CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

individual study plan
of doctoral student

Plan ID 16101

Student

Name	**Periklis Brakatsoulas**
E-mail	**41517993@fsv.cuni.cz**
Faculty	**Faculty of Social Sciences**
Study programme	**Economics and Finance (P0311D050002)**
Původní studijní program	**Economic Theory (P6201)**
Původní studijní obor	**Economics (6201V004)**
Datum změny studijního programu	**01.11.2019**
Standard length of the study (number of years)	**4**
Form of study	**full-time**
Date of commencement of doctoral study	**24.09.2018**

Study programme guarantor and Chair of subject area board

Name	**prof. Ing. Evžen Kočenda, M.A., Ph.D., DSc.**

Supervisor

Name	**PhDr. Mgr. Jiří Kukačka, Ph.D.**
E-mail	**jiri.kukacka@fsv.cuni.cz**
Department / Institute	**Institute of Economic Studies (23-IES)**

Doctoral dissertation

Title of thesis
Behavioral Finance-based Optimal Portfolio Allocation: Linkages to Market Risk

Progress on the doctoral dissertation

Synopsis:

Recent empirical research shows a growing interest in investment decision-making under market anomalies that contradict the rational paradigm. Momentum is undoubtedly one of the most robust anomalies in the empirical asset pricing research and remains surprisingly lucrative ever since Jegadeesh & Titman (1993) first documented it. Momentum-related strategies have achieved widespread use around stock price accelerations. Several static and dynamic asset pricing models have been developed to capture momentum patterns in expected stock returns and across different market regions. Fama and French (1993) use book-to-market and size to proxy for sensitivity to common risk factors in excess returns. Although the model captures the size and value patterns in post-1962 U.S. average stock returns better than the capital asset pricing model (CAPM), it is an incomplete description of expected returns and fails to absorb all momentum patterns identified in the U.S. stock market returns over medium-term intervals (Avramov and Chordia 2006). Carhart (1997) augments the FF three-factor model with a momentum factor, defined as the difference in returns between past winners and past losers portfolios. From the most recent contributions, Fama and French (2015) examine cross-sectional variation in stock returns augmenting the three-factor asset pricing model (Fama and French 1993) with profitability and investment factors. Three, four and five-factor regressions suggest that the five-factor model performs better when measuring abnormal returns towards firm size, profitability, book-to-market and investment patterns.

While literature expands relatively slow to different asset classes, there is evidence to suggest that momentum return premia demonstrate consistency across various liquid instruments and markets. Similar effects are now found in many equity markets (Griffin, Ji, and Martin 2003; Chui, Wei, and Titman 2010), country equity indices (Asness, Liew, and Stevens 1997; Bhojraj and Swaminathan 2006), bonds and commodities (Asness, Moskowitz, and Pedersen 2013) and currencies (Lettau, Maggiori and Weber 2014).

Asset price distortions violate the Efficient Market Hypothesis (EMH) assumptions. Size, value and calendar effects reflect only some market anomalies contradicting asset pricing theory (Fama and French 2012; Sutheebanjard and Premchaiswadi 2010). These phenomena appear to lose their predictive power once they fully reflect public information and often disappear, reverse or weaken (Sharma 2014). To test whether the dependence of consecutive observations dies out slowly across time, Gunduz and Kaya (2016) study the long memory properties of sovereign CDS spread changes for 10 European Union countries. Long memory behavior implies strong predictability on price-distorted assets that do not reflect trustworthy information anymore. The authors conclude that price discovery processes for sovereign CDS markets do satisfy the minimum requirements over weak market efficiency. Consequently, recent spread changes do not depend on past realizations. Academic work related to credit derivative liquidity effects and long memory behavior is very young and limited due to data restrictions (Bongaerts & Driessen, 2011; Tang & Wang, 2014).

This proposal is motivated by: a) the most recent developments and trends related to market behavioural biases heuristics and asset allocation decision-making and b) Prof. Richard H. Thaller's work who has been awarded the 2017 Nobel Memorial Prize in Economics for his contribution to behavioural economics (Roni, Thaler and Womack 1995; Thaler 1999; Lamont and Thaler 2003).

Excess returns cannot be explained in terms of CAPM risk alone or time-varying risk, serial covariance, size and lead-lag effects in the underlying factor structure. Alternative factors seem to capture medium and long-term momentum effects to a greater extent. Asset pricing models ignore however risk losses due to interest rates, foreign exchange rates and market volatility; which in turn assumes complete purchasing power parity, vetoes hedging against exchange or interest rate risk and fails to extend for different macroeconomic scenarios (Fama and French 2012).

Although predominantly phenomenona identified across equity markets, momentum premia are now evident across more asset classes. Yet few many attempts are made so far to provide traders a diversified portfolio of strategies across different assets and markets. Moreover, literature focuses on patterns from past returns rather than mechanisms to signal future price directions prior momentum runs.

The aim of this dissertation is to suggest a diversified portfolio approach to price distortion signals using daily position data on stocks, credit derivatives and bonds. An algorithm will allocate assets periodically and new investment tactics will take over upon price momentum signals (among other market anomalies) and across different ranking groups. Our approach should manage to forthcoming medium-term price accelerations advising agents when to reduce holdings or take the opposite position before it reverses.

Selective list of references:

Ang, A., G. Bekaert, and M. Wei. 2013. "Systematic sovereign credit risk: Lessons from the U.S. and Europe." Journal of Monetary Economics 493-510.

Ang, A., G. Bekaert, and M. Wei. 2008. "Term structure of real rates and expected inflation." Journal of Finance 761-797.

Asness, C. S., J. M. Liew, and R. L. Stevens. 1997. "Parallels Between the Cross-Sectional Predictability of Stock and Country Returns." The Journal of Portfolio Management 79-87.

Asness, C., T. J. Moskowitz, and L. H. Pedersen. 2013. "Value and momentum everywhere." The Journal of Finance.

Augustin, P. 2014. "Sovereign Credit Default Swap Premia." Forthcoming, Journal of Investment Management.

Avramov, D., and T. Chordia. 2006. "Asset pricing models and financial market anomalies." Review of Financial Studies 1001-1040.

Bhojraj, S., and B. Swaminathan. 2006. "Macromomentum: Returns Predictability in International Equity Indices." The Journal of Business 429-451.

Bocchio, C., J. M. Licari, O. Loiseau-Aslanidi, and A. Tsharakyan. 2015. Stressed Scenarios and Linkages to Market Risk Instruments. Moody's Analytics.

Bongaerts, J. D., and J. J. Driessen. 2011. "Derivative pricing with liquidity risk: Theory." The Journal of Finance 203-240.

Boyarchenko, N., A. Fuster, and D. Lucca. 2015. Understanding mortgage spreads. New York: FRB of New York.

Carhart, M. M. 1997. "On Persistence in Mutual Fund Performance." The Journal of Finance 57-82.

Chan, L. K.C., N. Jegadeesh, and J. Lakonishok. 1996. "Momentum Strategies." The Journal of Finance 1681-1713.

Chui, A. C.W., S. Titman, and K. C.J. Wei. 2010. "Individualism and momentum around the world." Journal of Finance 361–392.

Fama, E. F., and K. R. French. 2015. "A five-factor asset pricing model." Journal of Financial Economics 1-22.

Fama, E. F., and K. R. French. 2012. "Size, value, and momentum in international stock returns." Journal of Financial Economics 457–472.

Gündüz, Y., and O. Kaya. 2016. Sovereign Default Swap Market Efficiency and Country Risk in the Eurozone. Discussion Paper, Frankfurt: Bundesbank.

Garratt, A., and K. Lee. 2010. "Investing under model uncertainty: Decision based evaluation of exchange rate forecasts in the US, UK and Japan." Journal of International Money and Finance 403-422.

Griffin, J. M., X. Ji, and J. S. Martin. 2003. "Momentum investing and business cycle risk: evidence from pole to pole." Journal of Finance 2515–2547.

Hancock, D., and W. Passmore. 2011. "Did the Federal Reserves's MBS purchase program lower mortgage rates?" Journal of Monetary 498-514.

Lamont, O., and R. H. Thaler. 2003. "Can the Stock Market Add and Subtract? Mispricing in Tech Stock Carve-Outs." Journal of Political Economy 227-268.

Lettau, M., M. Maggiori , and M. Weber. 2014. "Conditional risk premia in currency markets and other asset classes." Journal of Financial Economics 197–225.

Licari, J. M., O. Loiseau-Aslanidi, and D. Vikhrov. 2017. Dynamic Model-Building: A Proposed Variable Selection Algorithm. Moody's Analytics.

Moskowitz, T. J., Y. H. Ooi, and L. H. Pedersen. 2012. "Time series momentum." Journal of Financial Economics 228-250.

Roni, M., R. H. Thaler, and K. Womack. 1995. "Price Reactions to Dividend Initiations and Omissions: Overreaction or Drift?" Journal of Finance 573-608.

Rouwenhorst, K. G. 1998. "International momentum strategies." Journal of Finance 267–284.

Sharma, A. K. 2014. "Stock market anomalies: A challenge of efficient market hypothesis." International Journal of Trends in Finance 222-230.

Subrahmanyam, M. G., D. Y. Tang, and S. Q. Wang. 2014. "Does the Tail Wag the Dog?: The Effect of Credit Default Swaps on Credit Risk." The Review of Financial Studies 2927–2960.

Sutheebanjard, P., and W. Premchaiswadi. 2010. "Analysis of Calendar Effects: Day-of-the-Week Effect on the Stock Exchange of Thailand (SET)." International Journal of Trade, Economics and Finance 57-62.

Thaler, R. H. 1999. "The End of Behavioural Finance." Financial Analysts Journal 12-17.

Form and scope of the dissertation:

The dissertation will have between 100 and 200 standard pages.

For all three research papers outlined below, we propose a two-stage modeling process (Bocchio, et al. 2015). First, we will generate forecasts on core macroeconomic variables. Secondly, satellite models will generate market risk forecasts using the core driver projections generated at the first stage as input. We aim to perform principal component analysis across a number of instruments suggested by economic theory and extended to variables that capture potentially market disconnectedness and spillover effects. We can explore here various model candidates to estimate the aforementioned relationship. The autoregressive conditional heteroscedasticity process (Engle 1982) and generalized ARCH process (Bollerslev 1986) model asset returns and volatilities producing reliable estimates especially for volatility clustering in high frequencies. This applies especially to stocks, exchange rates and interest rates. Extended versions include TARCH and EGARCH model specifications allowing different behavior for positive than negative shocks. IGARCH allows for permanent volatility shocks while GARCH in mean allows volatility to directly influence asset market mean returns.

On the model selection procedure, we propose the development of an algorithm for dynamic model building in line with prior economic expectations and assumptions and consistent with IFRS9 regulatory demands (Licari, Loiseau-Aslanidi and Vikhrov 2017). The optimal combinations, among a customized subset of candidates, will depend on user-defined correlation and selection criteria such as estimated signs based on economic intuition and statistical significance thresholds. The models will be validated on measures of in-sample fit and predictive ability and will be then sorted according to the chosen ranking criteria. While models built upon pure data-mining techniques appear to fit data history well, they often fail to meet regulatory requirements. A fully integrated empirical approach should combine both statistical rigor and economic theory.

2018/2019

- Work on my first dissertation article: "Filtering Momentum life cycles, Price acceleration signals and Trend Reversals for stocks, credit derivatives and bonds" (working title). Research will focus on developing methods to filter momentum life cycles, price acceleration signals and trend reversals for stocks, credit derivatives and bonds. The main effort here will concentrate on the density, time span and maturity of momentum phenomena to identify consistent patterns over time and measure the predictive power of buy-sell signals generated by these anomalies. Moreover, we will test the dependence of consecutive observations across time and for each portfolio instrument since long memory behavior in volatilities of one market may trigger persistent volatility patterns in another market. We believe that this is the first work that employs evidence of volatility transmissions among derivatives, equities and bonds (long memory) to identify momentum life cycle patterns.
- Submission of Grant Agency of Charles University (GAUK) application for three years grant related to my project "Behavioural Finance-based Optimal Portfolio Allocation: Linkages to Market Risk".

2019/2020
- Work on my second dissertation article: "Behavioural Finance-based Optimal Portfolio Allocation and Momentum Life Cycle Signals: Linkages to Market Risk". Research will focus on the current empirical asset pricing literature and development of several diversified portfolios of strategies across asset classes and markets. A custom-built model selection algorithm will decide on the optimal variable output for each type of instrument. Alternative model settings and estimates will be assessed against benchmark samples. The models will re calibrate periodically adding history, improving performance and potentially affecting selection criteria. The method will reallocate portfolio assets and new investment tactics will take over based on the most recent scenarios.
- Update and re-submission of GAUK application for three years grant related to my project "Behavioural Finance-based Optimal Portfolio Allocation: Linkages to Market Risk" in case the first submission (2018/2019) is not successful.
2020/2021
- Work on my third dissertation article: "Behavioural Finance-based Optimal Portfolio Allocation and market anomalies: Linkages to Market Risk". In the third research paper we will extend the previous framework to address a much broader scope of empirical phenomena resisting market efficiency. The main effort will concentrate this time on cyclical anomalies (often described as seasonal or calendar effects), lagged reactions to credit rating announcements and value versus growth investing. So far there is no attempt made in the literature to examine similar cases in credit derivatives and bonds markets. This work aims to provide agents with a highly diversified portfolio of strategies related to various market anomalies and across different assets and geographies. Our tool targets to signal future price directions prior return distortions and advice agents when to reduce or increase holdings.
- Re-submission of GAUK application for two years grant related to my project "Behavioural Finance-based Optimal Portfolio Allocation: Linkages to Market Risk" in case the first submission (2019/2020) is not successful.
2021/2022
- Write my final dissertation thesis (combining all three articles).
- Dissertation pre-defense.
- Dissertation defense.
* The data source for all proxy measures will be Bloomberg and Thomson Reuters.

State doctoral examination and doctoral thesis defence

Course of study

Schedule date of the state doctoral examination: November 2020
Schedule date of the pre-defense: November 2021
Schedule date of the defense of the dissertation: May 2022

Duties – study plan

Type	Code	Title, details	Ac. year
Course	JED414	Quantitative Methods I	2018/2019
Course	JED415	Quantitative Methods II	2018/2019
Course	JED412	Winter Semester Nonlinear Dynamic Economic Systems: Theory and Applications	2018/2019
Course	JED414	Quantitative Methods in Macroeconomics and Finance I	2019/2020
Course	JED415	Quantitative Methods in Macroeconomics and Finance II	2019/2020
Course	JED412	Winter Semester Nonlinear Dynamic Economic Systems: Theory and Applications	2019/2020
Course	JED414	Quantitative Methods I	2020/2021
Course	JED415	Quantitative Methods in Macroeconomics and Finance II	2020/2021
Course	JED412	Advanced Financial Econometrics I	2020/2021
Course	JED414	Quantitative Methods I	2021/2022
Course	JED415	Quantitative Methods in Macroeconomics and Finance II	2021/2022
Course	JED412	Advanced Financial Econometrics I	2021/2022
Course	JED511	Teaching Assistantship (Full) A	2018/2019
Course	JED511	Teaching Assistantship (Full) A	2018/2019
Course	JED511	Teaching Assistantship (Full) A	2019/2020
Course	JED511	Teaching Assistantship (Full) A	2019/2020
Course	JED511	Teaching Assistantship (Full) A	2020/2021
Course	JED511	Teaching Assistantship (Full) A	2020/2021
Course	JED511	Teaching Assistantship (Full) A	2021/2022
Course	JED511	Teaching Assistantship (Full) A	2021/2022
Academic teaching	---	Data Science with R (JEM181) Teaching Assistantship Full (A) Note: Under discussion with doc. PhDr. Ladislav Krištoufek Ph.D.	2018/2019
Academic teaching	---	Introductory Econometrics (JEM062) Teaching Assistantship Full (A)	2018/2019
Publication	---	Filtering Momentum life cycles, Price acceleration signals and Trend Reversals for stocks, credit derivatives and bonds Expected submission of the first paper to IES WP in May 2019. Final submission between September and October 2019 in one of the following journals (listed in dissenting order and according to the Article Influence Score published in the Web of Science): Banking and Finance (B), Quantitative Finance (C), Empirical Finance(C) and Computational Finance (D).	2018/2019
Other	---	BT and MT refereeing I will serve as an opponent of Bachelor and Master theses.	2018/2019
Other	---	Defences I will attend at least 50% of dissertation defences held at the IES FSV UK.	2018/2019
Other	---	Grants Submission of application for three years grant related to my project "Behavioural Finance-based Optimal Portfolio Allocation: Linkages to Market Risk" to competition of Grant Agency of Charles University (GAUK).	2018/2019
Other	---	Study documents By May 31st 2019, I will deliver my "Annual assessment of fulfilling the ISP" and "Supplement" in which I will further specify the intended course of my doctoral studies over the following academic year. In case of terminating/interrupting my studies, I will fill in the aforementioned documents for the upcoming academic year within a month from the end of my study interruption period.	2018/2019
Other	---	Teacher Education Seminar for Ph.D. Students I will attend the teacher education seminar.	2018/2019

Type	Code	Title, details	Ac. year
Academic teaching	---	Data Science with R (JEM181) Teaching Assistantship Full (A) Note: Under discussion with doc. PhDr. Ladislav Krištoufek Ph.D.	2019/2020
Academic teaching	---	Introductory Econometrics (JEM062) Teaching Assistantship (Full) A	2019/2020
Publication	---	Behavioural Finance-based Optimal Portfolio Allocation and Momentum Life Cycle Signals: Linkages to Market Risk Expected submission of the second paper to IES WP in May 2020. Final submission at the second half of 2020 in one of the following journals (listed in dissenting order and according to the Article Influence Score published in the Web of Science): Financial Econometrics (B), Banking and Finance (B), Quantitative Finance (C), Computational Finance (D).	2019/2020
Academic teaching	---	Data Science with R (JEM181) Teaching Assistantship Full (A) Note: Under discussion with doc. PhDr. Ladislav Krištoufek Ph.D.	2020/2021
Academic teaching	---	Introductory Econometrics (JEM062) Teaching Assistantship Full (A)	2020/2021
Publication	---	Behavioural Finance-based Optimal Portfolio Allocation and market anomalies: Linkages to Market Risk Final submission of the third paper at the second half of 2021 in one of the following journals (listed in dissenting order and according to the Article Influence Score published in the Web of Science): Financial Markets (A), Financial Econometrics (B), Banking and Finance (B), Quantitative Finance (C).	2020/2021
Academic teaching	---	Data Science with R (JEM181) Teaching Assistantship Full (A) Note: Under discussion with doc. PhDr. Ladislav Krištoufek Ph.D.	2021/2022
Academic teaching	---	Introductory Econometrics (JEM062) Teaching Assistantship (Full) A	2021/2022
Conference	---	Conferences By the end of my academic studies, I will actively participate in two, at least, international scientific conferences. Proposed conferences for 2019: 1. Computing in Economics and Finance (CEF) 2019: The Society for Computational Economics; 25th International Conference; Carleton University, Ottawa, Canada http://comp-econ.org/CEF_2019/ 2. Computational and Financial Econometrics (CFEnetwork) 2019; 13th International Conference (forthcoming) http://cfenetwork.org/conferences.php 3. ICCFAT 2019: 21st International Conference on Computational Finance and Algorithmic Trading; Stockholm, Sweden https://waset.org/conference/2019/07/stockholm/ICCFAT	2021/2022

* Supplementary duties were added to the plan in the course of study.

Duties specific for the field of study

Publications and other study duties required to register for the state doctoral exam and defense:
By the end of the 3rd year I enrol for the state doctoral exam (SDE) so that I pass the SDE not later than by the end of the 4th year. Not later than two months before the SDE I deliver all materials demonstrating compliance with the conditions for admission to the SDE, i.e. having published or accepted for publication (in that case I attach the postprint and a well verifiable confirmation of acceptance for publication) at least one article in a scientific journal included in the Scopus database (or in a journal with a nonzero impact factor from SSCI, SCI databases) and at least one scientific article in a series of at least IES Working Papers Series quality, two grant activities (according to the rules defined by the Doctoral Council), at least four semesters of Doctoral seminars passed, and at least four “Teaching Assistantships” (TAs) in at least two different classes. I also commit myself to fulfil further special requirements that were specified by the Doctoral Council (if there are any) and attendance at the dissertation defenses in the minimum average participation of 25% of the defenses for the whole period of my studies.
At the time of submission of my application to the predefense as well as to the defense of the dissertation I commit myself to have published or accepted for publication at least two articles in scientific journals included in the Scopus database (or in journals with a nonzero impact factor from SSCI, SCI databases). I further commit myself to have 8 TAs fulfilled. At the time of submission of my application to the predefense I commit myself to have my dissertation at least in the following form. At least one dissertation article is complete, the second is almost complete, and the third is “in progress”. For the third “in progress” article at least the structure, methodology, and objective are clear, and a significant work on it has already been done. Only articles accepted for publication when the student studies the PhD at the IES will fulfil these conditions. At the same time, the articles have to be affiliated to the IES FSV UK.
Only articles in Economics, Finance and closely related fields will be accepted.
Obligations in case of a study stay: In case of a study visit/stay, I will apologise in advance to the coordinator of dissertation defenses so that my the absence could be excused. I will also in advance send a request to the Doctoral Council for possible consideration of study requirements, which I plan to fulfil during my visit/stay.

BT and MT opponency:
Throughout the entire duration of my study I will serve as an opponent of Bachelor's and Master's theses.

Study documents:
Till May 31 of this academic year, I deliver my "Annual assessment of fulfilling the ISP" + "Supplement", in which I further specify the intended course of my doctoral studies in the next academic year. Once my "Annual assessment of fulfilling the ISP" + "Supplement" is evaluated by the Doctoral Council in SIS, I will print it, sign it, arrange my supervisor's signature and deliver it to the liable CDS member by the set date. In case of terminating my study interruption I will fill in the required documents ("Annual assessment of fulfilling the ISP" + "Supplement" for the next academic year) within a month from the end of my study interruption period.

Defenses:
I will visit at least 50% of dissertation defenses held at the IES FSV UK.

Approval of plan

Supervisor	Student
PhDr. Mgr. Jiří Kukačka, Ph.D.	Periklis Brakatsoulas
30.10.2018	30.10.2018

Approved by CDS.

Approved by Subject Area Board of doctoral study programme (field of study) on: .....

Chair of Subject Area Board	Study programme guarantor
prof. Ing. Evžen Kočenda, M.A., Ph.D., DSc.	prof. Ing. Evžen Kočenda, M.A., Ph.D., DSc.
31.10.2018	31.10.2018