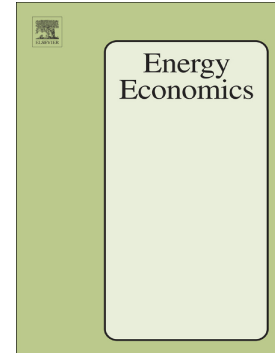


Accepted Manuscript

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PII: S0140-9883(18)30033-1
DOI: <https://doi.org/10.1016/j.eneco.2018.01.025>
Reference: ENEECO 3899

To appear in:

Received date: 26 August 2015
Revised date: 18 December 2017
Accepted date: 28 January 2018

Please cite this article as: Sydnei Marssal de Oliveira, Celma de Oliveira Ribeiro, Maria Paula Vieira Cicogna , Uncertainty Effects on Production Mix and on Hedging decisions: the case of Brazilian Ethanol and Sugar. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Eneeco(2018), <https://doi.org/10.1016/j.eneco.2018.01.025>

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Uncertainty Effects on Production Mix and on Hedging decisions: the case of Brazilian Ethanol and Sugar

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Abstract

The use of food crops to produce biofuels has been subject of interest in literature. The relationship between food and fuel prices can remarkably affect production strategies. These prices are subject to high uncertainty and producers must adopt hedging and storage strategies in order to avoid financial losses. This study investigates the effect of uncertainty on production, storage and hedging of ethanol and sugar in Brazilian mills.

A robust optimization model to define production, storage and hedging strategies is proposed. Uncertainty sets on returns are constructed based on a state space model (Kalman Filter). The presented model was applied to Brazilian ethanol and sugar markets in different economic scenarios. The study analyses efficient frontiers and optimal strategies and the results indicate that, even adopting good price forecast models, the optimal strategies can be deeply affected by uncertainty.

Key words: uncertainty; hedge strategy; robust optimization; production mix; multi-product feedstock

1. Introduction

The growing world demand for energy and the need to reduce the dependence on fossil fuels have increased the interest on biomass as a potential energy source. The use of biomass to produce energy and fuel can affect food security and the decisions regarding the best use of food crops have received considerable attention in recent literature. The Energy Monthly Report from the Brazilian Ministry of Mines and Energy shows that, in September 2017, 42.7% of the domestic energy supply came from renewable energy. It is worth noting that bioenergy generated from sugarcane represents 17.6 from the domestic energy supply (Brazilian Ministry of Mines and Energy, 2017).

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