

Cass Business School
Faculty of Finance
106 Bunhill Row
London
EC1Y 8TZ

Jan Novotny

jnovotny@cerge-ei.cz
<http://home.cerge-ei.cz/jnovotny/>
+44-779-443-7983 (UK Mobile)
+420-728-851-046 (CZ Mobile)

DATE OF BIRTH 05/25/1982

CITIZENSHIP Czech Republic

EDUCATION

- Ph.D. Economics, CERGE-EI, Charles University, Prague, February 2012
DISSERTATION: Essays on the Effective Market Dynamics
Faculty of Nuclear Sciences and Engineering, Czech Technical University (All but dissertation)
TOPIC: The Covariant Description of Three-Nucleon Systems (2005 – 2011)
- M.A. Economics, CERGE-EI, Charles University, Prague, 2009
- M.Sc. Nuclear Physics, Czech Technical University, Prague, 2005

FIELDS OF RESEARCH

Quantitative Finance, Time Series Econometrics, Numerical Methods, Counterparty Credit Risk

TEACHING IN ECONOMICS AND PHYSICS

- 2011 – now Money, Banking and Financial Markets (Spring semester)
Instructor: College of Polytechnics, Jihlava, CR; Undergraduate level (approx. 180)
- 2009 – 2010 Advanced Lectures in Econometrics (Spring semester)
Instructor: University of South Bohemia, C. Budejovice, CR; Graduate level (approx. 30)
- 2006 – 2011 Numerical Methods in Quantum Physics I & II
Instructor: Czech University, Prague; Graduate level (approx. 10)
- 2006 – 2011 Quantum Physics II
Teaching assistant: Czech University, Prague; Graduate level (approx. 15)
- 2005 – 2007 Quantum Mechanics I; Thermal theory; Wave Theory, Optics and Atomic Physics
Teaching assistant: Czech University, Prague; Undergraduate level (each approx. 30)

PROFESSIONAL EXPERIENCE

- 2012 – now Postdoctoral Research Fellow at Cass Business School, London. Marie Curie IEF Fellowship.
- 2012 Postdoctoral Research Fellows at Manchester Business School.
- 2011 – now Quantum Finance CZ, Ltd., Owner, Consultancy with focus on financial engineering and quantitative analysis.
- 2009 – now CERGE-EI, Prague, Research Assistant (formerly) and Research Fellow (with Prof. Hanousek).
- 2011 Generali Holding and CERGE-EI, Prague, Developing pricing policy for car insurance in Poland.
- Spring 2011 National Economic Council, Czech Republic, Consultant, Consultancy on Anti-corruption measures.
- Spring 2011 AZPIRO, Prague, Analyst, Developing trading algorithms for stock markets in the Visegrad region.
- 2002 – 2011 Academy of Sciences of the Czech Republic, Nuclear Physics Institute, Rez near Prague, Junior Researcher.
- 2009 – 2010 University of Pennsylvania, Visiting Researcher.
- Fall 2008 National Technical Institute, Mexico City, Visiting Researcher.

GRANTS

- 2012 – now Principal Researcher: Price jump dynamics and evolution of market panic
Marie Curie IEF Fellowship No. 302098
- 2012 – now Supervisor: Tobin Tax and Market Irrationality, Volatility and Liquidity
Grant Agency of Charles University (for students), No. 586112
- 2012 – now Consultant: General description of structural breaks in economy using ABMs
Grant Agency of Czech Academy of Sciences, P402/12/2255
- 2011 – now Consultant: Information Flow Dynamics and Volatility Spillovers over Financial Markets
Grant Agency of Czech Academy of Sciences, No. 403/11/0020
- 2011 Principal Researcher: Price Shocks Dynamics
Grant Agency of Charles University, No. 271111
- 2009 – 2011 Researcher: Corporate Performance, Behavior and Ownership Structures in the Czech Firms
Grant Agency of Czech Academy of Sciences, No. 402/09/1595
- 2008 – 2010 Researcher: Theory and Empirics of the Intra-Day Data Approach
Grant Agency of Czech Academy of Sciences, No. 402/08/1376
- 2003 – 2010 Student researcher in several grants in experimental and theoretical nuclear physics.

AWARDS, FELLOWSHIPS AND SCHOLARSHIPS

- 2011 – 2012 Teaching Fellowship
- 2009 – 2011 Schroder Family Scholarship
- 2004 First Prize of the director of Nuclear Physics Institute for HADES group (member)
- 2003 – 2005 Merit scholarship

CONFERENCE PRESENTATIONS:

The Identification of Price Jumps:

- Financial Frontiers, Warwick, 09/2012
- Mathematical Methods in Economics, Karvina, 09/2012
- Econometric Society Australasian Meeting, Melbourne, 07/2012
- The London/Prague Seminar Series on Financial Markets, London, 03/2012

Were Stocks During the Crisis More Jumpy: A Comparative Study

- Mathematical Methods in Economics, Janska Dolina, Slovakia, 09/2011
- Warsaw International Economic Meeting, Warsaw, Poland, 07/2011
- MFS Annual Conference, Rome, Italy, 06/2011
- Prague Economic Meeting, Prague, Czech Republic, 06/2011
- RCMFI Workshop, Crete, Greece, 06/2011

Stability of Economic Systems under Exogenous Structural Shocks

- CCSS2011, ETH Zurich, Switzerland, 06/2011

Price Jumps in Visegrad Country Stock Markets: An Empirical Analysis

- 6th CSE Biennial Conference, Prague, Czech Republic 11/2010
- Mathematical Methods in Economics, Kostelec upon Black Woods, Czech Republic. 9/2009

JOURNAL ARTICLES AND WORKING PAPERS:

The Identification of Price Jumps: Stock Market Indices During the Crisis

(with J. Hanousek and E. Kocenda)

(technical parts published as J. Hanousek, E. Kocenda, J. N., The Identification of Price Jumps, *Monte Carlo Methods and Applications*, Vol. 18, Issue 1, pp 53-77, 2012)

(Economic arguments as revise and resubmit in *Journal of Financial Econometrics*.)

Performs an extensive simulation study to compare the relative performance of many price-jump indicators with respect to false positive and false negative probabilities. We simulated twenty different time series specifications with different intraday noise volatility patterns and price-jump specifications. The double McNemar non-parametric test (McNemar, 1947) has been applied on constructed artificial time series to compare fourteen different price-jump indicators that are widely used in the literature. The results suggest large differences in terms of performance among the indicators, but we identified the best-performing indicators. In the case of false positive probability, the best-performing price-jump indicator is based on thresholding with respect to centiles. In the case of false negative probability, the best indicator is based on bipower variation. Then, we applied all price jump indicators to estimate the price jumps for nine stock market indices using 5-minute data for years from 2007 to 2010. Results show that the price jump indicators tend to group in clusters with close numbers of estimated price jumps per month. However, the overlap of the identified price jumps inside a cluster is rather low, which confirms their different real performance.

Price Jumps in Visegrad Country Stock Markets: An Empirical Analysis

(with J. Hanousek, *Emerging Markets Review*, Vol 13, Issue 2, pp 184-201, 2012)

Employs high frequency data to study significant price changes in the Prague, Warsaw, Budapest and Frankfurt stock market indexes from June, 2003 to December 2010. We use the price jump index and normalized returns to analyze the distribution of extreme returns. The comparison of jump distributions across different frequencies, periods, up and down moves, and markets suggests a possible relationship with market micro-structure. Namely, low turnover and very tolerant margin trading makes the behavior of the PX index significantly deviate from the rest of the stock indices. We also show that the recent financial crisis resulted an overall increase in volatility; however, this was not translated into an increase in the absolute number of jumps.

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Employment, Production and Consumption Model: Patterns of Phase Transition

(with H. Lavicka and L. Lin) in *Physica A*, 389(8), pp 1708-20, 2010.

We simulate a model of Employment, Production and Consumption (EPC) using Monte Carlo. The EPC model is an agent-based model that mimics very basic rules of industrial economy. From the perspective of physics, the nature of the interactions in the EPC model represents multi-agent interactions where the relations among agents follow the key laws for circulation of capital and money. Monte Carlo simulations of the stochastic model reveal phase transition in the model economy. The two phases are the phase with full unemployment and the phase with nearly full employment. The economy switches between these two states suddenly as a reaction to a slight variation in the exogenous parameter. Thus, the system exhibits strong non-linear behavior as a response to the change of the exogenous parameters.

Were Stocks during the Crisis More Jumpy?: A Comparative Study

(CERGE-EI Working Paper Series No. 416, 2010)

This paper empirically analyzes the price jump behavior of heavily traded US stocks during the recent financial crisis. Namely, I test the hypothesis that the recent financial turmoil caused no change in the price jump behavior. To accomplish this, I employ data on realized trades for 16 stocks and one ETF from the NYSE database. These data are at a 1-minute frequency and span the period from January 2008 to the end of July 2009, where the recent financial crisis is generally understood to start with the plunge of Lehman Brothers shares on September 9, 2008. I employ five model-independent and three model-dependent price jump indicators to robustly assess the price jump behavior. The results confirm an increase in overall volatility during the recent financial crisis; however, the results cannot reject the hypothesis that there was no change in price jump behavior in the data during the financial crisis.

For publications other than in Economics see my web page: <http://home.cerge-ei.cz/jnovotny/papers.html>

RESEARCH IN PROGRESS

Co-arrivals and co-jumps (with G. Urga)

Focuses on the econometric description of the price jumps in the multivariate time series. It aims to develop techniques to identify patterns of the price jumps in the portfolio assets—stocks or foreign currency pairs—and explain it with respect to the economic environment. The description is done using the high frequency and ultra-high frequency data, where the micro-structure noise has to be treated. The project also targets the multivariate and statistically improved price jump indicators.

Price Jump Dynamics (with J. Hanousek and E. Kocenda)

This project aims to describe the differences among different price jump indicators, assessing the valid statistical criteria, as well as to describe the differences among different assets. The particular interest is on the empirical application of the criteria using high-frequency data of stocks and stock market indices and compare it with Monte Carlo simulations.

Tobin Tax and Market Irrationality, Volatility and Liquidity (with H. Lavicka and T. Lichard)

This project aims to study the impact of the Tobin tax on the financial markets. The agent-based computational model is used to mimic the financial markets with different types of trading agents. The impact of the transaction tax is then studied from the risk perspective it imposes on the financial markets themselves and on the real economy. The special attention is spent on the role of price jumps.

COMPUTER SKILLS

Linux, OSX, C, C++, Fortran 77/95, Visual Basic, Mathematica, Matlab, Stata, TSP, R, Python, Latex, MQL, ROOT; Experience with parallel computations, optimization and Monte Carlo simulations.

LANGUAGES

English (fluent), Czech (native), Russian (proficient), German (proficient), Slovak (fluent)

REFERENCES:

Jan Hanousek (Chair)	Evzen Kocenda	Giovanni Urga
CERGE-EI	CERGE-EI	City University London
Charles University	Charles University	Cass Business School
Politických veznu 7	Politických veznu 7	Centre for Econometric Analysis
Prague 111 21, Czech Republic	Prague 111 21, Czech Republic	106 Bunhill Row, EC1Y 8TZ London, UK
+420-224-005-119 (Phone)	+420-224-005-149 (Phone)	+44 (0) 20 7040 8698 (Phone)
Jan.Hanousek@cerge-ei.cz	Evzen.Kocenda@cerge-ei.cz	g.urg@city.ac.uk