Carbon Market and its Impact on the European electricity stocks

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Abstract

Overview

The introduction of the EU-ETS has had a strong impact on the parties bound by the legislation. There was a significant research effort dedicated to examine this impact on specific industries, investors and consumers. This study specifically investigates the relationship between prices for the emission allowances and the electricity stock returns.

Most of the existing studies focus on the impact of the European Union Allowance (EUA) price dynamics on electricity prices, which are in effect addressing the impact of the ETS on the electricity consumers. Only Oberndorfer (2009), and Veith, Werner, and Zimmermann (2009) provide evidence on the capital market reaction to the EUA developments. Both studies found evidence for a positive capital reaction to the EUA developments. The authors explained their findings by arguing that the electricity companies were gaining windfall profits under the ETS due to the free-of-charge allowances allocated on this sector and its ability to pass the carbon price onto consumers (Sijm, Neuhoff, & Chen, 2006).

However, the ETS was designed and introduced for addressing the emission reduction targets by introducing additional costs for polluting producers. Under this scheme, the electricity generators have to incorporate EUA price as an additional production cost, which puts constraints on the way the generators conduct business and make effort towards profitability (Busch & Hoffmann, 2007). In effect, the additional carbon constraints additionally introduces the risk for the non-compliance of the Kyoto reduction commitment to the business of electricity generation sector (Busch & Hoffmann, 2007; Kolk & Pinske, 2004). According to the capital market theory, as the fundamental business risk is increased, the investors tend require more returns from electricity generators to compensate this additional risk. This thus leads to a lower electricity stock price, or a negative current stock returns. This means, the carbon constraints should have a negative effect on the electricity stock performance. Results obtained in this study based on phase I data are consistent with the theory.

Methodology

In contrast to previous studies, the analysis is done using more sophisticated methods, including a multivariate Constant Conditional Correlation Generalised AutoRegressive Conditional Heteroskedasticity (CCC-GARCH) and a Dynamic Conditional Correlation Multivariate Generalised AutoRegressive Conditional Heteroskedasticity (DCC-M-GARCH) method. These two methods are used to answer two distinct questions. First, the CCC-GARCH method is used to investigate the impact of the EUA price developments on the electricity stock return. Then, the DCC-M-GARCH method is used to address the volatility spillover effect between the EUA market and electricity stock.

Results

The results show that, in phase I, the investors of electricity companies negatively reacted to the EUA price changes. Differently, although this reaction still remain negative but becomes insignificant in phase II. Moreover, we found no effects of volatility spillover between EU carbon market and electricity stock in phase I whereas a significant positive effect in phase II.

Provided these results, it is clear that the EU ETS has been impacting on the capital market since its introduction in 2005. The results produced by applying CCC-GARCH for phase I follow the common logic that the additional carbon costs are likely to disadvantage the parties involved. In phase II, probably the impact of crisis has been considered more important in driving the capital market, the ETS does not show any significant effect. With respect to the volatility spillover effects by DCC-M-GARCH, the results show it was insignificant in phase I but highly significant in phase II. Again, the financial crisis may be the main contributor driving the results for phase II. Also, previous studies have already showed and explained that equity return correlations tend to be higher in bear markets than in bull markets (Longin & Solnik, 2001). Or, this may be an signal for that the carbon market gradually become integrated with other EU energy markets as information from other market have been incorporated into the EUA market since the start of phase II. However, the integration issue is beyond the focus of this study, and thus is recommended for the future studies.

References

Busch, T., & Hoffmann, V. H. (2007). Emerging carbon constraints for corporate risk management. *Ecological Economics, 62*(3-4), 518-528.

Kolk, A., & Pinske, J. (2004). Market strategies for climate change. *European Management Journal, 22*(3), 304-314.

Longin, F., & Solnik, B. (2001). Extreme correlation of international equity markets. *Journal of Finance, 56*, 649-676.

Oberndorfer, U. (2009). EU Emission Allowances and the stock market: Evidence from the electricity industry. *Ecological Economics, 68*(4), 1116-1126.

Sijm, J., Hers, S. J., Lise, W., & Wetzelaer, B. J. H. W. (2008). The impact of the EU ETS on electricity prices. *Final report to DG Environment of the European Commission*. Retrieved from http://www.ecn.nl/docs/library/report/2008/e08007.pdf

Veith, S., Werner, J. R., & Zimmermann, J. (2009). Capital market response to emission rights returns: Evidence from the European power sector. *Energy Economics, 31*(4), 605-613.