

MEASURING THE EFFECTS OF PARALLEL IMPORTATION OF THE EFFICIENCY OF SELECTED MULTINATIONAL PHARMACEUTICAL COMPANIES' OPERATIONS IN THE PHILIPPINES

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ABSTRACT: This study evaluated the operational efficiency of eight selected multinational pharmaceutical companies in the Philippines during the early implementation of parallel importation. Selected financial ratios were evaluated and the input-oriented CRS-DEA model was used in the determination of the efficiencies of the companies. Input variables used were total investment, operating expenses and cost of goods while total assets and sales as the output variables. The computed ratios of the companies served as the benchmark for the pharmaceutical industry; furthermore, ANOVA results indicated that parallel importation did not significantly affect their financial performances. This study revealed moreover, that the companies are not operating fully efficient during the study period; however, four companies operated above the mean industry efficiency of 90.60% having GlaxoSmithKline Philippines as the industry leader with an efficiency of 97.84%. Consecutively in the years 2002, 2004, 2005 and 2007 companies did not perform above the average efficiency. Multiple Regression Analysis was done to deduce a significant optimized mathematical model to predict the efficiency of a certain firm given the model. The multiple regression analysis showed that there were no at least one common variable on all the models populated for the eight companies showing that parallel importation had no effect to the efficiency scores of the said companies.

KEYWORDS: data envelopment analysis, efficiency, regression, parallel importation, pharmaceutical companies.

1 BACKGROUND

The Philippine pharmaceutical industry nowadays is facing a lot of turmoil despite of the positive forecast on the annual growth. The Philippines continues to represent as one of the less attractive pharmaceutical markets in the Asia Pacific Region. In reality, the drug prices in the Philippines have been already identified as the second highest in Asia, after Japan, according to the government. This current prices have the long been blamed reason for the low access of medicine to the poor.

With the current increase in the prices of almost all commodities, for years, the government and public have really clamored for lower-priced or affordable medicines. In accordance to this clamor, the Philippine government has implemented several laws already in lieu to this demand. It all started through the implementation of the Philippine Republic Act 6675 known as Generics Act of 1988 that ensured the production of an adequate supply, distribution, use and acceptance of drugs and medicines identified by their generic names. Likewise, this act also promoted the use of drugs with generic names and terminologies for essential drugs, even for the system of purchasing, distribution and promotional incentives. However, the use of the generic labeling, advertising, and prescriptions have done little to reduce the price of medicine as generally noted.

It is said that parallel importation is the act of importing legitimately finished goods into a certain country without the authorization from the patent holder and even of a copyright and trademark. Looking into the national exhaustion, the product owner may prevent the importation of the said finished products; however, in the international exhaustion concept, the parallel importation is indeed permissible.

Lately, the government further responded to the call of the people to further lower the prices of the medicines by passing the Universally Accessible Cheaper and Quality Medicines Act of 2008, which was signed into law by President Gloria Macapagal Arroyo dated last June 2008. This law has amended the Republic Act 8293 known as the Intellectual Property Code, Republic Act 6675 which is the Generics Act of 1988 and the Republic Act 5921 which is the Pharmacy Code. To date, the law has been implemented with the set provisions on the guiding rules and regulations. The main purpose of the said law is to lower the prices of medicines by the introduction of price competition through its provisions such as price control. Moreover, the accelerating global inflation and the country's continued low health expenditure have a very challenging situation for pharmaceutical companies (www.doh.gov.ph).

This research particularly measured the effects of the parallel importation to the efficiency scores of the eight selected multinational pharmaceutical companies in the Philippines based from the top ten companies from the IMS Health Data of 2008 in terms of their respective market share namely Pfizer, Inc., Glaxo SmithKline (GSK), Astrazeneca (Astra), Novartis, Boehringer Ingelheim (BI), Roche, Bayer Pharma (Bayer) and Schering-Plough. Furthermore this study aimed to determine the slacks in the input and output of each company and further determined which among the independent variables can predict significantly the efficiency scores. Lastly, this determine the effects of parallel importation to the financial performance and efficiency of the selected companies from 1999-2008.

This particular study mainly focused on the company's performance during the implementation of the parallel importations of pharmaceutical products in the Philippines by the selected multinational pharmaceutical companies. However, this study did not check and evaluate the impact of the parallel importation to the selected pharmaceutical companies. The set of the data used in this study were taken from the multinational pharmaceutical companies' audited Financial Statements which are available at the Security and Exchange Commission (SEC).

2 MATERIALS AND METHODS

This study used the Total Investment, Operating Expenses and Cost of Good Sold as its input variable and Total Assets and Total Sales as its output variables. These variables were simulated using the Data Envelopment Analysis (DEA) Program. The total investment in facilities, equipment and plant that covers the accumulated equity in the net earnings as well as the other investments incurred during each year was considered as one of the input variables. On the other hand, operating expenses covers the rentals on the use of the lands, the total expenses being incurred during distribution and marketing as well as some of the administrative and general expenditures with the inclusion of the benefits being given to their respective employees. The total cost of goods sold on the other hand pertains to the tolling services for an affiliate and other expenses on its affiliates and support service functions such as marketing costs that the company has incurred; furthermore, the cost of the bulk products and raw materials.

Two variables were considered as the output variables to further utilize the DEA namely total assets and total sales. Total assets covers the cash and cash equivalents, receivables, inventories, prepaid expenses and other current assets and the deferred tax assets; while net sales pertains to the value of the sales of the products being transferred to companies respective distribution partners like the Zuellig Pharma Corporation and Metro Drug Inc. An input-oriented CRS model approach was considered in the use of the DEA.

Effects of parallel importation were determined from the financial ratios and companies efficiency scores per year. Furthermore, the wastages in the inputs and outputs of the companies were further identified using the same analysis tool. Lastly, the independent variables utilized in the DEA simulation with selected financial ratio such as return on assets and day's inventory with a dummy variable that considered mergers or acquisitions were regressed to identify which among the considered variables can predict the company's efficiency further evaluating the effects of parallel importation to the efficiency scores. The enter method and the stepwise procedure of multiple regression was simulated using the Statistical Package for Social Sciences (SPSS).

3 RESULTS AND DISCUSSION

In the determination of the efficiency scores the input and output variables were correlated and results showed that the chosen input and output variables for the DEA are associated with each other except for the association of the total investment to that of cost of goods sold which were only moderately associated.

Table 1 shows the efficiency scores of the eight considered companies. Cross-sectionally, the eight companies showed different level of efficiency scores. The computed geometric mean figured at 90.60% indicated the accumulative efficiency performance of these companies. This entailed that from 1999-2008 the pharmaceutical industry is not fully operating at its ideal technical efficiency.

Table 1. Efficiency Scores of the Multinational Pharmaceutical Companies

DMU	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	MEAN
Astra	91.47	91.23	91.55	92.23	88.16	87.46	89.64	100.0	96.83	88.25	91.61
Bayer	90.21	98.27	98.03	81.35	100.0	93.60	81.55	84.43	83.17	82.50	89.02
BI	94.26	88.25	90.02	86.46	87.74	94.54	92.22	100.0	100.0	100.0	93.21
GSK	93.21	98.43	100.0	97.84	100.0	95.81	97.13	96.21	100.0	100.0	97.84
Novartis	100.0	95.91	87.11	82.22	79.82	68.89	84.79	88.76	84.04	89.44	85.70
Pfizer	100.0	92.87	92.40	94.09	94.25	85.45	79.46	76.93	77.05	86.31	87.54
Roche	100.0	96.22	94.41	92.50	87.20	83.65	85.25	86.46	89.26	93.42	90.70
Schering-Plough	86.96	91.81	84.66	83.27	90.53	85.19	83.94	100.0	87.52	100.0	89.20
Mean	94.40	94.06	92.15	88.56	90.73	86.42	86.58	91.22	89.38	92.26	90.60

Based on the computed mean per company, GlaxoSmithKline has the highest efficiency score that rated at 97.84%. GSK was the industry's ideal company from the study period as it took the lead among the seven considered companies. GSK was followed by Boehringer Ingelheim, AstraZeneca and Roche with mean scores of 93.21%, 91.61% and 90.70% respectively.

There were four companies who were identified to have means lower than the industry's mean. These companies were Schering-Plough, followed by Bayer Pharma, Pfizer and Novartis. Schering-Plough got a closer mean efficiency with respect to the industry's mean of 89.20%. Closely following Schering-Plough is Bayer is 89.02% efficiency score then Pfizer and Novartis with scores of 87.54% and 85.70%, respectively.

The chosen multinational pharmaceutical companies were not operating at its desired efficiency which is 100% though some were noted to have such efficiency score in some years. The gaps on their respective efficiency scores only proved that there were factors that need improvement in the resources handling and management that would entail to either reduction on inputs and improvement on output generation.

Both Bayer and Pfizer were noted to have the most number of years that over invested in their properties, facilities and equipment. Lower frequency for the the occurrence of the wastages for a certain year had been observed for Schering-Plough, GlaxoSmithKline, Boehringer and AstraZeneca. There were no suggested reduction in the operating costs across all the eight considered multinational pharmaceutical companies from 1999-2008. There were values that came out upon running the model; however, these values were already negligible. This only showed that all companies had been spending the right and considerable expenses incurred during operation. Boehringer and Roche had also years that exhibited wastages in their cost of goods sold.

Almost all of the considered companies need improvements in their total assets. Since all of the companies were noted to be not performing at their desired level of efficiency, these improvements in their total assets could had made their efficiency scores 100%. There were no improvements noted as far as the Total Sales is concerned across all the companies for the entire study period. This implied that all companies had attained the needed sales for each year considered in this study.

Multiple regression analysis was simulated in this particular study to check further the ability of the chosen independent variables to predict significantly the efficiencies of the eight selected companies. The results of the said method determined if parallel importation did affect the technical efficiencies of the companies.

Only four companies showed significant model with at least one significant independent variable as shown in the Model Efficiency Test Result in Table 2. Four companies namely AstraZeneca, Bayer, Novartis and Bayer did not have considerable coefficient of variation; thus did not generate any model and hence no variable can significantly predict their respective efficiency scores.

Table 2. Model Efficiency Test Results

Companies	Variables	Coefficient of Variation (R ²)	Test for Model Adequacy (Sig)	Efficiency of Coefficients (Sig)
AstraZeneca	*	*	*	*
Bayer	*	*	*	*
Boehringer	Constant	0.786	0.001	0.000
	Return on Assets (X ₇)			0.001
GlaxoSmithKline	Constant	0.539	0.016	0.000
	Day's Inventory (X ₅)			0.016
Novartis	*	*	*	*
Pfizer	Constant	0.597	0.009	0.000
	Operating Expenses (X ₂)			0.009
Roche	*	*	*	*
Schering-Plough	Constant	0.858	0.000	0.000
	Inventory (X ₆)			0.000

The stepwise procedure will initially enter two independent variables and identify from the two variables the insignificant which will be automatically removed. From then on, another variable will be entered and the process continues until no variable qualified for the set criteria. This is the reason why four companies did not arrive to a particular model.

The casewise diagnostic test was performed in the chosen variables to test the existence of outliers; however, no outliers were found.

One of the assumption checks would be the Durbin-Watson test for independence of variance. This entails that the considered independent variable does not affect the other variables. The heuristics for this assumption check is near 2 value; thus, as shown in the table, the 4 models did not violate the said rule of thumb.

Another assumption check that was performed would be the check for the normality of error terms. As a rule, the results for Kolmogorov-Smirnov and Wilk-Shapiro test must be more than the 5% level of significance. Based on the results below, the values for the said tests showed greater than the significance level; thus, the error terms were normally distributed and therefore, this assumption check did not violate the normal distribution assumption.

Lastly, multicollinearity test was performed through variance inflation factor. As per the rule of thumb, the value of the VIF must be less than the value of 5 to depict that the variables considered were truly independent. The results of the VIF for the 4 respective models showed less than the value of 5; hence, there was no multicollinearity among the variables. The results are tabulated in Table 3.

Table 3. Regression Model Assumption Test Result

Companies	Model	Assumption Checking			
		Independence of Variance	Normality of Error Terms		Multicollinearity
		Durbin-Watson	Kolmogorov-Smirnov	Wilk-Shapiro	VIF
AstraZeneca	*	*	*	*	*
Bayer	*	*	*	*	*
Boehringer	$y = 0.826 + 0.622 X_7$	2.084	0.200	0.977	1.000
GlaxoSmithKline	$y = 1.029 + 0.00045 X_5$	1.328	0.200	0.977	1.000
Novartis	*	*	*	*	*
Pfizer	$y = 1.027 - 9.16 \times 10^{-11} X_2$	0.871	0.200	0.277	1.000
Roche	*	*	*	*	*
Schering-Plough	$y = 0.757 + 9.183 \times 10^{-10} X_6$	2.975	0.200	0.322	1.000

Given that all of the assumptions were satisfied and validated as shown in the results, the deduced models for Boehringer, GlaxoSmithKline, Pfizer and Schering-Plough were significant. Furthermore, the independent variables in their respective models can significantly predict the results of their respective efficiency scores.

The analysis of variance test which was performed after the determination of the financial performance of the eight selected multinational pharmaceutical companies showed that there were no significant differences between the computed financial ratios. Given the parameters and the results of the multiple regression analyses, there were no common variable that was generated in their respective models. With this therefore, parallel importation did not considerably affect the efficiencies of the companies.

4 CONCLUSION

This research further revealed that the eight selected companies did not fully operate at its desired level of efficiency during the implementation of parallel importation. The computed industry mean average efficiency was 90.70%. The market leader with regards to the technical efficiency was determined to be GlaxoSmithKline with a geometric mean of 97.84%; followed by Boehringer, AstraZeneca and Roche with efficiency means of 93.21%, 91.61% and 90.70%, respectively. These companies were the noted pharmaceutical firms which performed above the computed industry mean average. Serially, there were six years, (1999, 2000, 2001, 2003, 2006 and 2008), which were noted to have a mean average above 90.70%.

Slacks were also determined with respect to the input variables and output variables. It has been noted that Bayer and Pfizer were the two companies that invested a lot on their properties, equipment and plant facilities but were not fully utilized; hence, values on the reduction on their total investment were noted. Similarly, values on reduction on cost of goods sold was also noted for Bayer for years 2000 and 2001. Furthermore, there were also improvements on the total assets for companies AstraZeneca, Boehringer, Novartis, Pfizer, Roche and Schering-Plough. No sensitivity analyses were generated for the reduction on the operating expenses as well as for the improvement on the total sales for the selected pharmaceutical companies.

Multiple regression analyses were done through enter method and stepwise process in order to evaluate if the considered independent variables can significantly predict the outcome of the respective efficiency scores of the companies. Likewise, this will also determine if parallel importation did affect considerably the firm's efficiencies.

Enter method showed that there were no significant models that can be deduced after checking the model's respective R² values and their significance of their coefficients. Another process, the stepwise, was used to verify the results of the simulated multiple regression. Based on the results, there were four significant deduced model particularly for companies Boehringer, GlaxoSmithKline, Pfizer and Schering-Plough. Independent variables considered were Return on Assets for Boehringer with R² value of 78.6%, Day's Inventory for GlaxoSmithKline with R² value of 53.90%, Operating Expenses for Pfizer with R² value of 59.70% and Inventory for Schering-Plough with R² value of 85.80%. Their respective R² values were the percentages that can predict the results of their efficiency scores. Assumption checks were also performed to verify if the derived models do not violate any of the parameters like test for outliers, independence of variance, normality of errors and multicollinearity.

The results of the ANOVA and the multiple regression analysis only showed that parallel importation did not significantly affect the financial performance as the technical efficiency scores of the eight selected multinational pharmaceutical companies from 1999-2008. This is supported with the considerable and reasonable results of the computed financial ratios of the companies. This is supported by the analysis of variance for the computed financial ratios did not show any significant differences while multiple regression analysis did not generate at least one common independent variable that can significantly predict the results of the efficiencies of the selected companies. Since this study was conducted very timely as the government is now in the process of evaluating the effects of the passing of the Cheaper Medicine Act, given the right number of years after its implementation, the proponent suggests to conduct similar evaluation as to the effects of the Cheaper Medicine Act to the financial performance and technical efficiency scores of selected companies in the country.

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