



University of
Zurich^{UZH}

Evidence on Weak Form Efficiency in the European Union Emission
Trading Scheme: An Analysis of the Day of the Week Effect

BACHELOR'S THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR
OF ARTS IN ECONOMICS AND BUSINESS ADMINISTRATION

AUTHOR

DAVID BIDER

SUPERVISOR

PROF. DR. MARC CHESNEY

PROFESSOR OF QUANTITATIVE FINANCE

HEAD OF DEPARTMENT OF BANKING AND FINANCE

UNIVERSITY OF ZÜRICH

ASSISTANT

LUKAS MÜNSTERMANN

DATE OF SUBMISSION: 29.01.2018

Executive Summary

Climate change is an omnipresent issue, which impacts the whole planet. A recent study found that climate change is the number one fear in Switzerland. Increasing temperatures, raising sea levels and various weather phenomena are only the most noticeable signs. Scientists agree that a temperature rise by more than 2°C above pre-industrial levels would endanger many ecosystems. The main driver of the rise in temperature are anthropogenic greenhouse gases, which have increased not only with the growing world population, but also with the intensifying economic activity. Because the atmosphere is a public good and greenhouse gases diffuse freely across the entire globe, international solutions are indispensable. The Kyoto Protocol was the first international agreement to stabilize the greenhouse gas emissions. Therefore, the European Union initiated the European Union Emission Trading System, which is the major instrument to reach the Kyoto Protocol emissions reduction targets. The European Union Emission Trading System is a market based solution, which aims to reduce the emissions as efficiently as possible. The key mechanism of a cap-and-trade system is that emissions are reduced first where it costs the least to do so. Increasing European Emission Allowance prices would then trigger more expensive emission reduction measures. The European Union Emission Trading System had to overcome also first major challenges, which is also a topic in this thesis. The most persistent challenge is the oversupply issue that was mainly introduced by the financial crisis.

The day-of-the-week effect is an anomaly, which has been studied extensively in stock market data. This phenomenon is generally defined as systematic disparities in daily returns among the weekdays. The existence of a day-of-the-week effect questions the weak form of informational market efficiency, which implies that asset prices reflect all past financial information. Therefore, according to the weak form of information efficiency, systematic patterns of daily returns should not be present. Many scientists have proven that the European Union Emission Trading System is not informationally efficient in the weak form. However, no one has examined the European Union Emission Trading System for a day-of-the-week effect. Since the European Union Emission Trading System is a relatively new market, it is of great importance to know whether the European Union Emission Trading System

exhibits a day-of-the-week effect. Such a pattern would not only be extremely interesting for investors but also for installations that are obliged to operate under the European Union Emission Trading System. Furthermore, this thesis presents the most prominent explanation approaches of the day-of-the-week effect.

To examine the day-of-the-week effect in the European Union Emission Trading System the standard dummy variable approach is applied with five dummy variables. Each of the five dummy variables represents a weekday. Firstly, it is tested whether the estimated coefficients are statistically different from zero. Secondly, the joint hypothesis tests whether the returns of the individual weekdays exhibit statistically significant inequalities between the trading days. The examined data are the settlement prices of the secondary spot market for European Emission Allowances, for the phases 1, 2 and the commenced phase 3 up to September 2017.

This thesis finds that the first trading phase, which lasted from 2005 to 2007, exhibits a day-of-the-week effect. Mondays show statistically significant negative returns and the weekdays exhibit statistically significant disparities in returns. This is evidence, that the first phase under the European Union Emission Trading System was not informationally efficient in the weak form. However, according to the efficient market definition provided by Jensen (1978) it remains questionable whether it would have been possible to generate net excess return in the first trading phase. Hence, the first trading phase might have been efficient in the weak form.

Many papers provide explanation approaches for the day-of-the-week effect but no theory seems to be completely satisfactory. Most explanation approaches see the reason in the behaviour of traders, information flow or in technical aspects. However, it is questionable whether these reasons are also true for the European Emission Allowances market.