INDIVIDUAL STUDY PLAN of PhD STUDENT

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Study program	Economic theories
Field of Study	Economics
Start of PhD studies (day of registration for studies)	3.10.2012
Standard term of studies	4 years
Form of studies	Full-time
Institute	IES FSV UK
Tutor	PhDr. Petr Teplý Ph.D.
Tutor's institute	IES FSV UK
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Consultant's institute	---
Consultant's e-mail	---

Title of dissertation:

Alternative risk measures: maximum drawdown and its modifications. Application on portfolio analysis and analysis of hedge funds strategies

Synopsis:

Appropriate measurement of the risk of a given portfolio of financial instruments or a fund is the cornerstone of any portfolio analysis and risk management problem, both in academic research and practical applications. This problem is concerned every time an investment opportunity is being analyzed or performance of existing portfolio or fund is being assessed by any kind of investor, starting from individual ones up to institutional players. Nowadays, one of the most commonly used frameworks for portfolio analysis is so-called mean-variance, or risk-return framework, where statistical variance or standard deviation of expected returns is considered to be the measure of risk. In other words, under this framework the risk is defined as variability of returns. However, a lot of academic researchers along with financial markets practitioners argue that variance approach to risk has its drawbacks, one of them is that it penalizes upside movements of returns equally as downside movements. Alternatively to that approach, several other statistical measures, such as Value at Risk (VaR), Maximum Loss or Maximum Drawdown (MD) were developed. The MD measure is of my particular interest. The Maximum Drawdown is a highest peak to through decline of a considered variable (portfolio or fund returns) over the given period of time. Main advantage of the MD is that it provides measure of maximum decline that the given variable experienced over certain period of time. There is a plethora of academic works studying the Maximum Drawdown measure. For example, Acar and James (1997) in their study analyze the Maximum Loss and Maximum Drawdown in financial markets; Karatzas et al. (1998) developed a study on dynamic measures of risk; Chekhlov et al. (2003) studied the MD measure in portfolio optimization; Alexander and Baptista (2006) in their study introduced a drawdown constraint to the portfolio selection problem. In practice, the MD measure is extensively used by hedge funds managers and commodity trading advisors (CTA).

In my doctoral research I would like to concentrate on application of MD measure and its appropriate modifications to assessing different portfolio selection strategies and strategies of hedge funds. Hedge funds are of a particular interest because much wider set of investment opportunities and strategies is available to them in comparison to other institutional investors, such as pension or mutual funds. Additionally, hedge funds usually have the most aggressively managed portfolios. Before introducing the MD measure to the above stated problem, it is necessary to assess the process underlying the fund's returns development. Or, at least, make an assumption of this process, e.g. that it is a random walk with drift or so. In my Master Thesis I mastered the advanced quantitative and econometric analysis methods. I focused on application of multilayered neural networks (NN) on financial markets data of different frequencies, i.e. high and "normal" frequency data, to model underlying processes. I compared NN's performance to widely used ARMA models as well as to performance of so-called realized measures (realized correlations). NN is a very powerful quantitative analysis tool. It was formally proven that depending on its architecture, NN can approximate any nonlinear function with finite number of discontinuities. Thus I believe that NNs can be utilized within proposed research. Moreover, additional NN's architectures can be introduced during that research. Outputs of the above proposed research can be also tested on the mutual funds.

Basic literature:

Acar, E., and Shane, J.: *Maximum Loss and Maximum Drawdown in Financial Markets*, Unpublished manuscript, 1997

Gordon, A.J., and Baptista, A.M.: *Portfolio Selection with a Drawdown Constraint*, Journal of Banking and Finance 30, pp. 3171-3189, 2006

Ammann, M., Moerth, P.: *Performance of funds of hedge funds,* Journal of Wealth Management 11 (1), 46–63, 2008

Blake, D.: *Financial Markets Analysis,* Wiley. 721 p., 2000

Chekhlov, A., Uryasev, S., and Zabarankin, M.: *Drawdown Measure in Portfolio Optimization,* International Journal of Theoretical and Applied Finance 8, pp. 13-58, 2005

Cogneau, P., and Hübner, G.: "The (more than) 100 ways to measure portfolio performance." Journal of Performance Measurement 13, 56–71, 2009

Cvitanic, J., and Karatzas, I.: *On Dynamic Measures of Risk,* Finance and Stochastic 3, pp. 451-482, 1999

Dichtl, H. and Drobetz, W.: *Portfolio insurance and prospect theory investors: Popularity and optimal design of capital protected financial products,* Journal of Banking & Finance 35, 1683–1697, 2011

Fortin, I., and Hlouskova, J.: *Optimal asset allocation under linear loss aversion*, Journal of Banking & Finance 35(11), 2974-2990, 2011

Grossman, Sanford J., and Zhongquan Zhou: *Optimal Investment Strategies for Controlling Drawdowns,* Mathematical Finance 3, pp. 241-276, 1993

Harding, D., Nakou, G., and Nejjar, A.: *The Pros and Cons of Drawdown as a Statistical Measure of Risk for Investments*, AIMA Journal, April, pp. 16-17, 2003

Hayes, Brian T.: *Maximum Drawdowns of Hedge Funds with Serial Correlation,* Journal of Alternative Investments 8, pp. 26-38, 2006

Leal, Ricardo Pereira Camara, and Beatriz Vaz de Melo Mendes: *Maximum Drawdown: Models and Applications*, Journal of Alternative Investments 7, pp. 83-91, 2005

Lhabitant, Francois-Serge: *Handbook of Hedge Funds,* Wiley finance series. 637 p., 2006

Malik, M., Atiya, A., Pratap, A., and Yaser S. Abu-Mostafa: *On the Maximum Drawdown of a Browninan Motion,* Journal of Applied Probability 41, pp. 147-161, 2004

Nicholas, Joseph G: *Market neutral investing: Long/Short hedge fund Strategies,* Bloomberg press. 265 p,2000

Phillips, Kenneth S, and Cima, Ronald J. Surz: *Hedge Funds: Definitive strategies and techniques*, Wiley finance seris, 2003

Pospisil, L., and Vecer, J.: *PDE Methods for the Maximum Drawdown,* The Journal of Computational Finance 12, pp. 59-76, 2008

Stephanini, F.: *Investment Strategies of Hedge Funds,* Wiley financial series. 336 p., 2006

The form and scope of work:

Dissertation will have 150 to 200 pages

It will have a form of three articles (third article will be added to schedule below when ISP is updated)

Schedule of works on dissertation:

1. year of studies:

WS:

- **Master Thesis:** review and extension of the results of the master thesis, preparation of master thesis for publication (IES WP).

- **PhD thesis:** research of most recent literature, narrowing the reading list and the direction of studies. Preparation of initial datasets for the first part of PhD thesis (sources of information: Thomson Reuters DataStream, Morningstar hedge funds database, S&P Capital IQ, Hedge Funds Research (HFR) database).

SS:

- Beginning of works on the first part of the PhD thesis under the working title "*Alternative risk measures: maximum drawdown and its modifications*".

During the year: start working on the first article (topic to be further specified).

2. year of studies:

- Write-up of the first article (topic to be further specified), publication.
- Beginning of works on the second part of the PhD thesis "*Application of alternative risk measures on portfolio analysis and analysis of hedge funds strategies*".
- GAUK: application for the project *"Alternative risk measures: maximum drawdown and its modifications. Application on portfolio analysis and analysis of hedge funds strategies"*

3. year of studies:

- Finishing the second article, publication.
- Working on the GAUK project.

4. year of studies:

WS:

- Finishing the third article, publication.
- Finishing GAUK project.
- Finishing works. Pre-defense.

SS:

- Defense

Planned date of state doctoral exam:	December 2014
Planned date of pre-defense:	October 2015
Planned date of defense:	May 2016

Publications:

Publications needed for application for defense and state doctoral exam:

Hereby I declare that I will have at least one publication in journal from Scopus database (or in journal with non-zero impact factor) and at least one scientific publication at least on the level of IES Working Papers Series when applying for state doctoral exam.

I also declare that I will have at least two articles published when applying for the defense. At least two of them in the scientific journals form Scopus database (or in journal with non-zero impact factor).

1. year of studies:

- Preparation of the results of the master thesis for submission as IES Working Paper under the title "*Modeling dynamics of correlations between stock markets with high-frequency data*".
- Following reviews from IES WP submission, further work on the article "*Modeling dynamics of correlations between stock markets with high-frequency data",* submission to (successively) Czech Journal of Economics and Finance and Prague Economic Papers.

2. year of studies:

- To be further agreed with tutor

3. year of studies:

- To be further agreed with tutor

4. year of studies:

- To be further agreed with tutor

Exams, subjects (code/ name/ semester /form of completion)**:**

1. year of studies:

ELBF / Economics and Law of Banking and Finance / WS / credits
ELBF / Economics and Law of Banking and Finance /SS / credits

2. year of studies:

ELBF / Economics and Law of Banking and Finance / WS / credits
ELBF / Economics and Law of Banking and Finance /SS / credits

3. year of studies:

ELBF / Economics and Law of Banking and Finance / WS / credits
State doctoral exam / WS
ELBF / Economics and Law of Banking and Finance / SS / credits

4. year of studies:

AAEM / Alternative Approaches to Economic Modeling / WS / credits
Pre-defence / WS
AAEM / Alternative Approaches to Economic Modeling / SS / credits
Defence / SS

Internships and stays abroad:

Grant activities:

Application for three-year grant to competition of Grant Agency of Charles University in Prague (GA UK) with planned topic „Alternative risk measures: maximum drawdown and its modifications. Application on portfolio analysis and analysis of hedge funds strategies" and connection it with amended master thesis being prepared to be published as IES WP.

Application for UCB grant with planned topic related to transition to BASEL III vs. SLOVENCY II and its impact on banks in cooperation with PhDr. Petr Teplý Ph.D.

Conferences:

Other:

- During the course of studies I will participate in bachelor and master theses reviews as opponent
- By 31 May of every academic year I will submit filled in and signed by a tutor Doctoral student evaluation form and Addition to individual study plan, also signed by a tutor, where I will clearly state the plan for doctoral studies for next year.
- I will participate in at least 50% of defenses that will take place at IES FSV UK
- **Planned harmonogram of teaching (code/title/semester)**

2012/2013:
WS: JEM003 Advanced Microeconomics
SS: 1. JEM034 Corporate Finance, JEM092 Portfolio Analysis and Risk Management, JEM036 Financial Markets Instruments II

2013/2014
WS: JEM032 Banking
SS: 1. JEM034 Corporate Finance, JEM092 Portfolio Analysis and Risk Management, JEM036 Financial Markets Instruments II

2014/2015
WS: JEM032 Banking
SS: 1. JEM034 Corporate Finance, JEM092 Portfolio Analysis and Risk Management, JEM036 Financial Markets Instruments II

2015/2016
WS: JEM032 Banking
SS: 1. JEM034 Corporate Finance, JEM092 Portfolio Analysis and Risk Management, JEM036 Financial Markets Instruments II

CLARIFICATION OF INDIVIDUAL STUDY PLAN FOR 1. YEAR OF STUDIES

Work on dissertation:

Beginning of work on dissertation

Work on the first dissertation paper with planned name *„Alternative risk measures: maximum drawdown and its modifications"*

Planned publications:

2012/2013 WS:

Preparation of the results of the master thesis for submission as IES Working Paper under the title "*Modeling dynamics of correlations between stock markets with high-frequency data*".

2012/2013 SS:

Following reviews from IES WP submission, further work on the article "*Modeling dynamics of correlations between stock markets with high-frequency data",* submission to (successively) Czech Journal of Economics and Finance and Prague Economic Papers.

Exams and subjects:

2012/2013
WS: ELBF – Economics and Law of Banking and Finance
SS: ELBF – Economics and Law of Banking and Finance

Internships and stays abroad:

Grant activities:

Application for UCB grant with planned topic related to transition to BASEL III vs. SLOVENCY II and its impact on banks in cooperation with PhDr. Petr Teplý Ph.D.

Conferences:

2012/2013

Planned teaching:

WS: JEM003 Advanced Microeconomics
SS (to be agreed): 1. JEM034 Corporate Finance, JEM092 Portfolio Analysis and Risk Management, JEM036 Financial Markets Instruments II

Other:

- Opposing bachelor and master theses
- By 31 May, 2013 I will submit filled in and signed by a tutor Doctoral student evaluation form and Addition to individual study plan, also signed by a tutor, where I will clearly state the plan for doctoral studies for next year.
- WS and SS: Participation at defenses (at least 50%)

Tutor **Doctoral student**

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In .....on..... **In .....on.....**

Approved by academic board of doctoral study program ……..

Date of approval ……..

Head of academic board

…….

In …….. on……..