Is information assimilated at announcements in the European carbon market?

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ABSTRACT

We examine the high frequency new information impact on prices, volatility, trading volume and illiquidity at scheduled macroeconomic and verified emissions announcements for the European carbon futures market. Verified emissions, United States non-farm payroll and German new factory order macroeconomic announcements impact carbon prices swiftly, within 5 min. We show that a one standard deviation surprise increase in verified emission announcements is associated with an approximate ten percentage point (9.96%) increase in carbon futures returns. A wait-and-see stylized trading behavior is evident at announcements in volatility and trading volumes. Market illiquidity increases at announcements in relation to United States non-farm payroll, albeit there is no evidence of an increase in illiquidity prior to announcements. The development of new information impact, over time, occurs mainly in the at-announcement 5-minute time interval.

1. Introduction

We study the European carbon market’s assimilation of new information at publicly scheduled macroeconomic and verified emissions (VE) announcements during its Kyoto phase, from 2008 to 2012. We examine high frequency market microstructure data on price impact, volatility, trading volume and illiquidity (bid-ask spreads and market depth) in the time vicinity of announcements. Our principal contribution to the literature is that we conduct a systematic study, at announcements, of whether certain quasi stylized regularities in capital and currency markets are also evident, or at least emerging, in the European carbon market.

Prior tests of information assimilation, in the European carbon market, are largely conducted with a low frequency of observations (e.g. daily) perspective. Mansanet-Bataller and Pardo (2009) and Chevallier et al. (2009) show the importance of regulatory announcements. Bredin and Muckley (2011) report links with economic growth and energy prices. In contrast, Chevallier (2009) shows that fundamental macroeconomic risk factors, e.g., default spreads and short-term interest rates, have only a tenuous relation to the EU allowance (EUA) price. More recently, Sanin et al. (2015) report the relevance of trading volume and European Commission (EC) announcements on the supply of permits to adequately model EUA futures returns and volatility. Hitzemann et al. (2015) show that the annual announcement of realized emissions on the European carbon permit market leads to significant absolute abnormal returns on the event day, which are accompanied by trading volumes and intraday volatilities. While the recent literature highlights the importance of news, there is the potential of omitted variable bias given the low frequency nature of the studies.

In order to identify whether the European carbon market reacts swiftly to these announcements, as predicted by the efficient market hypothesis (EMH), a high frequency setting is critical. In addition...
a number of theories based on the assumption of efficient markets would suggest that only unanticipated changes in policy should influence asset prices immediately. An important exception to the paucity of high frequency contributions to the literature on information assimilation at announcements is the study by Conrad et al. (2012). Using 2008, 2009 and 2010 EUA futures contracts the authors report that EUA prices do respond to good news in regard to current and expected economic activity in Germany and the United States (US). They also find that EC decisions on second National Allocation Plans (NAP) have a strong and immediate impact on EUA prices.

Our analysis offers several distinguishing features. As it is conducted on high-frequency intraday data, for the entirety of the Kyoto phase of the carbon market, it allows us to detect patterns of market reaction that may not otherwise be discerned. This permits our study to account for the speed, magnitude and direction of effects in 5-minute time intervals both before and after regulatory and macroeconomic announcements. Our study not only examines the assimilation of news at announcements for the case of carbon returns, but also price volatility, trading volume and illiquidity. Finally, the changing nature of news at information assimilation in the European carbon market over time is also examined.

To identify new and pertinent information in the European carbon market we avail of scheduled macroeconomic news announcements initially examined by Conrad et al. (2012) (namely, Germany Ifo index, Germany ZEW index, Germany new orders, EU consumers confidence index, US consumer sentiment, US manufacturing PMI, EU/Germany/France/UK industrial production, and US non-farm payrolls). We add to this set of news announcements, the EU ETS verified emissions (VE) announcements. In conjunction with this data, we use a broad set of synchronized survey data on market analysts’ expectations, which allow us to infer “surprises” associated with the announcement. We then use transaction level European carbon futures order book data in (near) continuous time to construct our market microstructure variables. We assess the responsiveness of these variables to the “surprise” component of the announcements, using both the news ratio (i.e. observations relative to non-announcement days) and the news impact (i.e. intra announcement day regression) methodologies. Our news impact methodology is also replicated over time to account for the development of information assimilation. We, hence, test for patterns at publicly scheduled announcements, in EUA futures returns, volatility, trading volume, and illiquidity which are consistent with quasi stylized regularities, at announcements, in capital and currency markets. Except for in our study of the development of information assimilation over time, we infer evidence of announcement effects only when there are consistent results using both the news ratio and news impact methodologies.

We, initially, present our main findings, with respect to EUA futures returns. After announcements on economic activity, including the US non-farm payroll (US NFP) and German new factory order (DE NO) announcements, we report information assimilation in EUA futures returns. In the 5-minute interval after a US NFP announcement, for instance, a one standard deviation increase in the surprise component of this announcement is associated with a 0.72 percentage point increase in EUA futures returns. Conrad et al. (2012) also show that in the EU ETS market (December 2008, 2009 and 2010 expiration contracts), new information on the German and US economies is priced within the first 10 min after the announcement. The predominance of these specific news announcements can follow due to the size and industrialized (emissions intensive) nature of the German economy and the likelihood that the US macroeconomic news contains information about the future development of the European economy. We show that a standardized surprise increase in VE announcements is associated with an approximate ten percentage point (9.96%) increase in EUA futures returns, which is consistent with the NAP announcement results reported by Conrad et al. (2012).

EUA futures price responses are only one potential aspect of information assimilation which can occur at news announcements. Other features of EUA futures trading which can reflect information assimilation include volatility, trading volume, and illiquidity. Announcements on current German industrial production (DE IP), US NFP and future DE NO economic activity exhibit announcement effects in volatility. For instance, after DE IP announcements, volatility increases markedly (1.68 times) in the initial 5-minute time interval, relative to the same time interval on non-announcement days. It is also evident that in respect to DE NO and US NFP announcements, there is a pronounced announcement effect in trading volumes. In the 5-minute interval after the US NFP announcement there is more than a 3 fold (3.41) increase in trading volume relative to in the same time interval on non-announcement days. Finally, there is an economically important influence of VE announcements on volatility and trading volume. Taking the temporal behavior of volatility and trading volume at announcements together, it is indicative of a wait and see behavior on the part of market participants (Rangel, 2011) rather than a calm before the storm stylized behavior (Jones et al., 1998).

Unlike findings reported in Balduzzi et al. (2001) and Elder et al. (2012), our results also suggest that once ten tes has elapsed after the announcement, the persistent impact of macroeconomic announcements on trading volume and volatility, with the exception of VE announcements, are absent. Turning to illiquidity, although our findings are sparse, we do document significant evidence of widening spreads in the initial 5-minute interval after a US NFP announcement.

While our empirical results are consistent with established asset markets, an important issue is to track the development of this progression. Taking the pre-announcement, announcement and post-announcement results together in respect to the development of new information impact two main findings are apparent. First, the results suggest that with respect to the responsiveness of EUA futures returns to new information, in the initial 5-minute time interval, there is a substantial strengthening of this responsiveness during the market’s Kyoto phase. Second, in the same announcement time interval, there is evidence of increased effects over time, in volatility, trading volume and illiquidity variables. Although a new market, our results indicate that news is incorporated into key microstructure information in a manner consistent with efficient markets.

The paper is organized as follows. In Section 2, we describe our benchmark set of stylized regularities in information assimilation in capital and currency markets. Our data and methodology to

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1 This data, observed at the 5-minute frequency, up to 15 min before and 30 min after announcements, offers a more comprehensive picture of the information assimilation process in the complete Kyoto phase of the EUA futures market than a prior work (Conrad et al., 2012; Rofu, 2009).

2 The news ratio methodology omits to account for magnitudinal differences in surprises over time. It is, thus, not a suitable methodology to study the development of information assimilation over time.

3 A single announcement where this is not adhered to is in respect to VE. With only 4 such announcements during the Kyoto phase, the news ratio test is likely to have little statistical power. So, we rely on the news impact methodology to establish statistical significance for VE announcements, together with subjective reference to the news ratio methodology.

4 The news ratio suggests that EUA futures absolute returns are 6.48 times bigger than in the same time interval on non-announcement days. This large multiple is economically important.

5 In the financial press, there is anecdotal evidence to suggest that markets enter a lull prior to the release of news. In the wake of an announcement, traders react to such information leading to an increase in activity. This pattern has been dubbed the calm before the storm. Where there is no lull before the news, the pattern is dubbed indicative of wait and see behavior.
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