# *FORECASTING COAL PRODUCTION AND VOLATILITY IN CHINA’S PRODUCING REGIONS*

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#### Overview

China's economy has grown at double-digit rates for most of the last thirty years. It possesses the second largest coal reserves globally and is the largest producer of coal in the world. Approximately 95% of the coal produced in China is from underground mining, which causes serious environmental problems which include ground subsidence, hydrodynamics change, land use change and soil pollution. The continued reliance on coal for China’s energy production makes it imperative to study the long term trends of coal production at the regional level. This paper seeks to forecast China’s coal production in its 25 coal producing regions using time series models. It will also study the volatility paths in these regions. Findings from this study are helpful to policy makers for designing environmental regulations in the coal production industry in China.

The paper will be organized as follows: Section 2 will provide an overview of past literature. Section 3 will cover the methodology. Section 4 will report the empirical results and analysis. Section 5 will present the conclusions and limitations of the study.

#### Empirical Methodology

The purpose of this study is to forecast coal production in China’s provinces using trend fitting based on historical time-series. The ARIMA technique is employed for this purpose. Monthly data for coal production is obtained for China’s 31 provinces from the China Data Online Centre. Data is obtained for the years 2002 – 2011. ARIMA is a popular method used for time series forecasting analysis, originating from the autoregressive model (AR), the moving average model (MA) and a combination of the AR and MA (ARMA).

We also model the conditional variance of coal production using (generalized) autoregressive conditional heteroskedasticity ((G)ARCH) techniques. Many time series experience periods of relative tranquility followed by periods of greater volatility. This makes predictability of the time series vary over time. These changes in predictability can be modeled using G/ARCH techniques. We use this approach to generate forecasts of volatility - an area which has not yet been explored in the coal production literature.

#### Preliminary Results

Preliminary results of short term forecasts imply that:

* 14 of the coal producing provinces will observe an increase in coal production. These include major coal producing regions such as Shaanxi, Shanxi and Inner Mongolia. At the national level, coal production is set to increase.
* Hubei, Jiangsu, Xinjiang and Zhejiang provinces will experience a decrease in coal production.
* Coal Production in Beijing, Guanxi, Heilongjiang, Henan, Liaoning, Shandong will remain relatively constant.

#### Conclusions

Preliminary results show that coal production is set to increase in many regions in China and preventive measures should be put in place to prevent or mitigate adverse environmental effects.

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