

# Report on Master Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Student:	Bc. Štěpán Chrz
Advisor:	PhDr. Ladislav Krištofuk, Ph.D.
Title of the thesis:	Testing the effects of parameter changes in the Bornholdt's model

## **OVERALL ASSESSMENT** (provided in English, Czech, or Slovak):

As the name of the thesis suggests, the main aim is studying the effect of varying parameters of the Bornholdt's model. Simply put, the model tries to mimic statistical and dynamic properties of the financial returns series using a parallel to the magnetic (ferromagnetic or paramagnetic) Ising model, specifically its specification of Bornholdt. Apart from the standard Ising model with a parameter for the local field (the nearest neighbor - herding - effect), the Bornholdt's specification adds a "minority game" part to the model and thus an additional parameter. The thesis then studies how varying these two parameters influences the implied statistical properties of the series.

However, the thesis brings more than a simple Monte Carlo study (even though computationally very demanding). Stepan also offers some discussion of the econophysics literature, brings forward some of its building blocks and also highlights some problematic topics or approaches (from the economics point of view).

The core of the thesis, i.e. the Monte Carlo simulation of the Bornholdt's model, brings some interesting, albeit not so much straightforward, results. It seems that there is no "correct" combination of the two parameters but the "ideal" pair is rather a function. Nonetheless, the results are presented in an original and legible fashion, which is not easy for such a huge amount of simulated data. Also, Stepan constructed a nice presentation of the dynamic relationship between prices, fraction of buyers and sellers as well as fundamentalists and chartists. Unfortunately, the printed paper does not allow for animations which would make some of the results and illustrations way better.

The thesis is carefully written and it reads very well. The structure is very straightforward. The topic as well as the execution of the thesis is above the standard master's thesis at the IES. Moreover, the topic is out of the standard scope of the master's courses at the institute and it has been thus more demanding. Stepan has also shown high programming skills while using the Wolfram Mathematica software. The thesis should be shortened and submitted as a paper to a scientific journal. **In the case of a successful defense, I gladly suggest grade A and the Dean's Prize for an Extraordinary Diploma Thesis.**

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**SUMMARY OF POINTS AWARDED** (for details, see below):

CATEGORY	POINTS
Literature (max. 20 points)	20
Methods (max. 30 points)	30
Contribution (max. 30 points)	30
Manuscript Form (max. 20 points)	19
<b>TOTAL POINTS</b> (max. 100 points)	<b>99</b>
<b>GRADE</b> (1 – 2 – 3 – 4)	<b>1*</b>

**NAME OF THE REFEREE:** PhDr. Ladislav Křišťoufek, Ph.D.

**DATE OF EVALUATION:** 18.9.2014

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*Referee Signature*