Executive Summary

Due to the recent financial crisis, which occurred in 2007-2009, and the resulting new regulatory requirements, especially banks face additional pressure to increase their capital base. Since the introduction of Basel III, a regulatory framework that was announced in 2013, the amount of so-called "Contingent Convertible" [CoCo] bonds issued in the market sharply increased and gained much interest in the market place. CoCo bonds are hybrid capital instruments that inherit most features of conventional bonds. They pay a regular (normally semi-annually) coupon and do have a maturity that is either fixed or perpetual. However, contrary to conventional bonds, CoCo bonds include a loss absorbing mechanism that is triggered whenever the issuing firm is in financial distress. Usually, the trigger is activated if a company's capital ratio falls below a predetermined threshold or the corresponding regulator forces the same company to trigger the CoCo bond. Upon this event – the so-called "trigger event", CoCo bonds are either written-down or converted to equity. Currently, one differs between temporary write down [TWD], permanent write down [PWD] and conversion-to-equity [CE] CoCo bonds. While PWD CoCo bonds are fully written down upon a trigger event, TWD CoCo bonds may be written up again after the occurrence of such an event. On the other hand, CE CoCo bonds are converted into shares upon a trigger event. However, independent of the trigger type all CoCo bonds intent so stabilize a firm through additional equity capital when they need it the most.

According to Bloomberg, the amount of CoCo bonds was rather small. Before the financial crisis. Before 2013, less than 100 CoCo bonds were traded on exchanges. The number more than quadrupled in the last years. The sharp growth in the amount of CoCo bonds increases the importance of fundamental knowledge about their functionality and price development. However, because of the very recent emerge of a CoCo bond market only few studies investigated their price behavior, yet. This thesis aims to fill this gap and provides a comprehensive analysis of the design of a CoCo bond, and its price development as well as reaction to shocks over time. Additionally, this thesis shows how the CoCo bonds' price development and reaction to shocks vary in their trigger types. A differentiation between trigger types is mainly interesting since the trigger types play a critical role in the risk structure of CoCo bonds. According to theory, one would expect the corresponding PWD CoCo bonds to be the riskiest. Contrary to the other CoCo bonds, there face value is written down without any change of a write up in the future. The difference between CE CoCo bonds and TWD CoCo bonds is more ambiguous since on the one hand, CE investors are compensated with stocks upon a trigger event, but they do not profit from a write up option in the future. The author however expects the CE CoCo bonds to be less risky

since a write up of the TWD CoCo bonds might take years (if at all) and even if they are restored, the stock prices (which a CE CoCo bond investor holds) increase in value as well. Thus, when considering three equal CoCo bonds that only vary in the trigger type on would thus assume the PWD CoCo bonds to be the riskiest, followed by the TWD- and the CE CoCo bonds. This statement will be evaluated in this thesis.

This work is split into two parts: The first part provides an overall examination of a CoCo bonds price behavior over time. For this analysis, not only a CoCo bond's price development by itself is investigated, but rather in comparison with different drivers, too. More precisely, the price changes of CoCo bonds are compared to price changes of subordinated bonds and stocks, as well as changes in the CDS spread, and in a variable called distance to trigger [DTT] which deducts the trigger threshold of a CoCo bond from the capital ratio of the issuing firm. As the CDS spread, the DTT thus provides a proxy for the risk of a trigger event. The analysis starts with a summary of this work's data set and a descriptive analysis of price changes of all variables mentioned above. The descriptive analysis shows that most CoCo bonds are similar to subordinated bonds with regards to the mean price changes and the standard deviation. Furthermore, the standard deviation of these financial instrument is often much lower than for stock prices, indicating a lower risk pattern for CoCo bonds and subordinated bonds than for stocks. The descriptive analysis further reveals only little differences in the standard deviation and mean price change changes between varying trigger types.

In a next step, a linear regression model is estimated to examine the relationship between the price changes of CoCo bonds, subordinated bonds, and stocks, as well as CDS spreads, and the DTT variable. This work's linear regression model is estimated after several tests that insure the coefficients not to be biased. Basically, one would assume that CoCo bonds prices and CDS spread to be negatively- and the DTT variable to be positively related. Both variables indicate the possibility of a CoCo bond's trigger event and, thus, should decrease a CoCo bond's price. On the other hand, just like stocks and subordinated bonds, CoCo bonds should increase in value if the issuing firm's financial situation strengthens. Thus, it is assumed that, on average, CoCo bonds prices should be positively correlated to stocks'- and subordinated bonds' prices. It is shown that subordinated bonds and stocks do have a positive impact on CoCo bonds' prices. However, for 49 out of 63 investigated CoCo bonds, a one percent change in the subordinated bond's price changes has, on average, a much larger impact on the CoCo bonds than a same change in the stock prices. This again indicates a strong similarity of CoCo bonds and subordinated bonds. Furthermore, the CDS spread does have a negative impact on a CoCo bond's price changes that is, in most cases, significantly different from zero. An unclear result is measured for the DTT

variable which does not seem to have a clear impact on a CoCo bond's prices. Especially interesting are the differences in the coefficients for banks that hold CoCo bonds with different risk structures. The measurement of the corresponding coefficient reveals a strong average impact of the stock prices on CE CoCo bonds that exceeded the coefficients of TWD- and PWD CoCo bonds. This result is intuitive, since stock prices influence the height of the compensation for a CE CoCo bond holder. However, TWD- and PWD CoCo bond holders are not compensated and, thus, the stock price effect should be lower. On the other hand, the results for the risk factors for which the regression did not measure large differences in the coefficients, present themselves counterintuitive. Thus, the impact of the CDS spread and the DTT variable were similar over all trigger types.

In the second part of this thesis, it is shown how CoCo bonds react on systemic shocks. Due to the recent emerge of a CoCo bonds market, only one far-reaching and significant systemic shock could be identified. The event occurred on June 23, 2016, in the United Kingdom when the people voted "yes" to the proposed exit of the European Union – also known as the "Brexit". Uncertainty about the future for many banks' businesses led to a large adverse impact on stock- and bond prices, as well as to a sharp increase in the CDS spreads. It is thus of interest how CoCo bonds did react on the vote, and whether there are differences in the intensity of their reactions across different trigger types.

To investigate the price reaction, an event-study is conduced. The authors' test procedure is split up into two parts. In a first part, two different models – the market model and the constant-mean-return model – are used to estimate coefficients that aim to replicate and explain the prices of CoCo bonds. The period over which the coefficients are estimated is called "estimation window" and precedes the "event window" in which the event takes place. The coefficients are then used to estimate abnormal price changes which are calculated by deducting the expected price changes, which in turn are derived by the model from the realized price changes. By accumulating and averaging the abnormal price changes over time, one can then investigate the price development of CoCo bonds. This method is also used to investigate CoCo bonds' price changes for various trigger types.

It is shown that for the constant-mean-return model, which suggests the price changes of CoCo bonds to be constant over time, the price reaction for CE and TWD CoCo bonds are very similar and much higher than for PWD CoCo bonds upon the event date. However, after the event, the CE CoCo bonds seem to recover much faster than TWD CoCo bonds. For the market model, which explains the development of CoCo bonds' prices with a CoCo bond index, the results are similar. Again, the CE and TWD CoCo bonds change in a same fashion, however, the PWD CoCo

bonds seem to be the most influenced in this model. Thus, some results are unexpected and can not fully be explained. Puzzling results like the weak reaction of PWD CoCo bonds are most likely a product of missing data and the small sample size. On the other hand, it is shown that CE CoCo bonds and TWD CoCo bonds are similar. However, TWD CoCo bonds seem to be a bit more sensitive to shocks than CE CoCo bonds. This is in line with theory.

Overall, it is shown that many results in this study do correspond with the author's expectations based on theoretical assumptions. However, there are several results that are puzzling. Due to the recent emerge of a market for CoCo bonds, the instruments are not considered as liquid, yet, and the amount of CoCo bonds is comparably small, as well. Thus, it would be interesting to conduct a similar or advanced examination of the tests conducted within this thesis to verify the reliability and truthiness of the derived results.