**Aktion Österreich-Tschechien, Semester- und Jahresstipendien**
**Aktion Austria – Czech Republic, semester and one-year scholarships**

# SCHOLARSHIP REPORT

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Home university: **Charles University in Prague**

Host university: **Vienna University of Technology**

Host institution: **Institute of Statistics and Probability Theory**

Date of stay: **Summer term 2012**

In the following document, I would like to give the detailed description of my stay at Vienna University of Technology. As my field of study is financial mathematics, we have decided together with my master thesis super- visor Dr. Jitka Zichova from the Chair of Probability and Mathematical Statistics, Faculty of Mathematics and Physics, Charles University in Prague, for one semester stay at Vienna University of Technology to visit lectures and libraries and to collect materials related to my master thesis. I am in the first year of my master studies, which I would like to finish next year 2013 in the summer. As my field of studies is Financial mathematics, the topic of my master Theses is : *„Modeling of non-stationary financial time series."* I was given the stipendium from OeAD Vienna for three month, to work on my master theses here in Vienna.

I arrived to Vienna at 1.3.2012. The same day as the semester at TU Wien began. From that day I visited lectures of subject *Stationary Stochastic Processes and Time Series Analysis*. The lectures were given by Ao.Uni- v.Prof. Wolfgang Scherrer. The lecture handles with the basic concept of stochastic Processes as models for Time Series. The modeling of time series is taken from both time and frequency point of view. I was also permitted to vis- it the tutorials to this subject, which enabled me to be much more involved in the topic. It also helped me, to get in touch with other students of this field of Statistics, which was of much use in my further residence and also social contact in Vienna.

Next week after my arrival I found another two very useful lectures related to my master thesis. These two lectures I found at University of Vienna. First of them, *the Multivariate Time series Analysis* handles exactly with the topic of my master theses. From the basic concept of multivariate time series to the quite new and useful theory of cointegration and error correction models. In my master thesis, we concentrate on the models of time series applicable to financial data. Such time series are representations of non-stationary processes with varying mean and variability. In financial analyses, we often observe several variables in time, e.g. interest rates, inflation, GDP. This leads to the concept of multiple time series and their modeling. This lecture was given by Univ-Prof. Dipl.- lng. Dr.Reschenhofer. Beside the topics given on the lectures of this subject, I was very pleased to find out his homepage being a very useful source of information related the topic of my thesis, for example materials explain- ing the linear VARMA models, which I used for the theoretical part of my master thesis. The most important part of my thesis refers to so called cointegration effect, which means that appropriate linear combination of several uni- variate non-stationary time series creates a stationary time series. From practical point of view, cointegration means that some particular series are connected via their common trend i.e. that their development in a long time horizon converges to the same stable state. During the lectures with Prof. Reschenhofer, we had not only learned the theoretical basis of multivariate time series, but also worked with real, mostly financial databases, like GDP, In- flation or returns on Stock markets. For this practical part of lecture we used statistical software R. The knowledge acquired in this lecture will enrich the practical part of my master thesis where I started to work with multiple mac- roeconomic time series applying the modeling procedures which I have learned during the lectures and tutorials.

Besides visiting the lectures I also visited libraries regularly. I visited the library in main building of University of Vienna and the library of University of Technology. The literature I worked with was recommended to me from prof. Reschenhofer. For instance I worked with these titles: *Hamilton, J.D.: Time Series Analysis, Brockwell, P.J. Time Series: Theory and Methods, Campbell, J.Y. The econometrics of Financial Markets, H.LOtkepohl: New Introduction to Multiple Time Series Analysis.*

Using the materials and notes from lectures and consultations with my professors and the literature mentioned above, I have collected material for my thesis. I have worked on my thesis and made a solid concept of the theoretical part of the thesis as well as I have learned to work with data from economical praxis, which I uses in the practical part of my thesis. In next months, I plan to work further with my thesis and to build upon the material I have collected during my stay to give my thesis a final form.

Furthermore, I would like to say, that my residence here in Vienna would never be so useful for me without the help of my residence supervisor Ao. Univ.-Prof. Dipl.-lng. Dr.techn.Peter Filzmoser who helped me during my stay and gave me very useful advices regarding the choice of lectures and Professors with whom I then consulted my master thesis topic. Prof. Filzmoser helped me very much with my questions how the system of lectures works and was there for me always when I needed help.

During my stay in Vienna I also enjoyed the city with its specific culture, beautiful architecture and cultural events in the Vienna State Opera. I treasure the experience I earned during my one-term residence here.

In the end, I would like to thank the Aktion: Czech- Austria Stipendiumprogram, for giving me the chance to stay one term here at Vienna University of Technology and to visit the lectures on the topic of my master theses and visit libraries, where I found additional information to more specific parts of the topics given in the lectures. I have collected material for my master theses and I have made progress with my thesis during the stay here in Vienna. Besides that, I had the chance to visit the beautiful city of Vienna and to get to know the Austria culture and history much better than I did before. I would also like to thank very much to my supervisor Ao. Univ.-Prof. Dipl.- lng. Dr.techn.Peter Filzmoser for his help during my stay in Vienna.