

Pricing behavior of USA exporter in wheat international market

R P Wibowo¹, Sumono¹, Y Iddrisu², M Darus¹, L P Sihombing¹ and Jufri¹

¹Department of Agribusiness, Faculty of Agriculture Universitas Sumatera Utara, Indonesia

²CSIR - Council for Scientific and Industrial Research - Ghana · SARI

E-mail: rulianda_wibowo@yahoo.com

Abstract. The number of wheat producing countries is changing over time. It is expected the change in wheat supply will lead world wheat market become more competitive and reduce market power of major exporter country. This paper tries to identify and examined the degree of market power on wheat international market for USA by using the Pricing to Market (PTM) method. USA is the biggest producer and exporter in wheat market. The PTM method found that USA impose noncompetitive strategy by applying price discrimination and apply market power to their importer country.

1. Introduction

The number of countries who are producing wheat is increasing over time. Total number of wheat producing countries in 2011 is more than two times of total number of wheat producing countries in 1960 [1]. The total of wheat product in world market is constantly increasing and market share of major wheat exporting countries such as USA, Canada and Australia is steadily decreasing. All these changes give indication that the global wheat market will become more competitive in the near future. However due to increasing world population lead to higher demand and collusive behavior between major exporting countries, then more exporter and producer which we expect lead to more competitive market will not always come to reality.

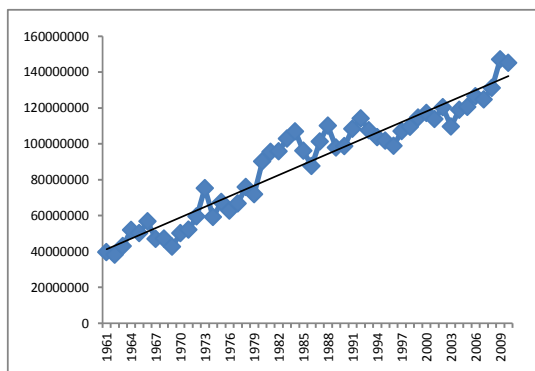
There is a steady increase in export and import from 1961 to 2010 as can be shown in figure 1 and 2. Both the import and export has increased more than three times from 1960 to 2010. The major cause of increasing export is because there is a sharp increase in area harvested as there are many countries increased their wheat plantation such as Kazakhstan, Iran, Ukraine, Pakistan, India, etc. The increase in wheat plantation is also derived by high demand of wheat which is induced by the increase in population and consumption trend. Thus, it results in steady increase of import over the year. The increase in export and production also being enhanced by innovation and technology of wheat plantation as wheat farm productivity is increasing over the year significantly especially in major exporting country. The increasing of area harvested by countries especially from country who are not wheat major exporter may contribute to more competitive market as market importer may have more option in exporting wheat. However whether the development in wheat international market will lead to more competitive market is still a big question.

The market power ability provides the ability to the exporter firm to engage in non-competitive and collusion behavior. However even the exporter firm has the market power, but the degree in which they can impose their market power also depend on convexity of importer demand schedule. The application of market power can be traced by price discrimination imposed by exporter firm to importer. [2] noted that the demand characteristic and market competitiveness will determine the



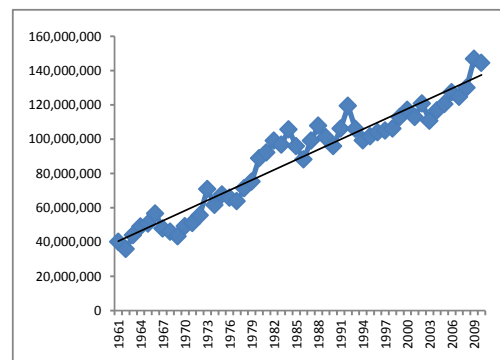
degree of price discrimination. The variation of degree of competition for each market depends on inside and outside competition [3].

Figure 1. World export by Tonnes



Source: FAO (2013)

Figure 2. World Import by Tonnes



Source: FAO (2013)

[4] using USA wheat quarterly export data from 1978-1988 to eight destination market found that USA apply price discrimination to importer countries. Similar result from [5] also found that USA exporter apply PTM to six from seven importer between 1978-1988. This previous study suggests that the USA exporter seems to imposed price discrimination across different importer countries. There are two possible PTM method that the exporter may apply which are local-currency price stability (LCPS) and amplify the exchange rate effects. [6] found evidence that USA exporter tend to apply LCPS between period 1980-1998.

The purpose of this study is to measure market power of USA exporter in world wheat market after USSR breakup. The method that is going to be used is Pricing to Market Power (PTM) methods. The PTM method try to analyze the pricing behavior of producer when the exchange rate changes, a producer may choose to past the cost shock fully to its selling price or to absorb the shock to keep its selling price unchanged or combination between those two [7]. The PTM method is used to examine the competitiveness behavior of exporter. PTM occurs when an exporter holds his domestic currency export price steady or raises it for an importer who has realized a domestic currency appreciation [8]. This has the effect of allowing the importer's domestic currency price either to fall or to remain stable.

2. Data and Model

We use annual data on USA wheat export, PPI (producer price index) which are provided by FAO. The official exchange rate of importer currency against the exporter currency, CPI (consumer price index), GDP (gross domestic product) was obtained from World Bank. Some data related with PPI wheat is obtained from each importer statistic center. USA data set include 252 annual cross section time series observation from 1991-2011 for 12 wheat importing countries.

This paper adopts two way fixed effect model for of export prices across destination for PTM method proposed by [3].

$$\ln P_{it} = \theta_t + \alpha_i + \beta \ln e_{it} + \varepsilon_{it} \quad (1)$$

By using two way fixed effect model suggest by [9] we make commodity group to analyze how exporter apply price discrimination between export market. The PTM model become:

$$\ln p_{i,t}^x = \sum \alpha_i A_i + \sum \theta_i t_i + \delta_i \ln \left(\frac{e_{i,t}^x}{CPI_{i,t}} \right) + \gamma_i \ln GDP_t + \beta_i Oil_t + \vartheta_i PPI_{i,t}^x \varepsilon_{i,t} \quad (2)$$

where $p_{i,t}^x$ is wheat export price in country exporter price to importing country i in period t , α_i is a importer country effect, θ_i represents the specific time effect, δ_i denote the parameter on exchange rate variable which represents the elasticity of the domestic currency export price with respect to the

exchange rate, e_{it} is the exchange rate in units of destination market currency per unit of the exporter's currency and $CPI_{i,t}$ is the consumer price index for importing country i and ε_{it} is the random disturbance with zero mean. Comparing to the original model we add more covariate by adding real GDP, oil price and wheat producer price index (PPI) from exporting countries. The reason that we add oil price and producer price index as the trend in price export may greatly effect by the variation in those covariate. We also estimate the PTM method with model not using Oil price and PPI. We compare between model using oil price and PPI with model which not using these covariates, surprisingly we have the same result for estimated parameter and variance of variable.

There are three possible form of market behavior that can be interpreted from the estimated parameter. The first is the competitive market behavior without price discrimination where export price are all the same across destination and price equal marginal cost. In this scenario we will find that α_i and δ_i will be zero. The second is there is price discrimination across importer countries with constant elasticity of demand for each export market i.e $\alpha_i \neq 0$, $\delta_i=0$. The last is there is price discrimination and elasticity of demand is not constant i.e $\alpha_i \neq 0$, $\delta_i \neq 0$. Positive expected sign of $\delta_i i$ shows that the exporter amplify the exchange rate effect and negative sign of $\delta_i i$ imply that exporter try to stabilize the price in buyer currency and not pursuing the constant markup policy.

3. Result and analysis

Result for pricing behavior of US wheat exporter is presented in table 1. The F test and R-squared are highly significant indicate that the wheat export market for USA is not having a competitive market in which they are not applying the law of one price. There is strong belief that the price of wheat export are differ across country export destination. As can be shown in table 1 that China, Colombia, Guatemala, Japan, Peru, Philippines, Thailand and Venezuela has a significant country effect which means that USA exporter applies price discrimination to those countries.

There is a significant positive exchange rate effect to Colombia, Guatemala, Indonesia, Japan, Peru, Philippines, Republic of Korea, Thailand and Venezuela which means that the USA wheat exporters amplify the exchange rate effect on local price currencies. Different situation happen with China as it has significant negative exchange rate effect which means that USA exporter apply local-currency price stability (LCPS). The application of LCPS to China is may due to China is the largest importer of USA wheat product. In addition, China market has big potential import market for USA wheat product where USA faces strong outside competition from other exporter, i.e. Australia and Canada (see table 2). USA wheat exporters behave as a competitive supplier in Egypt and United Kingdom. For these countries we cannot reject α_i and δ_i are zero means that we have competitive market without price discrimination across countries .

Table 1. PTM Estimation result for USA wheat exporter 1991-2011

Country	Fixed effect	Exchange Rate	Other Variable
China	-2.499***	-0.407***	
Colombia	1.117***	0.345***	GDP = 0.029
Egypt	0.206	0.192	
Guatemala	1.159***	0.470***	
Indonesia	0.809	0.445***	Oil Price = -0.366**
Japan	0.982**	0.356**	
Peru	1.389**	0.539***	
Philippines	0.962***	0.364***	
Republic of Korea	0.727	0.491***	PPI = 1.687***
Thailand	1.115***	0.451***	
United Kingdom	-0.325	0.155	R ² =0.9575

*10% significant, **5% significant, ***1% significant

USA has more market power compare to its respective competitor. One of potential reason is USA has bigger market share in world wheat market (see table 2) so that they have more ability to impose noncompetitive behavior in the market and set up the price to gain more profit.

Table 2. USA, Canada and Australia share of world wheat total export 1991-2011

Year/Country	Australia	Canada	United States of America
1991	11.021%	21.464%	28.687%
1992	7.097%	20.725%	29.694%
1993	8.824%	16.936%	33.171%
1994	12.277%	20.617%	29.482%
1995	7.690%	16.683%	31.891%
1996	14.740%	16.715%	31.517%
1997	18.106%	17.620%	24.076%
1998	13.915%	16.173%	24.671%
1999	14.447%	14.113%	24.845%
2000	15.124%	16.018%	23.748%
2001	13.664%	15.524%	22.666%
2002	12.207%	10.135%	20.138%
2003	8.672%	10.679%	23.204%
2004	15.513%	12.712%	26.553%
2005	11.550%	11.559%	22.561%
2006	11.844%	14.630%	18.489%
2007	5.420%	14.081%	26.433%
2008	6.311%	12.031%	22.942%
2009	10.204%	13.118%	14.930%
2010	10.945%	12.672%	19.034%
2011	11.909%	11.017%	22.115%

Interesting result come from exchange rate effect of China from USA as USA applies LCPS. If we see table 3 then we may found that USA has the biggest market share in import market for China and it is relatively stable which possible induced by LCPS strategy apply by USA exporter. However different condition may apply to other competitive exporter such as Canada with less market share as its import share in China is steadily declining and its market share is being captured by other competitive exporter, Australia, who is not applying market power to China makes its wheat more attractive to China importer.

Table 3. China Import Share 1991-2011

Year	Australia	Canada	United States of America	Rest of the World
1991	10.6089%	35.4583%	39.0626%	14.8701%
1992	2.0478%	51.6170%	34.1016%	12.2336%
1993	9.1810%	44.4272%	44.1137%	2.2781%
1994	19.0888%	45.7806%	34.7476%	0.3830%
1995	3.7217%	40.3641%	35.7419%	20.1723%
1996	26.2493%	41.8122%	29.5555%	2.3830%
1997	11.1621%	57.5430%	27.3435%	3.9513%
1998	11.5026%	48.0029%	40.2142%	0.2804%
1999	14.0731%	15.0251%	67.4848%	3.4170%
2000	8.3802%	43.9404%	47.6792%	0.0002%
2001	5.6199%	33.7255%	59.8612%	0.7934%
2002	10.3397%	32.2142%	54.5573%	2.8887%
2003	3.4489%	19.6372%	69.5988%	7.3152%
2004	23.4220%	32.5401%	42.2563%	1.7816%

2005	26.2187%	34.8721%	25.0539%	13.8553%
2006	36.0240%	8.5336%	55.1853%	0.2571%
2007	26.7265%	50.9297%	22.2993%	0.0445%
2009	30.5040%	9.4597%	56.2612%	3.7752%
2010	45.5400%	13.2800%	38.1100%	3.0700%
2011	35.5800%	6.7200%	55.9100%	1.7900%

4. Conclusion

The increase in wheat production and produces is not necessarily will result in less anti- competitive behavior in world wheat market. This paper tries to identify and examined the degree of market power on wheat international market by world wheat biggest producer and exporter, USA. We found that USA exporter applies price discrimination to China, Colombia, Guatemala, Japan, Peru, Philippines, Thailand and Venezuela. The USA wheat exporters amplify the exchange rate effect on local price currencies to Colombia, Guatemala, Indonesia, Japan, Peru, Philippines, Republic of Korea and Thailand but applying local price stabilization strategy (LCPS) to China. One of the main reasons why USA exporter applies LCPS to China could be because of to maintain the market share in China wheat market. Algeria, China, Republic of Korea and United Kingdom have a significant country effect.

References

- [1] FAO (2013). Statistic. www.fao.org.
- [2] Goldberg, P.K. and M.M. Knetter (1997): Goods Prices and Exchange Rates: What Have We Learned?. *Journal of Economic Literature*, 35, 3:1243-1272
- [3] Goldberg, P.K. and M.M. Knetter (1999): Measuring the intensity of competition in export markets. *Journal of International Economics*, 47: 27-60.
- [4] Pick, D.H., Park, T.A. (1991): The competitive structure of U.S. agricultural exports. *Am. J. Agric. Econ.* 73(1), 133–141.
- [5] Pick, D.H., Carter, C.A. (1994): Pricing to market with transactions denominated in a common currency. *Am. J. Agric. Econ.* 76(1), 55–60.
- [6] Carew, R., Florkowski, W.J. (2003). Pricing to market behavior by Canadian and U.S. agri-food exporters: Evidence from wheat, pulse and apples. *Can. J. Agric. Econ.* 51(2), 139–159.
- [7] Gaulier, G., Lahrèche-Révil, A., & Méjean, I. (2008). Exchange-rate pass-through at the product level. *Canadian Journal of Economics/Revue canadienne d'économie*, 41(2), 425-449.
- [8] Tasdogan, C., Τσακίριδου, E., & Μάρτας, K. (2015). Country market power in EU olive oil trade. *South-Eastern Europe Journal of Economics*, 3(2).
- [9] Falk, M. and R. Falk (1998). Pricing to Market by German Exporters: Evidence from Panel Data, Centre for European Economic Research. Discussion Paper No. 28. Mannheim.