Gold Price, Crude Oil, Exchange Rate and Stock Markets: 
Cointegration and Neural Network Analysis

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ABSTRACT

In the globalized world of 21st century, the world order has become dynamic. But the parameters of success are same. A country having only internal success cannot sustain for long and similarly for external success. External success is largely dependent upon exchange rate movements and its management by central banks especially for emerging economies. Internal success is reflected in the stock markets of the nations. In this paper long-term association between external and internal parameters, have been explored. For external parameters, not only exchange rate but crude oil prices and gold prices have also been taken. For internal success, stock markets have been taken as a parameter. Johansen’s Cointegration test, error-correction model and neural network have been deployed to find out the association among internal and external parameters of success for nations. The results have demonstrated the long-term association among the parameters but degree of association has been found to be weak.

KEYWORDS
BSE-Sensex, Economic Prosperity, Error-Correction Model, Log-Transformation, Sustainable Growth

1. INTRODUCTION

The world is undergoing a sea change with a blistering speed. Change is obviously a new permanent thing now. Before World War-II, the United Kingdom was a superpower. Post World War-II, it became the United States of America (USA). In the new world dispensation in 21st century, it is now the turn of third world nations led by China and India to take the lead (Nambiar, 2006 and Ikenberry, 2008). Things are changing so fast that it becomes uncertain whether what is today will remain same tomorrow or not. China’s close to double digit growth up to early years of second decade of 21st century has been cooled down by 2014. Change of political landscape in 2014 in India has also brought a significant change in the prospects for India in the changing world order vehemently. It is also prevalent that the existing power centers of the world are resisting the change which can further change the world order. Nations believe that by bringing change in certain things which are important like crude oil prices, they can divert the change in the world order. The hegemony of a few nations is evident by their behavior. The unwritten rule of dominance is always economic prowess and the present time is also not an exception. In this aspect, different nations are trying to maintain the status quo. But the third world countries including India and China are ruling the roost. China’s example is a testimony to the fact that for a long-term sustainable growth and development one should not adopt the strategy of too much, too soon. It was faulty adopted by China but eventually the country landed up in exploiting its own resources so much that it boomeranged and instead of supporting in the long-run, this strategy started creating trouble and by the mid of second decade of 21st century,
the retardation has been seen in Chinese economy. The world financial crisis of 2008 has added fuel to fire. Ideally an Economy should be on its own and sustainable enough so that it can come out of retardation from a crisis like 2008 financial crisis. Crisis is testing times for any economy to prove its resilience for long term sustainable growth but China succumbs to the crisis. But India has been a different story as the GDP growth rate has been rising more than the pre-2008 levels during the mid of the second decade of 21st century. India and China scenarios raise one pertinent question. It is what, that ensures the dominance of a country and supports the economic prosperity in the long-run. The present world order is being dominated by nations which can sustain the exponential growth of the economy. The sustenance of the growth of any economy hinges on the fact that how long a country can support its growth. The nourishment for growth is obviously dependent upon many things including the energy a country needs to fuel its growth trajectory. Fossil fuel is obviously a main source of energy. In other words, it can be stated that the control over fossil fuel is something which can provide a country an edge over the other countries. Many countries are dependent upon fossil fuel for their sustainable growth in the long-run. For instance, India also heavily depends upon crude oil imports and it has significant impact on the Indian economy. In India, on an average, more than 50% of the import bills are there to cater to meet the crude oil imports. Due to this reason, countries all over the world including India try to be self-sufficient directly for crude oil and indirectly for energy. As of now USA is the highest crude oil producing countries which gives an edge to USA to negotiate terms at International level better (OPEC, 2015). Crude oil being the international currency is traded in the currency which is also internationally acceptable like US $. Therefore, both US$ and crude oil should have long-term association. It is a fact that the Gold also has been there as an international currency for long despite the presence of earlier pound sterling and later US dollar. This is despite the fact that the last formal form of gold based exchange rate system, the Bretton woods system collapsed in early 1970s (Dooley, Folkerts and Garber, 2004/2009). There have been mixed evidences in support of the fact that gold always holds sway in the international exchange rate system whether before or after Bretton woods system. This discussion brings all the three things crude oil, US $ exchange rate and gold together to be taken up for further study. The earlier studies have tried to find the long-term and short-term association among them using varied methods and have come out with the varied results which need to be tested under present world scenarios.

The story of dominance in the new world dispensation does not start or end with a discussion of crude oil and the currency to procure it including gold. The success in the external markets needs to be supported by the internal markets as well. Only external success might bring the skewed growth of the economy and may not be sustainable in the long-run. The internal success has many more dimensions to add. The conventional wisdom of internal and external success talks about employment, inflation and exchange rate equilibrium (Porter, 2000). In micro parlance it can be assumed that the success in stock market of an economy speaks volume about the economic health of the nation which incorporates both the external as well as internal success. This paper is bringing all the discussed dimensions put together for both internal and external success of an economy. The foregoing discussion has established the hypothesis to be tested that for successful economy it is relevant to have all the four things in sync which need to be tested (the four variables are crude oil, exchange rate, gold and stock market returns). The objective of this study is to find out the long-term association among gold, crude oil, rupee-dollar exchange rate and stock market returns (BSE-Sensex). The objective includes studying the short-term correction, if long-term association is established among the markets undertaken for the study.

The paper has further been divided into five more sections. The next section is on review of literature. Third section of the paper is on data and research methodology being used in the paper. Fourth section discusses the results. Fifth section discusses the earlier found similar results and the sixth and last section concludes the paper.
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