Universität
Zürich UZH
| Executive Education Finance

University of Zurich
Executive Education Finance
Stampfenbachstrasse 73
CH-8006 Zurich
www.finance-weiterbildung.uzh.ch

UZH, Executive Education Finance
Stampfenbachstrasse 73, CH-8006 Zurich

Andrea Merli
Dammstrasse 8
8810 Horgen

Dr. Benjamin Wilding
CFO and Managing Director of Finance
Managing Director and Senior Lecturer
Department of Finance

Zurich, 23 September 2024

Assignment for the MAS Thesis in Finance

Dear Mr. Merli

I am delighted that you would like to write the MAS thesis in finance under my supervision. Please find the following assignment for you:

Title:
"Flash loans in ethereum using Aave: different use cases with specific analysis of applications"

Background:
Flash loans are based on the following mechanism: getting a loan, perform a set of operations, pay back the loan with interests within the same Ethereum (or other blockchains) transaction. If the loan is not repaid the transaction is reverted, therefore not written in the distributed ledger and the caller loses the gas cost of it. This instrument was made possible by the introduction of smart contracts with distributed ledger technologies and may offer new possibilities not seen with traditional financial instruments. This work aims to shed light on the use cases in arbitrage and re-collateralization, their usage as well as analyse their impact on the markets
This work will utilise data on Ethereum related to Aave smart contract calls for flash loans and "The Graph" as indexing tool to perform data analysis.

Objectives:
The objective is to conduct a comprehensive analysis of flash loans in the Aave protocol, focusing on their practical applications and implications within decentralized finance (DeFi). Show what Aave is and its general usage (focus on version 2) in the first part of your thesis. This section should address the concept of flash loans, outline the technical prerequisites for the research, and explain the rationale behind the chosen technologies, including the criteria, advantages, and other relevant technical frameworks that were considered.

Analyse the use cases of flash loans in the second part of your thesis by examining detailed transactions and their real-world applications. The primary use cases to be discussed include flash loans, re-collateralisation, and arbitrage within the Aave protocol. This section will highlight the significance of these use cases in decentralized finance (DeFi) and compare them to traditional financial instruments.

In the third phase, analyse the evolution of flash loan usage over time and explore correlations, such as with Ethereum gas prices. This section could leverage The Graph, a tool for indexing various blockchains, to perform statistical analyses, or others and could include examinations of accounts with over $1 million and their flash loan activity, the frequency of flash loan calls over time, and the size of these calls.

As a final step, draw a conclusion that adequately summarizes your results, including a comparison to traditional financial instruments.

Research Context / Relevant Papers

Relevant studies that inform this research include:

- Gronde, F. (unknown publication date). *Flash Loans and Decentralized Lending Protocols: An In-Depth Analysis*. Master Thesis, supervised by Prof. Dr. Fabian Schär, https://wwz.unibas.ch/fileadmin/user_upload/wwz/00_Professuren/Schaer_DLTFinte ch/Lehre/MA_Florian_Gronde_Flashloans-ohne_Appendix.pdf
- Yan, T., & Tessone, C. J. (unknown publication date). *Rug-pull Attack and Liquidity Pool Network on Uniswap*, no publication known.
- Aave. (2020). *Aave Whitepaper v1*. https://github.com/aave/aave-protocol/blob/master/docs/Aave_Protocol_Whitepaper_v1_0.pdf
- Aave. (2020). *Aave Whitepaper v2*. https://github.com/aave/protocol- v2/blob/master/aave-v2-whitepaper.pdf

Please note the following formal criteria:

- Write the thesis in German or English.
- Quality ahead of quantity. Pay attention to a concise notation; avoid long and unnecessary statements and quickly get to the point. Your thesis (excl. directories and appendix) should comprise between 30 and 50 pages.
- Please make sure that the spelling is correct and the writing style is scientifically concise as well as fluent. Pay attention to a correct citation style (according to the "Leitfaden MAS-Abschlussarbeit" on OLAT). Please use sufficiently described figures. Figures and tables should be self-explanatory and understandable without reference to the thesis.
- Set up your thesis as follows:
  - Title page
  - Abstract following the example of a scientific journal (maximum 100 words)
  - Present thesis assignment
  - Executive summary (maximum 3 pages)
  - Table of contents
  - List of figures and tables
  - Text part
  - Bibliography
  - Appendix
- Hand in your thesis electronically (via OLAT). Take the submission date that you received by email when you downloaded your assignment into account Please make sure that you submit the following documents (zip-file):
  - Title page of the thesis (PDF document)
  - Executive Summary (PDF document): Summary of maximum 3 pages
  - Entire work (LaTex- or Word-file as well as a PDF document thereof)
  - Used data-material
  - Computer code for the replication of your results
  - Electronically saved references (papers in PDF format).

If you wish to receive a physically signed copy back, you must also hand in a printed and bound copy of your work.

If you have any questions, please contact Benjamin Wilding and Manuel Keller, Executive Education Finance, e-mail: benjamin.wilding@execed.uzh.ch and manuel.keller@execed.uzh.ch.

Good work and good luck!

Yours sincerely

University of Zurich
Executive Education Finance

Benjamin Wilding