Demand and Supply Factors in India's Fish and Fishery Sector Exports: A VAR Approach

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Abstract **- This paper is to investigate the factors detrimental for fish and fishery sector exports from India. The paper uses VAR methodology to focus as it has the advantage of imposing no theoretical restriction such as exogeneity of the variables and for incorporating dynamic relations among economic variables. The major results suggest that it is more responsive to the lagged values of price, quantity exported, incidence of world demand, relative price etc. Evidence from Granger causality establishes bidirectional causation with respect to price and quantity edifying the market equilibrium theory. The paper thus highlights, the determinants of fisheries sector trade in general, though their relative importance varies from country to country. The emphasis is to carefully specify the model in order to cull out the deterministic factors.**

1.INTRODUCTION

As it is understood from the last chapter that India's Fishery sector exports has comparative advantage, the products being competitive and its demand has been extended across the world with promising trade opportunities for new markets. Thus this chapter is an attempt to ascertain the demand and supply side factors influencing India's fish and fishery sector exports during the period.1980-2013. Roy S (2004) highlighted that the superior export performance cannot be attributed to liberalization per se, as Indian export is significantly influenced by various demand and supply factors. In the analysis of the causal factors price and income forms the crucial factor in explaining the trade behavior. Theoretical literature specifically Marshall Lerner Condition underlines the enormity. Thus the concept of elasticity, its magnitude and intensity is further important for policy implications. Exports of a country being function of the income of the trading partner explain the absorption capacity of importers. In the present study income of the partner country gains more attention because the commodities being exported forms food items, a validation of Engel's law under ceterus paribus conditions that as income increases the expenditure spend on food items decreases as they gradually shifts to luxury items though the factors like lack of competitiveness, over protection of the domestic industries also matters. The share of agricultural exports has been increasing over the years but increase in imports is much steeper than the exports indicating the terms of trade in favor of India (Goyal et al 2000) as is the case with fish and fishery sector exports.

The share of India's fishery Sector in world's fishery sector ranges from 1.98 to 2.4 per annum during the post and pre WTO period respectively, several factors have contributed to this phenomenon. This chapter is an attempt to assess the contributing factors behind it. Though the motive is to tap export markets by taking advantage of being an item having comparative advantage, then there are factors like relative price, real exchange rate, world demand, domestic demand etc is further instrumental. The real appreciation of the Indian currency, improvements in price competitiveness and provision of export subsidies etc are also contributing factors for it. The supply side factors that contribute to export performance are not only the domestic production and distribution situation but also many other factors such as world economic scenario, prices of Indian exports relative to domestic prices, exchange rate and inflation rate in the countries competing with India for world market and taxes and subsidies on exports etc.

The organization of the paper is as follows. Following the introduction in section I, section 2 discusses the issues associated with econometric estimation of export determination. The next section sets out in detail explanation regarding the construction of variables and dataset availed for econometric model in estimating. A system equation model is developed in section 4 which is subsequently estimated in section 5. To end with the last section provides the results with

its interpretation highlighting the determinant factors behind the export behavior the sector with concluding remarks.

2. RELATED LITERATURE AND THE ASSOCIATED CONCERNS

There are different schools of thought that explain the export behavior – the importance of relative price effects has been emphasized (Goldstein and Khan 1985) whereas the relative importance of different demand or supply side factors has been given credit by other school of thought. Relative prices are also found to have lagged effects with a different result as compared to equilibrium models (Goldstein and Khan 1978, Holly and Wade 1991). But in theoretical trade model the price responsiveness finds relevance in 'small' country assumption (Goldstein and Khan 1985). The empirical examination of different demand and supply factors lend support to the influence of other factors. Moreover, it has been argued that the responsiveness of change in export due to a change in relative price relies on the development strategy followed like import substitution which may distort relative price effect resulting in bias against exports and trade liberalization is for correcting relative price distortions and stimulates exports to nurture. Thus in the trade liberalization context a simultaneous analysis of all the factors becomes more vital.

Another debate centers on the discussion on whether the goods traded are perfect or imperfect substitutes and subsequently models are constructed based on the assumptions (ibid). Perfect substitutes model in trade perceives that if the price of X rises, the demand for Y increases. Kravis and Lipsey (1971) argued that price differentials persists and goods are imperfect substitutes and differentiated in world trade justifying the need for separate demand and supply specification and an equilibrium condition. But the discrimination of trading in perfect and imperfect substitutes, however does not been taken into account by some scholars like Panchamukhi (1977) and therefore to distinguish export determination models based on it.

3. MODELS OF EXPORT DEMAND AND SUPPLY FUNCTION THE ANALYTICAL FRAMEWORK

Although it remains the fact that the extent of responsiveness in price varies across countries Goldstein and Khan (1982) presumes that exports of developing countries are less responsive to relative prices. The determining factors that influences both the foreign demand and domestic supply factors may well be explained by making use of simultaneous equations. Therefore a system equation model is developed to explain the causative factors affecting India's export performance in fish and fish products. Thus to analyze it, the variables considered are the real effective exchange rate (REER) and theoretically we expect a positive and negative link between appreciation and depreciation respectively. Exports are priced in US dollars and as it is in dollar terms it may not be driven in congruence with depreciation (Carter and Pick 1989). Moreover, the effects of exchange rate depreciation are driven by influential factors behind the demand and supply elasticities of imports and exports (ibid). World income expects to have a positive impact on export demand and therefore we expect that higher the world income higher is the demand for India's exports.

The theoretical reasoning anticipates that export supply will rise with relative price rise, the export supply output ratio. As the domestic demand increases it diverts export supply towards domestic consumption, leading to fall in exports, thus expecting a negative link between domestic demand and export supply (Joshi and Little, 1994) but theoretically domestic demand serves as the base for a commodity to be an exportable and therefore it can take a positive link also. Another contributory factor is the availability of infrastructure facilities. Infrastructure expects to have a positive link as the infrastructure improves export supply will also subsequently increase.

The econometric procedure developed is based on the empirical support that the 'law of one price' does not hold in the case of differentiated or differentiable goods both across and within countries (Baiardi et al, 2015). Thus the entire paper discourses on the standard export demand function pertinent for imperfect substitutes model. This has been justified as the products traded from fishery sector are always geographically differentiated. Given the conditions that imperfect competition prevails, the traditional export demand function (Goldstein and Khan ,1985) with relative price, world demand, real exchange rate

and other relevant factors in India's fishery sector exports context has been examined in a single equation with OLS. Hence, for empirical analysis, under the assumption that goods are imperfect substitutes the functional forms is

$X^t = f(REER, RP, WD, DD, Sk)$……(1)

In log terms the equation may be specifies as

$In\ X^t = \gamma_{0+} \gamma_1 InREER + \gamma_2 InRP + \gamma_3 InWD + \gamma_4 InDD + \gamma_5 InSk + U$ ……1a

The variables appear in the above equation may be segregated as demand and supply side factors separately. Accordingly, it has got a simultaneous equation nature and therefore those equations are also specified and estimated. The determinants of demand has been analysed by taking the variables real exchange rate (REER) and world demand where as relative price, domestic demand, skilled labour as explanatory variables on the supply side.

Export demand for the products are specified as follows:

$X^dt = f(REER_t, WDt)$…(2)

Export Demand

Theoretical reasoning expects that the first derivative of $REER_t$ should be negative, symbolically $X_r' < 0$ and the first derivative of WDt symbolically $X_d > 0$

Equation (1) can be rewritten as follows

$X^dt = f(P^x_{t/} eP^w_{t,} W_t)$……(3)

Or, $X^dt = g(P^x_{t,} eP^w_{t,} W_t)$……..(4)

In log-linear form, Equation (3) can be written as

$In\ X^dt = \alpha_0 + \alpha_1\ InP^x_{t\ +}\ \alpha 2In\ eP^w_{t\ +}\ \alpha 3In\ W_{t\ +U1}t)$…….(4a)

With $\alpha_1 <_{\cdot 0}$; $\alpha 2, \alpha 3 > 0$

The supply of exports is specified as a log linear function of the relative price of exports and supply capability is measured in terms of technological capability, prevalence of domestic demand etc. Thus

$X^st = f(RP_t, DDt, SKt)$……(5)

Export Supply

X^st: real exports supplied from fishery sector, RP is the relative price of exports from the fishery sector expressed as price of fishery sector exports relative to domestic price ($P^x_{t/}P^d_t$), DD is the domestic demand and SK is the technology measure which is expressed by the proxy variable Skilled labour.

The equation (5) may be rewritten as

$X^st = h(P^x_{t/}P^d_t, DDt, SKt)$……..(6)

In log terms, it may be rewritten as

$In\ X^st = \beta_0 + \beta_1\ InP^x_{t\ +}\ \beta 2In\ P^d_{t\ +}\ \beta 3In\ DD_{t\ +}\ \beta 4In\ SK_{t+U1}t$ … (6a)

The above explained equations are equilibrium models and quantity and prices are jointly dependent variables while other variables are predetermined or exogenous. Relying on the methodology of Goldstein and Khan (1978), the demand for exports is normalized by taking quantity as the dependent variable whereas the supply of exports by price. Thus we have,

$InP^x_t = \beta_0 + \beta_1\ In\ X^st_{\ +}\ \beta 2In\ P^d_{t\ +}\ \beta 3In\ DD_{t\ +}\ \beta 4In\ SK_{t+U2}t)$……(7)

In equilibrium, we expect

Xtd=Xts=Xt……..(8)

In a multilateral trade framework instantaneous adjustment of exports with regard to asymmetric information, transaction cost etc may not take place and therefore disequilibrium model has an advantage over equilibrium model. There is a time lag involved in the adjustment, the relevance of lagged models becomes important. The above argument has been well established in the trade literature by Goldstein and Khan,1985, Holly and Wade, 1991.The level of dynamic adjustment in export determination has been edified with the presence of lagged dependent variable (Arize 1990 and Goldstein and Khan 1978). Thus the dynamism has been brought in the model by taking the lagged values of the dependent variable and estimating in a VAR framework and Granger causality examines the direction of causality.

3.1 Estimation Procedure

As there are single equations and system method to estimate simultaneous equations, the two stages least squares (2SLS) method has been widely used for estimation as it is advantageous over other methods (Madalla,1988: Mukherjee et al,1998). The previous literature has extensively used 2SLS to estimate simultaneous equations in the trade literature (Arize 1990, Goldstein and Khan 1975). Hsaio (1994) found the 2SLS method valid for estimation even though the variables of the system are non stationary and co integrated. The OLS estimates produces efficient and unbiased estimates provided the CLRM properties are not violated but in the presence of simultaneity it becomes mandatory to go for system equation method. The relevance of relative price and real effective exchange rate becomes so crucial that led to the estimation of real value of fishery sector exports using OLS. On this point, the issue of simultaneity is addressed in the VAR framework. Moreover, dynamism in export determination has been brought by short run effects of the independent variables

(Goldstein and Khan 1978; Riedel 1988, Arize 1990). To have a better understanding of the Indian fisheries trade, a simultaneous demand and supply estimation approach have a better option. The procedure followed is by a system equation method considering all the time series properties of the variables. The present study makes use of the VAR framework and the Granger Causality to bring out the dynamism in the model and the same has been applied to the structural equations.

3.2 Methodology Relied

A vector autoregressive model is of much use to educe the information and the impulse in one variable has opposing repercussions on the other variable. In VAR framework each variable is related to lags of itself and all other variables in the system. Goldstein and Khan (1978) found that though there is difference in the results pertaining to dynamic models and equilibrium ones and the relative price effects exhibits significant lagged effects. Trade literature exposes that a demand and supply simultaneous equation approach presents vigorous estimates of coefficients and thus are more reliable. But the construction of the model more specifically depends on the nature and use of the good traded the trade scenario that persists, robustness of the data available etc. As expected from the literature, the time series properties like stationarity and the order of integration has been seen with Augmented Dicky Fuller test, Philips Pereon and KPSS test. To test for the existence of causal relation whether it is unidirectional or bidirectional, Granger causality Wald test for exogeneity has been used. The estimated coefficients in the VAR model with their level of significance have been exhibited in the appendix.

3.3 Data Source and Construction of the Variables:

The data source of the variables are drawn from diverse secondary sources like Comtrade, DGCI&S, Annual Survey of Industries, Office of the Economic Advisor, Ministry of Statistics and Planning, Government of India, Statistical Year Book, UNCTAD Publications etc for the time period ranging from 1980-2013. A brief discussion of the selected variables and the line of adjustment for the construction of the variables is explained. The choice of the variable is steered by theoretical base, prior discussion on previous studies and sector specific distinctiveness.

An analysis of import demand and export supply factors will pave the way to explain the competitive power of India's fish trade. Both the internal supply and external demand factors contribute towards trade performance and therefore vindicates to analyse the factors behind it. Theoretical logic expects that the export performance of a country is ipso facto based on both price and non price factors like the comparative exports price, the real income of the importing country, the exchange rates, commercial policies that prevails etc. The variables that explain the intricacies behind those supply and demand factors like exchange rate, relative price levels, and world demand, the expenditure for R&D to maintain the competitiveness, the technological capability of the sector etc are closely associated. All these are contributory factors that explains the outcome – processed products of fishery sector items either in live or in some value added form to export and therefore the dependent variable is items pertains to export of fish and fishery sector products.

a) Fish and fishery sector products Exports

The variable constructed for the selected item is extracted from UN Comtrade data base available at current prices and constant prices figures were computed by deflating the value by their respective unit value indices (1995=100) by taking the value and quantity of Indian export of the particular item (in US 1000). The unit value indices were worked out based on the Paasches index (1995=100). Thus the fish and fishery sector exports is reflected in real value terms. For converting the nominal export value into the constant price series, the base period of the unit value index series is 1995=100 as the year witnessed the inception of WTO relating to that there has been policy shifts which were expected to push and promote export orientation. The graphical plot of the variable is exhibited in the appendix which shows an upward trend which confirms that over the years it maintains an upward growing trend.

b) Real Exchange Rate

To calculate the real exchange rate the study depends on the modern approach which is based on the distinction between tradable and non tradable goods rather than on the traditional method of Purchasing

Power Parity[1]. The cost differentials between countries account for price differentials and therefore relative price of the home country in terms of its competitor forms the significant variable to explain the trade behavior. Based on this conditions with assuming that the price of tradable remains equal across the world, the real exchange rate is defined as follows

$RER = P^x / eP^w$

The variables are described as follows, P^x represents the price of tradable and is proxied as unit value index of fish and fishery sector exports from India. e is the exchange rate of the domestic economy calculated with respect to US dollar terms and P^w is the import unit value of major trading partners of India. The examination of real exchange rate in graphical view reveals the macro level picture which explains the fishery sector trade behavior. The real exchange rate computed is of sector specific rather than of more macroeconomic nature. The series has been shown graphically in the appendix.

c) World Demand

Another major contributory factor for India's fishery sector exports is the world demand for these items. In the WTO regime with the reincarnation of non tariff measures in the form of food safety concerns, it is important to see whether the demand for these items is favourable for the further growth and sustenance in trade scenario. Each product that exported need to cater to food safety requirement of the importer country, demanding the food safety standards of India to be elevated to International standards. Though theoretical reckoning behind WTO conditionalities intends for more market access of developing countries in the developed world, the restrictions and other impediments in the form of food safety standards are more trade restrictive rather than trade creative. Though the species wise product differentiation and locational advantage contributes to trade advantage, it is more likely that the percolation of these requirements in a way puts off trade. This influences the demand for fishery sector items exports. Taking it as the proxy for world income, usually we expect a positive sign, though it can take a negative sign also.

To capture the effect of this variable, there are three broad measures used and that differs from one country to another. In general, the three variables used are (1) GNP or GDP, the total valued added or production of the particular commodity, world real export or import of major export destination of particular products. In the particular study, the total world real export of fish and fishery sector products is taken. For the purpose the index has been constructed with those countries we establish a trade linkage over the study period. They are EU countries, USA, Japan, Middle East countries, UAE, South East Asian Countries etc. As the structure of demand is different in these countries, considering this fact the series has been normalized by taking export share as weights. That means the total fishery sector exports to these regions were weighted according to their relative share of each region in the India's export basket during 1995 because the study focuses on post WTO trade implications. To construct the index we have used data at the aggregate two digit level of SITC Revision two and three. The index constructed has been graphed and exhibited in the appendix.

The real exchange rate and world demand are demand side factors. Therefore, the construction of the supply side factors is also explained herewith. The important supply side factors are relative price, domestic demand, technological capability of the industry measured by the presence of skilled labourers in the industry etc.

d) Relative Price

Relative Price forms an important factor in determining the export supply. It explains the relative advantage, market share and profitability of Indian exporters in the overseas market. As the relative price increases, it acts as an incentive for the processing and exporting unit to expand production where as domestic price effect reduces this effect and producers will be interested to produce for domestic market. There are a number of studies which highlighted the importance of relative price effects

Relative price has been measured as the ratio of the price of fishery sector exports to domestic price (P^x/P^d). The price of fish and fishery sector exports is measured by the unit value index and domestic price by the whole sale price of the weighted price index of inland and marine fish by taking 1995=100 as the base year. It is hypothesized that relative price of export to

have a positive upshot on export from fish and fishery sector products. Though non-price factors are important, the importance of price factors is equally crucial.

e) Domestic Demand

Theoretical discussion explains that the effectiveness domestic demand is the base for a commodity to be exportable. Hence domestic demand forms a significant factor to explain the supply side trade behavior. The presence of the domestic demand exhibits the high profitability of the processing and exporting units as they can operate up to full capacity with a recession in the international market has been compensated with selling in the domestic market and vice versa.

We measure domestic demand for fish and fishery sector products by considering the clear consumption for fish and fish products. The explicit consumption has been measured by deducting export of the sectors item from its total assimilation ie., (total production + import). The total production data has been extracted from the Annual Survey of Industries (ASI) and trade data is from UN Comtrade trade data base.

f) Technological Capability

Another important factor that has left its mark to explain supply capacity is the technological expertise of the firm. It improves exports as the productive capacity and efficiency of the sector contributes to expand product base and thus the overall competitiveness. To work with the upgraded technology the proficiency of the skilled labour is important. Because of the shortage of data of the relevant variable to capture technological capacity, the presence of skilled work force has been taken as the proxy variable. It is assumed that the presence of skilled labour can improve the quality of the product which is being exported. Moreover, the Government extends its institutional support schemes especially by providing on the job training and other formal education, thus it will have a direct bearing in improving export competitiveness. The variable to measure the skill intensity of the labourers in the fish and fishery sector has been constructed as per the methodology of Bosshardt and Vishwasrao (1999). The skilled manpower has been defined in the study as the percentage of skilled workers to unskilled workers. It is computed as $\frac{(Employees - Workers)}{(Employees)}$ *100. The graphical presentation of the variable has been exhibited in the appendix.

Having discussed the specific variables taken and the construction of the variables, as explained the stationarity of each variable is checked and transformed the data appropriately and has been used for estimation.

The variables that we deal in the simultaneous equation system are annual time series and therefore the possibility of having unit root has not be able to rule out. . To bring proficiency three tests like Augmented Dickey Fuller, Philips Perron and KPSS test has been find apt to test for stationarity and executed. The test results of Unit Root along with the level of integration have been furnished here with. Results of unit root test exhibited in table 1 below show that all the variables are integrated of order one I(1) expect one variable which is stationary at the level itself.

Table 1: Results of Unit Root Test for all Variables

Variable	Model	Levels/ I st Difference / II nd Difference	T statistic (ADF test Statistic)	Phillips-Perron	KPSS	Inference
Domestic Demand	With Constant Constant& Trend None	First difference	-5.42 (1%) -2.95* -4.58*	-5.82(1%) -6.81(1%) -4.59(1%)	0.20 0.16 ….	I(1)
World price	With Constant Constant& Trend None	First difference	-1.74* -3.30(10%) -1.27*	-5.53(1%) -6.23(1%) -3.81(1%)	0.26 0.09*	I(1)
Exports Price	With Constant Constant& Trend None	First difference	-1.34 (0.59) -1.90(0.62) -1.29(0.17)	-5.7 (1%) -6.16(1%) -5.71(1%)	0.24 0.126 ……	I(1)
Domestic Price	With Constant Constant& Trend None	First difference	-4.01(1%) -3.99(5%) -0.57*	-3.81(1%) -3.74(5%) -2.07(5%)	0.074* 0.067* ……	I(1)
SkilledLabour	With Constant Constant& Trend None	Level	-2.99(5%) -4.16(5%) -0.76*	-2.91(5%) -4.29(1%) -0.60*	0.66 0.14	I(0)

Real Exports	With Constant Constant& Trend None	First difference	-4.45(1%) -3.71(5%) -0.875*	-6.55(1%) -6.86(1%) -4.23(1%)	0.116 0.06*	I(1)
World Demand	With Constant Constant& Trend None	First difference	-5.38(1%) -5.30(1%) -4.69(1%)	-5.36(1%) -5.30(1%) -4.68(1%)	.10* .10*	I(1)

Source: Author's own computation

4. THE ESTIMATES OF EXPORT DEMAND FUNCTION

The estimation result using single equation method in a multiple regression framework and the simultaneous equation method has been carried out and furnished in the tables below. In the first case we have estimated the export determination model using OLS disregarding the simultaneity problem. The dimensions of both demand and supply in explaining export performance in a single equation though partial will give a better understanding of the relevance and association of those variables. Thus eq(1) has been estimated and the results are furnished in table 2

Table 2: OLS Estimation Results: Export Determination Model

Variable	Coefficient	Level of Significance
Constant	0.27 (0.77)	0.44
REER	-0.253(-3.12)	0.004
RP	-0.0003(0.077)	0.99
DD	0.337 (4.17)	0.0003
WD	0.3 (2.7)	0.01
Sk	-0.091 (-0.624)	0.53

$R^2 = 0.73$ Durbin – Watson = 2.3 F-Statistic = 15.32* significant at 1% level

Source: Author's own calculation Figures in parenthesis are t- statistic

The estimated model is equation (1) and the results of the model are furnished in table1. The estimation results shows that 73 percent of the variation in the dependent variable has been explained by the model and the test for autocorrelation based on the Durbin Watson Static the presence of serial correlation has been ruled out. The significance of the F statistic confirms the overall fitness of the model. As there is endogeneity in the equation and collinearity persists between REER and relative price, for the accuracy of the results, the estimation technique is better to be based on system equation.

The real exchange rate and world demand are significant indicates that demand side factors are more dominant that proves the hypothesis that quantity exported is a buyer's market. The significance of the REER implies that the exchange rate appreciation or depreciation relative to trading partners do have an impact and the depreciation of real exchange rate by 1 unit increases quantity exported by 0.25 units. It shows the competitive price of India's exports vis-à-vis its competitors. Similarly, as the world demand increases by 1 percent the quantity demanded will also increases by 0.3 percent and is the proxy variable for income elasticity of demand. The relative price variable explains the ratio of export price to domestic price turned out to be insignificant and is more responsive in the supply function. Similarly, though domestic demand is signigicant at 1 % level, it is more responsive to export supply function. The inverse supply function equates price as the function of supply side variables and therefore explicitly the endogeneity problem persists. It is understood that the export demand function is more prone to demand side scale factors rather than supply side factors. Thus by taking into account the endogeneity problem and to see the causation the equation has been estimated in the VAR framework and using Granger causality the direction of causation has been seen.

4.1 Estimated Vector Autoregression and Granger Causality: Results and Discussion

The specification of the VAR model is limited to choice of the variables and the lag structure. The VAR model reported has seven variables both the demand and supply side factors taken together. All the variables entered are in log forms. The selection of the variables entered has been dictated by the theory and those availed by the previous researchers in their econometric exercise. The system reported contains two lag lengths of the each variable. The selection of lag length is based on Akaike Information Criteria (AIC). The model specified has theoretically two endogenous variables, the real exports value and the prices which are to be simultaneously determined. The simultaneity problem has to be addressed which led to the estimation by means of a system method.

The estimated VAR exhibits that as expected most of the autoregressive parameters are insignificant and it so happens from a profligately parameterized model. All the variables has been made stationary at their

respected level of integration. In most of the cases, the variables are enlightened by their own past values, an empirical answer to the venerable question.

India being a significant contributor of world trade, a small improvement in world demand will lead to substantial gains in Indian exports. Moreover, the significance of price factors explains the relative importance of demand side factors in explaining the short run dynamics of export performance. All the variables considered in the demand equation are significantly different from zero either at one or two lags overstate the importance of demand side factors in explaining export performance. The significance of real exports in the inverse supply function shows that the supply curve exports is positively sloped with respect to export prices implying exports have responded positively with increase in profitability as a result of increase in supply price overtime. On the other hand, the impact of other variables such as domestic demand and world price in the supply equation are not significantly different from zero in the inverse supply function, which suggests short run changes in merchandise exports are infinitely responsive to supply capabilities, domestic prices, world demand, skilled labour etc. The results overemphasis the importance of demand and supply price and world demand in explaining the export performance. The results of VAR model is attached in the appendix.

Table 3:Results Showing VAR Granger Causality / Wald Test

Direction of Causality	χ^2	Statistical Decision	Inference
Export Price →Quantity Exported	6.99* (2)	Reject Null	Price Granger Cause Real Exports
World Demand→QuantityExported	9.78* (2)	Reject Null	World Demand Granger Cause Real Exports
DomesticDemand→Quantity Exported	5.07*(2)	Reject Null	Domestic Demand Granger Cause Real Exports
Skilled Labour→ Quantity Exported	1.33*(2)	Accept Null	Skilled Labour does not Granger Cause Real Exports
Quantity Exported→ Export Price	4.55*(2)	Reject Null	Real Exports Granger Cause Exports Price
Domestic Price→ Export Price	7.03*(2)	Reject Null	Domestic Price Granger Cause Exports Price
Skilled Labour→ Export Price	9.66*(2)	Reject Null	Skilled Labour Granger Cause Exports Price
World Demand→ Export Price	8.15*(2)	Reject Null	World Demand Granger Cause Exports Price

Figures in brackets are lag values * shows the level of significance

Bivariate Granger causality framework analyses the direction of causality disclosing the endogeneity problem. The Granger causality test showed that there is bidirectional causality from export volume and price, thus theoretically establishing the hypothesis that quantity demanded and supplied will bring the market towards equilibrium whereas the other variables like domestic demand, world demand, exhibit a unidirectional causality. The variable of price is said to Granger cause export if and only if adding lagged values of price helps to predict export which has been explained by past values of export and vice versa. It is also understood that all the other variables together significantly contribute to export volume as for the model as a whole is significant at 5% level. It is also observed that a unidirectional causality runs from domestic demand and price level measured in terms of whole sale price index of fish and fish items. Both export price and domestic price of fish and fishery products contribute to skilled labour. Similarly, the factors like domestic price level and skilled labourers contribute to world demand as they are significant at 1% and 5% respectively and for the model as a whole included with lagged values of export volume, domestic demand, exchange rate effect and export price contribute to world demand as it is significant at 5% level.

5.SUMMARY AND CONCLUSION

In this paper an attempt has been made to explore the factors determining exports of fish and fish products from India. A single and simultaneous equation model was set out in terms of relative price, real exchange rate and scale factor on both the demand and supply side respectively. For the purpose of estimation, a single equation export demand model and an export supply and demand in the simultaneous equation framework has been developed. The single equation is estimated in OLS procedure and the system equation in the VAR framework and the unidirectional and bidirectional causality has been established by granger causality. The causality test can provide useful information to policy makers as it can isolate those variables policy-makers can control in order to obtain desired values for target variables.

It is found that demand side factors predominate the supply side factors during the period. The aggregate

exports are found to be price elastic and is also responding significantly to world demand. As the world demand also significantly influence India's fishery sector exports, these factors became equally important in understanding the trade behavior of fishery sector exports from India. The past behavior of price helps to predict the future behavior of exports and viceversa. With the basis of increases in the growth of world demand, India's exports positively responded to it Though the supply side factors are also equally important in explaining export behavior, the scale variable domestic demand pressure (Joshi and Little 1994), world price turned to be insignificant. The robustness of the results depends on model construction, it is a drawback that the model failed to incorporate technology developments, infrastructure due to non availability of time series data. On the whole, these results highlights the importance of prices and income proxied as world demand as important factors in explaining the export performance. Despite the limitations in the estimation of econometric estimation, it is inferred that demand side factors dominate the supply side factors and therefore to strengthen the export performance of this sector viable development policies focusing more on the demand factors may be considered.

REFERENCES

[1] Arize, A. (1990) An Econometric Investigation of Export Behaviour in Seven Asian Developing Countries, Applied Economics. 22(7): 891-904

[2] Athukorala, P and J. Riedel (1991) The Small Country Assumption: A Reassessmwnt With Evidence from Korea. Weltwirtschafthiches Achiv. 127 (1): 138-151

[3] Athukorala, P and J. Riedel (1994) Demand and Supply factors in the Determination of NIE Exports: A Simultaneous Error Correction Model for Hong Kong: A comment' Economic Journal 104 (427): 1411-1413

[4] Basevi G (1970) Domestic Demand and Ability to Export. Journal of Political Economy, 782):330-337.

[5] Carter A Colin and Pick H Daniel (1989) The J Curve Effect and the Agricultural Trade Balance, American Journal of Agricultural Economics, Vol 71 No3

[6] Engle, R F and CWJ Granger (1987). Co-integration and Error Correction Representation, Estimation and Testing. Econometrica, 55 (2): 251-276

[7] Goldar, B (1989) Determinants of India's Export Performance in Engineering Products: 1960-79 Deveoping Economies, 27 (1): 1-18

[8] Goldstein M and M S Khan (1978) The Supply and Demand for Exports: A Simultaneous Approach Review of Economics and Statistics 60(2):275-86

[9] Goldstein M and M S Khan (1975) Income and Price Effects in Foreign Trade' Chapter 20 in R . W. Jones and P B Kenen (eds) Handbook of International Economics, Amsterdam: North Holland.

[10] Goyal etal (2000) India's Agricultural Exports Growth and Instability, Foreign Trade Review, Volume XXXV No1

[11] Hsiao, C (1994) Statistial Properties of the Two Stage Least Squares under Cointegration. Working Paper Los Angeles: Unversity of Southern California

[12] Joshi V and IMD Little (1994) India : Macro Economics and Political Economy, 1964-1991, Oxford University Press Delhi

[13] Kravis and Lipsey (1971) Price Competitiveness in World Trade, National Bureau of Economic Research, Newyork

[14] Kholdy S and Sohrabian A (1990) Exchange Rates and Prices: Evidence from Granger Causality Tests, Journal of Post Keynesian Economics, Vol. 13, No.1 PP. 71-78

[15] Madalla, G S 1988 Introductory Econometrics, Newyork: Macmillan

[16] Mukherjee, C H White and Mb Wuyts (1998) Econometrics and Data Analysis for Developing Countries, London Routledge.

[17] Obi Ajuruchukwu, Ndou Portia & Peter Bathathu (2013) Journal of Agricultural Science, Vol. 5 No.10

[18] Panchamukhi V R (1977), Trade policies in India: A Quantitative Analysis, Concept Publishing Company, Delhi

[19] Riedel (1988) The Demand for LDC Exports of Manufactures: Estimates from HongKong Economic Journal 98(389) 138-148

[20] Riedel, J.,C. Hall and R.Grawe (1984) Determinants of India's Export Performance in

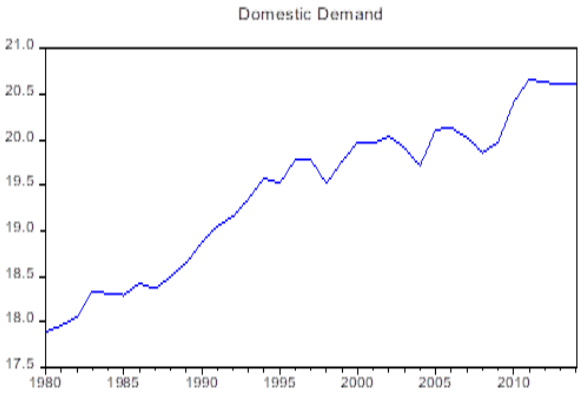
the 1970s Weltwirtschaftliches Archiv 120 (1): 40-63

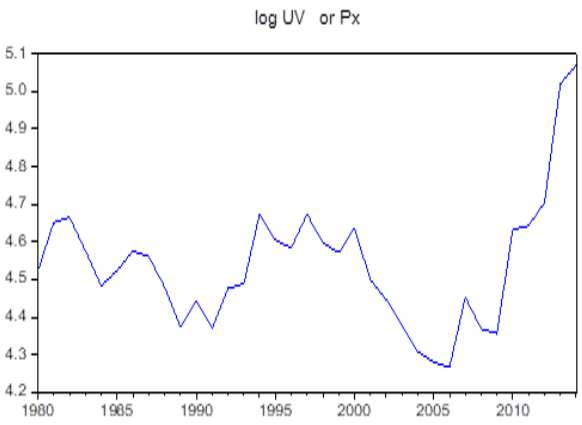
[21] Roy.S (2001) India's Trade Database: Contours, Inconsistencies and Ways Ahead, Economic and Political Weekly, Vol.36, No.1 pp 51-58

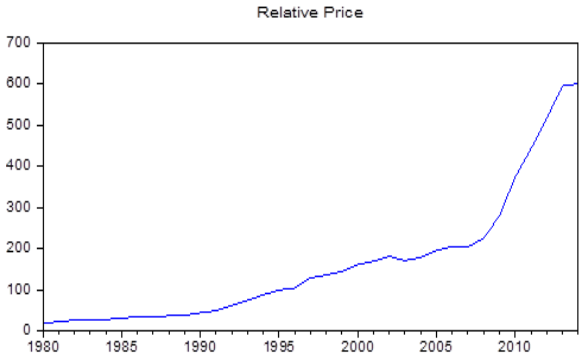
[22] Sato,K (1977) The Demand Function for Industrial Exports: A Cross-Country Analysis. Review of Economics and Statistics, 59 (4): 456-464

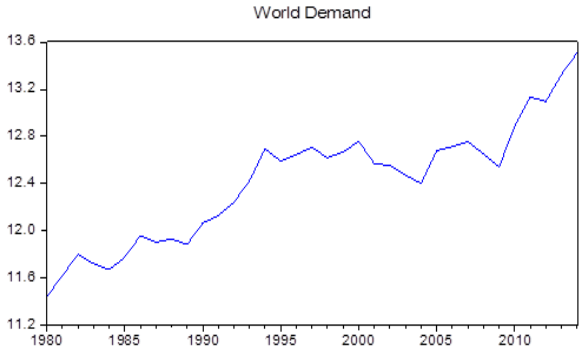
[23] Viramani, A (1991) Demand and Supply Factors in India's Trade, Economic and Political Weekly 26 (6): 309-314.

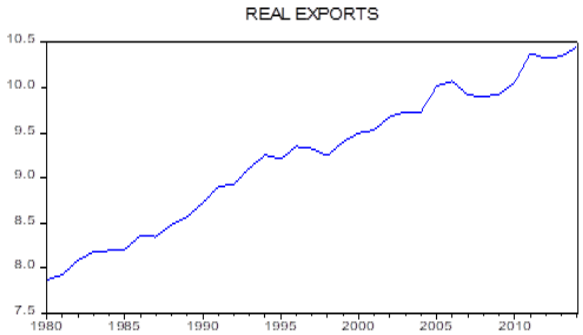
[24] Walter, I (1971) Non-Tariff Barriers and Export Performance of Developing Economies, American Economic Review (AEA Papers and Proceedings) 61. (May 1971) 195-205











Coefficients of VAR Estimation (Demand or Real Exports (Xt)) and price (pX) as Dependent Variable(Xt)

Variable	Coefficient	Level of Significance	Variable	Coefficient	Level of Significance
Xt(-1)	-0.44 (-0.85)	0.39	Xt(-1)	0.88(1.47)	0.14
Xt(-2)	1.33(2.41)	0.01	Xt(-2)	-1.16(-1.8)	0.07
Px(-1)	-0.34(-0.75)	0.45	Px(-1)	0.53 (1.02)	0.30
Px(-2)	-1.5(2.63)	0.009	Px(-2)	-1.76(2.69)	0.008
DD(-1)	0.15 (0.74)	0.46	DD(-1)	-0.23(0.95)	0.34
DD(-2)	0.41(-2.11)	0.03	DD(-2)	-0.004(0.02)	0.98

Pd(-1)	0.51(1.85)	0.06	Pd(-1)	0.68(2.15)	0.03
Pd(-2)	-0.05 (-0.16)	0.87	Pd(-2)	0.53(1.49)	0.13
WD(-1)	0.01 (0.02)	0.97	WD(-1)	-0.95(-1.8)	0.07
WD (-2)	-1.38(-2.97)	0.003	WD (-2)	1.41(2.66)	0.008
ePW(-1)	0.35(1.74)	0.083	ePW(-1)	0.07(0.311)	0.75
ePw(-2)	0.12(0.78)	0.43	ePw(-2)	0.15 (0.83)	0.40
Sk(-1)	0.23(1.14)	0.25	Sk(-1)	0.39(1.64)	0.10
Sk(-2)	-0.13(-0.65)	0.51	Sk(-2)	-0.71(-3.0)	0.0026
Constant	-.03(-0.6)	0.54	Constant	0.81(1.41)	0.15

Source: Author's own estimation Figures in brackes are t –values. (-1) and (-2) shows the lags