



## Estimating the Market Power of Traders in the Arabica Coffee Value Chain in Lam Dong, Vietnam

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### Abstract

Although some studies have assessed the market power of advanced degrees in Vietnam's agricultural sector, this research only focuses on analyzing the level of market concentration through CR4 or HHI indexes. The stochastic cost frontier can estimate market power using the Lerner ratio when input price data are not available and with or without constant returns to scale. Thus, the stochastic cost frontier with a maximum likelihood approach of [Kumbhakar et al. \(2012\)](#) is used to assess the market power of traders in the coffee value chain in Lam Dong province, Vietnam. The estimated market power and Lerner rate results are 0.0001. This index shows that the local coffee market is a market with perfect competition. So the traders do not have market power. Thus, there is no collusion between coffee traders to lower the purchase price for farmers or increase the price for processors and exporters. An RTS ratio of 0.96 (less than one) shows that the return to scale for traders is decreasing. This number proves that the degree of competition in the local coffee market among traders is very high.

**Keywords:** Market power; Lerner index; Coffee traders.

## 1. Introduction

Vietnam is the second-largest coffee exporter in the world after Brazil, with an area of 622,637 hectares and an output of 1,683,971 tons ([FAOSTAT, 2019](#)). However, the export turnover is low, accounting for about 8.8% of the country's entire agricultural sector ([Ministry of Agriculture and Rural Development MARD, 2017](#)). Vietnamese coffee is mainly exported in the form of low quality green beans. Most of Vietnam's coffee is robusta, while the market world prefers Arabica to robusta coffee. Lam Dong province is famous for its high-quality Arabica coffee varieties, thanks to the advantages of climate and suitable soil, especially in Dalat city.

Conversely, when the market is operating efficiently, it will contribute to the welfare and income of the coffee value chain if imperfect problems arise in the market. In that case, market information lack up, lack of information for production and processing, short-term storage, lack of quality control, and market power. Then potential chain actors' income and well-being benefits will not be achieved. The coffee value chain has been characterized by several large buyers and lower and more volatile producer prices; the selling price of coffee farmers is low and unstable ([Li and Saghaian, 2014](#)). Sometimes, farmers sold coffee at a price that did not cover the cost. [Mehta and Chavas \(2008\)](#). Coffee traders are essential factors connecting farmers with large enterprises (processing and exporting enterprises). The majority of coffee from farmers is sold directly to traders ([FAO, 2015; Nguyen and Mai, 2017](#)). So the principal role's traders in linking farmers with companies has been demonstrated in some studies. If without traders, most processing and exporting companies would not buy farmer's products by themselves. Since the firms lack up insufficient human resources, professional experience, and technical infrastructure such as transport, drying, and storage ([Do and Nguyen, 2018; Nguyen and Sarker, 2018; Nguyen et al., 2018; Vo et al., 2015](#)).

In previous studies, the market concentration index of the top 4 companies, CR4 or HHI, has often been used to measure market power. The calculation of these indicators is simple and straightforward. However, when bargaining power is assessed using CR4 or HHI indicators, company behavior is not explicitly modeled and statistical tests are not performed ([Murphy, 2006](#)). Another indicator for estimating market strength is the Lerner index (1934):  $\mathcal{L} \equiv (P - MC)/P$ . The Lerner coefficient can also be viewed as a measure of the markup. The  $\mathcal{L}$  score requires an MC score, as MC is usually not observed unless there is consistent returns to scale.

One method estimated a total cost function to obtain MC as in [Wolfram \(1999\)](#). Another is the new empirical industrial organization (NEIO) approach, which values  $\mathcal{L}$  without direct estimate of marginal cost. Instead, the price markup above the marginal cost is estimated using regression (often called the supply relation) which controls the

variables that determine the marginal cost. This approach has several disadvantages, as is discussed in [Perloff and Shen \(2012\)](#).

An essential disadvantage of directly estimating a cost function and the NEIO approach is that they require data on all cost determinants (output and input prices). To overcome the weaknesses with this approach, [Kumbhakar et al. \(2012\)](#). Used a stochastic frontier method to estimate market power when baseline price data are not available and with or without consistent returns to scale. The study proposed an experimental model to analyze the market power of traders in the Arabica coffee value chain in Lam Dong province according to the approach of [Kumbhakar et al. \(2012\)](#).

## 2. Overview of Studies on Market Strength in Agriculture and Food in the World and Vietnam

Market power is the ability to influence price (setting prices higher for buyers and prices for suppliers below open market levels), reduce competition, and set standards for a particular sector of economic activity. In a perfectly competitive market, since selling prices are equal to marginal cost ( $P = MC$ ), market participants have no market power ([Cakir and Balagtas, 2012](#); [Murphy, 2006](#)). There are several ways of measuring market power in economics, such as the CR<sub>n</sub> market concentration ratio, the HHI (Herfindahl Hirschman Index), and the Lerner index ( $\mathcal{L}$ ).

### 2.1. Market Concentration Ratio

A standard measure of market concentration is the CR<sub>n</sub> ratio. There is also another measure of market power through market concentration, which measures the market's share controlled by the largest firms (typically the top 4, 6, or 8). It's called market share. This metric is widely used for measuring concentration in the industry. It is calculated by the ratio of output to  $r$  large firms in the industry where  $r$  is an arbitrary number but usually 4, 8, or 12. The formula for calculating CR<sub>n</sub> is as follows:

$$CR_r = \frac{\sum_{i=1}^r x_i}{X}$$

Where  $x_i$  is the total size of the  $i$ -th individual firm and  $X$  is the whole market size. CR<sub>4</sub> is the market share of the top four companies. A CR<sub>4</sub> (meaning the top four firms' share) of 40 percent or less is generally considered a competitive market ([Murphy, 2006](#)). This CR<sub>4</sub> of 80 percent implies more monopoly power ([Kang et al., 2009](#)). The weakness of the CR<sub>n</sub> as a measure is that it does not indicate whether there is any movement among the top firms measured (number one might drop to fourth place, but the CR<sub>n</sub> could be unchanged). CR<sub>n</sub> also doesn't say if the top 100 firms are in the top 100 or just two other firms. A partial shot can be misleading. However, CR does provide a useful, albeit crude measure ([Murphy, 2006](#); [White, 2012](#)). Due to the limitations of the CR<sub>4</sub> index, some researchers have suggested the HHI when sales data for individual firms is available. It is the sum of the squares of the market share of each firm in the industry. In other words, it is equal to

$$HHI = \sum_{i=1}^n S_i^2$$

Where  $S_i^2$  is the squared market share of the  $i$ -th company in the industry, the HHI index takes into account the relative size and distribution of the companies in a market. It approaches zero when a market consists primarily of a large number of firms relatively equal in size. If the number of companies in the market is reduced or the difference in size between firms increases, the HHI will still increase. Markets in which the HHI index is between 1000 and 1800 points are considered moderately concentrated. Those in which the HHI ratio is in additional 1800 points are considered concentrated ([Kang et al., 2009](#)).

It's easy to calculate the HHI index. However, to fully understand, it is also necessary to define complex parameters of different industries. For example, when the market scope is clear, a high HHI ratio is not always proof of market power because the few firms in the market can face competition from outside. Assuming a company has a significant market share if the firm sells at too high a price or doesn't invest well, other companies probably take their post and dominate the market. If the barriers to market entry are low, a competitive market can maintain with relatively few firms. Despite the complications, it is crucial to estimate concentration to measure trends and change in the sector and give the problem a tangible form ([Murphy, 2006](#)).

Due to the advantages in calculating, the HHI and CR<sub>4</sub> have been used by many researchers. [Kang et al. \(2009\)](#) compared the CR<sub>4</sub> and HHI of rice exporting and importing countries from 1997 to 2008. [Pavic et al. \(2016\)](#) assessed the relationship between CR<sub>4</sub> and HHI at three levels of the non-concentrated, moderately concentrated, and highly concentrated market of the American economy. The study results showed that there is no difference between CR<sub>4</sub> and HHI. The concentration of sugar and rice markets in the Mekong Delta is also measured by [Huynh and Luu \(2016\)](#), [Luu \(2005\)](#) by CR<sub>4</sub> ratio.

When market power is assessed using the above measures, firm behavior is not explicitly modeled, and no statistical tests are performed. Various believe that the types of strategic interactions among the firms, rather than the number of companies determining the degree of market power, and econometric techniques can be used to estimate the degree of market power ([Azzam and Pagoulatos, 1990](#); [Weerahewa, 2003](#)).

### 2.2. Lerner Index

Unlike the CR and HHI indexes, [Lerner \(1934\)](#) measures the difference between price and marginal cost as a fraction of the product's price as an estimate of market power. This rate is

$$\mathcal{L} = (P - MC)/P$$

Where P is the price, and MC is the marginal cost. Lerner's rate ranges from 0 to 1, with higher numbers representing more monopoly power. If price is equal to marginal cost, the Lerner index is 0, indicating that the company has no bargaining power. When the Lerner ratio approaches 1, this shows relatively weak price competition, and therefore the company has bargaining power.

The  $\mathcal{L}$  score requires an MC score, as MC is usually not observed unless there is consistent returns to scale. Thus, another approach is to estimate the total cost function and use it to derive the MC.

Another estimation method of NEIO, it is possible to estimate the  $\mathcal{L}$  index without directly estimating marginal cost. Instead, the increase in marginal cost is estimated using a regression function, also known as the supply ratio. This approach monitors variables to determine MC. Most econometric models follow NEIO's approach is a simultaneous equation model (SEM) in which the supply and demand equations are estimated along with the pricing equation. Researchers often use the SEM tool for nonlinear spherical functions to obtain direct estimates of the predicted elasticity. Specifically: [Raper et al. \(2000\)](#) applied this model to estimate the market power of the American tobacco market; measuring the market power of food retail in France [Gohin and Guyomard \(2000\)](#); [Lass et al. \(2005\)](#) use the method of estimating supply and demand simultaneously to determine the market strength of farms that support communities and their customers; [Merel \(2009\)](#) also applies this tool to the analysis of the French cheese market strength. Meanwhile, [Cakir and Balagtas \(2012\)](#) also developed the NEIO approach for constructing a linear model to assess the market power of dairy cooperatives in America.

An important limitation of direct cost function estimation and NEIO methods is that they require data on all cost determinants (ie, output prices and costs). To overcome the limitations of the above-mentioned approach, [Kumbhakar et al. \(2012\)](#) developed a new method for assessing market power. In this paper, we develop a new method for estimating market power: It provides an alternative use of the stochastic frontier model, which is traditionally and widely used to estimate frontier functions of production, cost, or profit. Based on the theory of the duality of cost and input-distance functions, a significant advantage of this method is that it allows the use of either input price data, as in the NEIO approach, or input quantity data to estimate market power. Based on the theory of the duality of cost and cost and distance functions, a significant advantage of this method is that it allows the use of either baseline price data, as in the NEIO approach, or quantity baseline data to estimate market power. Unlike NEIO approach, this new method allows us to evaluate the bargaining power when on the basic price data are unavailable. Another advantage of this method is that it can reliably estimate the bargaining power with constant returns to scale or not, that is not always the case in NEIO approach ([Kumbhakar et al., 2012](#)).

Because of the outstanding advantages of [Kumbhakar et al. \(2012\)](#) that many recent studies have been applied to calculate market power in agricultural and food products. Specifically: [Čechura et al. \(2015\)](#) and [Koppenberg and Hirsch \(2019\)](#) use to analyze the market power of the dairy industry in Europe; [Lopez et al. \(2015\)](#) and [Lopez et al. \(2017\)](#) use the analysis of the market power of the food industry and most recently, [Rahman et al. \(2020\)](#) on analysis rice market power in Bangladesh.

### 3. Research Methods

#### 3.1. Empirical Model of Market Power Analysis

The study used the random marginal analysis approach of [Kumbhakar et al. \(2012\)](#) to assess trader's market power in the Arabica coffee value chain in Lam Dong province. The model starts from the basic set-up of an industry exhibiting an oligopoly, where the output price set exceeds the marginal cost of production ( $P > MC$ ) ([Lopez et al., 2015](#)). If  $P = MC$  is a competitive market, and if  $P > MC$  is a non-competitive market. With P is the output price, Y is an output, and C is the cost of production. Starting from

$$P \geq \frac{\partial C}{\partial Y} = MC \quad (1)$$

Multiplying both sides of equation (1) by the output share in total cost  $Y/C$ , we have:

$$\frac{P \cdot Y}{C} \geq \frac{\partial C}{\partial Y} * \frac{Y}{C} = \frac{\partial \ln C}{\partial \ln Y} \quad (2)$$

In equation (2) can be transformed to equation (3) by adding a non-negative, one-sided error term, u to the equation, u represents a measure of market failure. Then, equation (3) can be estimated using the stochastic frontier method of [Kumbhakar et al. \(2012\)](#).

$$\frac{P \cdot Y}{C} = \frac{\partial \ln C}{\partial \ln Y} + u, \quad u \geq 0 \quad (3)$$

where  $PY/C$  is the revenue share in total cost, C is the total cost,  $\partial \ln C / \partial \ln Y$  is the elasticity of scale, u is the non-negative, one-sided error term indicating the mark-up. The mark-up model in equation (3) is derived from the standard profit maximization problem. In this study, price information of coffee traders has been collected. Therefore the duality theorem should not be employed ([Kumbhakar et al., 2012](#)). The cost elasticity of  $\partial \ln C / \partial \ln Y$  would be estimated from the trans-log cost function as follows:

$$\ln C = \beta_0 + \sum_{j=1}^J \beta_j \ln W_j + 0,5 \sum_{j=1}^J \sum_{k=1}^J \beta_{jk} \ln W_j \ln W_k + \beta_Y \ln Y + 0,5 \beta_{YY} (\ln Y)^2 + \sum_{j=1}^J \beta_{jY} \ln W_j \ln Y + \beta_{PR} D_{PR} + \beta_{HT} D_{HT} \quad (4)$$

where  $\beta$  are unknown parameters to be estimated, C is the total cost, Y is the output, and W represents the input prices.  $D_{PR}$  is the dummy variable that takes the value one if traders process coffee.  $D_{HT}$  is the dummy variable that takes the value one if traders support for coffee farmers. From (4) the expression for cost elasticity,  $\partial \ln C / \partial \ln Y$  as follows:

$$\frac{\partial \ln C}{\partial \ln Y} = \beta_Y + \beta_{YY} \ln Y + \beta_{YM} \ln W_M + \beta_{YL} \ln W_L + \beta_{YT_T} \ln W_{T_T} + \beta_{YO} \ln W_O + \beta_{YK} \ln W_K + \beta_{PR} D_{PR} + \beta_{HT} D_{HT} \quad (5)$$

Substituting equation (5) with (3), adding a variable capturing statistical noise (v), and imposing the homogeneity restriction by normalizing all input prices compare to the cost of capital, the equilibrium condition can be written as:

$$\frac{P.Y}{C} = \beta_Y + \beta_{YY} \ln Y + \beta_{YM} \ln \frac{W_M}{W_K} + \beta_{YL} \ln \frac{W_L}{W_K} + \beta_{YTr} \ln \frac{W_{Tr}}{W_K} + \beta_{YO} \ln \frac{W_O}{W_K} + \beta_{PR} D_{PR} + \beta_{HT} D_{HT} + u + v \quad (6)$$

Set ratePCY = (P.Y)/C, y=Y; m=(W<sub>M</sub>/ W<sub>K</sub>); l=(W<sub>L</sub>/ W<sub>K</sub>); tr=(W<sub>Tr</sub>/ W<sub>K</sub>); o=(W<sub>O</sub>/ W<sub>K</sub>); equation (6) can be rewritten as:

$$ratePCY = \beta_Y + \beta_{YY} \ln y + \beta_{YM} \ln m + \beta_{YL} \ln l + \beta_{YTr} \ln tr + \beta_{YO} \ln o + \beta_{PR} D_{PR} + \beta_{HT} D_{HT} + u + v \quad (7)$$

The combined error term (u+v) is similar to the one in the SF cost function. Assuming u is half-sided normal, which means  $u \sim N^+(0, \sigma_u^2)$ , and v is the two-sided normal, which means  $v \sim N(0, \sigma_v^2)$ . We can use equation (7) to estimate the stochastic cost frontier with a maximum likelihood method. In the case of an SF cost function, u measures the cost inefficiency, but in equation (7), it is treated as the mark-up. There is a correlation between the mark-up and the degree of market power. The degree of market power can be represented as  $\theta = (P - MC)/MC$ . Kumbhakar et al. (2012) expressed market power as a function of the mark-up (u). By using the estimated mark-up ( $\hat{u}$ ), the market power ( $\hat{\theta}$ ) as follows:

$$\hat{\theta} = \frac{\hat{u}}{MC} = \frac{\hat{u}}{\frac{\partial \ln C}{\partial \ln Y}} \quad (8)$$

Equation (8) indicates that a firm’s degree of market power increases, decreases, or remains constant when there is an increasing return to scale ( $\frac{\partial \ln C}{\partial \ln Y} < 1$ ), decreasing return to scale ( $\frac{\partial \ln C}{\partial \ln Y} > 1$ ), or constant return to scale ( $\frac{\partial \ln C}{\partial \ln Y} = 1$ ), respectively. The return to scale (RTS) and the Lerner ratio are presented in equations (9) and (10), respectively.

$$RTS = \frac{1}{\frac{\partial \ln C}{\partial \ln Y}} \quad (9)$$

$$\hat{L} = \frac{\hat{\theta}}{(1+\hat{\theta})} \quad (10)$$

### 3.2. Data Collection

Data used for the market power analysis model were collected from 60 traders buying coffee in Lam Dong province utilizing the value chain linkage method. Data was collected through structured interviews conducted from April to December 2020. Survey data is information on buying, processing, and consuming coffee by traders in the coffee year 2019-2020. The data to be analyzed are described in Table 1.

Table-1. Describe the variables in the model

Variable	Unit	Label	Source
(P.Y)/C		Revenue share	Kumbhakar et al. (2012); Lopez et al. (2015); Lopez et al. (2017); Čechura et al. (2015); Rahman et al. (2020).
Y	ton/day	Output of coffee	Kumbhakar et al. (2012); Lopez et al. (2015); Lopez et al. (2017); Čechura et al. (2015); Rahman et al. (2020).
W <sub>M</sub>	Thousand VND /ton	Price of coffee	Kumbhakar et al. (2012); Lopez et al. (2015); Lopez et al. (2017); Čechura et al. (2015); Rahman et al. (2020).
W <sub>L</sub>	Thousand VND /day	Salary of labor	Kumbhakar et al. (2012); Lopez et al. (2015); Lopez et al. (2017); Čechura et al. (2015); Rahman et al. (2020).
W <sub>Tr</sub>	Thousand VND /day	Cost of transporting coffee	Rahman et al. (2020).
W <sub>O</sub>	Thousand VND /day	Other input	Čechura et al. (2015); Rahman et al. (2020).
W <sub>K</sub>	Percent	Capital	Kumbhakar et al. (2012); Lopez et al. (2015); Lopez et al. (2017); Rahman et al. (2020).
D <sub>PR</sub>		Dummy variable, it takes the value one if traders process coffee.	The author suggested.
D <sub>HT</sub>		Dummy variable, it takes the value one if traders support for coffee farmers.	The author suggested.

## 4. Results and Discussion

### 4.1. Characteristics of Observed Samples

Traders are intermediaries in the Arabica coffee value chain in Lam Dong province. They buy coffee from farmers or other traders in many forms (**coffee cherry, green coffee beans**). After that, the traders will sell the coffee to processors and exporters. The inputs to Arabica coffee purchasing, processing, and consumption by traders in Lam Dong include coffee, labor, transportation, price of capital, and other costs, as **illustrated** in Table 2. Prices and quantity of input data were collected through a direct survey of 60 traders.

**Table-2.** Descriptive statistics on coffee traders

Variable	Unit	Obs	Mean	Std. Dev.	Min	Max
(P*Y)/C		60	1.04	0.02	1.01	1.10
Y	tons/day	60	6.85	7.23	0.54	29.49
M	Thousand VND/ton	60	8,111.67	686.45	7,000.00	10,000.00
L	Thousand VND/day	60	334.00	78.64	200.00	500.00
TR	Thousand VND/ton	60	203.67	126.18	-	500.00
O	Thousand VND/ton	60	151.00	63.80	-	300.00
K	Percent/year	60	16.09	14.08	-	72.00

Source: Survey with coffee traders, 2020

In which raw material price (WM) is the cost that traders have to pay when buying 1 ton of cherry coffee from farmers or other traders (thousand VND / ton). This expensive is the highest out of the total cost. The average price of cherry coffee is about 8.1 million VND / ton. It depends mainly on the proportion of red cherry coffee. If the rate is above 95%, the trader will buy at a high price.

On the contrary, if the ratio is low (below 80% or 50%), the price will also decrease. Labor price (WL) is the salary per day (thousand VND/day). Labor wages also vary among traders, depending on the complexity of the job. WTr is expensive for transporting coffee (thousand VND/day). However, some traders do not incur transportation costs. The seller must transport the coffee to the point of purchase of the trader. Similarly, buyers also have to transport coffee themselves when buying from those traders. Therefore, there is a big difference in the transportation costs of traders. Other expenses (WO) include packaging, loss, depreciation... (thousand VND/day). OW is a low cost, but it also varies among traders. Interest rate (WK) is the percentage of interest paid by traders when borrowing money from banks or other forms of informal credit to buy coffee (% / year). Some traders do not need to borrow. Conversely, some traders have to borrow capital with preferential interest rates or interest rates announced by banks. Meanwhile, some traders use informal credit (hot loans) with very high interest rates per day.

The output (Y) of traders is the average quantity of fresh and green coffee sold per day. C is the total cost, including all expenses associated with the purchase of coffee cherry, green beans, and wet-processed coffee. Total revenue (P\*Y) is equal to the sales of coffee cherries and green beans. The ratio (P\*Y)/C is calculated by the total revenue divided by the total cost.

### 4.2. Cost Function Estimation Results

The results of estimating the stochastic marginal cost function with the Maximum Likelihood Estimation (MLE) method are presented in Table 3. The variables of output, labor price, transportation expenses, and other costs significantly affect the P\*Y/C ratio. Traders with coffee processing have a higher P\*Y/C rate than without processing 0.02%. Meanwhile, the coffee cherries' price and the support for buyers have no significant effect on P\*Y/C.

**Table-3.** Estimation results of cost function parameters (Equation 7)

Stoc. frontier normal/half-normal model			
Variable	Estimate	Standard error	P_value
y	-0.0056743	0.0023181	0.014
l	-0.0469808	0.0229263	0.040
m	0.0111138	0.0097932	0.256
tr	-0.0085892	0.0022295	0.000
o	-0.0083010	0.0038651	0.032
D <sub>PR</sub>	0.0218533	0.0074104	0.003
D <sub>HT</sub>	0.0008172	0.0039781	0.837
_cons	1.3432880	0.1422456	0.000
$\sigma_v$	0.0136951	0.0012510	
$\sigma_u$	0.0001542	0.0108608	

### 4.3. Results of Market Power Analysis

The market power of coffee traders in Lam Dong province is presented through the values of mark-up ( $u$ ), market power ( $\theta$ ), return to scale (RTS), and Lerner index ( $\mathcal{L}$ ), as shown in Table 4. The traders' market power is only 0.0001. This ratio is almost zero. It illustrates that the market of coffee traders is perfectly competitive. There is

no collusive behavior between traders to reduce the coffee farmers' price or increase the selling price for processors and exporters. In addition, the price of coffee in Vietnam depends on the world price (Phuc and Hong, 2014), so it is difficult for traders to become the price markers. Similarly, Deodhar and Pandey (2008) estimated the market power of processors in India's Instant Coffee. The estimated result of the degree market power of the processing companies is approximately 0.128, but it is also very close to zero. This number shows that these companies have implemented the solution of competition rather than collusion.

**Table-4.** Mark-up and return to scale estimates based on the cost function approach

Variable	Label	Mean	Std.dev	1st quartile	Median	3rd quartile
$\hat{u}$	Mark_up	0.0001231	6.32e-07	0.0001228	0.0001231	0.0001234
$\hat{\theta}$	Market power	0.0001182	1.45e-06	0.0001173	0.0001186	0.0001193
RTS	Return to scale	0.9602418	0.01069	0.9565984	0.9626141	0.9678385
$\mathcal{L}$	Lenner index	0.0001181	1.45e-06	0.0001173	0.0001186	0.0001192

The estimated results are based on equations 7-10

The estimated result of the RTS index is nearly 0.96 (<1). This rate shows that the scale efficiency of traders is reduced (Table 4). Thus the degree of competition in the local coffee market is enormous. Therefore, it is difficult for traders to invest more capital and other resources to increase the quantity of coffee. Just like bargaining power, the Lerner Index is also tiny (0.0001, close to zero). Thus, it is once again confirmed that the structure of the local coffee market is perfect competition.

The Lerner coefficient have been used in several studies to assess market power. The values indicate that the Lerner rate fluctuates significantly in countries and periods. Gilbert (2007), has shown significant differences in the Lerner index of coffee retailers from 1980-2005 in coffee consuming countries. The result estimated Lerner ratio in France, Germany, Netherlands, Japan, and the UK is 0.000, 0.000, 0.072, 0.590, and 0.669, respectively. There are differences in the Lerner index within a country but at different times. For example, the Lerner of coffee retailers in the USA in the period 1980-2005 was 0.140, in contrast in 2001-2005 this rate decreased to only 0.033. Similarly, the Lerner rate of coffee producers in the period 2001-2005 also varied significantly. This index of Brazil, Tanzania, and Uganda is nearly zero, while this number in Côte d'Ivoire, Columbia, Vietnam, and Indonesia is very high, 0.361, 0.230, 0.184, 0.108, respectively (Gilbert, 2007). This result is similar to estimating the market power of tea exporting countries (Weerahewa, 2003).

## 4. Conclusion

Although several studies have assessed degree market power in the agricultural sector in Vietnam, this research only focuses on analyzing the level of market concentration through CR4 or HHI indexes. The stochastic cost frontier with a maximum likelihood approach of Kumbhakar *et al.* (2012), as analyzed above, is said to be the newest method with numerous advantages to measuring the market power of traders in the coffee value chain in Lam Dong.

The estimated results of the market power and Lerner rate are both 0.0001. This index indicates that the local coffee market is a perfect competition market. So the traders do not have market power. Therefore is no collusion between coffee traders to reduce the purchasing price of coffee farmers or increase the price for processors and exporters. The RTS ratio of 0.96 (less than one) illustrates that the return to scale of traders is decreased. This number proves that the degree of competition in the local coffee market among traders is very high.

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