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Attaining Food Security in the Midst of a Changing Climate: Is Agricultural Subsidy Still Relevant?

Climate change has the potential to hinder the attainment of food security in Indonesia. Some studies report that climate change impacts are expected to significantly decrease the country's agricultural crop production by 2050, especially rice production. To improve agricultural productivity, the Indonesian government widely uses input subsidies that improve farmer access to seeds and fertilizer. However, the results of an EEPSEA study suggest that this may not be an effective solution.

The study is the work of Hermanto of the Indonesian Ministry of Agriculture. It simulated the economy-wide impacts of climate-induced changes in agricultural production in the country. It analyzed the reduction in the output of various agricultural sub-sectors in two scenarios: with and without agricultural input subsidies. Results show that input subsidies exacerbate climate-induced impacts on the Indonesian economy. It recommends that the government focus its resources instead on reducing farmers' vulnerability to climate change impacts.

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A summary of an EEPSEA research: 'General Equilibrium Analysis of the Impact of Climate Change and its Adaptation in Indonesian Agriculture" by Hermanto, Head of Collaboration, Indonesian Center for Agricultural Socio-Economic and Policy Studies, Indonesian Agency for Agricultural Research and Development, Ministry of Agriculture, Bogor, Indonesia. Email: manto_her@yahoo.com.

Strengthening local capacity in the economic analysis of environmental issues

The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam.) It aims to strengthen local capacity for the economic analysis of environmental issues so that researchers can provide sound advice to policy makers.

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Agricultural input subsidies in Indonesia

As the fourth biggest country in terms of population, the effort to achieve food security is a challenge that must be given priority by Indonesia to ensure its welfare. Its population continues to grow at a rate of 1.49% per year, bringing on an increase in the demand for food. To meet its food requirements, Indonesia has to produce at least 33 million tonnes of rice, 16 million tonnes of corn, 2.2 million tonnes of soybeans, 2.8 million tonnes of sugar, and 484 thousand tonnes of beef each year.

Indonesia's agricultural development policy is currently focused on achieving food security, especially in rice. To achieve this goal, one of the various policy instruments that is widely used by the Indonesian government is the provision of input subsidies (i.e., fertilizers and seeds). In 2013, the allocated budget for agricultural subsidies is around IDR 17.7 trillion (USD 18.2 billion), which consists of IDR 16.2 trillion (USD 16.7 billion) for fertilizer and IDR 1.5 trillion (USD 1.5 million) for seeds. This is equivalent to 28% of the total government budget for strengthening food security. These subsidy programs are intended: a) to improve productivity of food crops, especially rice, toward the attainment of a surplus of 10 million tonnes in 2014; b) to improve farmers' access to fertilizers to increase production; and c) to improve farmer's welfare by reducing poverty and improving price stability in the fertilizer market. In the future, it is expected that the Indonesian government will continue to implement subsidy prescriptions in its agricultural sector to address national food security concerns, which have been aggravated by climate change.

Simulating climate-induced impacts on agricultural production

The economy-wide impacts of climate-induced changes in agricultural production in Indonesia have not been fully studied. In order to ensure the timely implementation of various strategic adaptation and policy responses, an overview of possible climate-induced impacts on the macroeconomic variables of the Indonesian economy is necessary. To produce such an overview, the reduction in the output of various agricultural sub-sectors (i.e., rice, maize, soybeans, sugarcane, and palm oil) as a result of climate change was simulated using a multi-sectors computable general equilibrium (CGE) of the Indonesian economy. The CRUSOE CGE model was used, which employed the input-output table of Indonesia in 2008 consisting of 66 sectors.

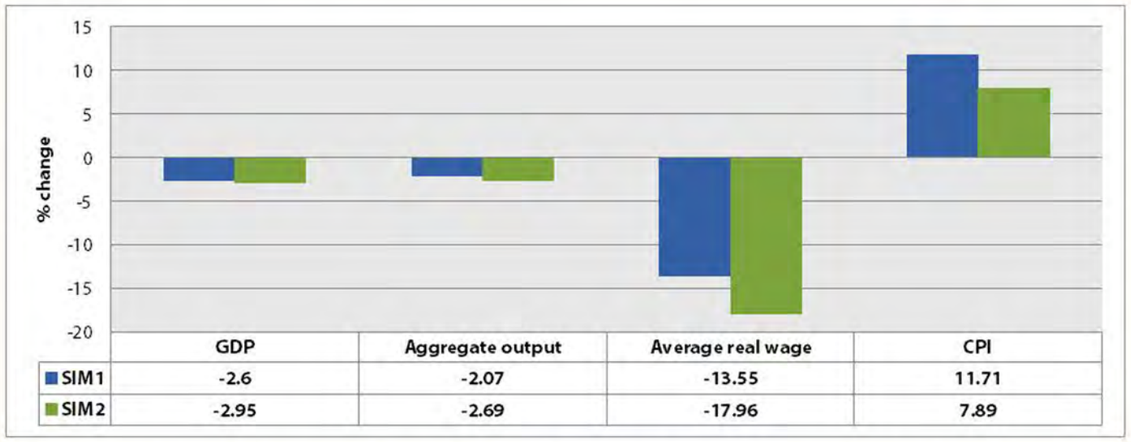
The simulation consisted of two scenarios: a) the impact of climate change in agricultural sectors (SIM1) given the decline in agricultural output through higher prices, reduced demand, and the reallocation of resources in the economy; and b) the impact of climate change accompanied by a policy response (SIM2) in the form of subsidies in agricultural production, both upstream and downstream. SIM2 assumes that the budget for subsidies will be obtained by increasing the tax from the agriculture and manufacturing sectors, which are contractive in nature and may lead to lower economic activity in these sectors.

Economy-wide impacts of climate change in Indonesia

According to simulation results, climate change impacts on the agricultural sector will decrease Indonesia's gross domestic product (GDP) by 2.6%. Aggregate output will decrease by 2.07% (Figure 1). Moreover, almost half of the Indonesian agricultural sub-sectors will suffer a major decline in production. Rice production will decrease by 21%, beans by 12.4%, maize by 13.6%, and sugarcane by 7.6% (Figure 2).

The manufacturing sector, which is closely linked to agriculture, will also suffer a significant decline. For instance, the production of the food sub-sector will decrease by 0.5%, oils and fats by 36.6%, and rice industry by 22.2% (Figure 3).

Changes in the output of the agricultural sector will cause a 11.71% increase in the prices of consumer goods, based on the consumer price index (CPI) (Figure 1). This increase was observed not only in the agricultural sub-sectors but also in the other sectors closely related to agriculture, such as the food processing industries.



	GDP	Aggregate output	Average real wage	CPI
SIM1	-2.6	-2.07	-13.55	11.71
SIM2	-2.95	-2.69	-17.96	7.89

Figure 1. Climate change impacts on the value of some macroeconomic variables in Indonesia

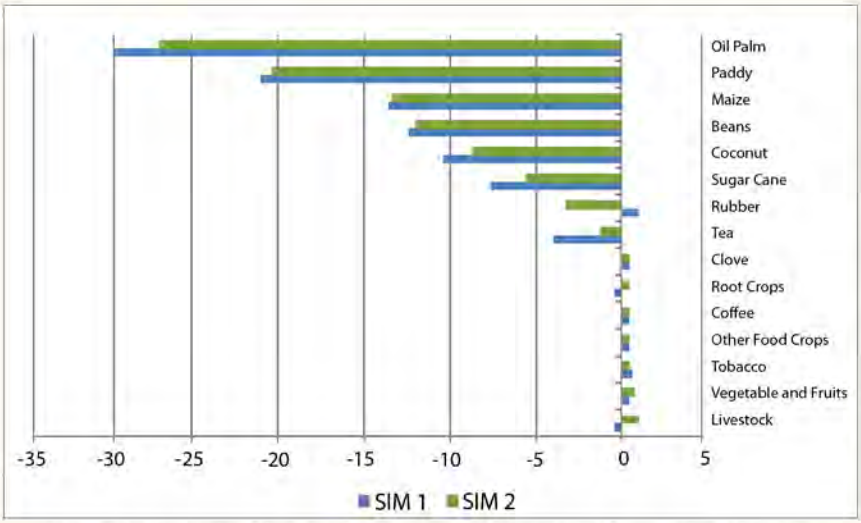


Figure 2. Impacts of climate change on agricultural production in Indonesia

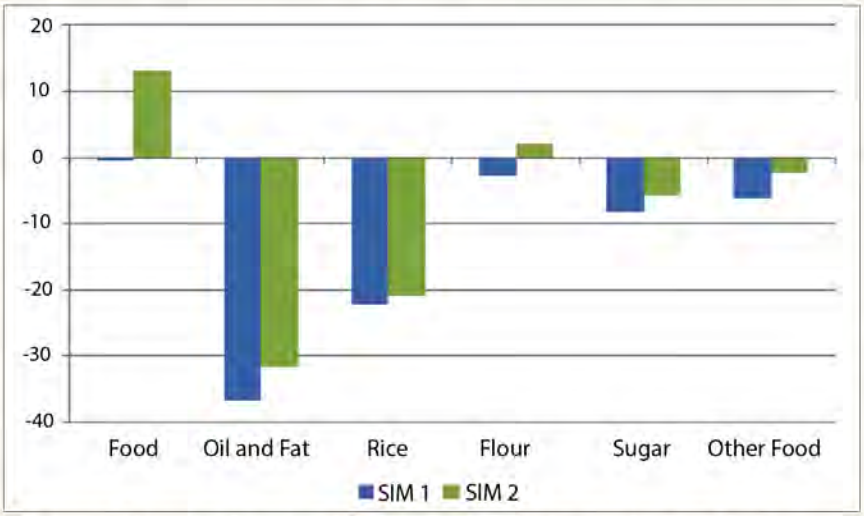


Figure 3. Impacts of climate change on manufacturing production in Indonesia

Agricultural subsidies exacerbate climate-induced impacts

When the government implements fiscal instruments such as 20% subsidies on the agricultural and manufacturing sectors, various economic indicators will experience further reduction. For example, GDP will decrease by 2.95%, which is about 0.35% higher than the scenario without government subsidies. CPI will rise by 7.89%, which is about 3.82% higher than the scenario without subsidies (Figure 1).

There are two reasons why fiscal instruments, in the form of agricultural subsidies, exacerbate climate-induced impacts on the Indonesian economy and overall welfare. First, agricultural production subsidies as a policy response need funding and the most likely source is an increase of tax on other sectors. This tax incidence will result in increased production costs. All other factors remaining constant, output will tend to decline with this increase in production cost.

Second, since most of the demand for agricultural commodities is highly inelastic, the decline in agricultural prices due to subsidies will not result in an expected increase in demand for the said commodities. In other words, fiscal instruments, such as the subsidies mentioned, as a response of the government to reduce climate change impacts have the potential to lose its effectiveness.

Focus should be on reducing vulnerability

The use of fiscal instruments such as agricultural subsidies is not an effective tool to encourage growth in the Indonesian economy and in improving sectoral performance. The government should consider alternative forms of policy responses. Policy prescriptions that can be considered may focus on reducing the vulnerability to climate change impacts. For example, policy development in technological innovations (i.e., the use of varieties that are able to survive in the extreme conditions, the use of organic materials to improve soil fertility, and investment in irrigation) may be adopted to minimize the negative impacts of climate change.

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