

IMPACT OF INVESTMENT INCENTIVES ON AGRIBUSINESS AND MACROECONOMY OF INDONESIA: A COMPUTABLE GENERAL EQUILIBRIUM MODEL

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ABSTRACT

To create a strong agriculture development, the agribusiness approach needs to be applied holistically. Agroindustry is believed to be the leading sector which can run the agribusiness system well. Therefore, the agroindustry, particularly food agroindustry, need to be given the priority in the agricultural development through the giving of investment incentive like the lessening of added value tax and the increasing of subsidy. This study aims to analyze the impact of the investment incentives on agribusiness and macroeconomy of Indonesia. The analysis is done by using the Computable General Equilibrium model with the main data of Social Accounting Matrix Indonesia in 2005, which is classified in 37 sectors, 8 household groups, government institution and company. The findings of this study show that: the higher government spending in the electronic and gas sectors has the biggest impact on investment absorption. Tax deduction can be used as instrument to achieve such objective. The national output is influenced mainly by increasing subsidy in the the fertilizer industry, the electricity and gas, and the agricultural infrastructure simultaneously. Some sectors such as rice commodity, vegetable and processed fruit industries and flour industry are significantly affected by increasing infrastructure subsidy and tax deduction. This study recommends government to implement some policies related to increasing spending and tax incentives. Some analysis need to be carried out to see the possibilities of dispute with international rules.

Key words: output of economy, economic model, CGE, SAM, agribusiness, agroindustry

INTRODUCTION

The change of sectoral output based on the current price shows that the agricultural sectors (agriculture, forestry and fishery) still play an important role in the Indonesian economy, i.e. more than 20% of GDP in 1985, but the share of the agricultural sector tends to decline from time to time. On the other hand, the share of the industrial sector is always constant (about 10 %). In 1975, the mining sector increased until 19 %, but this increase was caused by the increase in oil price in 1974. According to the GDP of constant price in 1973, the contribution of the mining sector was only 11% in 1975, while the share of the industrial sector increased by 7% between 1970 and 1980. In reality, the industrial sector is to be prioritized in the Indonesian economy. Based on GDP constant price in 1983, the share of the industrial sector is 18% in 1988, exceeds the mining sector (16%). However the agricultural sector still dominated Indonesian economy during this period (Mackie and Sjahrir 1989).

The structural adjustment is based on the share of sectoral export and import (Akita 1991). Based on the export share, the contribution of mining sector is still dominant, i.e. more than 60% from the total export in 1985. The export ratio of mining sector reached its peak in 1975 (of 81 %) and decreased to become 53% in 1985. In 1980, there was a direction shift from the dependence on the export of primary product to the export of industrial product, so the export of forestry product is decreasing. The export of log wood is replaced with the export of sawn wood and plywood. The export ratio of forestry is decreasing from 45% in 1980 to 5% in 1985, at the same time the sawn wood and plywood industries are succeeded to increase the export ratio from 27% to 44%. The government introduces the new form of log wood export in the beginning of 1980-s and develops the industry of plywood and sawn wood. The beginning of 1980-s showed a symptom of export substitution from the primary product export to the industrial export. Beside the log processing industry, the export of textile industry also experiences the increase.

From the import aspect, the capital goods and the intermediate goods like: machinery, chemical products and metal products dominate heavy industry; it records around 60% from the total import. However, the import ratio tend to decline, 45% of the domestic demand for the heavy industry in 1985 were import products. The industrial strategy of import substitution for end products caused the segment of light industry like food processing and textile to decrease gradually from 18% in 1971 to less than 5% in 1985. The import ratio of the light industry segment was around 3% in 1985.

Since 1980, there was a significant change in production structure and trade in Indonesia, because of the decrease of oil price. The Indonesian economy shifted from the inward looking structure based on the oil export to become the outward looking structure based on the industrial export (Akita 1991; Dumairy 1996; Saleh *et al.*, 2000). The import-substitution industrialization strategy (ISI) is applied in order to eliminate the dependence on imported product and even to export them.

In the period of 1987-1996, the four important sectors in the Indonesian GDP were agriculture, mining, processing industry and trade, hotel and restaurant. However, in 1996 there was a significant change in the GDP: first is the processing industry, followed by the trade, agriculture and mining due to continuous economic growth, which at the time reached 8%, and low inflation (Bappenas 1997).

During the economic crisis of 1997/1998, the Indonesian economy collapsed and experienced a negative growth of 12.9. According to Basalim *et al.* (2000), the contraction of the economy mainly came from the subsector of non oil and gas. The worsening of performance of the non oil and gas processing industry was the result of the internal and external weaknesses of this subsector. In the internal side, there was a strong dependence of the industry on the import raw material as well as the financial dependence on the banking loan. In the external side, the problem came from the weakness of the exchange value of *rupiah* and the market demand.

The agricultural sector was the “buffer” sector of economy from the deeper negative impact due to the economic crisis. Based on Statistical Agency of Indonesia data (BPS, 1998; BPS, 2001), in 1993 the agricultural sector could absorb the employment of 50.6% and the industrial sector absorbed of 15.7%. The share of employment absorption by the agricultural sector declined in 1997 to 40.7% and in the industrial sector declined to 12.9%. On the other hand, the contribution of the agricultural sector to employment showed an increase from 40.7% to 45.1%, from 1997 to 2000. Meanwhile, the contribution of the industrial sector showed a small increase from 12.9% in 1997 to 12.9% in 2000.

The difference between agriculture and other sectors of the economy in most countries around the world is the significant degree of policy interventions. In many developed countries, policy interventions in agriculture are common practice and have yielded levels of farm subsidies

among the highest in the world (OECD, 2002; Brook 2010). In contrast, trade policies and overvalued exchange rates in many developing countries have resulted in a taxation of agriculture, and during the 1970s and 1980s agriculture was often effectively discriminated (Wiebelt *et al.*, 1992). However, more recent analyses of this so-called agricultural policy bias in 15 developing countries indicate that such generalizations today are difficult; country specific circumstances affect the relative impact of trade policies on agriculture and the rural economy (Jensen *et al.*, 2002).

In Indonesia, the micro, small and medium enterprises are generally dominated by the industry with agricultural base (agro-industry). The growth increase of agro-industry is one priorities of development direction of Indonesia in the future (Deperindag 2002). This should be done because the agricultural sector, specially the activity of agro-industry, plays an important role in maintaining the economic stability in Indonesia. Development of agro-industry needs a lot of investment such as building, machines, water sanitation etc. To accelerate the growth target, it is necessary to have the investment incentive in the sector of agro-industry in the form of tax lessening and subsidy. In order to attract agro-industrial investment in the country, the government of Indonesia has given the investment incentive such as Government Rule No. 1, 2007 and Government Rule No. 7, 2007. Will such policy bring a significant impact on the national economy? This paper will investigate the impact of investment incentive in the agro-industrial sector on the economy (output) in Indonesia.

RESEARCH METHODOLOGY

Data and source of data

This paper employed secondary data of Indonesia consisting of the *Sistem Neraca Sosial Ekonomi* (SNSE) – Social Accounting Matrix (SAM) - of Indonesia in 2005, the Input-Output Table of Indonesia in 2005, SUSENAS in 2005, Armington elasticity, the elasticity of export demand (CET), the elasticity of primary input substitution, the elasticity of employment substitution, and the elasticity of household expenditure. SNSE data in 2005 and Input-Output Table in 2005 were compiled from the Statistical Agency of Indonesia (BPS), while the elasticity data were obtained from various previous studies (Oktaviani 2000; Oktaviani and Drynan 2000; Sitepu *et al.*, 2007; Haryono 2008).

Computable General Equilibrium Model

The study used computable general equilibrium (CGE) model. CGE Model of Comparative Static is one of the economic models which can analyze the economic macro and micro toward the change of policy/economy on macro level and micro level (De Janvry and Sadoulet 1986). The general equilibrium model saw the economy as one system. In this model, there are interrelatedness among the economic actors, i.e. between industry, household, investor, government, importer and exporter, and between the different commodity markets. The entire markets are in equilibrium and have specific structures to reach the equilibrium Dixon *et al.*, (1992).

Similar with other common CGE models, the model used in this study assumes that all industries operate under the competitive markets either in the output markets or in the input markets. This implies that no sector or household can govern the markets. Hence, all economic sectors are price-takers. At the output level, the price paid by consumers equals marginal cost of producing goods. Similarly, wages received by labor are equal to their marginal productivity of labor. In addition, demand and supply equations for private agents are derived from optimization procedures.

The structure of production in a given industry, as an example is depicted in Figure 1. In the production process, each industry can produce several commodities. Industries use both intermediate and factor inputs. Each intermediate input can be source domestically or imported. Factor inputs for

each industry are labor, capital and land. Key simplifying assumptions made in this production model include input-output separability and the multi-stage. The hierarchical structure in the model is based on constant elasticity of substitution (transformation) production functions except for the combining of intermediate goods and aggregate primary factors, a stage which uses the Leontief or fixed proportions technology.

The production function can be defined as: $F(\text{input}, \text{output}) = 0$

and can be written as $G(\text{input}) = \mathbf{XITOT} = H(\text{outputs})$

where \mathbf{XITOT} is an index or the level of industry activity. The assumption of input-output separability in the transformation function means the production of a combination of products by an industry is not directly linked to the particular combination of inputs used, but only through the intermediary of the index of activity in that industry (Blackorby *et al.*, 1978). Similarly, product prices have no effect on input combinations except through their effect on the level of activity in the industry. This represents a substantial empirical simplification.

While the $H(\text{outputs})$ transformation function is assumed to have only a single stage, the $G(\text{inputs})$ function is hierarchically nested with up to three stages. This implies further separability and further simplifies the demand functions. In particular, the demand for inputs at any given level can be expressed as a function of the prices of inputs at that level and need not be expressed as functions of prices of inputs at lower levels in the hierarchy.

The study adopts the Standard CGE model which was built by Lofgren *et al.* (2002) for the International Food Policy Research Institute (IFPRI). The Model of Investment Incentive and Trade Liberalization in the Food Agro-Industry Sector in Indonesia was analyzed using GAMS program for windows.

The sector classification analyzed in the model of capital investment incentive covers 37 sectors, i.e.: *First*, the activity of primary food crop agriculture, i.e.: rice, corn, all kinds of tubers, other food crops, and vegetable and fruit. *Second*, the activity of agro-industry in creating the added value covers rice processing industry, wheat flour industry, and other flour, bread and cracker, noodle, sugar, cattle food, processed soybean, and other food types. *Third*, the subsystem of agricultural input and infrastructure such as fertilizer, pesticide, water supplying, agricultural infrastructure. *Fourth*, the supporting subsystem, i.e. transportation and banking services. The four classifications have represented the comprehensive agribusiness subsystem from the upstream to downstream levels and other sectors.

The institution classification is divided into government institution, company and household. Household is classified into 8 groups, i.e.: (1) farm labor household, (2) farm entrepreneur household (having land), (3) village household with the category of low group free entrepreneur, administrative staff, traveling salesman, free worker of transportation sector, individual service, manual laborer, (4) village household with the category of non work force and not clear group, (5) village household with the category of top group free entrepreneur, non agricultural entrepreneur, manager, military, professional, technician, teacher, administrative worker and top group, (6) city household with the category of low group free entrepreneur, administrative staff, traveling salesman, free worker of transportation sector, individual service, manual laborer, (7) city household with the category of non work force and not clear group, and (8) city household with the category of top group free entrepreneur, non agricultural entrepreneur, manager, military, professional, technician, teacher, administrative worker and top group.

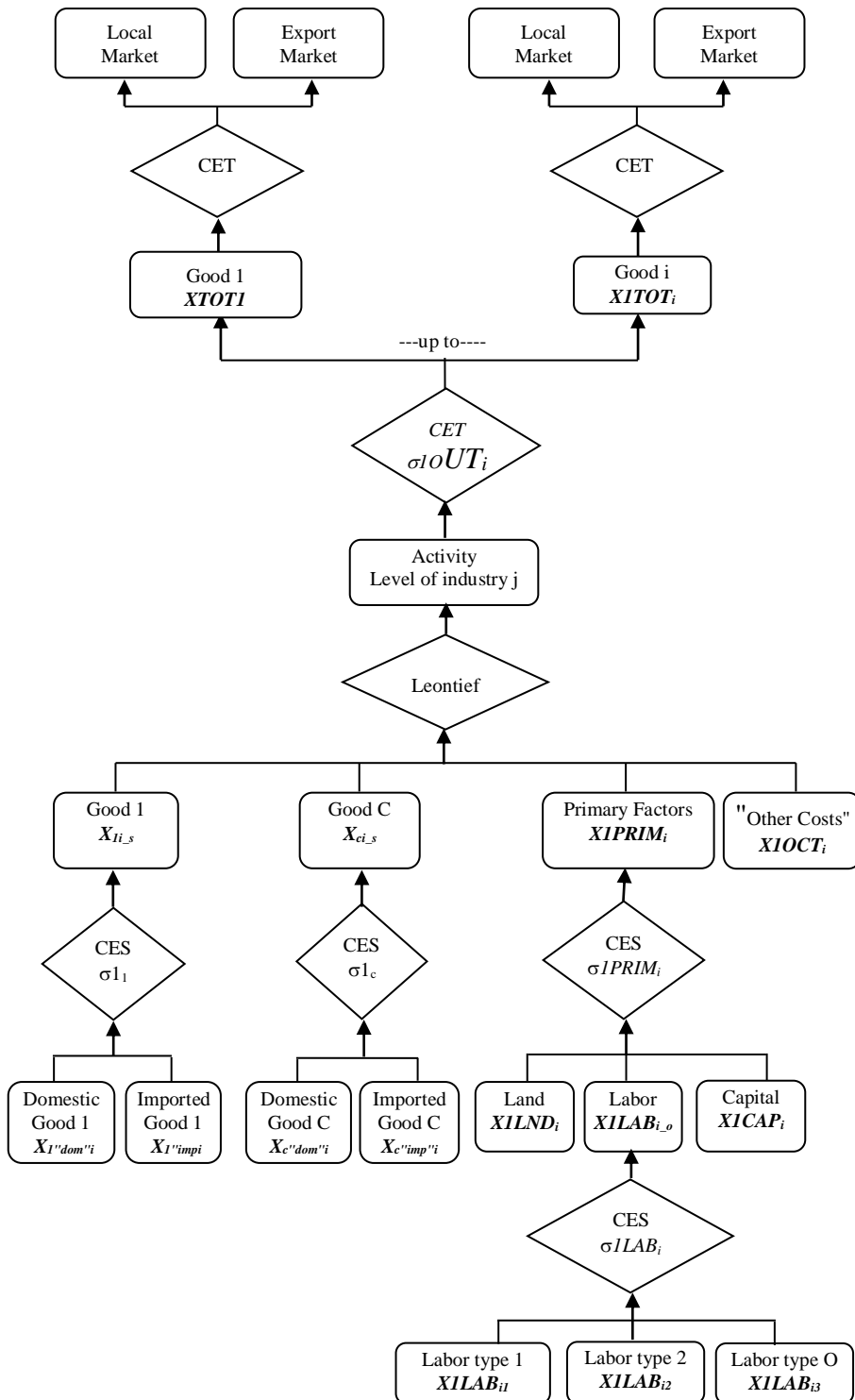


Fig. 1. Production structure

The policy simulation is carried out by increasing 10 % of the investment incentive (tax) covering incentive of added value tax, subsidy incentive and incentive of export tax. The scenario of policy simulation of the investment incentive (tax) and incentive of export tax in form of the decline of investment incentive (tax) or export tax together or partially in the industry of animal husbandry and fishery and their products, the processing industry and the fruit and vegetable preserving, industry of animal oil and vegetable oil, the industry of rice milling and rice hulling, the industry of wheat flour, the industry of other flour, bread industry, cracker and other, noodle industry, macaroni and its kinds, sugar industry, the industry of processed cereals, the industry of soybean processing, other food industry, and cattle food industry. Besides that, there are also policy simulation of subsidy to fertilizer industry, electricity and gas, and agricultural infrastructure.

RESULTS AND DISCUSSION

Agricultural development with the approach of agribusiness system will strengthen the foundation of national economic development (Saragih *et al.* 1998). From the five subsystems in the agribusiness system, the agro-industry subsystem is declared as the activator of economic development. This is based on the fact that the agro-industry has the multiplier effects to the upstream and downstream sectors of agriculture. The multiplier effect in form of long backward linkages indicates that the agro-industry can generate growth in the upstream of the sectors. While forward linkages indicate that the agro-industry can generate growth in the downstream of the sectors.

One of the government policies in accelerating the economic progress through the development of agro-industrial sector is by making the policy instrument which can attract the investors, both domestic and foreign countries, to invest their capital in the country. The policy instrument meant amongst all is giving the tax incentive. However, for the developing country the incentive (particularly tax) for investment should be selective because it is very expensive and can create the distortion in the tax system, decrease the tax revenue and restrain the budget. Therefore, the entire investment incentive, including tax, should be conducted effectively.

Impact of investment incentive in food agro-industry sector on the share of investment absorption

The result of CGE model by using the basic data of *Sistem Neraca Sosial Ekonomi* (SNSE) – Social Accounting Matrix (SAM) - of Indonesia in 2005 showed that the segment of investment absorption in Indonesia of 21.7%. The simulation of 10% tax reduction in the agro-industry sector (animal husbandry and fishery industry and their products, processing and preserving industry of fruit and vegetable, animal oil and vegetable oil industry, rice milling and rice hulling industry, wheat flour industry, other flour industry, bread industry, cracker and others, noodle industry, macaroni and its kind, sugar industry, processed cereals industry, soybean processing industry, other food industry, and cattle food industry) will increase the share of investment absorption in Indonesia (Table 1). Likewise the simulation of 10 % tax reduction for each agro-industry sector will increase the segment of investment absorption, except the simulation of tax decline in the processing and preserving fruit and vegetable industry, other flour industry, and cattle food industry.

The simulation of tax reduction in some agro-industry sector have positive impacts to the share of investment absorption, especially incentive of tax reduction in the industry of animal oil and vegetable oil, i.e. 0.01047%. This indicates that if the government wishes to increase the share of investment absorption through the tax incentive, so tax reduction in the food agro-industry sector such as animal oil and vegetable oil industry should be prioritized. Crude Palm Oil (CPO) and Palm Kernel Oil (PKO) are the raw material for vegetable oil, particularly cooking palm oil industry. The investment incentive in form of tax reduction for this industry will theoretically push the development of cooking palm oil industry in Indonesia.

Table 1. Impact of 10 % tax reduction in agro-industry sector on the share of investment absorption

Simulation Scenario	Change (%)
Basic Value (%)	21.70047
Agro-industry sector	0.00839
Industry of Livestock, Fish and the Results	0.00237
Industry of processing and preserving of fruit and vegetable	-0.00596
Industry of Animal Oil and Vegetable Oil	0.01047
Milled Rice and Process of Hulling Rice Industry	0.00077
Wheat Flour Industry	0.00019
Other Flour Industry	-0.00050
Industry of Bread, Biscuits and the Like	0.00039
Industry of Noodles, Macaroni and the Like	0.00202
Sugar Industry	0.00033
Processed Grains Industry	0.00027
Soybean Processing Industry	0.00018
Other Food Industry	0.00066
Cattle Feed Industry	-0.00041

The simulation of 10% subsidy in the fertilizer industry, electricity and gas, and agricultural infrastructure together will increase the share of investment absorption in Indonesia, except for the subsidy on the agricultural infrastructure (Table 2). The subsidy on the electricity and gas sector gives the highest positive impact in compare to the subsidy on the fertilizer industry. The electricity and gas are the main source of energy in the production process of the agro-industrial companies beside oil fuel and coal. With the subsidy of electricity and gas, it will reduce the production cost of agro-industry and increase the production in order to obtain the higher profit. The expectation of higher profit will push both the domestic and foreign investor to invest in the field of agro-industry. The subsidized fertilizer is intended for the small farmers who are food crop farmers, such as rice, corn and cassava. The agro-industry for these commodities is generally small scale industry. So, the positive impact of the fertilizer subsidy is relatively small to the share of the investment absorption in the agro-industrial sector as a whole.

Table 2. Impact of 10 % subsidy on the share of investment absorption

Simulation Scenario	Change (%)
Basic Value (%)	21.70047
Fertilizer, electricity and gas, and agricultural infrastructure	0.01680
Fertilizer	0.19068
Electricity and gas	0.36585
Agricultural infrastructure	-0.51653

Based on the above results, the impact of the investment incentive on the share of investment absorption through two policy instruments suggest that the incentive through the subsidy instrument gives the highest impact, particularly the subsidy on the electricity and gas sectors. However, the incentive of tax reduction also can be done, particularly the tax incentive in the sector of animal oil and vegetable oil industry.

Impact of investment incentives in food agro-industry sector on the national economy

The simulation of 10% reduction of the value added tax in the agro-industry sectors has the highest positive impact on the output of vegetable and processed fruit industry sector, followed by sugar industry, with increase of 4.57584% (Rp 0.108192 trillion) and 0.08064% (Rp 0.00496 trillion), respectively. On the other hand, the noodle industry and macaroni have the highest decrease of -2.55314% or Rp 0.03599 trillion (Table 3).

Table 3. Impact of tax reduction of agroindustry sector on the national economy

Sector	Basic Value (Trillion Rupiah)	Change			
		SIMALL (%)	SIMVAT2 (%)	SIMVAT6 (%)	SIMVAT8 (%)
Paddy	66.30770	0.00298	-0.00099	0.00012	0.00012
Corn	16.29657	-0.00309	-0.00029	0.00309	-0.00023
Tubers	21.06792	0.00057	0.00102	0.00072	0.00004
Soybean	2.58200	0.00397	-0.00198	-0.00017	0.00011
Other Food Crops	1.88972	-0.02229	-0.00233	0.00458	-0.02379
Vegetables and Fruits	59.12292	0.00967	0.01034	-0.00007	0.00016
Cane	5.64762	0.04089	0.00540	-0.00013	0.00000
CPO	14.30216	-0.07162	0.01702	0.00158	-0.00551
Other Plantation and Forestry	89.39150	0.00061	0.00224	-0.00008	0.00003
Livestock and Fishery	86.56227	-0.00005	-0.00253	-0.00027	0.00020
Mineral	379.02700	0.00860	-0.01509	-0.00124	0.00398
Industry of Livestock, Fish & Results	77.93571	-0.00291	-0.00018	-0.00003	-0.00024
Processed Vegetable and Fruit Industry	2.36442	4.57584	4.46925	-0.00709	0.02530
Industry of Animal and Vegetable Oil	150.26015	-0.08889	0.02194	0.00203	-0.00702
Milled Rice and Process of Hulling Rice Industry	79.18253	0.00703	0.00018	0.00043	-0.00023
Wheat Flour Industry	2.48977	-0.10019	0.00152	0.00001	-0.11757
Other Flour Industry	1.40775	0.00764	-0.00696	0.59082	0.00464
Industry of Bread, Biscuits and the Like	2.09855	-0.10567	0.00161	-0.00002	-0.00123

Sector	Basic Value (Trillion Rupiah)	Change			
		SIMALL (%)	SIMVAT2 (%)	SIMVAT6 (%)	SIMVAT8 (%)
Industry of Noodles, Macaroni and the Like	1.40977	-2.55314	0.02540	0.00451	-2.36821
Sugar Industry	6.14775	0.08064	0.01236	-0.00013	-0.00014
Processed Grains Industry	36.12387	0.01740	-0.00155	-0.00024	-0.00007
Soybean Processing Industry	5.33719	0.03363	-0.00003	-0.00020	-0.00039
Other Food Industry	22.78214	-0.00916	-0.00105	-0.00013	-0.00561
Cattle Feed Industry	14.42555	0.01170	-0.00165	-0.00029	0.00019
Fertilizer Industry	46.58777	-0.00239	0.00329	0.00029	-0.00088
Pesticide Industry	0.78971	-0.02117	0.02912	0.00258	-0.00932
Other Industries	2467.68415	0.00092	-0.00325	-0.00025	0.00078
Electricity and Gas	116.25573	-0.00363	0.00195	0.00022	-0.00066
Clean Water	14.35682	-0.00477	0.00073	0.00014	-0.00044
Building	311.28640	-0.00128	0.00049	0.00006	-0.00019
Agricultural Infrastructure	15.36838	-0.00023	0.00008	0.00001	-0.00002
Other Infrastructures	48.18106	-0.00003	-0.00018	-0.00001	0.00005
Trading, Hotel and Restaurant	790.54585	-0.00153	-0.00110	0.00029	0.00018
Transportation Services	351.54949	-0.00120	-0.00015	0.00018	0.00011
Financial Services	250.99239	-0.00289	0.00020	0.00003	-0.00006
Government Services	74.87523	-0.00083	-0.00046	-0.00002	0.00003
Other Services	515.03725	-0.00378	0.00032	0.00009	-0.00043

Notes:

SIMALL : Tax of agroindustry sector, declining of 10%

SIMVAT2 : Tax of Industry of processing and preserving of fruit and vegetable, declining of 10%

SIMVAT6 : Tax of Other Flour Industry, declining of 10%

SIMVAT8 : Tax of Industry of Noodles, Macaroni and the like, declining of 10%

The simulation of 10% tax reduction in vegetable and processed fruit industry (SIMVAT2) has the impact on the output increase in the sector itself of 4.46925% (Rp 0.105672 trillion), followed by the simulation of tax reduction in other flour industry sector (SIMVAT6) which result in an increase of 0.59082% increase of the sector itself or Rp 0.008317 trillion. Meanwhile, the simulation of tax reduction on the noodle industry and macaroni (SIMVAT8) has a negative impact with -2.36821% decrease or Rp 0.03339 trillion. The simulation of the 10% subsidy to fertilizer industry, electricity and gas, and agricultural infrastructure all together will increase the output in the industrial sector of fertilizer, electricity and gas, and vegetable and processed fruit industries (Table 4).

Table 4. Impact of subsidy on the sectoral output

Sector	Basic Value (Trillion Rupiah)	Change			
		SIM- INFALL (%)	SIM- PUK (%)	SIM- LIGAS (%)	SIM- PPERT (%)
Paddy	66.30770	0.08417	0.11200	-0.03754	0.01043
Corn	16.29657	-0.01067	0.05014	-0.06497	-0.00181
Tubers	21.06792	0.00768	0.03314	-0.02331	-0.00040
Soybean	2.58200	0.09314	0.10296	-0.00563	-0.00092
Other Food Crops	1.88972	0.06437	0.05671	0.01284	-0.00147
Vegetables and Fruits	59.12292	0.00513	0.05751	-0.04863	-0.00068
Cane	5.64762	0.01633	0.07009	-0.05051	-0.00085
CPO	14.30216	-1.39361	-0.50650	-1.06087	-0.02436
Other Plantation and Forestry	89.39150	-0.14024	-0.04031	-0.11050	0.00460
Livestock and Fishery	86.56227	-0.06579	-0.00345	-0.05501	-0.00225
Mineral	379.02700	0.80071	0.23662	0.61583	0.00905
Industry of Livestock, Fish and Results	77.93571	-0.14739	-0.02834	-0.11903	-0.00114
Processed Vegetable and Fruit Industry	2.36442	4.57802	2.20987	3.13761	0.05807
Industry of Animal Oil &Vegetable Oil	150.26015	-1.79868	-0.67595	-1.32880	-0.04374
Milled Rice & Process of Hulling Rice Industry	79.18253	-0.09164	0.02556	-0.12475	0.00408
Wheat Flour Industry	2.48977	-0.16486	-0.04676	-0.12423	-0.00186
Other Flour Industry	1.40775	0.58152	0.21368	0.39621	0.00387
Industry of Bread, Biscuits & the Like	2.09855	-0.12816	-0.03785	-0.09217	-0.00209
Industry of Noodle Macaroni& the like	1.40977	-1.78276	-0.64817	-1.25467	-0.01475
Sugar Industry	6.14775	-0.05466	0.01643	-0.06843	-0.00066
Processed Grains Industry	36.12387	-0.09907	0.00268	-0.10530	0.00375
Soybean Processing Industry	5.33719	-0.04226	0.00063	-0.03960	-0.00087
Other Food Industry	22.78214	-0.14951	-0.02730	-0.12930	0.00079
Cattle Feed Industry	14.42555	-0.02172	0.00741	-0.02343	-0.00089
Fertilizer Industry	46.58777	0.99309	1.11402	-0.13292	-0.00163
Pesticide Industry	0.78971	-1.15098	-0.20935	-0.93322	-0.03256
Other Industry	2467.68415	-0.06764	-0.03703	-0.02416	0.00121

Sector	Basic Value (Trillion Rupiah)	Change			
		SIM- INFALL (%)	SIM- PUK (%)	SIM- LIGAS (%)	SIM- PPERT (%)
Electricity and Gas	116.25573	2.11672	-0.05825	2.16836	-0.00227
Clean Water	14.35682	0.11008	-0.02640	0.13058	-0.00227
Building	311.28640	-0.05682	-0.01012	-0.04877	-0.00062
Agricultural Infrastructure	15.36838	-0.00602	-0.00159	-0.00523	0.00003
Other Infrastructures	48.18106	0.01259	0.00165	0.01131	0.00008
Trading, Hotel and Restaurant	790.54585	-0.17113	-0.02520	-0.15118	-0.00162
Transportation Services	351.54949	-0.13448	-0.02640	-0.11218	-0.00113
Financial Services	250.99239	-0.10265	-0.02238	-0.08389	-0.00141
Government Services	74.87523	0.00684	0.00705	-0.00242	0.00276
Other Services	515.03725	-0.14818	-0.02843	-0.12279	-0.00163

Notes:

SIMINFALL : Subsidy for fertilizer, electricity and gas, and agricultural infrastructure of 10%

SIMPUK : Subsidy for fertilizer of 10%

SIMLIGAS : Subsidy for electricity and gas of 10%

SIMPPERT : Subsidy for agricultural infrastructure of 10%

The simulation of the subsidy in the three sectors together gives the highest impact on the industrial output of vegetable and processed fruit, followed by the output of electricity and gas sectors, and the output of fertilizer industry, i.e. increase of 4.57802% (Rp 0.10824 trillion), 2.11672% (Rp 2.46081 trillion) and 0.99309% (Rp 0.46266 trillion), respectively.

The simulation of 10% subsidy to fertilizer (SIMPUK) has the biggest impact on the increasing output of vegetable and processed fruit industries (2.20987% or Rp 0.05225 trillion), followed by the increasing output of fertilizer industry (1.11402% or increase of Rp 0.51900 trillion). Moreover, the simulation of the subsidy to electricity and gas of 10% (SIMLIGAS) gives the highest impact on the increasing output of vegetable and processed fruit industries (3.13761% or increase of Rp 0.07419 trillion), followed by the increasing output of electricity and gas sectors (2.16836% or increase of Rp 2.52084 trillion). Then, the simulation of 10 % subsidy to agricultural infrastructure (SIMPPERT) also gives the highest impact on the increasing output of vegetable and processed fruit industries (0.05807% or increase of Rp 0.00137 trillion), followed by the increasing output of rice sector (0.01043% or Rp 0.00692 trillion).

The above simulation noted that the policy of incentive through the subsidy to fertilizer industry, electricity and gas as well as agriculture infrastructure gives higher impact on the economy compared to the incentive of added value tax reduction, particularly in the sector of vegetable and processed fruit industries. In order to make this study easy to be used by decision makers, a web based prototype information system has been developed for use by decision makers when planning the resource allocation based on economic sector analysis (Suroso 2012).

CONCLUSION AND POLICY RECOMMENDATIONS

The agricultural development through the approach of agribusiness system with the main priority in the subsystem of agro-industry will have multiplier effect through the backward and forward linkages in the agribusiness sector. In order to accelerate investment in the agro-industrial sector, this paper carried out simulations concerning some possible incentives. The incentive through subsidy gives the biggest positive impact on the share of investment absorption, especially in the sector of electricity and gas. Moreover, tax incentive in the food agro-industry sector can also be done, especially in the industrial sector of animal oil and vegetable oil.

The subsidy in the fertilizer, electricity and gas, and agricultural infrastructure industries simultaneously and partially also give an impact on the economy, with the highest positive impact on the output of its industry and in the industry of vegetable and processed fruit. The simulation of subsidy in the agricultural infrastructure also gives a quite significant impact on the output of rice commodity. The investment incentive in form of tax reduction in the sector of agro-industry simultaneously and partially will give the highest impact on the increasing output of industrial sector of vegetable and processed fruit as well as other flour industry sector.

Based on above results of the study, it suggested that the government of Indonesia has to consider a higher government expenditure policy in forms of subsidy and tax deductions to push the development of the agro-industry in Indonesia. The subsidy can be implemented in the form of inputs, outputs and infrastructure development. However the government needs to analyze further such mechanisms in order to avoid dispute with international rules. For further study, a user-friendly information system is required to assist decision makers when planning the resource allocation based on economic sector analysis.

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