



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



Selected Poster/Paper prepared for presentation at the Agricultural & Applied Economics Association's 2017 AAEA Annual Meeting, Chicago, Illinois, July 30-August 1, 2017

Copyright 2017 by [authors]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Agriculture Sector Analysis on Intended Nationally Determined Contribution in Developing Countries: A Case Study of Vietnam

Guannan Zhao, Bruce A. McCarl, Peter Läderach, and Godefroy Grosjean

Introduction

In forming its INDC Vietnam recognizes that agriculture sector is a large emitter of GHGs and also has substantial potential for offsetting CO₂ emissions with low cost. However, there is some uncertainty about those agricultural opportunities in Vietnam. Evidences are lacking on the optimal sequence and combination of mitigation options over time and under different conditions of mitigation incentives. Secondly, large-scale country wide mitigation efforts in agriculture are likely to have effects in the market altering agricultural production and consumption. Such actions can increase farmers' opportunity costs of agricultural GHG emission reduction and thus affect mitigation opportunity desirableness and in turn performance. Interactions between strategies also have largely been absent from analytical models.

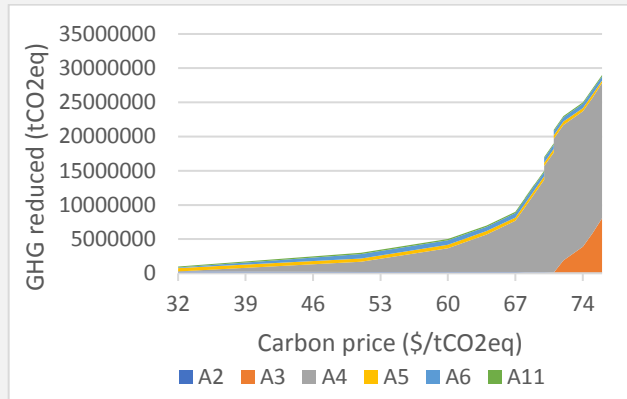
Model

$$\begin{aligned} & \text{Max} \sum_h \int_0^{Z_h} P_{dh}(Z_h) dZ_h - \sum_i \int_0^{X_i} P_{di}(X_i) dX_i \\ \text{s.t.} \quad & Z_h - \sum_{\beta, k} C_{h\beta k} Q_{\beta k} \leq 0 \quad \text{for all } h \\ & X_i + \sum_{\beta, k} a_{i\beta k} Q_{\beta k} \leq 0 \quad \text{for all } i \\ & \sum_k b_{j\beta k} Q_{\beta k} \leq Y_{j\beta} \quad \text{for all } j \text{ and } \beta \\ & Z_h, X_i, Q_{\beta k} \geq 0 \quad \text{for all } i, h, k \text{ and } \beta \end{aligned}$$

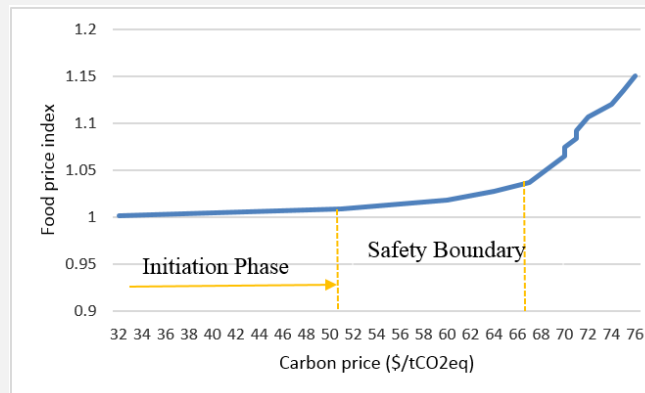
A quadratic, price endogenous model is employed that can provides a sector level evaluation and suggestion for agricultural mitigation policies in INDC, following discussion in McCarl and Spreen (1980) and the implementation in the U.S. Agricultural Sector Model (ASM) model (Adams et al. 2005, Baumes 1978, Beach and McCarl 2010). This model simulates a competitive equilibrium for agriculture sector in Vietnam under carbon pricing, taking into account strategy interaction and food market effects. The objective is mainly restricted by natural and human resource endowments, commodity production technologies, supply and demand balances, trade balances, crop mix balance and also relevant policies.

Findings

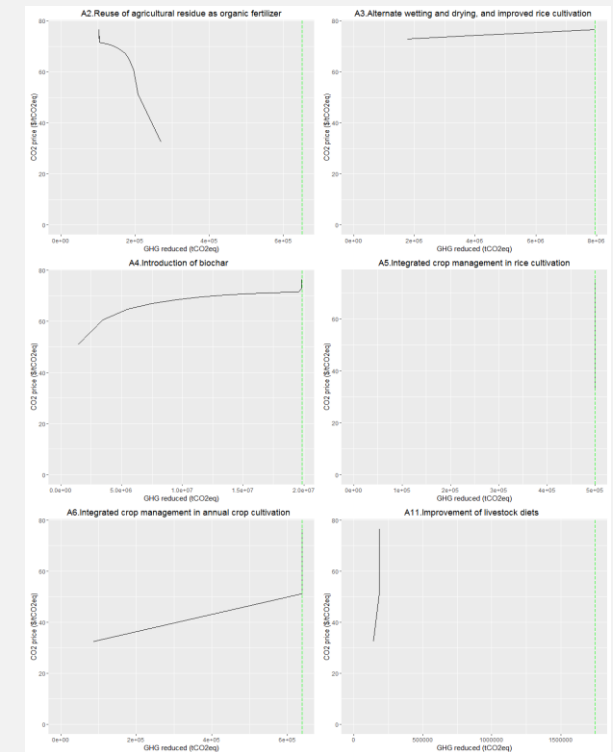
- Agricultural abatement curve is estimated for GHG reduction with optimal portfolios of the INDC options.



- The effects of mitigation on food market prices (Fisher Index) are also assessed.



- Significant differences between economic and technical potential of mitigation policies are discovered.
Note: green line for technical potential and black line for economic potential.



Conclusions

- Vietnam agriculture can accomplish unconditional contribution (6.4 MtCO₂eq) claimed in the INDC with modest impacts on the food market.
- Increasing mitigation requires increasing incentives, but not with a relation of proportionality.
- The INDC overstates the potential of some strategies when considering interactions of mitigation policies and food market.
- Delaying mitigation effort will increase the total costs of achieving the INDC commitments especially when the total amount of mitigation is not large.