

The roles of global coffee initiatives for the efficiency of coffee value chain in Indonesia

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The Indonesian Coffee Economy

- Indonesia is the **4th largest** coffee producer, after Brazil, Vietnam, and Columbia, but the **2nd largest** Robusta producer after Vietnam
- Coffee production in 2009 is about 570,000 tons - a slight increase from about 560,000 tons of production in 2008 (ICO, 2010).
 - 85% of coffee is Robusta (mostly from Lampung)
 - 15% of coffee is Arabica (virtually all exported)



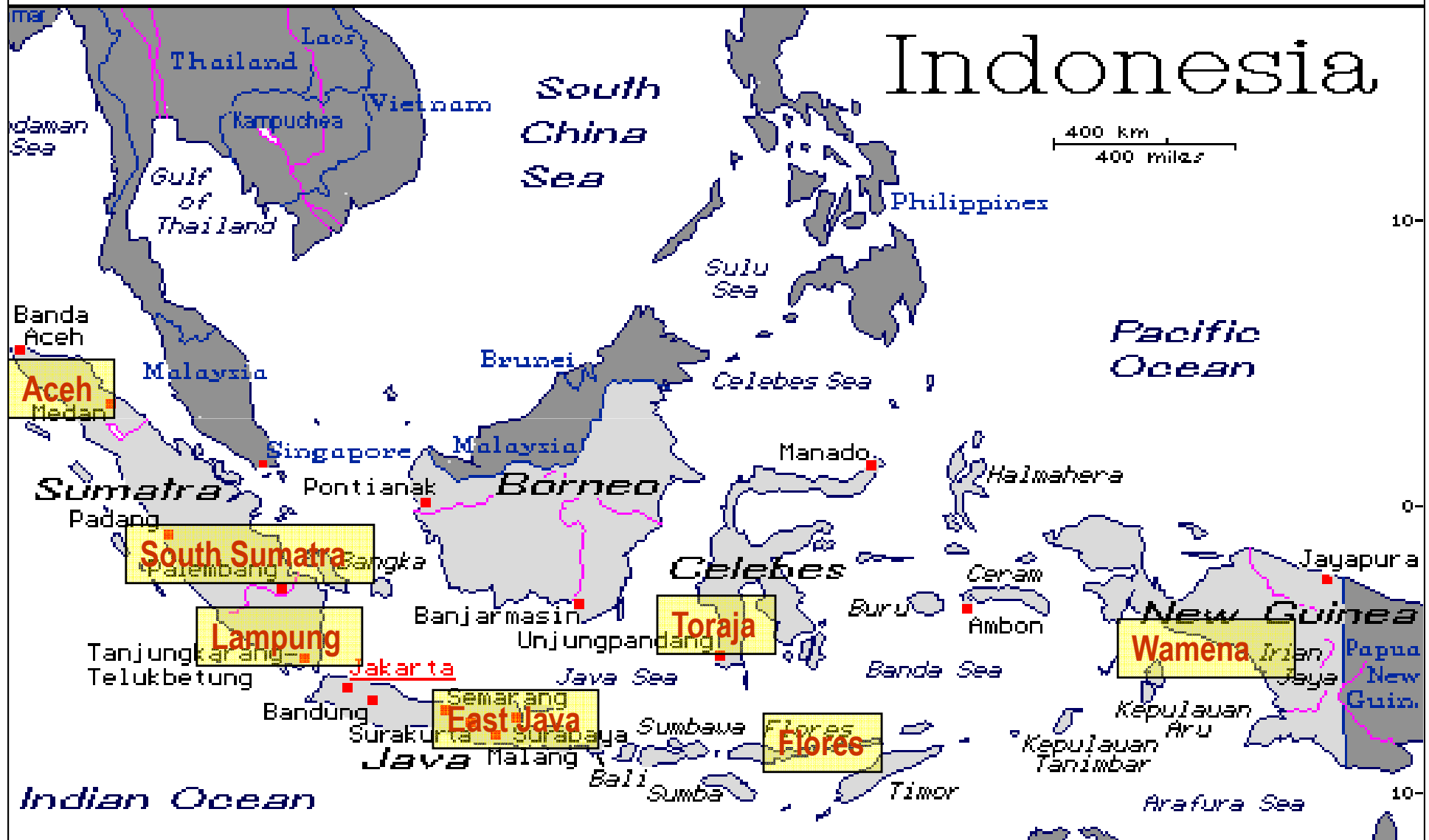
Sustainability Standards & Regulations

- First party; Starbucks preferred supplier program, later evolved into CAFÉ (coffee and farmer equity) Practices
- Second party: Sustainable Agriculture Information (SAI)
- Third party regulatory systems:
 - Utz Kapeh: originally by Guatemalan, Dutch company Ahold
 - Fair Trade: now thru Fairtrade Labelling Organization (FLO)
 - Organic: e.g. USDA Organic labelling
 - Shade-grown: now thru Bird-friendly and Rainforest Alliance
- Fourth party: Common Code for Coffee Community (4C), was led by GTZ and DKV (German Coffee Association).

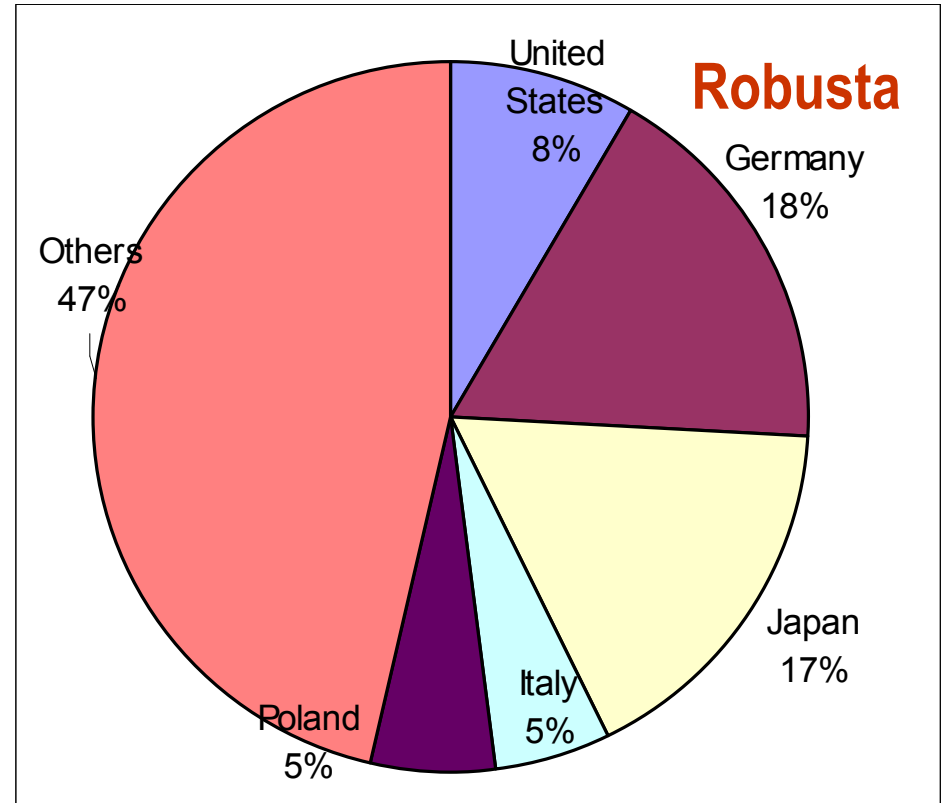
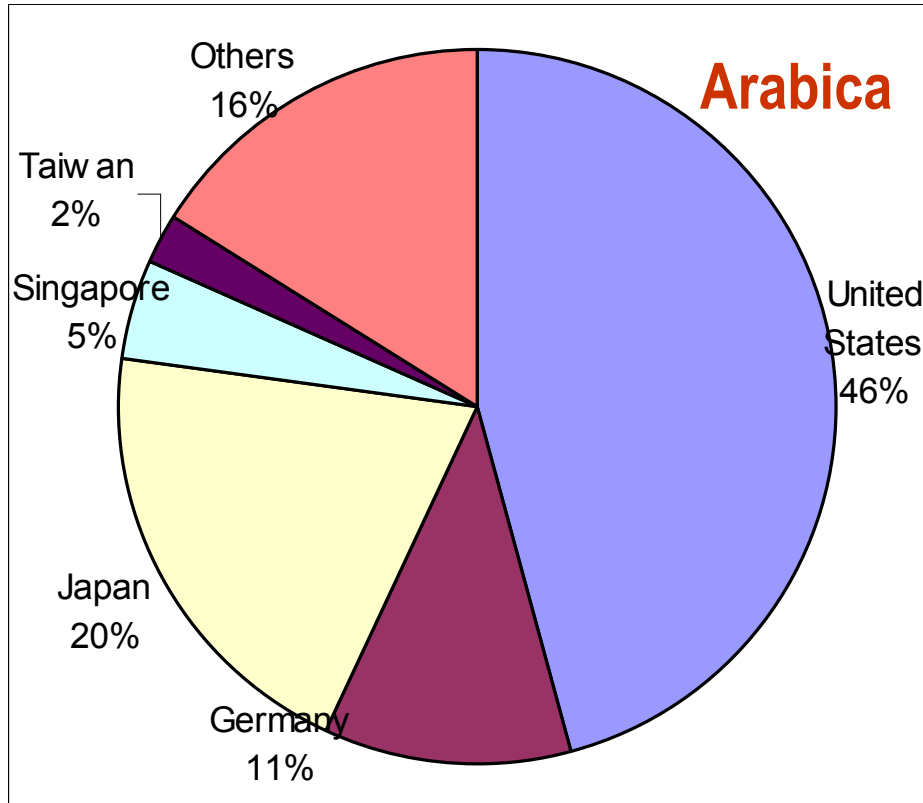
Study Objectives

- This study examines the roles of global initiatives for the efficiency of coffee value chain in Indonesia, by identifying the structure of coffee market in Indonesia and by analyzing the effects of coffee prices at global level on the price of Robusta coffee in Indonesia.
- A series of econometric analysis of vector autoregressive (VAR) and Vector Error Correction Model (VECM) is employed to examine the spatial integration of coffee markets in Indonesia and the vertical integration of global coffee markets and the Indonesian coffee market.

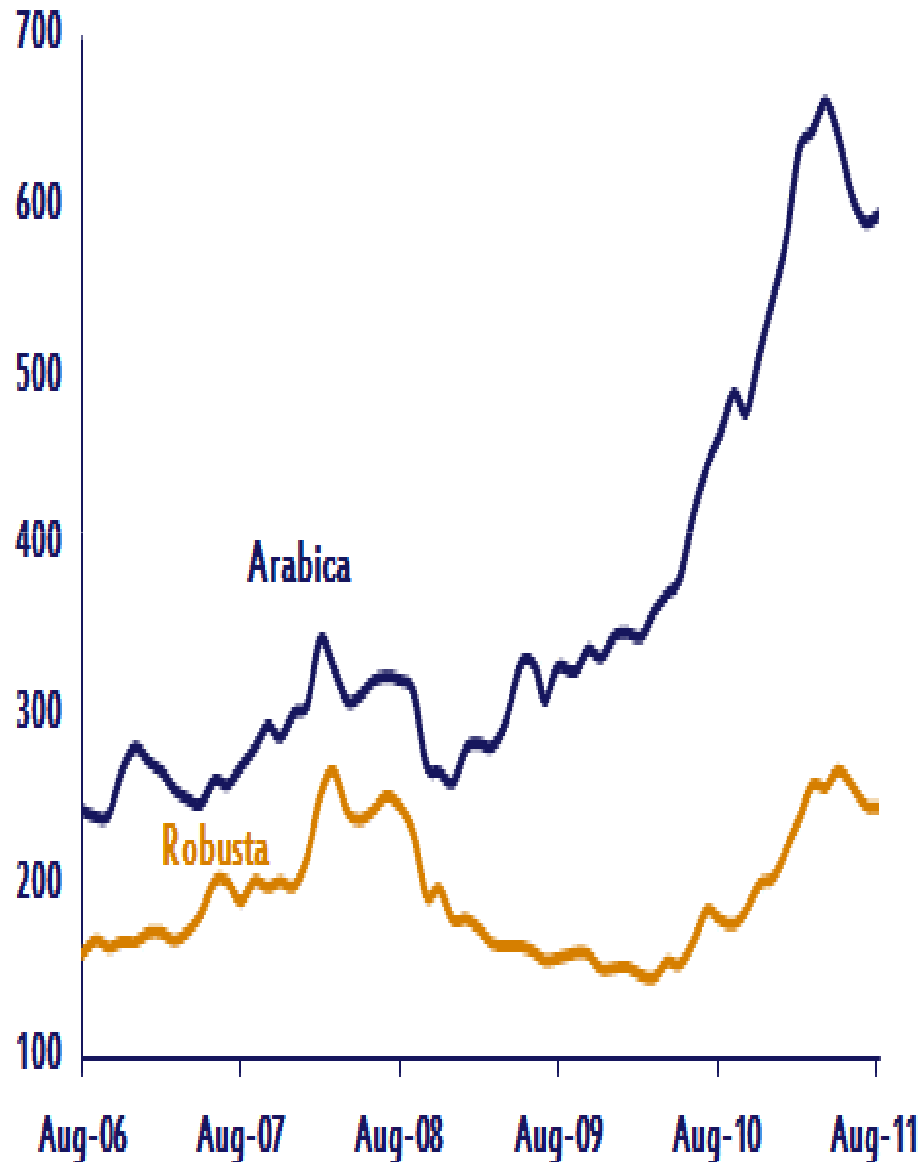
Coffee Producing Regions in Indonesia



Export Destination of Indonesian Coffee



Specialty Coffee: Growing Significance



Source: Word Bank, September 2011

- The growing significance of specialty coffee in world market coincides with the growth of global environmental governance in agri-food industry.

Arabica Specialty Coffee of Indonesia

- Mandheling Coffee (12,000 ton/year)
- Gayo Coffee (25,000 ton/year)
- Lintong Coffee (8,000 ton/year)
- Toraja/Kalosi Coffee (5,000/year)
- Washed Java Coffee (4,000/year)
- Bali/Kintamani Coffee (2,000/year)

Robusta Specialty Coffee of Indonesia

- Lampung Specialty ALP (20,000 ton/year)
- Lampung Specialty ELB (10,000 ton/year)
- Semendo Coffee (2,000 ton/year)
- Washed Java Coffee (20,000/year)
- Robusta Flores Coffee (2,000/year)

Coffee-Farm Production System

- The majority (95%) is small-holder, 0.5- 2 ha of farms.
- Average Robusta yields 625 kg/ha, far below that in Vietnam and Brazil of about 3 ton/ha.
- About 120,000 Arabica coffee farming families in Indonesia
- Harvest system varies by regions, but is mostly rudimentary: Harvest, pulp, ferment, wash, dry, and sell the bean at farm gate (collected by traders) and send to larger traders and exporters.



Spatial Market Integration:

(1) Co-Integration Test

$$\overline{Pr}_t = \mu + \pi_i \overline{Pr}_{t-1} + \dots + \pi_k \overline{Pr}_{t-k-1} + \overline{E}_t$$

\overline{Pr}_t = vector of coffee price ($pX1$) at time t ,

μ = vektor of intercept ($pX1$),

$\pi_1 \dots \pi_k$ = parameter matrix ($pX1$) for $i = 1, \dots, K$

where i is the provinces producing coffee

\overline{E}_t = vector error term where $\overline{E}_t \sim \text{idd}(0, \Omega)$.

(2) Error Correction Model (ECM)

$$\overline{\Delta Pr}_t = \mu + \pi \overline{Pr}_{t-1} + \Gamma_1 \overline{\Delta Pr}_{t-1} + \dots + \Gamma_{p-1} \overline{\Delta Pr}_{t-p-1} + \overline{E}_t$$

where:

$$\Gamma_i = -I + \pi_i, (i = 1, \dots, K-1)$$

$$\pi = -I + \pi_1 + \dots + \pi_K$$

Γ_i explains the dynamics of short-run system

π is the matrix of long-run coefficient, expressed in $\pi = \alpha\beta$.

This could be used to determine the number of co-integration vector in the system

Vertical Market Integration

$$\overline{\text{Pr}}_t = \alpha + \sum_{i=1}^k B_i \overline{\text{Pr}}_{t-1} + \overline{E}_t$$

$$\Delta \overline{\text{Pr}}_t = \alpha + \sum_{i=1}^k B_i \Delta \overline{\text{Pr}}_{t-1} + \overline{E}_t$$

$\overline{\text{Pr}}$ is a vector of coffee price (p1)

α is a vector of intercept (p 1)

B_i is matrices of parameter (p p), $i=1, \dots, k$,

\overline{E}_t is vector of *error term*;

k is the number of lag, and t is time

Important Results and Implications

- The results show that the coffee value chain in Indonesia is both spatially and vertically integrated, where the regional price and national price of coffee are affecting each other, implying long-term relationship among coffee markets in Indonesia.
- About 60 percent variation of Robusta coffee price in Lampung Province could explain the variation of coffee price in Indonesia, showing the market leadership of the province in Robusta coffee.

Spatial Market Integration of Robusta Coffee

Coffee Price-Lampung and Coffee Price-Indonesia

Unit root test: Data is stationary at degree 2

Variables	Model	t α	A			Results
			1%	5%	10%	
Coffee Price- Indonesia	TI	-1.751524	-4.532598	-3.673616	3.277364	NS
Coffee price- Lampung	I	-0.639743	-3.831511	-3.029970	-2.655194	NS
Coffee Price- Indonesia	TI	-1.669142	-4.532598	-3.673616	-3.277364	NS
Coffee price- Lampung	I	-0.532550	-3.831511	-3.029970	-2.655194	NS

TI = Trend and Intercept

I = Intercept

NS = Non-Stationery

Co-Integration Test

Variables	Model	ta	A			Results
			1%	5%	10%	
Coffee Price-	TI	-5.264320	-4.616209	-3.710482	-3.297799	S
Indonesia	I	-5.418524	-3.886751	-3.052169	-2.666593	S
Coffee Price-	TI	-5.006855	-4.616209	-3.710482	-3.297799	S
Lampung	I	-5.152015	-3.886751	-3.052169	-2.666593	S

TI = Trend and Intercept

I = Intercept

S = Stationery

Vector Autoregressive (VAR) Test

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.983902	0.0009
Test critical values:		
1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

- t-statistics < t-critical value: **No unit root**
- Co-integration between the coffee price of Indonesia (Robusta) and coffee price of Lampung (Robusta)

Vector Error Correction Model (VECM)

Dependent Variable: D(INDP,2)

Method: Least Squares

Date: 10/30/10 Time: 01:44

Sample (adjusted): 1992 2009

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.40298	42.47521	0.715782	0.4851
D(LP,2)	1.061835	0.014229	74.62599	0.0000
E(-1)	-2.269606	0.389109	-5.832830	0.0000
R-squared	0.998333	Mean dependent var	-63.44444	
Adjusted R-squared	0.998110	S.D. dependent var	4102.764	
S.E. of regression	178.3467	Akaike info criterion	13.35635	
Sum squared resid	477113.2	Schwarz criterion	13.50474	
Log likelihood	-117.2071	F-statistic	4490.731	
Durbin-Watson stat	1.771303	Prob(F-statistic)	0.000000	

Results: **Variable e < 0 = -2,2696**

Coffee price of Indonesia (Robusta) is above the long-run level.

$R^2 = 0,9983$ – the rest is affected by variables which are not analyzed

The Chain System of Global Coffee

- The new global initiatives affecting the determination of coffee prices in New York market and London market have also some impacts on the farm-gate coffee price in Indonesia, albeit very small.
- Each percent of price increase in New York market and London market respectively affects farm-gate price in Indonesia of 0.013 and 0.028 percent respectively.
- The price transmission elasticity of global coffee price to the domestic price is 0.48, implying that the value chain system of coffee market in Indonesia is not in an ideal or efficient condition.

Vertical Market Integration of Coffee

Augmented Dickey-Fuller Test

All variable is non-stationery: coffee price-Indonesia, ICO price indicator, coffee price-London, and coffee-price-New York

	Indonesia	ICO	London	New York
t-statistics	-2.383216	-2.698280	-2.305406	-2.968275
1% level	-3.457630	-3.457865	-3.457984	-3.457865
5% level	-2.873440	-2.873543	-2.873596	-2.873543
10% level	-2.573187	-2.573242	-2.573270	-2.573242
Prob.	0.1476	0.0758	0.1711	0.0394

Co-integration Test

All variable is stationery: coffee price-Indonesia, ICO price indicator, coffee price-London, and coffee-price-New York

	Indonesia	ICO	London	New York
t-statistics	-14.62673	-8.404666	-8.180272	-8.877297
1% level	-3.457747	-3.457865	-3.458104	-3.457865
5% level	-2.873492	-2.873543	-2.873648	-2.873543
10% level	-2.573215	-2.573242	-2.573298	-2.573242
Prob.	0.0000	0.0000	0.0000	0.0000

Vector Error Correction Model (VECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
E(-1)	-0.099372	0.028226	-3.520588	0.0005
C	0.011674	0.997513	0.011703	0.9907

Results: $e = -0,0993 \rightarrow$ coffee price-Indonesia is above the long-run level (where the independent variables are ICO price indicator, coffee-price London, and coffee price-New York).

Notes: the smaller e_t , the faster the correction process for its long-run equilibrium level.

Granger Causality Test (monthly data)

Null Hypothesis:	Obs	F-Statistic	Probability
IP does not Granger Cause IND_P	238	5.15110	0.00647
IND_P does not Granger Cause IP		0.07212	0.93044
LDN_P does not Granger Cause IND_P	238	4.39416	0.01339
IND_P does not Granger Cause LDN_P		0.14057	0.86894
NY_P does not Granger Cause IND_P	238	3.62785	0.02809
IND_P does not Granger Cause NY_P		0.13908	0.87023
LDN_P does not Granger Cause IP	238	0.12844*	0.87953
IP does not Granger Cause LDN_P		0.06292	0.93903
NY_P does not Granger Cause IP	238	1.20073	0.30283
IP does not Granger Cause NY_P		1.23360*	0.29314
NY_P does not Granger Cause LDN_P	238	0.44194*	0.64333
LDN_P does not Granger Cause NY_P		0.68061*	0.50731

***) menyatakan nyata pada taraf 5% dan 1%

Sustainability & Certification Systems



- Market chains to exports are unregulated, but some certification systems have been adopted in Indonesia.
- Market-based schemes to induce sustainable farm practices:
 - ‘Forest stewardship’ payments, such as those linked to carbon markets;
 - Supply chain certification programs that attempt to create price premiums at the farm level, such as ‘Organic’, ‘Rainforest Alliance’ or ‘Utz Kapeh’



Price Differences among Coffee Marketing Agents

Price Differences	2004	2005	2006	2007	Growth (%)
FOB Export (Rp/Kg)	30500	93000	108000	75000	63.50
<i>Share (%)</i>	100	100	100	100	
Factory/Trade (Rp/Kg)	9429	12617	14724	18676	25.78
<i>Share (%)</i>	30.91	13.57	13.63	24.90	
Farm-Gate (Rp/Kg)	5158	8746	12023	16346	47.66
<i>Share (%)</i>	16.91	9.40	11.13	21.79	
Marketing Margin					
FOB-Export (Rp/Kg)	21071	80383	93276	56324	85.97
<i>Share (%)</i>	69.09	86.43	86.37	75.10	
Factory-Farm (Rp/Kg)	4271	3871	2701	2330	-17.78
<i>Share (%)</i>	14.00	4.16	2.50	3.11	
FOB-Farm (Rp/Kg)	25342	84254	95977	58654	69.16

Conclusion and Recommendations

- Coffee value chain in Indonesia is spatially integrated, where regional price and national price of coffee are affecting each other, implying long-term relationship among coffee markets.
- New global initiatives affecting the determination of coffee prices in New York market and London market have also some impacts on the farm-gate coffee price in Indonesia, albeit very small.
- The value chain system of coffee market in Indonesia has low level of transmission elasticity, but fast growing market of specialty coffee could provide more opportunities for improving efficiency.
- The study suggests more access for market information, openness in business contracts and economic governance to improve the market structures, hence increasing income of coffee farmers.