

Policy Research Center Research Project Accomplishment Report

(April 1 2012–March 31 2013)

	Name	Title	Affiliation
Project Leader	Roberto Leon Gonzalez	Associate Professor	National Graduate Institute for Policy Studies (GRIPS)
Research Project	Estimating the impact of government subsidies on Biofuel production and carbon sequestration in Japanese farms.		

Project duration:
05/16/2011 ~ 03/31/2013 (2 years)

Project Participants:			
	Name	Title	Affiliation
Leader	Roberto Leon Gonzalez	Associate Professor	National Graduate Institute for Policy Studies (GRIPS)
Participant 1	Ai Leon	Research Fellow	National Institute for Agro-Environmental Sciences (NIAES)

Project aims and goals:

- 1) Build a database containing information about the agricultural production and agricultural revenue for every municipality in Japan.
- 2) Estimate the impact of government subsidies on the production of biofuels and food crops.
- 3) Propose alternative measures for the efficient production of biofuel crops in Japan.
- 4) Produce a discussion paper that describes the research that has been done.
- 5) Build on research capacity for future directions of research.

Accomplishment of Project:

Main Findings:

- An increase in the demand for biofuel crops will cause substantial price increases of Japanese agricultural products, crowding-out to a large extent demand for food crops.
- Increases in subsidies for biofuel crop production will increase the price of food crops.
- Although the long run supply of some crops is highly elastic, when we hold production of other crops constant, the supply becomes highly inelastic.
- An increase in the price of a biofuel crop will induce greater supply but mostly at the expense of lower production of other crops.
- Instead of policies promoting the use of abandoned land, which tends to have lower productivity, we recommend policies that encourage the practice of multiple cropping with crop rotation.
- In particular we recommend a system of rotation in multiple cropping of rice and wheat, or rice and sweet potatoes.
- We discourage policies for full scale biofuel crop production unless substantial reforms that increase the production capacity of Japanese agriculture are implemented first.

1) Construction of a Database.

We gathered a longitudinal database of 1822 municipalities covering all of the 47 Japanese prefectures. The database includes information on the production of 116 crops and their respective revenues inclusive of subsidy. Even though the data is publicly provided by the Ministry of Agriculture, Forestry and Fisheries (MAFF) through its official webpage, a substantial amount of effort was necessary to put the data together. MAFF website presents the data for each crop and for each municipality in a separate Excel file. Thus assembling the dataset required a large number of downloads. For the production data we downloaded and then combined 211352 (116 times 1822) Excel files. For the income data we downloaded an additional 1822 Excel files. Additional work was done to combine all these files into one database and handle appropriately the data from municipalities that merged during the sample period. Obviously it would have been impossible to do all this work manually, and so we wrote computer code to make several computers download, combine and make the data ready for statistical analysis. By means of the research grant we were able to buy computer equipment and software for this operation.

2) Estimating the Effect of Subsidies on Crop Production

We have written a GRIPS discussion paper to answer this question which we attach to this report and has been submitted for publication. In this paper we study the viability of price subsidies and some other policies to increase the production of biofuel crops. Firstly we estimate the elasticity of supply of Japanese agriculture with respect to price (inclusive of per unit of production subsidy). For this purpose we use the longitudinal database of 1822 municipalities covering all of the 47 Japanese prefectures. The database includes information on the production of 116 crops and their respective revenues inclusive of subsidy. Using panel data regression techniques we find that even though the long run supply of some crops is highly elastic, the conditional long run supply of a crop, holding other crops constant, is highly inelastic. Thus, an increase in the price of a biofuel crop will induce greater supply but mostly at the expense of lower production of other crops. That is, if we were to hold production of other crops constant, the capacity to increase the supply of biofuel crop would be very small. This indicates that an increase in the demand for biofuel will cause substantial price increases of Japanese agricultural products, crowding-out to a large extent demand for food crops.

3) Alternative measures for the production of biofuel

We then discuss the viability of other policies such as multiple cropping and cultivation of recently abandoned land. Instead of using abandoned land, which has a lower yield, we recommend a system of rotation in multiple cropping of rice and wheat. In our empirical analysis we found wheat to be responsive to price stimulus. In addition, wheat is a crop that can be planted in the paddy field after harvesting rice. In this sense it seems an optimal agricultural practice that will increase the amount of biofuel crop without decreasing the amount of rice produced for food. Although to a lesser extent, we also found sweet potatoes to be responsive to price, and this crop could also be combined with rice in crop rotation. We find that multiple cropping (i.e. growing more than one crop in a field during a year) has been decreasing over time in Japan. We therefore suggest that before using abandoned land, which tends to have lower productivity, it would be better to encourage the practice of multiple cropping with crop rotation. It has been showed in previous research that the soil carbon sequestration of a system of multiple cropping is higher than leaving the field fallow.

However, although these measures will increase biofuel crop production to some extent in the short run, they will not be sufficient to meet the goal of producing 6 million kiloliters of bioethanol by 2030 (MAFF 2007). Full scale biofuel crop production could only take place after substantial reforms that increase the production capacity of Japanese agriculture.

4) Produce a discussion paper

We have published a GRIPS discussion paper describing the research that has been done and we have submitted it to an international journal with anonymous referee system.

5) Build on research capacity for future directions of research.

This project has allowed us to build a greater capacity for research in agricultural economics and we plan to continue expanding this line of research in several directions. Firstly, we are currently investigating what are the factors that determine the productivity of Japanese agriculture. In particular we are interested in finding out whether the introduction of subsidies per unit of arable land has affected productivity. We aim to arrive to an understanding of why the productivity of Japanese agriculture has been decreasing over time and be able to propose policies to reverse that trend.

In order to carry out this line of research we have already done a review of the literature and gathered data on factors of production such as labor, machinery, size of land, fertilizer use and age of farmers. We aim to use regression analysis to estimate a production function and be able to give answers to these research questions.

References:

MAFF 2007: Large-scale increase in domestically produced biofuels.
http://www.maff.go.jp/j/press/2007/pdf/20070227press_1b.pdf.

Other things to report:

The research in this project has had positive spillovers on other areas of our research. At the same time the research in this project has benefitted from research we have carried out in other related areas. In the list of accomplishments we mention not only the research output directly related to the research questions of this project but also other research output from related projects.

List of Accomplishment

(including forthcoming)

Articles:		9 in total	The number of refereed articles:		0				
Author	Title	Publisher	Vol/No/ Page	Date of Publications	Start page	Finish page	Referee Report		
1	Leon, A. and R. Leon	The Scope for Increasing Biofuel Crop Production in Japan: An Analysis of Alternative Policies	GRIPS Discussion Paper 12-10, it has been submitted for publication to a refereed journal.	Sep-12	1	- 17			
2	Jochmann, M., G. Koop, R. Leon-Gonzalez, R. W. Strachan	Stochastic search variable selection in vector error correction models with an application to a model of the UK macroeconomy.	Journal of Applied Econometrics	28, 1	Jan-13	62	- 81		
3	Leon-Gonzalez, R. and D. Montolio	Endogeneity and Panel Data in Growth Regressions: A Bayesian Model Averaging Approach	GRIPS Discussion Paper 12-08, it has been submitted for publication to a refereed journal.	Aug-12	1	- 32			
4	Acharya, C.P. and R. Leon-Gonzalez	The Impact of Remittance on Poverty and Inequality: A Micro-Simulation Study for Nepal	GRIPS Discussion Paper 11-26	Mar-12	1	- 32			
5	Chan, J.C.C., G. Koop, R. Leon-Gonzalez & R.W. Strachan	Time Varying Dimension Models	Journal of Business & Economic Statistics	30, 3	Jul-12	358	- 367		
6	Koop, G., R. Leon-Gonzalez, R. W. Strachan	Bayesian model averaging in the instrumental variable regression model	Journal of Econometrics	171, 2	Dec-12	237	- 250		
7	Koop, G., R. Leon-Gonzalez, R. W. Strachan	03/31/2013	Journal of Econometrics	165-2	Dec-11	210	- 220		
8	Dasgupta, A., R. Leon-Gonzalez, A. Shortland	Regionality revisited: An examination of the direction of spread of currency crises	Journal of International Money and Finance	30-5	Sep-11	831	- 848		
9	Huang, X., R. Leon Gonzalez , S. Yupho	Financial Integration from a Time-Varying Cointegration Perspective	GRIPS Discussion Paper 12-07, submitted for publication to refereed journal.	Aug-12	1	- 22			

Verbal Reports:		11 in total				
Name	Title	Name of the workshop	Report Date	Venue		
1	Leon-Gonzalez, R. and D. Montolio	Endogeneity and Panel Data in Growth Regression: A Bayesian Model Averaging Approach	The Osaka Workshop on Economics of Institutions and Organizations (65th Meeting)	March 27–28, 2013	University of Tokyo	
2	Leon-Gonzalez, R. and D. Montolio	Endogeneity and Panel Data in Growth Regression: A Bayesian Model Averaging Approach	Frontiers in Macroeconometrics	March 1–3, 2013	Hitotsubashi University, Tokyo	
3	Leon-Gonzalez	Fat-tailed gamma autoregressive processes for stochastic volatility with jumps	5th International Conference of the ERCIM WG on COMPUTING & STATISTICS (ERCIM 2012)	Dec 1–3, 2012	Oviedo, Spain	
4	Leon-Gonzalez	Fat-tailed Gamma autoregressive processes for stochastic volatility with jumps	Invited Seminar at Hitotsubashi University	2-Nov-12	Hitotsubashi University, Tokyo	
5	Leon-Gonzalez	Fat-Tailed Wishart Autoregressive Processes for Multivariate Stochastic Volatility with Jumps	RCEF 2012: Cities, Open Economies, and Public Policy	August 16–18, 2012	Toronto, Canada	
6	Leon-Gonzalez	Fat-tailed Gamma autoregressive processes for stochastic volatility with jumps	ISBA 2012 World Meeting	June 25–29, 2012	Kyoto	
7	Leon-Gonzalez, R. and D. Montolio	Endogeneity and Panel Data in Growth Regression: A Bayesian Model Averaging Approach	Invited Seminar at CRiSM, Department of Statistics, University of Warwick	22-Mar-12	University of Warwick, U.K.	
8	Leon-Gonzalez, R. and D. Montolio	Endogeneity and Panel Data in Aid- Growth Regressions: A Bayesian Model Averaging Approach	5th Japanese-European Bayesian Econometrics and Statistics Meeting (JEuBES 2011)	August 23–24, 2011	Norges Bank, Oslo	
9	Leon-Gonzalez, R. and L. Tole	The determinants of mergers & acquisitions in a resource-based industry: What role for environmental sustainability?	Bayesian Econometrics Workshop, Rimini 2011	31 May and 1 June 2011	Rimini, Italy	
10	Jochmann, M., G. Koop, R. Leon-Gonzalez, R. W. Strachan	Stochastic Search Variable Selection in Vector Error Correction Models with an Application of a Model of the UK Macroeconomy	Rimini Conference in Economics and Finance RCEF	June 10–13, 2010	Rimini, Italy	
11	Koop, G., R. Leon-Gonzalez, R. W. Strachan	Bayesian Inference in the time-varying cointegration model	International Workshop on Bayesian Econometrics and Statistics	Feb 4–5, 2010	University of Tokyo	