Report on Master Thesis

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

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Advisor:	**Prof. Ing. Karel Janda M.A., Dr., Ph. D.**
Title of the thesis:	**Weather Risk in the Natural Gas Market**

The thesis is focused on weather risk hedging in the natural gas market with a special focus on the Czech Republic. The main idea is to describe both weather risk and natural gas markets, analyze the weather risk in Czech conditions and provide techniques of decreasing the risk. The overall structure of the thesis is organized as follows. In the first part, author defines weather risk, its history and its impact to day-to-day business. In the second part, author introduces a natural gas market, describes how the market works and dedicates a lot of space to the market's historical development. In the end of the second part, author provides a detail oversight over the Czech natural gas market. The third part is dedicated to the analysis of the weather risk in the Czech Republic. Author uses regression analysis to find out a relationship between average temperatures across the year and natural gas consumption. The last part of the thesis focuses on weather risk hedging with weather derivatives. This part is rather a description of weather derivatives types.

The thesis is quite well organized. Author shows his ability to use relevant literature and to provide a reader with a well-structured flow of ideas. However, there are several things that unnecessarily decrease the value added of the work. First, author's work with references is not perfect. Some of the sources listed in bibliography are not cited in the work's body. Moreover, references to legal regulations that are cited in the work are then not included in the sources overview. Second, author's English language is in some cases more popular than academic (e.g. an expression "what is more" shouldn't be used in an academic work). Other commentaries are linked to individual chapters and therefore will be discussed separately.

Introduction of a Master's Thesis should define the scope of literature used. Instead of this, author several times claims that an issue was discussed in the stock of literature but doesn't provide a single reference.

In the second chapter, the reader might again lack references, particularly at the description of natural gas markets regulation and deregulation. Author should provide citations at each point that was described. In the subchapter 2.1.4 I would disagree with author's opinion that alternative pipelines could be used when a main source pipeline of natural gas is closed due to political reasons. Recent history has shown that, especially in Central and Eastern Europe, the dependence on Russian natural gas is so heavy that it can't be replaced in a short run. At Figure 14, where author illustrates the share of major customers in natural gas consumption in the Czech Republic, author states that the decrease of the consumption is significant in some months. Unfortunately, author does not provide any tests to confirm his statement. In this light, the statement is an empty sentence.

The third chapter, the biggest value added of the thesis, provides an estimation of dependence of natural gas consumption to a temperature. Author uses several linear regression models. This chapter is full of statistical mistakes that prove that author should pay more attention to the econometric exactness. The biggest problem of the whole analysis is that author does not focus on the time-series feature of used datasets. Instead of that, author tries to correct heteroscedasticity and autocorrelation present in his models by using GLS and White's errors. Common way how to deal with these two features of time series is to use returns or log-returns instead of absolute values. Author himself claims that he is

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"interested in assessing the impact of changes in temperature" so at the very first step, he should have transformed original datasets into returns. This would, with a high probability, resolve all problems author faced. There are other minor issues in this chapter; however, there is no sense in discussing them due to the most serious problem described.

In the last chapter, author describes weather derivatives and their pricing methods. This chapter is rather a summary of existing techniques and author doesn't even discuss their weaknesses. My suggestion would be to try to focus on an issue that is not resolved by commonly used pricing techniques and try to work out a method that would improve it.

Despite my criticism, the thesis fulfills all demands for a Master's thesis and thus I recommend the thesis for a defense. In the case of extraordinarily strong defense I suggest grading B (good, velmi dobře, 2).

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

CATEGORY		**POINTS**
Literature	*(max. 20 points)*	18
Methods	*(max. 30 points)*	10
Contribution	*(max. 30 points)*	15
Manuscript Form	*(max. 20 points)*	18
TOTAL POINTS	*(max. 100 points)*	**61**
GRADE	**(1 – 2 – 3 – 4)**	**2**

NAME OF THE REFEREE: Petr Gapko

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