The liberalisation effect on variability in net income of food processing industry in Kerala: An empirical evaluation

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The Liberalisation Effect on Variability in Net Income of Food Processing Industry in Kerala: An Empirical Evaluation

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As a linkage factor between two pillars of economy i.e., Agriculture and industry, the food processing sector is an important segment in India. The main motto of the food processing sector is the value addition of local tastes and presenting it to the world market. Food processing sector in India is going through drastic changes in the liberalization age and it has been able to adopt tailor made innovative methods of development to compete in the global market. This paper attempts to analyse the returns of net income to the extent to which variation can be explained by the rate of increase in inputs such as invested capital, number of workers and total input. The data for regression analysis is made available from Annual Survey of Industries. Most significant input element that could explain the variability in net income before and after liberalization is identified and explained to compare values of net income returns before and after liberalization.

Index words: Food Processing Industry, Liberalisation, Regression

1.1 INTRODUCTION

As a linkage factor between two pillars of economy i.e., Agriculture and industry, the food processing sector is an important segment in India. The main aim of the food processing sector is the value addition of local tastes and presenting it to the world market. Food processing sector has certain special characteristics which are suitable for the development of rural economy. The growth of this industry will bring immense benefits to the economy by raising agricultural yields, enhancing productivity, creating employment and raising life standards of a large number of people across the country, especially those in rural areas. In India Food Processing Industries ranks fifth and it provides employment to 19% of India's industrial labour force i.e. 16 lakh workers are engaged in this sector. It accounts for 14% of total industry output which accounts for 5.5% of the GDP. The turnover of this sector is estimated at Rs. 1,44,000 crore of which 1, 11,200 crore is in the unorganized sector. The Confederation of Indian Industry (CII) has estimated that food Processing Sector has the potential of attracting US $33 billion of investment in next 10 years and provides 9 million employment opportunities.

1.2. Segments in Food Processing Industrial Sector

Food Processing is a large sector that covers agriculture, horticulture, animal husbandry, plantation and fisheries. Industries which use agricultural products as inputs are also included in this category. The Ministry of Food Processing Industry classifies this sector as;

- Dairy , Fruit and Vegetable Processing
- Grain Processing
- Meat and Poultry processing
- Fisheries
- Consumer goods including packaged foods, beverages and packaged drinking water.

1.3. Food Processing Sector in Kerala

Food processing industry has been recognized as a priority sector in Kerala due to its potential for growth, diversification and possibility of generating substantial employment. The FPI in Kerala spans over both organized as well as unorganized sectors. Spices, pickles and the marine products are the major food products exported from Kerala. Two thirds of Kerala's export income comes from processed food. Dairy products, Fish/Meat products, Rice & wheat products, Ready to eat/ Ready to cook products and bakery products, masala powder, Coconut& other oils, Ayurvedic medicines, Fruit juices etc. are the major food items produced in the State. Kerala Industrial Infrastructure Development Corporation (KINFRA) has been playing a proactive role for the promotion of Food Processing industry in the state. KINFRA has to set up industrial parks to suit the specific needs of the Food Processing sector. According to District Industries Centres there are 8128 food processing units are in Kerala, it is 4.17% of the total MSMEs. Thrissur ranks first in number of units with 1023 units up to 2013. Kerala Industrial Infrastructure Development Corporation (KINFRA) has set up exclusive Food Processing Parks to suit the specific needs of the food processing sector and they offer space for food processing units in their Industrial parks also. Out of these Mazhuvannur (Ernakulam) and Kakkancherry (Malappuram) food processing parks have the highest number of units. KINFRA provides 4114 sq. ft space for 132 Food Processing Units with an investment of Rs. 26979 lakh.

1.4. Liberalisation on food Processing Sector

New Economic liberalisation policy adopted in 1991 has resulted in improved industrial performance of food processing sector by providing supporting services to its infrastructural development. Trade agreements, technological agreements, financial sector reforms, EXIM policy and de-reservation are the main areas which brings changes. In order to comply with the revised export license, industrial units were forced to reconstruct their plant according to the quality requirements. Though the liberalisation measures facilitate the firm to improvise its work life quality it requires a high amount of capital to the fixed asset. Every seafood processing plant in India is HACCP compliant. India has one of the highest number of EU approved processing plants with 313 approved plants (MPEDA).Only the fixed assets have impact on return on equity (Ani, 2014). Any change in the infrastructure investment is directly reflected on its net income growth. Investors consider capital intensity as one of their evaluation tools while determining investment portfolio (Lee, 2010).Hence it is imperative to understand the variability of net income related to investment made in Food Processing sector before and after liberalisation.

1.5. Review of Literature:

Sunthornjittanon.S.(2015) analyzes the company data and verify whether the regression analysis methods and models would work effectively in the Bangkok based company in Thailand. The data collected were used to construct models to examine the contribution of each of the company's financial factors to the net income of the company. The study uses Stepwise Regression Methods to generate a linear regression line and equation for the model which helps to observe and predict future trends. The model could explain which variables play the most important roles in the company's net income.

Simon Jette- Nantel (2011) investigated the potential role of off-farm employment as a risk management tool among farm operators. He applies a two-part model to a longitudinal farm-level data set of about 20,000 Canadian farms, from 2001 to 2006, in order to estimate the relationship between farm income risk and the decision to participate in the off-farm labour market and the level of off-farm employment income. The study found that the variability of farm market revenue to be positively related to the likelihood of off-farm work and the level of off-farm employment income, in particular for operators of relatively large farms. Hence, farm operators' production decisions appear to be conditioned on an income portfolio that includes a substantial amount of off-farm income for all sizes of farms. He concludes that the social implications are highlighted by the results that reinforce the need to consider the portfolio effect induced by the integration of farm resources within the non-farm sector. This is particularly relevant to risk management farm policies that have typically considered decisions made in the agricultural sector in isolation. The study uses a true farm-level panel data set to investigate the relationship between farm income risk and off-farm work. The size of the data set also allows the robustness of the results across farm typologies and size to be tested. This study in particular contributed to the understanding of structural changes in the farm sector, and their potential implications for both rural and agricultural policies.

Marc Badia (2007) studied year to year changes in the components of operating profit by using industry level data. His findings suggest that conducting variation analysis may help managers and other parties with access to managerial accounting information can predict future operating profit. In addition, since a primary objective of financial reporting is to provide information useful for the prediction of future earnings, the evidence provided by him suggests that the FASB may improve the usefulness of financial reports by requiring firms to disclose summary information, consistently produced, on key drivers of changes in operating performance.

Hamid Falantoonzadeh (1985) studied the most suitable risk management strategy that can be used to reduce the net income variation of the farmers. A normative programming model is used to test the variation. Attitude towards risk which is considered as an individual farmers risk aversion coefficient greatly influences the firms expected net return. Results revealed that farmers can reduce production and price risks when a combination strategy together with a diversified crop production plan and participation in the futures market and the Federal Crop Program (FCIP) is implemented.

1.6. Research Questions

1. Which input can explain variability that occurs in the net income before and after liberalization
2. Identifying the role of investment of fixed capital in infra structural development in explaining the variations in net income of FPIs after liberalization of the economy.

2.1. RESEARCH METHODOLOGY

Industry level data of food processing industry is used to analyse the result of net income variability after liberalization. Time series data starting from 1980 to 2013 were taken from Annual Survey of Industry for the study. Jarque-Bera test is used to determine whether the data is normally distributed or not and augmented Dickey Fuller test is applied to check unit root with the aim of determining the stationary nature of the data series. Wherever applicable the data series is subjected to first order differencing. The Ordinary least regression is applied to identify which of the input could explain the variability in net income significantly.

2.2 Data Source

Industrial level data of Food Processing Industry were taken from ASI. Annual survey of Industries is the principal source of industrial statistics in India providing information on important characteristics of registered manufacturing sector. ASI is the main survey conducted by central Statistics Office (CSO) Industrial Statistics wing. The ASI extends to the entire country. It covers all factories registered under sections 2(m) (i) and 2(m) (ii) of the said Act. It provides data relating to capital, employment, emoluments and several economic parameters relevant to industrial sector such as number of factories, fixed and working capital, total input, total output, depreciation, net value added etc.

2.3. Experimental Results

The input factors such as fixed capital, working capital, value of output and number of workers are used as independent variables (predictors) and return on net income is the dependent variable or predictand. The experimental analysis examines which of the input factors could explain the variability of net income significantly.

2.2.1Descriptive Statistics

The pre-requisites of data sets for regression were examined in terms of normality and its stationary nature. Table 1 depicts the descriptive statistics of the data sets experimented.

Table 1 Descriptive Statistics of study variables

	Net Income	Fixed Capital	Working Capital	Value of Output	No. of Workers
Mean	11720.27	8524.87	7447.60	80521.47	84966.20
Median	10031.00	4397.00	6561.00	60849.00	79750.00
Maximum	27208.00	29733.00	15315.00	222367.00	131640.00
Minimum	3135.00	2007.00	3085.00	17367.00	54409.00
Std. Dev.	7464.04	8857.22	3964.88	59669.05	22747.97
Skewness	0.79	1.41	0.82	1.19	0.66
Kurtosis	2.59	3.55	2.39	3.34	2.27
Jarque-Bera	1.66	5.13	1.91	3.63	1.40
Probability	0.44	0.08	0.39	0.16	0.50

It is observed that skewness is near zero and kurtosis values are near to 2 which are indications that the distributions are normal. The probably values of Jarque-Bera statistics are greater than 0.05, and hence the null hypothesis that the distributions are normal cannot be rejected.

2.2.2 Unit Root Test

The stationary nature of data was examined by identifying the presence of unit root in the distribution. The null hypothesis of unit root is present can be tested using Augmented Dickey Fuller test and the stationary nature of data series can be ensured if there is no unit root. Augmented Dickey Fuller test was applied on raw data initially and since the data was not stationary it was subjected to first differencing to ensure stationary nature. The results of unit root test at level and after first differencing are tabulated as table 2.

Table 2 Result of Augmented Dickey–Fuller test

Variables	Level		First diffrence	
	t	Sig.	t	Sig.
Net Income	0.127	0.963	5.400	0.000
Fixed Capital	2.528	1.000	7.163	0.000
Working Capital	1.172	0.067	3.583	0.012
Value of Output	2.237	0.999	4.468	0.001
No. of Workers	2.581	1.000	4.881	0.000

The p values of t-statistics being greater than 0.05 for level data fails to reject the null hypothesis that unit root is present mat 5% significance level. Hence at level the raw data is not stationary. With an objective of ensuring stationary nature the data is subjected to first differencing before applying ADF unit root test again. It was observed that the data becomes stationary since the null hypothesis of presence of unit root is rejected at 5% significance level since p values of t-statistics are lesser than 0.05 for all the independent variables and the dependent variable.

2.2.3 Regression

The regression was run using first difference of all variables and the presence of structural break is observed to determine whether the pre and post liberalization periods vary significantly. Table 3 illustrates the regression results

Table 3 Summary of Regression Results

Variables		B	Std. Error	t	Sig.
(Constant)		-1761.149	4615.91	-0.382	0.706
Fixed Capital	D.FC	0.334	0.123	2.717	0.011
Working Capital	D.WC	0.007	0.235	0.028	0.978
Value of Output	D.VO	0.075	0.026	2.906	0.007
No. of Workers	D.NW	0.064	0.229	0.281	0.781
R Square		0.361			
Std. Error of the Estimate		22164.281			
F		3.957			
Sig.		0.011			

The p values of the t-statistics of coefficients of independent variables fixed capital and value of output are lesser than 0.05 and hence the null hypothesis that coefficient is zero can be rejected at 5% significance level. Thus the coefficients of these two variables are significant. In all the other cases including the predictor constant, the p values are greater than 0.05 and the null hypothesis that the constant and coefficients of working capital and number of workers is zero cannot be rejected at 5% significance level. Hence the constant and coefficients of the variables namely working capital and number of workers are insignificant.

A reasonably high R square validates the relevance of regression and F test statistics have a p value of 0.01, which rejects the null hypothesis that the independent variables have no influence on the dependent variable at 5% significance level. In other words the F-tests of the linear regression tests whether the $R^2=0$ and states that R-squared is relevant, since the p value of F statistics is lesser than 0.05.

There was no structural break at or near 1991 and the Structural break point was observed at 2007. However two regression models were estimated i.e. Regression model for period up to 1991 and Regression model for period after 1991

Backward selection method is an alternate approach which avoids the drawbacks of forward selection method of adding variables one by one to multiple regressions. Under this approach, we start with fitting a model with all the variables of interest. Then the least significant variable is dropped, so long as it is not significant at our chosen critical level. We continue by successively re-fitting reduced models and applying the same rule until all remaining variables are statistically significant. The backward selection method was used to extract the significant predictors of variability in net income. Initial model contains all independent variables and final model contains only significant independent variables. So, interpretation should be based on final regression models.

2.2.4 Regression model for period up to 1991

The regression results of initial model up to the period 1991 (with all independent variables) are tabulated as table 4.

Table 4 Regression Results of Initial Model – Pre Liberalization

		B	Std. Error	t	Sig.
(Constant)		14.707	1374.444	0.011	0.992
Fixed Capital	D.FC	0.066	1.281	0.052	0.960
Working Capital	D.WC	0.301	0.845	0.356	0.734
Value of Output	D.VO	0.134	0.141	0.946	0.381
No. of Workers	D.NW	-0.014	0.081	-0.171	0.870
R Square		0.380			
Std. Error of the Estimate		3097.863			
F		0.920			
Sig.		0.510			

The p values of t-statistics of coefficients of all the variables and the constant are greater than 0.05. Hence the null hypothesis that coefficient and constants are zero cannot be rejected at 5% significance level. Thus all the coefficients and predictor constant seems to be insignificant in the initial model. Further the p value of F statistics is also greater than 0.05 which fails to reject the null hypothesis that the independent variables have no influence on the dependent variable at 5% significance level.

The regression results of the final model (with significant independent variable) for the period up to 1991 is shown in table 5.

Table 5 Regression Results of the Final Model – Pre Liberalization

		B	Std. Error	t	Sig.
(Constant)		283.293	1011.587	0.280	0.786
Value of Output	D.VO	0.134	0.062	2.160	0.059
R Square		0.341			
Std. Error of the Estimate		2607.469			
F		4.665			
Sig.		0.059			

It was observed that up to the year 1991, value of output is the only variable that significantly affected net income as is obvious from a p value of t statistics of 0.05. That period considered as the pre liberalisation period, did not signify the independent variables such as the fixed capital, working capital and number of workers in explaining the variability in net income.

However the testing revealed that the actual break was in 2007. On the basis of result it is clear that value of output determine the variability in net income. Any increase or decrease in net income could directly be attributed to variations in Value of output only.

2.2.5 Regression model for period after 1991

The results of analysis of the initial regression model (with all independent variables) for the period after 1991, referred to as post liberalization period is depicted in table 6.

Table 6 Regression Results of Initial Model – Post Liberalization

		B	Std. Error	t	Sig.
(Constant)		-4605.990	8616.673	-0.535	0.600
Fixed Capital	D.FC	0.346	0.159	2.178	0.044
Working Capital	D.WC	0.001	0.300	0.004	0.997
Value of Output	D.VO	0.079	0.034	2.313	0.034
No. of Workers	D.NW	0.157	0.373	0.421	0.679
R Square		0.360			
Std. Error of the Estimate		28212.449			
F		2.391			
Sig.		0.091			

With lesser than 0.05 p values of t-statistics of coefficients of fixed capital and value of output the null hypothesis that the coefficients are zero is rejected. Hence these two variables are considered to be significant in explaining the variability in net income. In all the other cases of coefficients of independent variables and predictor constant the null hypothesis that the coefficients/ constant are zero cannot be rejected at 5% significance level since p values of t- statistics greater than 0.05.The p value of F test statistics being greater than 0.05, also fails to reject the null hypothesis, at 5% significance level, that the independent variables have no influence on the dependent variable.

The results of analysis of the Final model (with significant independent variables) for post liberalization period are shown as table 7.

Table 7 Regression Results of the Final Model – Post Liberalization

		B	Std. Error	t	Sig.
(Constant)		-2457.387	6631.082	-0.371	0.715
Fixed Capital	D.FC	0.343	0.140	2.455	0.024
Value of Output	D.VO	0.077	0.032	2.404	0.027
R Square		0.353			
Std. Error of the Estimate		26827.417			
F		5.188			
Sig.		0.016			

During the post liberalization period after the year 1991, the value of output and fixed Capital significantly affected variability in net income as is evident from the p values of t-statistics of the coefficients of these two independent variables, which stood at lesser than 0.05 values which reject the null hypothesis that coefficients are zero. However the constant appeared to be insignificant since a greater than 0.05 p value of t-statistics fails to reject the null hypothesis that constant is zero at a 5% significance level.

The p value lesser than 0.05 of F statistics also rejects the null hypothesis, at 5% significance level, that the independent variables have no influence on the dependent variable.

3. 1CONCLUSION

In the pre liberalization period up to the year 1991, the value of output was the lone variable that could explain for the variability in net income. However, after liberalisation, infrastructure represented by the independent variable namely fixed capital became an important determinant of Net Income. The analysis revealed that number of workers and working as inputs did not play any significant role in explaining the variability in net income both in the pre liberalization and post liberalization periods. The post liberalization policies of providing infra structural development and facilities which necessitate further input in the form of fixed capital thus assumes importance since it could be directly attributed to explanation of variations in net income after 1991 along with the other independent variable of value of output which was significant even in the pre liberalization period. Hence, the plant reconstruction on the basis of revised licence requirements requests additional capital for the existing units and high fixed capital requirements for new entrants. Total cost incurred by the sample large scale units increased during the period of the study ie, 1996 to 2000 (A Jose).This additional financial requirement might be a reason to the reduction in number of units after 2000 especially in northern region of the Kerala.

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