

Do European Allowance Futures offer diversification gains for international investors? A portfolio analysis of the EU ETS from 2008 to 2010

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Executive summary

Problem statement

The European Union Emission Trading System (EU ETS) is by far the largest market for carbon trading at current stage. Apart from compliance firms which must surrender enough allowances each year according to their emissions, financial traders, such as banks and carbon funds participate in the EU ETS. As emission permits are a new tradable asset, Mansanet-Bataller and Pardo (2008), as well as Mansanet-Bataller (2011) have pointed out the importance of portfolio management for carbon permits. They have analyzed the inclusion of EUA futures into well-diversified portfolios, because EUA futures are the most frequently traded carbon asset in the EU ETS. However, with regards to the equity class, their study concentrates solely on European stocks. Therefore, this thesis conducts an enlarged portfolio analysis of the second trading phase of the EU ETS also for non-European stocks in the portfolio. Having an international perspective on EUA futures allows to compare the European and non-European portfolio combinations. It is hypothesized that diversification benefits are higher with non-European stocks, because these markets are less related to the European economy and thus the EU ETS. The reason for this is that the European economy directly determines carbon production and influences EUA prices. As a result, European stock markets should exhibit higher correlations with EUA futures compared to non-European economies. Detecting diversification benefits from this new asset is important, because correlations between more traditional asset classes and markets seem to have increased, which ceases the benefits from global diversification (Goetzmann, Li & Rouwenhorst, 2005).

Methodology

The study first evaluates the diversification potential of EUA futures in deriving CAPM-Beta values with broad equity market indices. Furthermore, the efficient frontier and portfolio weights with and without EUA futures are derived with a mean-variance optimization following Markowitz (1952). The Sharpe Ratio is used to quantitatively measure diversification gains, which also allows to compare different specific portfolios, such as the global minimum and the tangency portfolio. To form a well-diversified benchmark portfolio, a combination of indices on stocks, bonds, gold and energy commodities is used. More specifically, to differentiate between European and non-European equity portfolios, two different sets are studied

with historical data. The data sets are tested if only short futures positions, short-selling or no short positions are allowed at all.

Results

With an return of -21% and standard deviation of 38.4%, EUA futures have been unattractive stand-alone investments during the sample period. The data is driven by the financial and economic crisis and thus, bonds and gold dominate the other assets due to their favorable risk-return properties during the recession phase. Correlations of EUA futures with other assets vary between -0.21 and 0.34. As a result, EUA futures exhibit low beta values, indicating substantial risk diversification potential. Allowing for futures short positions and considering European equities in the benchmark portfolio, there are small diversification gains for investors in the low- and high-risk area. The Sharpe Ratio of the global minimum variance and the tangency portfolio of the benchmark assets both can be improved by 2.9% and 1.6%, respectively. In contrast to this, considering non-European equities as benchmark assets, higher increases in the Sharpe Ratio have been detected for the global minimum variance portfolio (+4.4%), while the tangency portfolio in that case could not be improved. According to the two-fund-separation theorem, only the tangency portfolio is relevant for investors with respect to the risky assets. From this perspective, non-European equities do not provide higher diversification potential compared to European stocks in the portfolio. The portfolio weights of EUA futures vary between -17% to +7.5% depending on the target return used for the optimization. A prohibition of short positions ceases the benefits from EUA futures in the high risk area, because investors could have profited from the negative returns only with short positions.

Overall, the results are comparable to earlier research and EUA futures offer investors only minor diversification gains, irrespective of the sets and variations studied. The mean-variance analysis is limited due to the fact that the variance cannot address the heavy tail properties of the EUA futures returns. Moreover, a correlation analysis over time shows that while stock correlations remain stable over the sample period, this is not the case for EUA futures. EUA futures are highly dependent on the regulator and climate policy, there are potentially limited capital gains, as well as risks specifically related to the carbon market. On account of this, EUA futures are delicate assets in order to enhance an already well-diversified portfolio.