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Master Thesis

Banking and Finance

Correlation or Volatility?
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Empirical Analysis about the Correlation Risk Premium in Index Options in the Swiss Equity Markets

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Executive Summary

Since the inventing of the CAPM there has been a controversial debate about the meaning of the market factor as the single explanator for the behavior of stock market returns. With findings of Fama and French (1993), Banz (1981) and Ang et al. (2006) there were other relevant factors described accountable for the cross-section of expected stock returns. Since then over 300 factors or risk premia have been discovered over the years leading to the conclusion of the existence of a "factor zoo" (Cochrane (2010)). Harvey, Liu, and Zhu (2015) criticize the ongoing race to find new risk factors and apply harsher methods to test whether a risk premium is significant. Under this premise only five factors are statistically significant according to them: value, momentum, liquidity, durable consumption goods and volatility.

The volatility factor was also found in options and as the first, Bondarenko (2003) described its existence. He conducted an analysis on the S&P 500 index option returns and found evidence of high returns of simple unhedged index put selling strategies, indicating that index put options are very expensive. The pricing of index options subsequently became a more studied topic and different approaches to explain the high pricing of index options emerged. This overpricing of options was primarily studied as the difference of option implied and subsequent realized volatility, known as the volatility premium. Driessen and Maenhout (2006) tested volatility risk in international markets and find a negative volatility risk premium. These results imply that buyers of index options have the willingness to pay a high negative premium for the hedge against future volatility of their assets returns. Bakshi and Kapadia (2003) find that when they test individual equity options for a volatility risk premium it is much smaller compared to the premium embedded in index options. The difference in pricing and size of the volatility premium between individual equity options and index options contains unique information about the price of correlation. Driessen, Maenhout, and Vilkov (2009) extensively tested the pricing of index and individual equity options and concluded that a correlation risk premium can explain why index options seem to be higher priced than individual equity options. The intuitive idea is that investors overestimate correlation risk in the market and therefore pay high prices for index options as a hedge against increasing correlations in stock returns. They state that the high volatility risk premium in index options compared to stock options can be explained with this correlation risk premium, which an investor in equity options is not willing to pay.

The strategy proposed which yields the highest returns utilizing the volatility and correlation risk premiums is dispersion trading. A dispersion trading strategy contains the shorting of index options and simultaneously buying a portfolio of equity options corresponding to the index weights. The strategy is independent of market returns because the long position in the portfolio of equity options does display similar payoff profiles like the index options but in the reverse direction, offsetting the market return. As index options should include the negative correlation risk premium not found in equity options, positive returns are expected when shorting index options and hedging with equity options. A positive return of such a strategy would indicate the existence of such a correlation risk premium.

This thesis provides new insight into the correlation risk premium in the way that, compared to most literature, instead of theoretical pricing models, traded prices were used. This helps understanding if the correlation risk premium can be found in traded prices. Additionally, it is to our knowledge the first to test if a dispersion trading strategy can yield positive returns for the Swiss option market.

The option data sample consists of daily last traded prices for the Swiss Market Index (SMI) and all the constituents for the time period from January 2008 to October 2016. One month maturity, at-the-money (ATM) options were used. The dispersion trading strategy was tested in a model-free and systematic approach, selling ATM index straddles on a monthly repeating cycle and buying a portfolio of ATM equity straddles as a hedge. The portfolio of equity straddles is weighted according to the index composition and that expected option payoffs of the long and short position offset each other. To get more insight into the behavior of the different aspects of this strategy, the straddles were dissected into the call and the put option side, as well as the index and equity option side.

We find that a put dispersion strategy yields annualized positive mean returns of 1.23% per annum, indicating that a negative correlation risk premium exists in index put options. On the other hand, a call dispersion strategy results in significant negative mean returns of -2.27%, which denies the existence of a negative correlation risk premium in index call options for the Swiss market. One could even assume a positive correlation risk premium for index call options. The straddle dispersion trading strategy yields insignificant negative returns of -1.21% for our data sample.

Our results show that index put options are on average significantly more expensive than index call options. In times of financial distress, the aggregate individual equity put options have slightly lower costs than index put options for our data sample. This favors a dispersion trading strategy with put options by selling index put options and buying individual equity put options. For calls the opposite situation exists. Index call options are lower priced than equity calls resulting in high costs for an investment in a call dispersion strategy. This could explain the use of index options for general portfolio insurance although a risk premium must be paid by the buyer.

It therefore is not possible to affirm the general existence of a correlation risk premium in index options for the Swiss market. Despite showing positive returns for a put dispersion strategy, no significant correlation risk premium in index put options can be found. Call dispersion returns imply a significant positive correlation risk premium. The put side of a dispersion strategy returns seem to be depending on the volatility risk premium rather than a correlation premium. Call dispersion returns show a significant return implying a positive correlation premium in index call options. The call dispersion returns are independent of the size of the volatility risk premium and correlate more with the size of the implied correlation premium. These ambiguous findings lead to the conclusion that in the Swiss equity market no consistent correlation risk premium can be found and that the pricing of index call and put options differs significantly.