

The Impact of Dairy Imports on Performance of Domestic Dairy Industries: A Case of Tanzania Milk Processing Plants

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Abstract: *This study analyses how dairy imports affects the performance of domestic dairy industries. It covers the period from 1980 to 2009. It employs a time series regression analysis in which the performance of domestic dairy industries is assumed to be determined by quantities of dairy imports in the domestic market, price of dairy products in the world market, milk collections and cost of production. The STATA computer package was used to analyze quantitative data. The empirical results indicate that, quantities of dairy imports, milk collections and production cost have impact on performance of domestic dairy industries during the sample period. While the cost of production contributed significantly to the decrease in plants performance, price of dairy products in the world market is not a significant variable to influence the actual performance of domestic dairy industries. Future development of the milk processing sector should stress on sustainable production systems of high productivity conducted on commercial basis in order to contribute more significantly to the national income*

Keywords: Dairy imports, Domestic dairy industries, Sustainable production systems, National income

1. Introduction

International trade in basic foods has increased markedly during the past decade. Growth in trade is expected to continue in the coming years with both positive and negative consequences for food security in some low-income food insecure countries. With regard to the likely impact at the household level, imports may constrain the development of the processing sector [1].

One concern has been increasing reports by many developing countries as well as civil society organizations that a rise in food imports are disrupting local markets, with negative effects on prices, production and food security in rural areas. Import surges and associated negative effects, notably on farmers or other producers, is a sensitive matter, and hence the reporting of such episodes hits headlines. This phenomenon seems to be on the rise particularly since the mid-1990s. It is one reason why some observers relate this phenomenon to the opening up of domestic markets with the implementation of the WTO Agreement on agriculture [2].

The markets for food commodities in Tanzania have profoundly changed since the country adopted market-led policy reforms in the mid-1980s. Reforms in the exchange rate regime, liberalization of trade and price de-control have increased the quantities and types of food commodities imported, including livestock products. Escalation of imports in the mid-1990s has also been associated with further opening up of domestic markets with the implementation of the WTO Agreements [3].

Tanzania had experienced a decline in dairy product imports in the early 1990s attributed to structural changes in the dairy sector largely due to privatization of state companies.

However, since 1997 the declining trend has reversed as a result of increase in dairy imports. Also according to some stakeholders, the increasing volume of imports has been an influential factor affecting domestic prices of dairy products in Tanzania [4]. Although the potential for growth in the dairy sector in Tanzania may take similar trends with neighboring Kenya where, with similar conditions, growth has been much faster and total production is now six times larger than Tanzania's production. The major difference lies in a longer history of public investment in improved genotypes and private sector led growth that has characterized dairying in Kenya [5]. Due to the increase of these imports in Tanzania, the country has achieved its objective in meeting local demand which is not fully satisfied by the domestic dairy industries. This domestic shortage of dairy products has been caused by low milk production which is due to small number of dairy animals, undeveloped systems of production, low standards of domestically produced dairy products and low technologies used by domestic industries. It is therefore important to examine impact of dairy imports on performance of domestic dairy industries to provide an answer to the relationship between dairy imports and domestic dairy industries in Tanzania.

2. Objectives of the Study

This paper investigate the impact of dairy imports on the performance of domestic milk processing plants, specifically on;

- 1) How quantities of dairy imports affect production performance of domestic milk processing plants
- 2) How price of dairy imports affect production performance of milk processing plants

3. Theoretical Literature

The concept of demand, supply and price

According to [6], the complex interactions between prices, demand and supply in domestic markets and those in world markets make it difficult to distinguish causes and effects of increasing dairy imports. In general it appears that increasing dairy imports have increased the total supply of dairy products in importing countries. This tends to halt upward trends in prices of domestically produced dairy products or even lowering them, consumers benefit from this effect. In the face of declining prices for dairy imports, domestic processing plants can be expected to cut back on dairy production. The overall effect of decreased dairy import prices is interpreted as hampering domestic milk processor's output and income potential as well as reducing their economic welfare. It should also be stressed that there is possibly a circular effect; imports depress local production and this generates ever more demand for imports. Allegedly, there have been cases where local milk processing plants have stopped operating because they found it not economical to run a plant while producing noncompetitive dairy products. Basing on this literature the government has to make sure that domestic dairy processors are highly subsidized in order to lower processing costs. It can attempt to exempt import duties for milk packaging materials, and equipment used in the collection, transportation and processing of dairy products. Consequently, local dairy processors will produce price competitive dairy products. This will offset the effect of decreasing dairy import prices so milk processing continued.

The benefit of international trade

Benjamin Franklin (1751) spoke cautiously about the benefits of international trade, arguing that "No nation was ever ruined by trade." Many economists and business analysts speak more positively about the benefits from free trade. Using techniques ranging from simple comparative advantage notions to sophisticated econometric models, economists have shown potential gains from trade. Economic studies frequently find that the cost of saving domestic jobs by erecting barriers to imports runs high. To jog policymakers' memories about dangers of protectionism, economic historians point out that the Smoot-Hawley legislation of 1930, which raised U.S.A. tariffs sharply, helped to push the U.S. economy into the great depression. Economic studies also show that consumers in most countries and producers in low-cost producing countries are frequently big beneficiaries from free trade. Furthermore subjecting domestic firms to foreign competition will-over the longer-run-produce stronger, more competitive firms. Basing on this, the domestic dairy firms in Tanzania can take this advantage of existing dairy imports in the domestic market. Presence of imports in the domestic market is an opportunity for them to learn the gap which they see rather than implementing policy which will discourage importation. Competition between domestic and imported dairy products will bring to more growth of domestic firms. Tanzanian dairy firms can do so by exploiting clear comparative advantage that they have in producing dairy products. Consequently, domestic firms will produce competitive products in terms of price and quality and hence gain from international trade.

The concept of import and export

Most countries that have experienced food import surges are not competitive as exporters of food products and thus stand to gain little from international trade in food products. Only the firms which are able to enter into and compete in export trade stand to benefit from dynamic efficiency gains. Amundsen (2005) considers a firm that moves to export markets as being more productive because it can afford to invest more and pay the costs of expansion. However, in the short run, even such a firm has to be able to realize reasonable returns to investment to be able to maintain its rate of capital investment in the presence of import surges and, therefore, needs protection through government intervention before it can expand. Therefore, in view of this literature, the Tanzanian milk processing firms must make sure that they utilize a clear comparative advantage that they have in producing competitive dairy products. This will enable domestic dairy firms to move to export market and to gain much from international trade. As the result, this will offset the effect of increasing dairy imports.

4. Methodology

Hypotheses to be tested

Basing on the stated problem, objectives of the study and the literature review, the following hypotheses are tested;

- 1) Production performance of domestic milk processing plants is affected negatively by increase in quantities of dairy imports
- 2) Decrease in price of dairy imports have negative impact on production performance of domestic milk processing plants
- 3) Decrease in production costs have positive impact on production performance of domestic milk processing plants
- 4) Increase in collection of raw milk leads to increased production performance of domestic milk processing plants

5. Theoretical Analysis

The theoretical foundation on which the model is predicated is the simple linear relationship between total imports as dependent variables and independent variables, which include; *gross domestic product, exchange rate, imports capacity, foreign reserves and index of openness.*

The theoretical foundation of the total import demand model used here is rooted in the works of Khan (1974), Narasimhan & Pritchett (1993) and Thirlwall (1999) which was modified and used by Yekini (1999), Aliyu (2001) and Okoh (2002). The Import demand equation can be expressed as;

$$(1) \kappa\chi_a = \beta_0 + \beta_1G + \beta_2E + \beta_3F + \beta_4I + \beta_5M + \beta_6D, \beta > 0,$$

Where;

$\kappa\chi_a$ = Total Imports

G = Gross Domestic Product (GDP).

E = Exchange Rate,

F = Foreign Reserves,

I = Index of Openness,

M = Index of Import Capacity,

D = Dummy Variable

The model

This study deployed a regression analysis in which the production performance of domestic milk processing plants as dependent variable is assumed to be determined by *quantities of dairy imports, price of dairy imports, production costs and collection of raw milk*. The model establishing the link between production performance of a plant and the independent variables covering the period between 1980 – 2009 is specified as;

$$Y_{MP} = \beta_0 + \beta_1 E + \beta_2 X + \beta_3 C + \beta_4 A + \epsilon, \beta > 0, \quad (2)$$

Where;

Y_{MP} = Actual Plants Production Performance,

E = Quantities of Dairy Imports,

X = Price of Dairy Imports,

A = Collection of Raw Milk,

C = Production Costs,

ϵ = Error Term

Explanation of variables

Actual plant production performance

In this study actual plants processing performance is the ability of all domestic milk processing plants to process 507,000 litres of raw milk per day following their maximum installed capacity utilization. In this study the plant production performance was measured by taking the value of the produced dairy products following maximum utilization of plant processing capacity in (USD) per tonne per year provided that other factors of production remain constant in the specified period.

Quantities of dairy imports

These are quantities of dairy imports entering the domestic market. In this study the quantities of dairy imports were measured by taking the average value in (USD) per tonne of imported dairy products in the specified period of time.

Price of dairy imports

This is the price assigned to various dairy products. In this study, price of dairy imports was measured by taking the average price per tonne of dairy products (in US dollars) in the world market for the specified period. It is expected that low price of dairy imports in the world market affect negatively production performance of domestic milk processing plants in Tanzania

Production cost

Production costs include all necessary costs incurred to produce dairy products ready to be sold in the market. It includes transportation of raw milk from collection centers to the processing plants, communication costs, and costs of chemicals, additives, payment of utilities such as water & electric power and the labour force. In this study, cost of production was measured by taking an average variable cost (in USD) for processing a tonne of dairy products. High production cost lower the production performance of the plant.

Collection of raw milk

Tanzania has a potential to produce more milk which is the raw material for processing other dairy products, but despite

this endowment milk production is still low. In this study milk collection was measured in terms of value of milk (in USD) per tonne collected from dairy farmers and regional milk collection centres reported to the Ministry of Livestock and Fisheries Development. Therefore any effort to increase milk production will have positive impact on actual production performance of the plant.

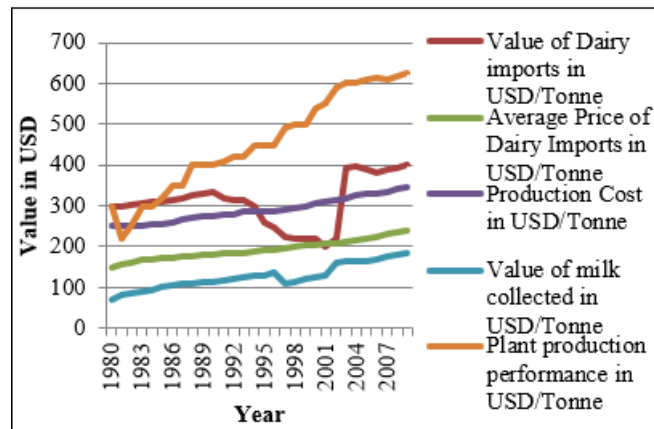


Figure 1: Trends of variables from 1980-2009

Data types and uses

The model estimated using annual time series data covering the period of 1980-2009. The period 1980-2009 offers a rich case study on analyzing the impact of dairy imports on performance of domestic dairy industries. The study used both primary and secondary data. Primary data is used for discussion purpose while secondary data is used to examine how quantities of dairy imports, prices of dairy imports, production cost and milk collection would affect production performance of domestic dairy industries

Collection of primary data

Onsite observation on the selected milk processing plants to see collection of milk was conducted. This was followed by a face to face interviews with milk processors in order to share with them the knowledge and experience which they have on the impact of dairy imports.

Collection of secondary data

Annual reports from various Institutions such as Tanzania Dairy Board, Tanzania Revenue Authority, Ministry of Livestock and Fisheries Development, World Trade Statistics and FAO Statistics, National Bureau of Statistics (NBS), United Nations Conference on Trade and Development (UNCTAD) were studied so as to get relevant materials concerning the impact of dairy imports. Import data were obtained from TRA and FAOSTAT.

Preliminary test results of the time series characteristics of data

Data transformation was carried out to establish the normality and stationarity of the data. The results show that values of mean and median are close to each other which imply that most of the variables satisfy the normality test.

Table 1: Summary of the descriptive statistics of the data

	Production Performance	Milk collection	Quantities of Dairy imports	Average Price	Production Costs
Mean	454.6	5.4523	27.4433	32.08	16.01
Median	450	5.7	30	32	16
Maximum	625	6.25	40.1	34	19
Minimum	220	3.5	14.4	29	14
Std. Dev.	122.3532	682256	6.233983	1.203	1.1229
Skewness	-.12740	-1.3890	-.4385666	-.4270	.9203
Kurtosis	1.8872	4.26154	2.424728	2.774	3.7211
Observation	30	30	30	30	30

Source: Computed

Correlation analysis

The correlation test was done in order to establish the co-movement of variables through carrying correlation analysis of variables and testing the strength of variables. Table shows a correlation matrix for all variables in the model. Numbers are Pearson correlation coefficients; go from -1 to 1. Closer to 1 means strong correlation. A negative value indicates an inverse relationship (roughly, when one goes up the other goes down). This maintaining the positions that the actual production performance of the plant is affected by quantities of dairy imports, collection of raw milk, average price of dairy products in the world market and production costs.

Table 2: The correlation matrix table

	Plant performance	Raw milk collection	Quantities of dairy imports	Price of dairy imports	Cost of production
Y_{MP}	1.0000				
A	0.7345	1.0000			
E	-0.4477	-0.0502	1.0000		
X	0.9073	0.7606	-0.3824	1.0000	
C	0.7961	0.6888	-0.0181	0.8247	1.0000

Source: Computed

Unit root test results

This part presents and discusses the regression results of the unit root test for all the regression variables found in the model. The Augmented Dickey Fuller test for the presence of unit root is performed on the variables levels and the results are presented in Table 3. The results shows that all variables are stationary at levels (or has no unit root).

Table 3: Unit root test results: At levels

Variables	ADF Test statistic	MacKinnon approximate p-value for Z (t)	Order of integration
Plant performance (Y_{MP})	-1.780***	0.3907	1(0)
Quantities of dairy imports (E)	-1.339***	0.6113	1(0)
Raw milk collection (A)	-2.554***	0.1029	1(0)
Price of dairy imports (X)	-1.423***	0.5711	1(0)
Cost of production (C)	1.757***	0.9983	1(0)

Source: Computed

- (i) McKinnon (1980) critical values are used for rejection of the null unit root.
- (ii) 1(0) = The variable is stationary, 1(1) = A variable is integrated of order one
- (iii) Critical value for ADF: *1%, *5% and ***10% are 3.730, -2.992 and 2.626 respectively

Cointegration tests

In Johansen’s Method, the eigenvalue statistic is used to determine whether or not variables are cointegrated. Cointegration is said to exist if the values of computed statistics are significantly different from zero. Thus cointegration test indicates the presence of long run relationship between the dependent and the independent variables. Meaning, in the long run, the dependent variables; Actual production performance can be efficiently predicted using the specified independent variables. This is because even if individual variables are non-stationary the linear combination of these variables may be stationary. That is simply because equilibrium forces make linear combination to exert adhesive forces to keep variables together in the long run. In this circumstance therefore, error correction term prevailed to account for short term deviations of the long run equilibrium of the cointegrated variables. Results from the cointegration test are presented in Table 4.

Table 4: Johansen test for cointegration

LL	Eigen Value	Trace Statistic	5% Critical Value	Rank
-181.57316	.	75.7858	68.52	0
-163.16401	0.73151	38.9674*	47.21	1
-149.66483	0.61872	11.9691	29.68	2
-144.59437	0.30384	1.8282	15.41	3
-143.69561	0.06218	0.0306	3.76	4
-143.68029	0.00109			5

Source: Computed

Following the results in Table 3, in which the maximal Eigen value statistics are reported, co-integration is accepted and therefore the residual generated from the long run impact of dairy imports on production performance of domestic milk processing plants is not tabulated, if differenced can be used as an error correction term in the model.

Estimation techniques

The study used Ordinary Least Square (OLS) estimation techniques. The technique is simple, convenience, and has been successfully used by other studies and gives out meaningful results (Koutsoyiannis, 1973). The results from OLS are usually the best, linear, and unbiased. However, direct use of OLS techniques in analyzing econometric relationship by using time series data has some limitations (Xwire, 2004). In order to maintain data quality for further analysis the Unit Root and Cointegration tests are used in detecting time series problems caused by OLS limitations.

Empirical results and interpretation

This section reports the econometric results on the impact of dairy imports on the production performance of domestic milk processing plants for the specified period. The general model shows that most of the variables are significant in explaining the production performance of domestic milk plants. Results are shown in Table 5 below.

Table 5: Empirical results and interpretation

Dependent variable Y _{MP}	Coefficient	STD Error	t- Statistic	Prob.
Quantities of dairy imports (E)	-6.378577	1.8847	-3.38*	0.002
Raw milk collection (A)	41.47924	20.451	2.03**	0.053
Price of dairy imports (X)	27.58558	19.518	1.41	0.170
Cost of production (C)	44.36253	15.883	2.79**	0.010
Const	-1191.883	422.68	-2.82	0.009
R-squared				0.8858
Adjusted R- square				0.8675
Number of observation				30
Root MSE				44.541
F-Statistic				0.0000
Durbin- Watson stat				1.19022

Source: Computed

Diagnostic tests

The results of the model in **Table 1** show that the goodness of fit is strong as shown by the R-squared of 88.6 percent. The interpretations of these results is that the observed factors affecting the production performance of domestic dairy industries for the period of analysis is explained by the independent variables by 88.6 percent. The remaining 11.4 percent is explained by other variables not found in the analysis. These include consumption of raw milk, quality of the labour force, marketing strategies, infrastructure, and the attitude of people towards dairy products. The coefficient of multiple determinations, that is, the adjusted R² is very strong at 86.8 percent. This shows a very strong explanatory power of the independent variables in explaining change in the dependent variable, which is the actual plants production performance. In addition, model specification is significant since the probability of rejecting is zero given by Prob. (F-statistic) of 0.0000. This implies that the model is significantly explained by the explanatory variable hence acceptable in overall terms. The autocorrelation problem was found to be slightly more than average; this is inaccordance with the information given by the Durbin- Watson (D-W) statistic of 1.190225 which is far from conventional mark of 2. Generally, the implications of these results show that the dependent variable (The actual plant production performance) can be predicted using the specified independent variables

6. Results

Interpretation of estimation results

The coefficient of quantities of dairy imports (E) is statistically significant at 1 percent level and has a correct sign; theoretically. This coefficient implies that, one percent increase in quantities of dairy imports would lead to decrease in the actual production performance of domestic milk plants by 6.4 percent. The result is in line with the hypothesis of this study (stated earlier) which explains that the actual production performance of domestic milk processing plants is affected negatively by increased in quantities of dairy imports. The result further reveals that coefficient of milk collections (A) is statistically significant at 5 percent level and is positively signed. This implies that, one percent increase in milk collection would lead to increase in actual production

performance of domestic milk processing plants by 42 percent. The result is in line with the hypothesis of the study stated earlier that, increase in collection of raw milk would lead to increase in the actual production performance of domestic milk processing plants. The coefficient of price of dairy imports (X) is insignificant. This is not in line with the hypothesis that production performance of milk processing plants is affected negatively by decrease in price of dairy imports in the world market The coefficient of cost of production (C) is significant at 1 percent level and positive. This indicates that a one percent increase in the cost of production would lead to about 44.4 percent increase in production performance of domestic milk processing plants. The coefficient is not in line with the hypothesis that production performance of milk plants is affected positively by decrease in production costs. This is quite contrary to economic theories and empirical literature because it was expected for the two variables to have an inverse relationship (roughly, when production costs goes down, actual production performance goes up). Environmental issues and cost escalation can be a cause of rising positive relationship between plant production performances versus production cost. The Dairy industry is traditionally considered as a polluting industry in the finishing stages of the production chain. Global standard set by importing countries are associated with high cost of compliance of good manufacturing practices and chemical used during manufacturing.

7. Major Findings

Results from an empirical estimation of the model reveal that the coefficients of virtually all the variables used in the model were fairly significant and consistent in a priori grounds. It follows from the fact that quantities of dairy imports, milk collections and cost of production are significant variables to influence the actual production performance of domestic milk processing plants. These are useful for policy making and forecast. While the price of dairy imports seems to be insignificant variable to influence the actual production performance of domestic milk processing plants

Policy implications

The government of Tanzania through the Ministry of Livestock and Fisheries should formulate policies which will promote the growth of the milk processing sector. Policies should focus on acquiring proper processing technology and production of competitive dairy products in terms of standards and quality. This could be done by carrying out a detailed analysis of the characteristic of the supply chain which is determined by products quality and their relative prices. The structure and performance of marketing system can be studied in the available domestic market opportunities. This could help in designing a market oriented strategy. Therefore, milk processors are required to be educated in improved preservation techniques, proper collection methods and proper storage and transportation methods in order to fulfill consumers' preferences. Milk producers must be taught newly developed dairy husbandry practices which will increase productivity of milking cows per head. This will help farmers to get premium prices once they sell raw milk to milk processors

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