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Conceptualization of energy security in resource-poor economies: The role of the nature of economy

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ABSTRACT

This paper studies how energy security is conceptualized in four resource-poor, advanced island economies: Singapore, South Korea, Japan, and Taiwan. It is found that the energy security conceptualization of the four economies in effect returns to the very original and conventional one: stable and reliable energy supply. However, these economies are different in the level of stability and reliability demanded. Why are they similar in energy security conceptualization whereas different in the level of stability and reliability demanded? Adopting documentation analysis, comparative study, and the varieties of capitalism theory, we find that the nature of economy constitutes the decisive factor that shapes energy security conceptualization. The coordinated market economies (CMEs) are more concerned about energy supply disruption than the liberalized market economies (LMEs). The paper demonstrates that despite numerous energy security concepts in the literature, resource-poor economies still adopt the original and conventional one in practice. The findings suggest that security of supply is the top measure for resource-poor economies to improve their energy security and creating a joint petroleum and LNG market would be desirable for the four economies in this study.

1. Introduction

The concept of energy security has long been studied since WWII. The traditional and/or conventional concept would be a condition in which a country has access to adequate, stable and reliable energy supplies (Yergin, 1988; Bielecki, 2002; Clingendael International Energy Programme, 2004; Chang and Lee, 2008). During the past two decades, a series of articles has been written in an attempt to conceptualize energy security in a new and comprehensive way, making energy security a more holistic concept. New facets and new dimensions have been added to fit the changing international situation. These new dimensions include factors such as environment, technology, regulation, international relation, military security, and so on (Kruyt et al., 2009; Vivoda, 2010; Sovacool and Mukherjee, 2011; Yao and Chang, 2014).[1]

Based on the traditional energy security concept and the new dimensions, a new framework that has been established recently is a three-dimension framework including vulnerability, efficiency and sustainability, which is applied to a case study of four island economies (Japan, Korea, Taiwan and Singapore).[2] Unlike large countries, these economies have little indigenous energy resources and thus almost entirely dependent on imported energy. Furthermore, as small economies, they do not have domestic flexibility in demand and supply. This serves the vulnerability dimension; due to vulnerability to energy supply disruption, these economies attach great importance to demand side management measures, particularly energy efficiency and thus justifies the efficiency dimension; as developed economies, they have committed to using safer and cleaner energy resources and greener methods of energy production and consumption to maintain sustainability. A more detailed discussion is presented in Li et al. (2016).

Using an energy security concept framework, this paper analyzes energy security conceptualization of resource-poor yet economically advanced island economies in East Asia—Singapore, South Korea,[3] Japan, and Taiwan. This group of economies has common unique characteristics in the economy, society, and especially in their energy import dependence and lack of indigenous energy resources (Li et al., 2016). The paper addresses the research question 'how is energy security conceptualized by resource-poor, advanced island economies'. It

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[1] For more discussion on energy security concept, please refer to Section 3.

[2] In this study we do not include Hong Kong, a city that has many similarities to Singapore, on the understanding that as far as energy is concerned, Hong Kong has the mainland China as a reliable energy supplier and thus its concept of energy security would be quite different.

[3] South Korea is considered an island country as North Korea physically blocks over-land connections between South Korea and other countries.

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shows that these economies, despite their common characteristics as 'resource-poor yet economically advanced island economies', possess both commonalities and differences in the way they conceptualize energy security. The paper argues that, despite the current trend towards a holistic concept of energy security, the energy security concept of these four resource-poor economies in effect returns to the very original and conventional one: stable and reliable energy supply.

The contribution of this paper is three-fold. First, it reveals the conceptualization of the energy security of resource-poor, advanced island economies. Second, it constructs an analytical framework to explain why these resource-poor economies have such an energy security conceptualization. The framework can explain the interaction between the nature of economies and the liberalization of an energy market and is deeply indebted to the 'varieties of capitalism' theory, which has not been introduced into energy -analyzing framework before. Third, it gives suggestions as to how the resource-poor economies can improve energy security.

The paper is structured as such: Section 2 presents the methodology, including an analytical framework. Section 3 analyzes the commonality and distinction of the energy security concept of these resource-poor island economies through a literature survey. Applying the analytical framework, Section 4 discusses the role of the nature of the economy of these resource-poor islands and their energy markets in determining their energy security concept. Section 5 concludes the paper with implications and recommendations.

2. Methodology

The methods employed include documentation analysis, comparative study, and the varieties of capitalism theory. The paper evaluates the concept of energy security of these economies through documentation analysis. With a cross-country comparative study of their national energy policies, the paper identifies the common characteristics and the distinction, which help explain energy security conceptualization. After the review, using the varieties of capitalism theory, the paper explains why these economies, all being market economies, have different degrees of liberalization in the energy sector, and how the interaction between liberalization and the type of economy determines the concept of energy security.

The nature of national energy economy is identified as a key factor that has deeply affected the energy sector of these economies. The paper constructs a framework for understanding the interaction between the nature of economies and the liberalization of an energy market, with the aim of explaining why these four economies are different in the level of their pursuit for stable energy supply. Based on the 'varieties of capitalism' theory (for more details, see Hall and Soskice, 2001) and following the core distinction drawn to compare national political economies, our study categorizes these four economies into two types of economies: liberal market economies (LMEs) and coordinated market economies (CMEs). The dichotomy is set out by Hall and Soskice (2001) in their introduction to the widely cited collection of essays under the title *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*.

The LMEs and CMEs are distinguished primarily by the way through which firms coordinate their activities with each other and other actors. In LMEs, firms coordinate their endeavors and construct their core competencies by way of competitive market mechanisms; while in CMEs, the coordination relies more on non-market forms of interaction. Five spheres are selected, in which firms must develop relationships with others. They are: industrial relations, vocational training and education, corporate governance, inter-firm relations, and relations with employees. Table 1 illustrates these five spheres which lay the foundation to distinguish LMEs and CMEs.

While the behavior of firms has an important role in determining the energy security concept, their behaviors, however, are affected by the market structure, or the level of liberalization in the energy market, due to regulations and competition that constrain their behavior. For example, coordination among firms could lead to a violation of the antitrust laws in some markets. However, in the case of highly concentrated markets, competition is not a significant concern as the government often regulates energy prices and thus there is little room for further manipulation. The energy market liberalization, in turn, is affected by the nature of the economy.

In this paper, our framework has four quadrants to categorize these four economies as presented in Fig. 1. The horizontal axis of the quadrant shows the degree of energy market liberalization and the vertical axis represents the types of economy. The matrix illustrates how the types of the economy affect energy market liberalization and how their interaction affects energy security concept. The illustration of the relationship between the types of economies and liberalization of energy markets explores why there is a big difference in these economies' pursuit of energy supply. A detailed discussion is presented in Section 4.

3. Commonality and distinction of energy security concept of the four economies

This section provides a detailed literature review to address the questions: how energy security is conceptualized by the resource-poor island economies, and what are the commonality and distinction? The conceptualization of energy security has been captured on the basis of their national energy policies,[4] where the objectives and principles have been clearly stated. Identification of the commonality and distinction is based on a framework that evaluates energy security of the resource-poor economies (Li et al., 2016). The framework covers three dimensions of energy security: vulnerability, efficiency, and sustainability.

3.1. Vulnerability

Given that the four economies are resource-poor, securing the supply of energy is a straightforward and top priority. However, the methods to secure energy supply are different among these economies. The Singapore government has put great efforts in the diversification of energy supplies to hedge against price fluctuation and other threats to the reliability of energy supply, particularly supply disruption (MTI, 2007, 4). This indicates that as a small island without indigenous fossil fuel resources, Singapore's energy security concept focuses on 'energy supply diversification'. In November 2007, the Singapore government launched its first comprehensive 'National Energy Policy Report' (NEPR) titled 'Energy for Growth', which clearly specifies that "[d]iversification is the best way to ensure energy security" (MTI, 2007, 29). With this guidance, the Singapore government has started to import LNG from various sources, in addition to its pipeline imports from Indonesia and Malaysia, and thus enhances its energy security.

Korea's traditional energy policies are designed to ensure stable and reliable energy supply at low prices to keep their industrial competitiveness. Energy independence and self-reliance is the most important policy goal in the 1st National Energy Basic Plan (1st Plan hereafter) that was issued in 2008. The 2nd National Energy Basic Plan (2nd Plan hereafter), approved in early 2014, also emphasizes that "[a] stable energy supply basis must be maintained in preparation for energy crises" (KEEI, 2015). The 1st Plan highlights the pursuit of the 'nation's controllable energy resources' and stable energy supply to fuel economic growth; it also specifies to increase the ratio of the nation's 'controllable' energy resources, including self-developed fossil fuels, new and renewable energies, and nuclear power, to 65% by 2030 from

[4] Specifically, these national energy policies include governments' official policy statements and papers that discuss the policy targets/objectives, as well as the policy instruments.