

# Dynamism between selected macroeconomic determinants and electricity consumption in India

## An NARDL approach

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805

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### Abstract

**Purpose** – By disentangling the impact of positive and negative shocks of GDP, FDI and oil consumption on electricity consumption, the purpose of this paper is to investigate whether this bifurcation significantly determines the level of electricity consumption in the short run and long run.

**Design/methodology/approach** – Using the recently developed nonlinear autoregressive distributed lag (NARDL) bounds approach, the study investigates the changes in the level of electricity consumption over a period of 1980–2015. The inclusion of a dummy variable for the possible structural break makes the electricity demand function more reliable. After checking the stationarity of data series, the study has employed the bounds test, which confirms the existence of the long run stability in the system. Further, using the VECM, the causality among the comprised variables has also been examined.

**Findings** – The findings confirm that not only the positive shocks but also the negative shocks in GDP have a positive and significant impact on electricity consumption in the long run. Similarly, the increased FDI has widened the scope of electricity consumption in the region, whereas the negative shocks' impact is found negative in the long run. In comparison to GDP and FDI, the influence of the increased oil consumption on electricity demand is found negative and significant in India, which reveals that electricity acts as a significant substitute for oil consumption in the long run.

**Originality/value** – To the best of the literature evidences available, none of the studies in the past has examined electricity demand in an NARDL framework. The study may help in estimating the demand for electricity consumption comprehensively, as this approach captures the separate influence of favourable and unfavourable changes while determining the level of electricity consumption. This approach may be crucial for policy makers, especially in an energy importer country, such as India.

**Keywords** Electricity consumption, Economic growth, FDI, Oil, NARDL, VECM

**Paper type** Research paper

### Introduction

In developing countries, such as India, the efficient and wider utilisation of electricity is desired, since 80 per cent of the total energy demand for country is fulfilled by imported energy. In the year 2016–2017, the Indian Government had spent a whopping \$70.196bn on crude oil import, whereas in the year 2017–2018 the energy-import bill increased to \$87.79bn. However, during this period, the domestic production of crude oil has remained stagnant (PTI, 2018) and persistent crude oil price fluctuations have imposed another set of challenges to the government. The literature suggests that the persistent increase in oil price may significantly influence other major macroeconomic indicators such as current account, inflation, and economic growth (Abdi, 2018). That is why, instead of relying on imported energy, the extensive use of electricity to meet the energy demand has been initiated across the world, as the supply of electricity is relatively more elastic and depends on endogenous resources (Ghosh, 2002). In 2003, the Indian Government passed an Act, which intends to

