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RESEARCH ARTICLE

THE IMPACT OF ASEAN ECONOMIC COMMUNITY (AEC) IMPLEMENTATION ON CASSAVA ECONOMIC PERFORMANCE IN INDONESIA

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ABSTRACT

This study aimed to analyze the impact of the elimination of cassava starch import restrictions on economic performance cassava Indonesia and formulated alternative policies in order to self-sufficiency in cassava and cassava starch. This study used econometric model 2SLS with a system of simultaneous equations and used time series data 1992-2011 period. Results from this study showed that: 1) Eliminating cassava starch import restrictions caused quantity of cassava starch import only increased by 1.11% and only resulted in domestic cassava starch price fell by -0.04%, the price of cassava decreased by -0.006% and cassava production fell by -0.004%. 2) Cassava self-sufficiency can be achieved through an alternative policy as follows: a) an increased in harvested area by 5%, b) increasing cassava productivity by 5%; c) combined increasing harvested area 1% with increasing productivity 2%. While self-sufficiency cassava starch can be achieved through a policy of increasing the capacity of cassava starch industry by 15% combined with the policy alternatives as follows: a) increasing harvested area 15%; b) increasing harvested area of 1% and increasing productivity by 15%; c) increasing harvested area by 5% increasing productivity by 10%; and d) increasing harvested area of 10% and increasing productivity by 5%.

INTRODUCTION

Cassava development in Indonesia is an integral part of agricultural development. In the years 2015-2019 the development of cassava will be directed not only for food needs, but also for feed materials, industrial raw materials and energy (Dirjen Tanaman Pangan, 2014). Cassava is a commodity that is very prospective in the future for developed as a bio-industrial commodities (Simatupang, 2012). Because cassava has a various functions as food and processed food products, industrial raw materials, feed and energy.

Indonesian cassava production is increasing every year. However, the increase is mainly due to the increased productivity of cassava. The cassava harvested area tend to decrease. On the demand side, demand for cassava also increased both for food, feed and processing industry (Hafsah,2003).

Indonesia is among the world's major exporting countries of dried cassava. Indonesian dried cassava exports increased to tahun1990's. Furthermore, dried cassava export volume continued to decrease. Nevertheless, Indonesia still suffered net exports annually. As for cassava starch, Indonesia imports more than exporting. Since 2005, Indonesia became a net importer of cassava starch. cassava starch imports fluctuated annually, but more imports than exports. (FAOSTAT, 2014). In the long term it is feared there will be imbalance in the fulfillment of domestic cassava. Moreover, cassava diminishing land and productivity is still low. Domestic cassava demand is higher than production will encourage compliance with demand by import mechanism.

At year-end of the 2015, the ASEAN Economic Community (AEC) will be implemented (Arifin, et al, 2008). AEC implementation with commitment removal of all trade restrictions between member countries of ASEAN, a problem for Indonesia. During this time, Indonesia imports of cassava starch from Thailand, if all trade barriers were eliminated, it is possible to increase the volume of imports of cassava starch. According to the Ministry of Agriculture (2014), significantly reduced import tariffs, and even abolished completely, could result in higher import Indonesia. Based on the above, this study aimed to analyze the impact of the elimination of import restriction cassava starch and formulate alternative policies in order to self-sufficiency in cassava and cassava starch.

MATERIALS AND METHODS

This study used time series data's in the period of 1992-2011. Data is obtained from various sources, namely Indonesia

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Ministry of Agriculture, Bureau of Indonesia Statistics, Bank Indonesia, Food and Agriculture Organization and World Bank. data analyze and simulate used computing with aplication program SAS/ETS version 9.1.

Indonesia cassava economic model is a simultaneous equations consisting of five sub-models: sub cassava domestic market, sub cassava dried domestic market, sub cassava starch domestic market, sub cassava dried world market and sub cassava starch world markets.

Models specification used are described as follows:

1. AUK $= a_1*PUKP + a_2*PJP_{t-1} + a_3*AUK_{t-1} + \mu_1$;
2. YUK $= b_0 + b_1*PUKP + b_2*PUR + b_3*UBTP_{t-1} + b_4*TSB + b_5*YUK_{t-1} + \mu_2$;
3. QUK $= AUK*YUK$;
4. DUK $= DKL + DIP + DIG + DIT + DIL$;
5. DKL $= c_1*PUK + c_2*YI + c_3*POPI + c_4*DKL_{t-1} + \mu_3$;
6. DIP $= d_1*PUK + d_2*PJ + d_3*DIP_{t-1} + \mu_4$;
7. DIG $= e_1*PGI + e_2*DIG_{t-1} + \mu_5$;
8. DIT $= f_1*PTI + f_2*DIT_{t-1} + \mu_6$;
9. PUKP $= g_1*PUK + g_2*PUKP_{t-1} + \mu_7$;
10. PUK $= h_1*PGI + h_2*PTI + h_3*DUK + h_4*QUK + h_5*PUK_{t-1} + \mu_8$;
11. QGI $= DIG*RG$;
12. DGD $= i_1*PGI + i_2*YI + i_3*POPI + i_4*DGD_{t-1} + \mu_9$;
13. PGI $= j_0 + j_1*PUK + j_2*PGW + j_3*QGI + j_4*DGD_{t-1} + \mu_{10}$;
14. XGI $= k_1*PGI + k_2*PGW + k_3*DGD + k_4*QGI + \mu_{11}$;
15. QTI $= DIT*RT$;
16. DTD $= l_1*PTI + l_2*YI + l_3*POPI + l_4*DTD_{t-1} + \mu_{12}$;
17. PTI $= m_0 + m_1*PUK + m_2*PTW + m_3*MTI + m_4*QTI + m_5*DTD + \mu_{13}$;
18. XTI $= n_1*PTW + n_2*PTI + n_3*DTD + n_4*QTI + n_5*MTC + \mu_{14}$;
19. MTI $= MTITH + MTIS$;
20. MTITH $= o_1*PTI + o_2*DTD + o_3*QTI + o_4*RESTITH + \mu_{15}$;
21. XGW $= XGI + XGTH + XGV + XGWS$;
22. XGTH $= p_0 + p_1*PGW + p_2*DUKTH + p_3*QUKTH + p_4*MGE + \mu_{16}$;
23. XGV $= q_1*PGW + q_2*DUKV + q_3*QUKV + q_4*MGC + \mu_{17}$;
24. MGW $= MGE + MGC + MGWS$;
25. MGE $= r_1*PGW + r_2*DUKE + r_3*POPE + r_4*RESGE + \mu_{18}$;
26. MGC $= s_1*PGW + s_2*POPC + s_3*RESGC + s_4*MGC_{t-1} + \mu_{19}$;
27. PGW $= t_1*MGW + t_2*XGW + t_3*PGW_{t-1} + \mu_{20}$;
28. XTW $= XTI + XTTH + XTWS$;
29. XTTH $= u_0 + u_1*PTW + u_2*QUKTH + u_3*MTT + u_4*MTC + u_5*XTTH_{t-1} + \mu_{21}$;
30. MTW $= MTT + MTC + MTI + MTWS$;
31. MTT $= v_0 + v_1*PTW + v_2*DUKT + v_3*POPT + v_4*RESTT + \mu_{22}$;
32. MTC $= w_1*PTW + w_2*POPC + w_3*YC + w_4*RESTC + w_5*MTC_{t-1} + \mu_{23}$;
33. PTW $= x_1*MTW + x_2*XTW + x_3*PTW_{t-1} + \mu_{24}$;

Note:

AUK = Cassava harvested area of Indonesia (Ha)
PUR = Fertilizer prices of Indonesia (US$/Tones)
PUKP = cassava produser prices of Indonesia (US$/Tones)
PUK = cassava consumer prices of Indonesia (US$/Tones)
PJP = Corn produser prices of Indonesia (US$/Tones)
PJ = Corn consumer prices of Indoensia (US$/Tones)
TSB = Indonesia interest rate (%)
YUK = cassava productivity of Indonesia (Tones/Ha)
QUK = cassava production of Indonesia (Tones)
DUK = total cassava demand of Indonesia (Tones)
DKL = Indonesia cassava demand for direct consumption (Tones)
DIP = Indonesia cassava demand for feed industry (Tones)
DIG = Indonesia cassava demand for cassava dried industry (Tones)
DIT = Indonesia cassava demand for cassava starch industry (Tones)
DIL = Indonesia cassava demand for other used (Tones)
POPI = Population of Indonesia (people)
YI = *Indonesia GDP per capita* (US$ per capita)
QGI = cassava dried production of Indonesia (Tones)
DGD = cassava dried demand of Indonesia (Tones)
PGI = cassava dried prices of Indonesia (US$/Tones)
PGW = cassava dried prices of World (US$/Tones)
XGI = cassava dried exports of Indonesia (Tones)
RG = cassava dried rendemen (%)
QTI = cassava starch production of Indonesia (Tones)
DTD = cassava starch demand of Indonesia (Tones)
PTI = cassava starch prices of Indonesia (US$/Tones)
XTI = cassava starch exports of Indonesia (Tones)
MTI = cassava starch imports of Indonesia (Tones)
MTITH = Indonesia cassava starch imports from Thailand (Tones)
MTIS = Indonesia cassava starch imports from rest in the world (Tones)
RESTITH = Indonesia cassava starch imports restriction from Thailand (%)
RT = cassava starch rendemen (%)
XGW = World Cassava dried Exports (Tones)
XGTH = Cassava dried Exports of Thailand (Tones)
XGV = Cassava dried Exports of Vietnam (Tones)
MGW = World Cassava dried imports (Tones)
MGE = Cassava dried imports of E.U (Tones)
MGC = Cassava dried imports of China (Tones)
PGW = World Cassava dried prices (US$/Tones)
DUKTH = Cassava demand of Thailand (Tones)
QUKTH = Cassava production of Thailand (Tones)
DUKV = Cassava demand of Vietnam (Tones)

QUKV = Cassava production of Vietnam (Tones)
DUKE = Cassava demand of E.U (Tones)
RESGE = Cassava dried imports restriction of E.U (%)
RESGC = Cassava dried imports restriction of China (%)
XGWS = Cassava dried Exports of rest on the world (Tones)
MGWS = Cassava dried imports of rest on the world (Tones)
POPE = Population of E.U (people)
POPC = Population of China (people)
XTW = World Cassava starch Exports (Tones)
XTTH = Cassava starch Exports of Thailand (Tones)
MTW = World Cassava starch imports (Tones)
MTC = Cassava starch imports of China (Tones)
MTT = Cassava starch imports of Taiwan (Tones)
PTW = Cassava starch prices (US$/Tones)
POPT = Population of Taiwan (Org)
DUKT = Cassava demand of Taiwan (Tones)
YC = *China GDP per capita* (US$ per capita)
RESTC = Cassava starch imports restriction of China (%)
RESTT = Cassava starch imports restriction of Taiwan (%)

Structural model identification formulation based on order condition was: (K - M) ≥ (G - 1), where K is the total number of variables in the model (endogenous and predetermined); M is the number of variables (endogenous and exogenous) in the equation are identified, and G is the number of total equation (endogenous variables) on the model (Pyndick and Rubinfeld,1991). Parameter estimation used Two Stage Least Square (2SLS). This method is an appropriate method to estimate parameters that all structural equation was over-identified (Gujarati, 2006). Each equation were tested by F-test, t-test and DW-test. To determine the goodness of fit of the model used the coefficient of determination (R2) .

Validation models used indicator MPE, U-Theil coefficient and U-Theil decomposition. MPE was represented by variables value deviation between actual value with simulation value. A model has good predictive power if simulation value approached the actual value. U-Theil coefficient with a value between 0 and 1. U-Theil consist of proportion bias (U^M), variance bias (U^S) and covariance bias (U^C).

Simulation models used *ex-ante simulation* period 2015-2019. The conditions were as follows:

Simulation 1: eliminating cassava starch import restrictions from Thailand
Simulation 2: Increasing harvested area 1%, 5%,10% and 15%
Simulation 3: Increasing productivity 2%, 5%, 10% and 15%
Simulation 4: Increasing of capacity cassava starch industry 5%, 10% and 15%
Simulation 5: Combining policies to self- sufficiency of cassava starch

RESULTS

Cassava Econometric Model Estimation

This model has 33 equation, consist of 24 structural equation and 9 identity equation. This model has 24 endogenous variable and 45 predetermined variable (28 exogenous variable and 17 lag variable. All structural equation was *over-identified* so that used in parameter estimation. All structural equation have high R^2 value above 70%. Based on the results of the F test for all equations show that the simultaneous equation that is used to provide a significant effect on endogenous variables. Based on the results DW-test, the equations used do not have a serious problem autocorrelation.

Based on the results of model validation, the econometric model used is valid to predict simulation. The deviation between the actual value and simulations on all the equations of <15%. And only two equations which has a deviation of> 10%.. While validation is based on the decomposition of U-Theil showed that U^M and U^S value less than 0.2, where U^M value between 0.00 - 0.16 and U^S value between 0.00 – 0.19. UC value ranged between 0.69-1.00. and U-Theil value ranged between 0.02-0.49.

The simulation of elimination import cassava starch restriction

The elimination of import cassava starch restrictions in the framework of AEC caused cassava starch import volume increased by 6.576 tones (1,11%). The conditions negatively affect, where the price of cassava starch decreased by -0,04%, prices cassava decreased by -0,006% , cassava starch production decreased by -0,013% and cassava production decreased by -0,004% (Table 1).

Table 1. Result simulation of Eliminated Indonesia import cassava starch restriction from Thailand (SIM1)

NO	VARIABLE	MEAN VALUE		CHANGE	
		SIM BASE	SIM1	VALUE	%
1	AUK	1,113,486.0000	1,113,466.0000	-20.0000	-0.001796
2	YUK	24.5853	24.5848	-0.0005	-0.002034
3	QUK	27,364,898.0000	27,363,840.0000	-1,058.0000	-0.003866
4	DUK	28,228,460.0000	28,226,894.0000	-1,566.0000	-0.005548
5	DKL	762,145.0000	762,153.0000	8.0000	0.001050
6	DIP	581,837.0000	581,842.0000	5.0000	0.000859
7	DIG	656,987.1920	656,987.0240	-0.1680	-0.000026
8	DIT	12,476,524.0000	12,474,945.0000	-1,579.0000	-0.012656
9	PUKP	368.9192	368.9002	-0.0190	-0.005150
10	PUK	573.6306	573.5974	-0.0332	-0.005788
11	QGI	236,515.3860	236,515.3300	-0.0560	-0.000024
12	DGD	121,388.1740	121,391.9780	3.8040	0.003134
13	PGI	402.6882	402.6870	-0.0012	-0.000298
14	XGI	113,892.6080	113,888.7340	-3.8740	-0.003401
15	QTI	3,493,427.0000	3,492,985.0000	-442.0000	-0.012652
16	DTD	3,994,041.0000	3,995,786.0000	1,745.0000	0.043690
17	PTI	824.7000	824.4000	-0.3000	-0.036377
18	XTI	48,104.0000	47,790.6000	-313.4000	-0.651505
19	MTI	593,921.0000	600,497.0000	6,576.0000	1.107218
20	MTITH	553,660.0000	560,236.0000	6,576.0000	1.187733

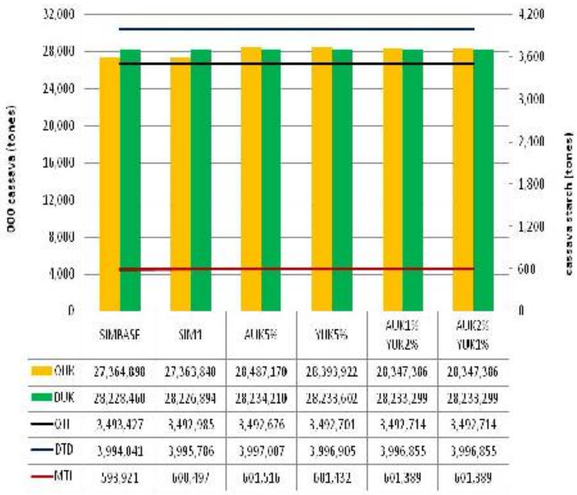

Figure 1 Alternative policy for cassava self sufficiency

Policy simulation

Based on the results of SIM2 and SIM3, cassava self-sufficiency can be achieved by a policy of increasing harvested area by 5%; the policy of increasing productivity by 5%; and combining policy between increasing harvested area 1% and increasing productivity 2% (Figure 1). However, cassava starch is not reduced.

Based on the results of SIM4, cassava starch self-sufficiency can be achieved through a policy of increasing capacity of cassava starch industry by 15%. In these conditions the import of cassava starch reduced up to 10% of the total production of cassava starch.

The result SIM5 showed that can be achievable cassava starch self sufficiency by combining policy between increasing of cassava starch industry by 15 % with the following policy alternative:

a) increasing harvested area 15%
b) increasing harvested area of 1% and increasing productivity of 15%
c) increasing harvested area of 5% and increasing productivity of 10%
d) increasing harvested area of 10% and increasing productivity of 5%

DISCUSIONS

Efforts to harvested area is possible because in 2006 the total area of the cassava crop has reached 1.4 million hectares. In addition there are potential dry land that could be used for the cultivation of cassava (Saliem and Nuryanti, 2011). Likewise with increased productivity. Indonesian cassava productivity is still low compared to the potential outcome (Suwarto, 2012). So it can still be efforts to increase productivity.

The policy of increasing harvested area and productivity (single and combination policy) were able to overcome the gap between cassava production with demand. So that self-sufficiency in cassava achieved. However, in these conditions cassava starch still imported 600,000 tons, because cassava starch demand is higher than domestic production. In order to meet domestic needs and reduce the volume of imports, it is necessary to increase the production of cassava starch. The policy can be taken one of them by increasing capacity of cassava starch industry. The increasing capacity of cassava starch industry by 15% can reduce the amount of cassava starch imports up to 10% of national production. However, to achieve self-sufficiency condition cassava starch, cassava production support is needed that is able to meet the needs of industrial raw materials cassava starch. Therefore, the policy increasing capacity of cassava starch industry by 15% should be combined with policy increasing harvested area and/ or increasing productivity. In these conditions occur self-sufficiency in cassava and cassava starch

CONCLUSIONS

Elimination of cassava starch import restrictions relatively small effect on economic performance of cassava Indonesia. Cassava starch imports is mainly due to domestic production lower than the demand. In the period 2015-2019, there will be a deficit in Indonesia cassava production. The deficit can be addressed by a partial policy of increasing harvested area by 5% and the policy of increasing productivity by 5%, or a combination of both. Policy alternatives that can be taken to reduce the import of cassava starch is a combining policy of increasing capacity cassava starch industry by 15% with the policy as follows: 1) increasing harvested area 15%, 2) increasing harvested area of 1% and increasing productivity of 15%, 3) increasing harvested area of 5% and an increasing productivity by 10%, and 4) increasing harvested area by 10% and increasing productivity by 5%.

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