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Are China's new energy stock prices driven by new energy policies?

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ABSTRACT

This paper studies the impact of China's new energy policies on expected changes and volatility in new energy stock prices. Considering different kinds of policies (energy legislation, binding targets for new energies, economic incentives and technological research and development) and several new energy indexes (China's new energy sector and the solar, wind, nuclear and lithium battery subsectors), we used a regression model with a GARCH specification and dummy variables to differentiate policy pre- and post-announcement effects on expected returns and volatility. Our evidence indicates that pre- and post-announcement energy legislation policies dampened price volatility in all subsector indexes and that economic incentives had a positive policy announcement effect on all subsector index prices. Other new energy policies had no significant impact on either the mean or the volatility of the new energy assets. The potential implications for policy makers and investors are discussed.

Contents

1. Introduction

Since the release of its 11th five-year plan in 2006, China's new energy industry has rapidly developed to occupy a position of world dominance. New energy development has been fostered by complex and ambitious emissions-reducing energy policies, aimed at facilitating the switch from conventional to renewable energy resources, so as to ultimately converge towards a low-carbon economy and gain in energy efficiency, security and competitive advantage.

Many scholars have concluded that new energy policies have played a key role in China's new energy developments. According to Zeng et al. [1–3], there was significant progress in the exploitation and use of new energy resources during the 11th five-year plan, even though coal consumption accounted for more than 70% of energy consumption. More ambitious targets were set in the 12th five-year plan. Thus, 371.2 billion RMB were earmarked for national power engineering construction in 2011, with 71.61% devoted to investments

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in non-fossil fuel generation. As a result, by the end of 2011, 8% of total energy consumption was from non-fossil energies, compared to 6.6% in 2006. The 12th five-year plan also established a competitive industry-wide renewable energy system. As noted by Liu et al. [4], this shows a strong determination on China's part to pursue a sustainable long-term path in economic and energy development.

Although new energy policies are set to play a crucial role in promoting China's development (see, e.g., Zeng et al. [1,2]; Chai and Zhang [5]; Wang [6]; Wang et al. [7]; Yu et al. [8]; Zhang et al. [9], Zhao et al. [10]), capital reallocation to new energy investments is indispensable to attain policy objectives. As an important financing channel for new energy development, Chinese new energy stock markets have also been developing rapidly, with growing numbers of listed companies contributing to the funding and growth of new energy firms. Given that these companies are still developing and that the new energy sectors mainly depend on favourable government policies, China's new energy policies may play a crucial role in shaping risk-return tradeoffs and in mitigating regulatory risk for new energy companies, thereby encouraging investors to consider capital reallocation to new energy investments. But, do these new energy policies affect China's new energy stock prices? The answer to this question is important for investors and policy makers since it shapes the risk-return equation for investors and helps policy makers in designing optimal policies aimed at providing incentives for successful transition to a new energy future. Despite its importance, evidence concerning the impact of China's new energy policies on new energy stock prices is still lacking. The aim of this paper is to fill this gap by providing evidence of the impact of China's new energy policies on expectations regarding price changes and price volatility in new energy stock assets.

A growing body of literature is investigating the impact of government policies on company stock prices. Thorbecke [11], Rigobon and Sack [12] and Bernanke and Kuttner [13] studied the effects of changes in monetary policies on stock prices. Klingebiel et al. [14] examined the impact of bank restructuring policy announcements by East Asian governments on stock markets during the 1997–1998 crisis. Regarding the current financial crisis, Ait-Sahalia et al. [15] investigated the effects of policy changes on interbank credit and liquidity risk premia. Cohen et al. [16] showed how government legislation impacted on a firm's stock prices. At the theoretical level, Pastor and Veronesi [17] focused on stock market reactions to government policy announcements, predicting that stock prices would drop and volatility and stock price co-movements would increase in response to policy change announcements.

Despite this growing literature, however, the intersection between energy policy and stock markets continues to be understudied. Few energy economics papers explore how energy stock prices react to energy events. Guidi et al. [18], Hyndman [19], Demirer and Kutan [20], Lin and Tamvakis [21] and, more recently, Schmidbauer and Rösch [22] studied the effect on oil returns of Organization of the Petroleum Exporting Countries (OPEC) announcements. Stock market reactions to energy accidents have been examined by Scholtens and Boersen [23], Xu [24] and Kawashima and Takeda [25]. Motivated by the crucial role played by policies in shaping returns and risk associated with investments in new energy stocks, Masini and Menichetti [26], Sadorsky [27] and Donovan and Nuñez [28] studied the policy implications of behavioural aspects of the investment decision regarding renewable energy companies, the risk determinants of renewable energy companies and the cost of equity capital for renewable energy firms, respectively. Bürer and Wüstenhagen [29] and Lüthi and Wüstenhagen [30] provided empirical evidence on how investors perceive risk associated with energy policies.

We contribute to this emerging strand of literature by examining how China's new energy policies of recent years have impacted on price changes and volatility for new energy companies. China's new energy policies have been implemented at different government levels (see [5]), as follows: energy legislation to create a legal environment for transformations to new energy systems; binding new energy targets set in long-term plans and indicating development aims for the future; economic incentives in the form of short- to medium-term financial and fiscal instruments for new energy development; and technological research and development (R&D) aimed at providing stable support for new energies. Given that expectations for future industrial development are quite important in stock investment decisions, investors are likely to be more sensitive to binding new energy targets; speculators, however, with shorter investment horizons, may react more to economic incentive.

Since different policies may have different implications for the new energy sector, it is difficult to know which kind of new energy policy is more valued by new energy investors. Hence, to address this issue in detail, we separately analysed the effects of existing policies on new energy stock price returns and volatility. In addition, given that new energy subsectors tend to have unequal development prospects, we considered the whole new energy sector and each subsector separately. Note that while wind power and solar energy have developed rapidly, fostered by government energy policies, the nuclear power industry has been negatively affected by the Fukushima Daiichi nuclear disaster of 2011 in Japan. In 2011, China's installed power generation capacity was 1060 GW, with renewable energies in the form of hydropower, nuclear power, wind power and solar power accounting for 21.7%, 1.2%, 4.3% and 0.2%, respectively, and biomass, geothermal and ocean energies accounting for 0.4%. Total generation capacity in the same year was 4740 TW h, with hydropower, nuclear power, wind power and solar power accounting for 14%, 1.8%, 1.5% and 0.02%, respectively, and with biomass, geothermal and ocean energies accounting for 0.4%. Overall, although hydropower continues to be the preferred form of renewable energy, solar energy, wind power and nuclear power are the main emerging renewable energy sources. Given these energy priorities, certain new energy stocks may be more appealing than others to stock investors[2]. It is also worth noting that, the new energy vehicles sector is rapidly developing in China and Chinas has also become the world's largest manufacturing base for lithium batteries and the second largest producer and exporter of lithium batteries. Driven by a series of favourable policies related to new energy cars, lithium battery stocks have brought very satisfying returns to investors and are thus increasingly of interest to investors. Given the above arguments, solar energy, wind power, nuclear power and lithium batteries are now the most attractive subsectors of the new energy industry in China and, as such, have been analysed in the extant literature (see, e.g., Liu et al. [31]; Yu et al. [8]; Zhao et al. [10]; Zhang et al. [32]; Zhou and Zhang [33])[3]. Investors are more likely to allocate their financial resources to these sectors than to other apparently less promising subsectors. However, these subsectors

[2] Other data also confirm that solar energy, wind power and nuclear power are the main new energy subsectors being awarded priority in terms of energy policies, as having more promising prospects in China. For example, based on [3], of the $51 billion renewable energy investment in 2011, wind and photovoltaic power accounted for 87.8% (wind energy, 61.6%; photovoltaic energy, 26.1%). According to [1], by 2015 the installed capacity of wind power, nuclear power and solar power will amount to 100 million kW, 40 million kW and 5 million kW, respectively; the corresponding shares of China's total installed capacity are 7.36%, 2.94% and 0.37%, respectively, while shares for geothermal power and ocean energy are 0.0037% and 0.0007%, respectively. By 2020, the shares of China's total installed capacity of wind power, nuclear power, solar power, geothermal power and ocean energy are expected to be 9.66%, 4.29%, 1.34%, 0.0107% and 0.0011%, respectively, indicating that wind, nuclear and solar power will continue to be the main sources of renewable energy.

[3] Biomass energy is an important new energy resource in China, but uncertainty regarding biomass-fuelled power generation remains high, with few government stimuli to its development (only two in our sample period) and few listed companies in this new energy subsector. Since investors have not been attracted to this subsector, we have excluded it from our analysis.