BIOMASS AND BIOENERGY XXX (2014) 1–13

Available online at www.sciencedirect.com

ScienceDirect

http://www.elsevier.com/locate/biombioe

Analysis of woody biomass commodity price volatility in Austria

Christa Kristöfel [a,*], *Christoph Strasser* [a], *Ulrich B. Morawetz* [b], *Johannes Schmidt* [b], *Erwin Schmid* [b]

[a] *BIOENERGY 2020+ GmbH, Gewerbepark Haag 3, 3250 Wieselburg-Land, Austria*
[b] *Institute for Sustainable Economic Development, University of Natural Resources and Life Sciences, Feistmantelstrasse 4, 1180 Vienna, Austria*

ARTICLE INFO

Article history:
Received 28 June 2013
Received in revised form
24 February 2014
Accepted 9 March 2014
Available online xxx

Keywords:
Woody biomass
Biomass commodity markets
Price volatility models
Energy market
GARCH

ABSTRACT

Several energy and agricultural commodities have experienced higher price volatility in recent years. Management of price risks usually leads to additional costs that are often shared and transmitted along the supply chain to the final consumers. Only little information is currently available on how price volatility of woody biomass commodities has developed compared to energy and agricultural commodities in recent years. We compute the historic price volatility of woody biomass commodities using the standard deviation of log returns as well as univariate GARCH models. The results show that the price volatility of several woody biomass commodities has increased in recent years. However, the price volatility of woody biomass is still lower compared to the price volatility of agricultural commodities and fossil fuels. The analysis of factors and linkages provides insights of the current biomass market developments.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

The renewable energy sector has become one of the fastest growing segments of the energy industry due to concerns about climate change, energy security and peak oil but also due to new technologies and environmentally conscious consumers in recent years [1]. In EU-27 woody biomass fuels constituted 50% of the gross domestic consumption of primary renewable energy sources in 2010 (about 3.6 EJ) [2]. According to the European National Renewable Energy Action Plans (NREAP), the share of biomass and in particular of wood fuels to produce electricity, steam or heat is projected to increase in the energy demand portfolio until 2020 [3]. In 2012, Austria had a total gross domestic consumption of 1.5 EJ and woody biomass, which is mainly used for heat production, constituted about 80% (190 PJ) of total bioenergy consumption [4]. According to the National Energy Strategy [5] there was an additional potential for energy supply from woody biomass of 50 PJ in 2005. About 25 PJ of this potential were tapped by the demands of the additional Combined Heat and Power (CHP) and heating plants. Thus, approximately 25 PJ of woody biomass are available for energy supply. The supply for bioenergy has more than doubled in Austria since 2000 (Fig. 1).

National implementations of European renewable energy policies and dynamic international markets have influenced the supply and demand of woody biomass and thereby influenced not only levels but also volatility of commodity prices [6].

* *Corresponding author*. Tel.: +43 (0)7416 522 38 55; fax: +43 (0)7416 522 38 99.
E-mail address: christa.kristoefel@bioenergy2020.eu (C. Kristöfel).

http://dx.doi.org/10.1016/j.biombioe.2014.03.010
0961-9534/© 2014 Elsevier Ltd. All rights reserved.

Please cite this article in press as: Kristöfel C, et al., Analysis of woody biomass commodity price volatility in Austria, Biomass and Bioenergy (2014), http://dx.doi.org/10.1016/j.biombioe.2014.03.010

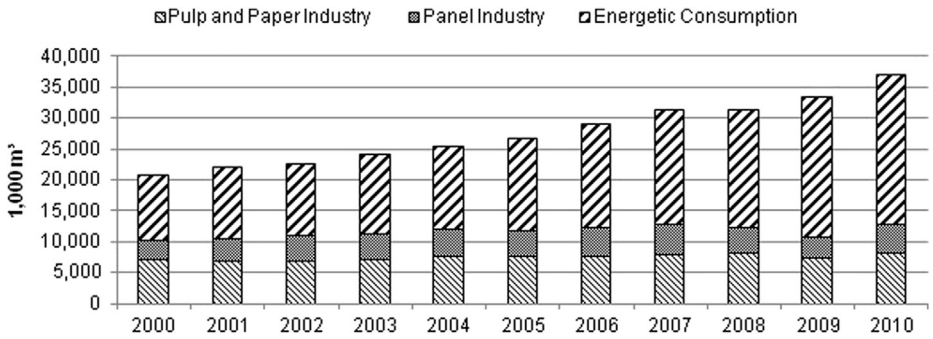

Fig. 1 – Quantity and structure of woody biomass utilization excluding sawn wood production and wood products in Austria between 2000 and 2010. Source: own investigation.

In the scientific literature, the term "volatility" is not consistently defined and different methodologies with respect to concepts, data and estimation procedures are applied in the analyses. However, the scientific literature often distinguishes between historical and implicit price volatility. The latter is a measure of the expected fluctuation of the underlying asset over the remaining term of the option. Historical price volatility specifies a measure for the relative changes in prices over time [7]. A commonly used measure of historic commodity price volatility is the standard deviation of log-price differences [8].

Furthermore, there are a number of approaches to model the time-varying pattern of price series such as the concept of implied volatility, which is a measure of the market estimate of the ex-ante or conditional variance of subsequent prices [9,10]. The Generalized Autoregressive Conditional Heteroscedastic time series models (GARCH), introduced by Bollerslev [11], allow the direct estimation of such conditional variances. The historic volatility of agricultural commodity prices has been analyzed by Thompson et al., Trostle et al., Von Ledebur and Schmitz, JI and Fan [12–15], and JI and Fan [15] have measured the influence of the crude oil price on non-energy commodity prices both before and after the 2008 financial crisis. The results show that the crude oil price has significant volatility spillover effects on non-energy commodity prices. The overall level of correlation strengthened after the crisis, which indicates that the consistency of market price trends was enhanced by economic recession.

Similarly, the price volatility of crude oil and electricity has been analyzed by Regnier and Wirl [8,16]. For instance, Regnier [8] has investigated the price time series of a wide range of commodities in the US American economy and has tested the hypothesis whether or not oil and energy price volatility are higher than other commodity price volatilities. Her analysis shows that the oil prices were about a third less volatile than other commodity prices before 1970. After 1986, the oil prices have become significantly more volatile than other commodity prices.

Some authors also deal with the price changes of renewables and biofuels. Awerbuch and Sauter [17] compare the macroeconomic costs of volatilities between fossil oil prices and renewable energy prices. The results of their study indicate that the substitution of fossil fuels by renewable energy investments represents a significant external macroeconomic benefit since these investments help to avoid losses caused by oil price volatility. Furthermore, Awerbuch [18] argues that prices for renewable commodities are uncorrelated or have a low correlation with crude oil prices and therefore allow diversifying energy portfolios to manage the overall risks. Thompson et al. [12] explore how corn yields and petroleum prices affect the volatility of ethanol prices. They show that if a mandate requiring fuel blenders to use at least a certain amount of ethanol in the fuels, ethanol prices would be more sensitive to corn yields and less sensitive to changes in petroleum prices. Furthermore, several recent studies [19–21] investigate volatility spillover effects between crude oil and ethanol as well as corn markets since agricultural commodities are increasingly being used as feedstock for biofuels. The results of these studies indicate volatility spillover effects from the crude oil market to the corn and ethanol markets as well as spillovers between the corn and ethanol markets.

In contrast to analyses of fossil fuel and agricultural commodity price volatilities, woody biomass commodity price volatility has been rarely investigated in the literature yet. The results of one study, conducted by Kranzl et al. [22], show that bioenergy commodity prices are less volatile than fossil energy carriers. However, in this study price data from different markets and of different frequency were analyzed, thus comparability is limited.

Analyses of price volatilities of commodities are important in many economic sectors. However, what matters for both market participants as well as policy makers are not the market price variations per se, but their unpredictability and the resultant risks for producers, traders, consumers and government agents [10]. Unpredictable high price volatility can cause additional management costs throughout the supply chain and investment-based processes can be interrupted or even stopped such that sectoral development and integration are being delayed and immature [10,23].

Therefore, price volatility is an important concern both at macro level for the government and at the micro level for consumers, producers, and investors [23]. A better understanding of the price volatility behavior also allows cost-effective management of trade for importing and exporting countries. At the microeconomic level, commodity price volatility is relevant for the assessment of investment returns and capacities. In addition, price fluctuations can be troublesome

Please cite this article in press as: Kristöfel C, et al., Analysis of woody biomass commodity price volatility in Austria, Biomass and Bioenergy (2014), http://dx.doi.org/10.1016/j.biombioe.2014.03.010

Download English Version:

https://daneshyari.com/en/article/7064863

Download Persian Version:

https://daneshyari.com/article/7064863

Daneshyari.com