs of production and subsequently, to lower production or lower expected earnings (Filis, 2010; Jones, Leiby, & Paik, 2004). This leads to oil conservation policies (Behmiri & Manso, 2012a).

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