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PRICE EFFECTS OF TRADE OPENNESS ON TRADED AND NON-TRADED GOODS IN PAKISTAN: AN APPLICATION OF H-O-S 2X2X2 MODEL

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Abstract

The key motivation behind this research was to empirically estimate the competitive effects of trade liberalization on prices of 22 selected consumer traded and 2 nontraded goods most frequently consumed by the poorest households in Pakistan. For this, a theoretical framework of Heckscher-Ohlin-Samuelson model was used. For the study purpose, Time Series of retail domestic and international prices, household expenditure on various goods and import tariff on commodities stretched to the period of 36 years was used. The results confirm that a fall in tariff rates reduces the prices of all selected traded goods significantly that induces household demand for the goods. At the end, key limitations of this study and scope of future research were discussed.

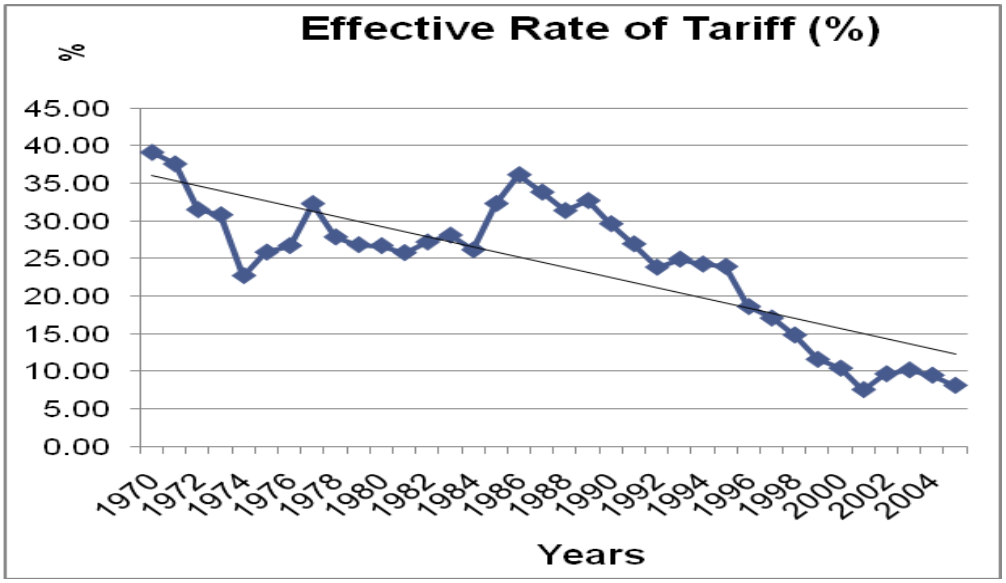
Keywords: Trade Liberalization, Trade and Non-traded Goods, Heckscher-Ohlin-Samuelson Model, Price Effects

INTRODUCTION

Pakistan, gesticulating a small open economy, has not been adhered historically to a single (open) trade policy. Prior to 1988, Pakistan has been following more inward looking import-substitution policy [For reference see Pakistan Trade Policy Review 1995 and Graphs 1 and 2 showing trend of Trade-GDP Ratio and overall effective tariff rates since 1970] as a major element of development process by subsidizing priority sectors such as textile and tobacco, to strengthen the export base by import of machinery at no or very low duty and penalizing the import of final products. [Notwithstanding, the overall effective rate of tariff and trade GDP ratios have been observing a falling and rising trends respectively since 1970 (even before 1988)].

However, since 1988, Pakistan has successfully implemented economic reforms and consequently embraced a more open market oriented development strategies.

Figure 1: Declining Effective Rate of overall Import Tariff (1970-2005)



After adoption of outward looking policies in the country, it would be interesting to look into the competitive effects of imports and exports on domestic prices of consumer goods purchased most frequently by poorest households.

Figure 2: Rising Trade-GDP Ratio (1970-2005)

The Classical Trade Theorists recommend the income effects as the key factor to the famous Stolper-Samuelson theorem, which relates international trade to the domestic distribution of income (Dixit and Norman, 1980). By the Heckscher-Ohlin theorem, a country has a comparative advantage in the good that intensively uses the country's relatively abundant factor. Free trade will increase the relative price of that good and so, by the Stolper-Samuelson theorem, increase the real return of the relatively abundant factor by an even larger percentage. At the same time, trade will reduce the return to the relatively scarce factor, though to a smaller degree. As a result, it can be said that changes in commodity prices due to trade liberalization magnify the resulting changes in factor prices. The main motive pursued here is to empirically estimate the competitive effects of trade liberalization on prices of selected consumer traded and nontraded goods most frequently consumed by the poorest households in Pakistan using theoretical framework of Heckscher-Ohlin-Samuelson model.

Total 24 consumer goods have been selected for analysis. The number of traded goods is 22 and two are nontraded goods. The consumer goods selected here, have been segmented into two broad categories: Traded goods and nontraded goods. It would be important to note that the nontraded goods taken here are not similar to nontradables. Later are the goods which cannot be traded such as haircuts etc while the former are the goods that have not been traded during the study period (1970-2005), however they conceive chances to be traded at some time in future. For e.g. electricity and firewood (two nontraded goods here) can be traded given domestic production capacity and international demand and supply conditions. Furthermore, the paper is organized in the following way. Section 2 reviews the previous research work on the issue. Section 3 presents model explaining the theoretical justification of domestic prices of traded goods in a small open economy and the link between prices of traded and nontraded goods. Further, it elaborates the household demand function for the selected traded and nontraded goods. Section 4 is allocated for brief discussion on data type and sources. Section 5 includes discussion on empirical results and last section concludes the paper.

LITERATURE REVIEW

The existing literature [For comprehensive work on several key linkages see Winters. L. Alan (2000)] on the issue suggests that Growth effects and Price and Wage effects are the most important transmission channels of trade effects on economic growth and poverty of any country. Though the trade effects on economic growth are well researched and a visible consent has been developed amongst the researchers that open economies function better in aggregate than the closed ones and that open policies contribute more in the development of the country. On the contrary, the research on the other transmission channel (Price and Wage effects) is still under way and no clear cut consensus is achieved.

So far, browsing the work done on Trade-Poverty link via prices gives a mixed impression of trade effect on poverty via domestic prices. Christopher Barrett and Paul Dorosh (1996) have predicted the short run effects of rice price changes in Madagascar (partly induced by import policy). They estimated that one third of poor rice farmers could lose from higher prices or price variability partially linked with import policy. Studies such as Yung Y. Yang (1999) and Saggay, A., Heshmati A. and Dhif M. A. (2005) have measured price effects of trade liberalization on Korean and Tunisian manufacturing sectors respectively. These studies are of much assistance to grasp the pricing behavior in these open economies at industrial level. Former has found a restraining effect of trade on domestic prices in Korean manufacturing industry. Whereas later have attempted to examine competitive effects of trade liberalization on domestic pricing behavior of Tunisian manufacturing industries and found that domestic prices do respond to greater import penetration. Another study (Swagel, 1995) has examined the competing goods effect on corresponding domestic (manufactured) prices in US and finds a small but significant effect of imported manufactured goods on domestic prices. Further, the study by Cogneau and Robillard (2000) finds significant changes in domestic prices and income using applied micro-simulation model in GE framework resulting from trade liberalization in Madagascar. The above studies provide a great assistance in developing a rich concept of competitive effects of trade on domestic prices. Nevertheless, no any study has been found which uses disaggregated household expenditure surveys as a parameter to investigate competitive impact of trade on prices of traded and nontraded goods selected from household budget expenditure. The major study found in this context has been done by Siddiqui et.al (2002) where researchers have attempted to investigate the impact of across the board tariff reduction on relative prices of goods in Pakistan using Household Integrated Economic Survey (GOP 1993). The study has confirmed that tariff cuts reduce domestic relative prices of goods in Pakistan. Though Siddiqui et.al (2002) has used Household Integrated Economic Survey in their analysis of link between tariff and relative prices of goods, yet it is of more general nature as it has used across the board tariff rate rather than commodity-wise tariff rates. Further, since the studies found in the existing literature are of more sector specific (for ex. manufacturing goods prices) nature and encompass across the board change in tariff rates, they do not offer much help in estimating the impact of trade liberalization on prices of goods forming household consumption bundles. The study in hand is different from the existing reviewed literature in a sense that it attempts to measure the impact of commodity-wise tariff changes on prices of goods which form the household consumption basket. Thus it is an attempt to contribute in filling the existing research gap between more general and sector specific price effects of trade and price effects on goods forming the household consumption bundles by examining the impact of change in commodity tariffs on prices of 24 traded and nontraded goods selected from household budget expenditure.

RESEARCH METHODOLOGY

Total 24 consumer goods have been selected for analysis. The number of traded goods is 22 and two are nontraded goods. For complete list of all goods see Table 1. The consumer goods selected here, have been segmented into two broad categories: Traded goods and nontraded goods.

Model

Domestic price determination of traded and nontraded goods

In a small open economy domestic prices of traded goods are determined by exogenous international prices and country's trade policy. If the country e.g. levies tariff on imports t_i on traded goods, the domestic price P_i would be given by

$$P_i = P_{wi}(1+t_i)$$

Here P_i and P_{wi} are the domestic and world prices of the traded goods *i* respectively and t_i is the rate of tariff applied on traded goods.

Assuming that the international price is exogenously determined, change in the local price would exclusively be established by the given change in the rate of tariff. This is shown in following equations.

$$dP_i = P_{i2} - P_{i1} = P_{wi}(t_{i2} - t_{i1})$$

or $$dP_i = P_{i2} - P_{i1} = P_{wi}(1+t_{i2}) - P_{wi}(1+t_{i1})$$

or $$dP_i = P_{wi} \times dt_{i2}$$

We can infer from above equations that given exogenous world price, the absolute change in the domestic price depends upon the international price times the tariff change. Taking log on both sides would linearize the relationship,

$$d\ln P_i = d\ln(1+t_i)$$

For simplicity gestures, we would allow the relaxation of two strong assumptions. Firstly, there are unified products and one tariff line for imports of the same product for all countries. In this way, indeed we are relaxing the Armington assumption of differentiated products with respect to their various points of origination or production (countries). [For simple description of The Armington Model see J.P Lloyd and Xiao. Guang Zhang Paper in Melbourne University Australia. http://www.ecom.unimelb.edu.au/downloads/nus_symposium/Lloyd_paper.pdf].

Secondly, we are further assuming that the prices of goods have similar prices throughout the whole country. Though, in developing countries, this assumption may not hold in its entirety due to variety of reasons such as irregular market structures, information unevenness etc. Nevertheless, in case of Pakistan owing to sea access and a relative good communication and Transportation infrastructure and developed markets in urban sectors, above equation can be a reliable exercise to determine the absolute price changes caused by a change in tariff. Additionally, it has also been observed that the percentage difference in retail prices of the goods in various cities throughout Pakistan do not show much deviation from their averages.

Link between Prices of traded and nontraded goods

The equilibrium price of nontraded goods could be derived from equating demand and supply of the good in question. Open trade offers *unlimited* supply of goods for a small open economy (see perfect competition). In this case domestic supply curves happen to be perfectly price elastic. Consequently, the prices turn out to be independent of demand conditions. They only depend on prevailing technology or cost of supply factors. Therefore, prices of nontraded goods can be determined from information on prices of traded goods. Thus in our case, an aggregate relationship between prices of traded and nontraded goods can be established in the form of:

$$P_{nt} = f(P_t)$$

Here P_{nt} are prices of nontraded goods and P_t are prices of traded goods. The prices of nontraded goods can be captured by the introduction of the elasticity of prices of nontraded goods with respect to traded goods:

$$\partial \ln P_{nt} = d \ln P_t \cdot \frac{\partial \ln P_{nt}}{\partial \ln P_t}$$

Household demand

Household demand for goods is a function of prices of goods, income of the household or per capita income and prices of other goods. As it is shown in the following equation:

$$Q^d = f(P, Y, P^S, P^C)$$

Here, Q^d is demand for a good, Y is income of household, P^s is the price of any substitute if any and P^C is the price of complementary goods. Theoretically, demand for a normal good has a negative association with price of that good and a positive association with household income. Coefficient of price of substitute assumes positive sign and that of a complementary good assumes negative sign.

Data

Time series of retail domestic and international prices, household expenditure on various goods and import tariff on commodities stretched to the period of 36 years has been used in this study. The main source of data on prices is the published annual reports of Federal Bureau of Statistics. The data on import duty rates on various commodity groups has been taken from annual reports of Federal Board of Revenue. Household expenditure data provided in Household Income Expenditure Surveys has been very helpful in selecting consumer goods for analysis. Admittedly, the selection of goods for analysis was not a straight forward exercise. So only the most relevant goods have been selected for the analysis. Thus goods claiming implicit expenditures, heterogeneous in nature (for e.g. personal care etc) or claiming negligible amounts have been put down for further studies. As HIES records have included goods on which households are not allocating any explicit income shares, rather these are implicit expenditures. For example “Rent”. On average 10.52% of household expenditure goes on rent. However, 80% of the share of expenditure on rent is recorded under the head of “owner occupied houses”. This simply means that a household would “otherwise” have spent this amount *had he/she been not the owner of the house*. Thus this amount seems to be “saved” rather explicitly spent by poorest Households since mostly poor household live in “owner occupied houses”. Secondly, since some excluded goods here such as health and personal care are quiet heterogeneous thus need a separate study. Accordingly, the goods selected for analysis explain on average 51.145% of total household expenditure and if we exclude the implicit expenditure on rent our study covers 57.16% of total “explicit” household expenditure.

Since household surveys in Pakistan are not conducted on yearly basis, so the data on household expenditure was not available for the whole 36-year time period. Household expenditure is available only for 14 years. All the missing values for rest of the time period have been generated via linear interpolation using PASW.

Federal Bureau of Revenue Pakistan has provided yearly information on revenue from import duties in Million PKR on various commodity groups. The need of data on individual commodities, rather than the commodity groups required use of appropriate technique to calculate tariff revenues on individual commodities without losing much sense out of original data. Import quantities in tonnes of commodities are used as a weight to determine each commodity’s share of tariff in the total revenue on the commodity group. For example, tariff revenue on the commodity group of Meat, Fish and other preparations is divided between Meat and Fish imports according to their respective share in total import quantity in tonnes.

Further, the statistics on commodity-wise import tariff is available only from 1992 to 2005. The figures from 1970 to 1991 have been constructed with the help of averages of

available data. The yearly percentage change trend in the original data has been maintained throughout the constructed series.

EMPIRICAL RESULTS

Domestic Prices and Trade Policy

In case of a small open economy, domestic prices respond to the fluctuations in international prices and national tariff lines. This has been empirically investigated on the 36 year data on domestic and international prices and yearly tariff applied on various commodity groups and the results found are in line with our theoretical claims. Trade policy influences the domestic prices of all traded goods positively. That is, the domestic prices of all selected traded goods rise as tariff rises and fall as tariff rates fall. Large values of F-Statistics confirm the strong goodness of fit of all models.

All relationships are significant under 1% significance level except fish [At 2% level of significance and accepted as its under 5% level of significance]. Import duty on tea is negligible (yearly around 0.0001%) so no distorting effects of tariff on its domestic price are observed. The variable-wise regression statistics are given in Table 05. The coefficients of all domestic prices are significant at <1% degree of significance except fish (<2%). From these results one can confirm that the imposition of tariff on imported goods has a positive relation to the prices of domestic goods. Higher tariff rate leads to higher domestic prices of traded goods and vice versa. Since all the variables are in the form of natural logarithm, the estimated coefficients may thus be interpreted as elasticities. The values of magnitudes of all estimated coefficients determine the percentage change in the domestic prices of traded goods associated with 1 percent change in the tariff rate (given international prices). These values range between 0.000026 and 1.15. The domestic price of rice (1.15) assumes highest sensitivity to the tariff rates followed by tea (1.09) and other vegetables (1.01).

It is interesting to note that the three traded goods (namely, Rice, Tea and other vegetables) with highest sensitivity with tariffs are relatively traded with a rising trend over last 36 years. Thus the magnitudes of their coefficients are rightly reflecting impact of tariff on their domestic prices. See coefficients column in table 1 for impact of 1 percent change in tariff on domestic prices of all goods.

Table 1 Impact of tariff on domestic prices

	Coefficients	SE	T	Sig.	F	Sig.	R Square
(Constant)	3.835	0.78	4.941	0.0000	30.821	0.0000	0.47
Wheat	0.558	0.10	5.552	0.0000			
(Constant)	-0.590	0.55	-1.07	0.2925	282.88	0.0000	0.892
Rice	1.146	0.068	16.819	0.0000			
(Constant)	3.674	1.228	2.990	0.0052	20.333	0.0001	0.374
Pulses	0.662	0.147	4.509	0.0001			
(Constant)	4.962	0.785	6.318	0.0000	24.68	0.0000	0.421
Milk	0.436	0.088	4.968	0.0000			
(Constant)	2.959	0.904	3.272	0.0025	59.05	0.0000	0.635
Vegetable oil	0.782	0.102	7.684	0.0000			
(Constant)	3.322	0.845	3.933	0.0004	79.438	0.0000	0.700
Butter	0.762	0.086	8.913	0.0000			
(Constant)	2.532	0.39	6.496	0.0000	432.73	0.0000	0.9272
Meat	0.821	0.039	20.802	0.0000			
(Constant)	9.018	.130	69.197	0.0000	81.93	0.0000	0.707
Beef	0.00003	.000003	9.052	0.0000			
(Constant)	4.146	2.574	1.61	0.1166	5.64	0.0233	0.1423
Fish	0.477	0.201	2.375	0.0233			
(Constant)	1.062	0.841	1.262	0.2175	116.34	0.0000	0.81
Chicken	0.925	0.086	10.786	0.0000			
(Constant)	2.403	0.995	2.415	0.0213	35.541	0.0000	0.51
Potato	0.739	0.124	5.962	0.0000			
(Constant)	2.421	0.802	3.020	0.0048	54.961	0.0000	0.618
Onion	0.827	0.112	7.414	0.0000			
(Constant)	-0.194	1.61	-0.121	0.9047	25.81	0.0000	0.432
Other vegetable	1.009	0.199	5.08	0.0000			
(Constant)	3.378	0.68	4.965	0.0000	94.44	0.0000	0.735
Chilies	0.722	0.074	9.718	0.0000			
(Constant)	3.762	0.867	4.34	0.0001	40.13	0.0000	0.541
Other spices	0.618	0.098	6.335	0.0000			
(Constant)	5.194	0.896	5.796	0.0000	19.455	0.0001	0.364
Sugar	0.494	0.112	4.411	0.0001			
(Constant)	1.278	1.698	0.752	0.4573	39.165	0.0000	0.55
Tea	1.089	0.174	6.258	0.0000			
(Constant)	-6.689	1.302	-5.138	0.0000	44.76	0.0000	0.57
Cigarettes	0.961	0.144	6.690	0.0000			
(Constant)	0.999	0.549	1.822	0.0773	176.16	0.0000	0.838
Kerosene Oil	0.938	0.071	13.27	0.0000			
(Constant)	-0.856	0.475	-1.803	0.0802	138.425	0.0000	0.803
Gas	0.731	0.062	11.77	0.0000			
(Constant)	1.726	1.581	1.092	0.2823	15.36	0.0004	0.311
Banana	0.763	0.195	3.92	0.0004			
(Constant)	2.447	2.27	1.078	0.2886	8.56	0.0061	0.201
Apples	0.714	0.24	2.93	0.0061			

The reasonable size of magnitudes of all other coefficients also indicates strong influence of tariff on domestic prices. All selected goods prices change by more than half a percent when tariff changes by 1 percent. Only four goods (sugar, milk, fish, beef) prices change by less than half a percent when tariff changes by one percent. The values of R^2 reflect the percentage of movements in domestic prices explained by the percentage of tariff movements. Higher the value of R^2, higher is the proportion of explained movements in dependent variable (domestic prices) by the movements in independent variables (tariff and given international prices). The values of R^2 in all our models range between 0.14 (Fish) and 0.93 (Meat). Definitely, the argument here is not that all changes in domestic prices are explained by changes in tariff rate (given international prices). Rather, a significant association with a correct sign of a coefficient would suffice our analysis.

Traded and Nontraded goods prices

A set of 22 traded and 2 nontraded goods covering 57.16% of all explicit household expenditure has been selected. Prices of 2 nontraded goods (Firewood and Electricity) have been regressed on domestic prices of 22 selected traded goods (Wheat, Rice, Milk, Butter and Ghee, Pulses, Banana, Apples, Potatoes, Onions, Chilies, other spices, Other Vegetables, mutton, Chicken, Sugar, Vegetable Oil, Tea, Cigarettes, Kerosene Oil, Natural and Manufactured Gas, shirting and footwear). Stepwise Least Square Regression method is applied to find out the most powerful predictors of the outcome. The reason we use the Stepwise Least Square Regression method is that we have no prior information on which prices of traded goods affect significantly the prices of nontraded goods. Stepwise regression technique applies a pure mathematical criterion to include predictors in the model. This technique assesses and reassesses the predictors and gradually includes only those predictors in the model that have the highest simple correlation with the outcome. When one predictor significantly improves the ability of the model to predict the outcome, then this predictor is retained in the model and search for the next best predictor is done with largest semi-partial correlation with the outcome. A simultaneous removal test is made of the least useful predictor. Backward selection technique has been used to avoid any *suppression effect* on any predictor which has a significant effect when other variable is held constant.

The results depicted in tables 02 to 05 confirm our claims of a link between domestic prices of traded and nontraded goods. In case of firewood, a highly significant (<1%) influence of prices of as many as 13 traded goods (Wheat, Rice, Milk, Vegetable Oil, Apple, Mutton, Potatoes, Other Vegetables, Chilies, Sugar, Natural and Manufactured Gas, Tea and Butter and Ghee) out of 22 traded goods is confirmed. Except 3 goods (Sugar, Apples and Vegetable Oil), rest have positive link with price of firewood. Goods such as Banana, Onion, Cigarettes, Fish,

Pulses, Kerosene Oil, Other Spices, Beef and Chicken are removed as they did not pass through the removal test due to insignificant t-test probability. Whereas, in case of electricity, 13 goods' prices (Rice, Pulses, Banana, Apple, Potatoes, Other Vegetables, Chilies, Other spices, Natural and Manufactured Gas, Beef, Chicken and Tea) have been found influencing the price of electricity significantly with all coefficients assuming positive signs except coefficient for price of gas which takes negative sign. All relationships are significant under 1% significance level except Gas [Significant at 3.7% level of significance]. The negative association of prices of some traded goods (for e.g. Sugar, Apples and Vegetable Oil in the case of firewood and gas in case of electricity demands more justification. The use of firewood in Pakistan is limited to households only. Bagasse (the woody residue left over from crushed sugarcane) is a by-product of Sugar is also used as a source of energy by households. In boom seasons with high prices of sugar, large amounts of Bagasse is also produced which is used by households as an alternative fuel. Thus the price of firewood falls as the demand for fuel shifts partially from to Bagasse. Similarly, higher prices of apples induce farmers to grow more apples which results in increased supply of firewood used as fuel by households. The small magnitude of coefficients in both cases and relatively high value of constant in firewood (2.608) and electricity (-0.341) further validate the conventional wisdom that it is not just the prices of traded goods which determine the dynamism of prices of nontraded goods, rather many other factors such as factor costs, demand and supply conditions must have a strong contribution. High values of F-statistics under 1% significance level strengthen the goodness of fit of all models in both cases.

Table 2 Stepwise (Backward Selection) Included Predictors

Model	B	S.E	Standardized Coefficients	t	sig
(Constant)	2.608	.731		3.568	.002
Wheat	.002	.001	.230	2.513	.020
Rice	.001	.000	.189	3.228	.004
Milk	.006	.001	.902	8.961	.000
Vegetable Oil	-.001	.000	-.625	-7.308	.000
Apple	-.001	.000	-.138	-5.395	.000
Mutton	.001	.000	.768	10.092	.000
Potato	.001	.000	.065	3.431	.002
Other Vegetables	.001	.000	.082	3.838	.001
Chilies	.000	.000	-.115	-4.340	.000
Sugar	-.002	.000	-.273	-5.752	.000
Gas	.016	.007	.060	2.186	.040
Tea	.000	.000	-.323	-5.450	.000
Butter & Ghee	.000	.000	.188	5.404	.000

Dependent Variable: Price of Firewood (40 KG)

Table 3 Stepwise (Backward Selection) Excluded Predictors

Model	B	S.E	Standardized Coefficients	t	sig
Banana	.000	.001	.014	.156	.879
Onion	0.00007629	0.000290185	-0.007562586	-0.26289	0.796463
Cigarettes	0.09671689	0.208494629	0.015071172	0.463882	0.649393
Fish	0.00014353	0.000185062	0.123883777	0.77558	0.449309
Pulses	0.00011707	0.000146994	-0.028387183	-0.79641	0.436776
Kerosene Oil	0.00028510	0.000357199	0.057076242	0.798141	0.435193
Other Spices	0.00041435	0.000309503	-0.093623029	-1.33875	0.196452
Beef	0.00003928	4.59702E-05	-0.020619788	-0.8544	0.403002
Chicken	. 0.00005547	.000	.022	1.243	.228

Dependent Variable: Price of Firewood (40 KG)

Table 4 Stepwise (Backward Selection) Included Predictors

Model	B	S.E	Standardized Coefficients	T	Sig
(Constant)	-.341	.080		-4.283	.000
Rice	.000	.000	.391	3.052	.006
Pulses	.000	.000	.378	3.775	.001
Banana	.000	.000	-.445	-3.775	.001
Apple	.000	.000	.276	3.203	.004
Potato	.000	.000	-.224	-4.543	.000
Other Vegetables	.000	.000	-.241	-2.951	.007
Chilies	.000	.000	.087	2.548	.018
Other Spices	.000	.000	.401	2.928	.008
Gas	-.001	.001	-.121	-2.216	.037
Beef	.000	.000	.308	6.592	.000
Chicken	.000	.000	-.518	-8.602	.000
Tea	.000	.000	.534	3.155	.005

Dependent Variable: Electricity Price (KwH)

Table 5 Stepwise (Backward Selection) Excluded Predictors

Model	B	S.E	Standardized Coefficients	T	Sig
Kerosene Oil	.000	.000	.029	.074	.942
Sugar	.000	.000	.141	.532	.603
Mutton	.000	.000	-.202	-.432	.672
Vegetable Oil	.000	.000	.175	.509	.618
Cigarettes	.015	.024	.057	.623	.542
Milk	.000	.000	-.589	-.942	.358
Wheat	.000	.000	-.530	-1.321	.202
Fish	.000	.000	.249	1.463	.159
Fish	.000	.000	.267	1.575	.130
Onion	.000	.000	.147	1.993	.059

Dependent Variable: Electricity Price (KwH)

Household demand

Household demand for selected traded and nontraded goods with respect to their own prices and prices of other goods and household income has been performed. The estimated demand equations of all 25 traded and nontraded goods are given in the following table 6.

Table 6 Estimated Demand Equations

1	Wheat	$Q_d^w = 14.190 - 0.060P_{\text{int}}{}^w + 0.047P^{Rice} + 0.256PCI$ R^2 = 0.62 F= 17.41 (0.000) DW=2.24
2	Rice	It is substitute to Wheat
3	Milk	$Q_d^{milk} = 13.70906 - 0.359834P^{milk} + 0.023154P^{b\&g} + 0.636208y$ R^2 = 0.947 F = 190.8847 (0.0033) DW = 0.45
4	Butter & Ghee	$Q_d^{b\&g} = 9.385 - 0.022059P^{b\&g} + 0.38355y$ R^2 =0.95 F=357.313(0.000) DW = 0.2868
5	Vegetable Oil	$Q_d^{vegoil} = 76006.78 - 2.890317P^{vegoil} + 12.36817y$ R^2 = 0.9188 F= 186.7439 (0.000) DW = 1.503791
6	Apples	$Q_d^{app} = 26909.5 - 7.458916P^{app} + 65.62548P^{ban} + 1.129516y$ R^2 =0.85 F= 65.42(0.000) DW = 0.737
7	Banana	$Q_d^{ban} = 142354.8 - 12.97321P^{ban} + 3.317768y$ R^2 = 0.303 DW = 0.6758 F = 7.167 (0.002)
8	Mutton	$Q_d^{mtn} = 16885.41 - 0.623406P^{mtn} + 533.4363y^{\$} + 1.700530P^{beef}$ R^2 = 0.802 F = 43.38 (0.000) DW = 0.77
9	Pulses	$Q_d^{pul} = 159965.2 - 2.012429P^{pul} - 7.628013y + 4.939652P^{chkn} + 4.823P^{pot}$ R^2 = 0.415 F = 5.51 (0.0018) DW = 1.9958
10	Chicken	$Q_d^{chckn} = 329.4504 - 0.014644P^{chkn} + 4.200679P^{fish} - 5.495767P^{oveg} + 19.51696y^{\$}$ R^2 = 0.94 F = 179.15 (0.000) DW = 0.8194

11	Fish	Substitute of Chicken
12	Potatoes	$Q_d^{pot} = 194148.3 - 25.6474P^{pot} + 58.06983P^{oni} - 51.23402P^{oveg} + 54.08511y$ R^2 = 0.98 F = 405.75 (0.0) DW = 1.719
13	Onions	$Q_d^{oni} = 8.851643 - 0.063921P^{oni} + 0.667827y - 0.116494P^{pot}$ R^2 = 0.95 F = 252.20 (0.0) DW = 1.35
14	Spices	$Q_d^{ospcs} = 17346.81 - 0.429822P^{ospcs} + 0.234767P^{chls} + 0.743949y$ 0.000 0.5263 0.0028 0.1104 R^2 = 0.692 F =23.95 (0.003) DW = 1.0828
15	Sugar	$Q_d^{sugar} = 475934.9 + 92.66718P^{sugar} + 27.88137y$ 0.0169 0.0036 0.1213 R^2 = 0.809 F = 70.05 (0.0) DW = 1.4213
16	Tea	$Q_d^{tea} = 8.503 - 0.062P^{tea} + 0.048P^{cola} + 0.458y$ R^2 =0.617 F = 17.186 (0.0003) DW = 0.771
17	Cigarettes	$Q_d^{cig} = 7.569 - 0.380P^{cig} + 0.214y$ R^2 =0.780 F = 58.556 (0.0000) DW = 0.578
18	Kerosene Oil	$Q_d^{k\_oil} = 8941.874 - 2.898P^{k\_oil} + 33.525P^{gas} - 5117.393P^{elect} + 4.091y$ R^2 =0.937 F = 114.906 (0.0) DW = 0.842
19	Gas	$Q_d^{gas} = 136629.766 - 107.902P^{gas} + 4053.910P^{fwood} + 13.076y$ R^2 =0.979 F = 488.545 (0.0) DW = 1.00
20	Footwear	$Q_d^{fwear} = -3.608 - 1.427P^{fwear} + 1.532y$ R^2 =0.293 F = 6.825 (0.003) DW = 1.147
21	firewood	$Q_d^{fwood} = 2.654 - 0.221P^{k-oil} - 7.553P^{fwood} + 0.089y$ R^2 =0.813 F = 46.467(0.0) DW = 0.604
22	Electricity	$Q_d^{elec} = 2736.371 - 1384.106P^{elec} - 1.931P^{k\_oil} + 572.105P^{fwood} + 11.704P^{gas} + 1.313y$ R^2 =0.975 F = 231.29(0.00) DW = 1.183
23	Beef	Substitute to Mutton
24	Other vegetables	Q_d^{oveg} =964171.245+120.901P^{chckn}-32.921P^{chckn}-56.170P^{pul}+103.336P^{oni}+20.586HH^y+94.5826P^{pot}+45.053P^{vegoil} R^2 =0.561 F = 4.02(0.006) DW = 1.604
25	Chilies	Other spices are substitute

All regressions are found significant at <1% degree of significance with large values of F-statistics. As a matter of the fact that we are not dealing with sample data the significance of t-statistics is not of much importance here. Further, it has been found that all goods are negatively related with their own prices (except sugar) and positively related with Per Capita Income or Household incomes.

This confirms the basic theory of household demand incorporated here. Being a necessity good and in absence of its substitutes, the demand for sugar rises even when the price is rising. Another possible explanation for positive association of price of sugar with

demand for sugar can be the illegal hoarding of sugar by sugar millers. However, pulses demand has negative relationship with income confirming that the good (pulses) is treated as inferior good by the households. A raise in Household income shifts their demand from pulses to its substitutes (chicken and potatoes). See Table 7 given below for information on complementary and substitute goods and the nature of goods if traded or nontraded good.

Table 7 Substitute and Complementary Goods

	Consumption	**Substitutes**	**Complementary**	**Traded/ Nontraded**
1	Wheat (ln)	Rice	Na	Traded
2	Rice	Na	Na	Traded
3	Milk	Butter	Na	Traded
4	Butter	Na	Na	Traded
5	Apples	Banana	Na	Traded
6	Banana	Na	Na	Traded
7	Onion	Na	Potato	Traded
8	Vegetable Oil	Na	Na	Traded
9	Potato	Onions	Other vegetable	Traded
10	Pulses	Chicken & potatoes	Other Vegetable	Traded
11	Mutton	Beef	chicken	Traded
12	Beef	Potato	Na	Traded
13	Fish (ln)	Chicken	Mutton	Traded
14	Chicken	Fish	Other Vegetables	Traded
15	Other vegetable	Other Spices	Pulses	Traded
16	Chilies	Ospcs	Na	Traded
17	Other Spices	Chilies	Na	Traded
18	Sugar	Na	Na	Traded
19	Tea	Coca cola	Na	Traded
20	Cigarettes	Na	Na	Traded
21	Kerosene Oil	Na	Fwood	Traded
22	Gas	Fwood+Kerosene Oil	Na	Traded
23	Fwear	Na	Na	Traded
24	Electricity	Gas	Crude Oil	Nontraded
25	Firewood	Na	Kerosene Oil & Gas	Nontraded

Demand for milk is regressed on three independent variables, namely, milk price, butter and ghee price and per capita income. Milk demand has a positive association with Butter and Ghee price which ratifies our claim that milk is a final as well as an intermediate good further used in production of Butter and Ghee. Higher price of Ghee and Butter provide incentive to its manufacturers to produce more of it eventually resulting a rise in the demand for milk.

CONCLUSION

A decrease in tariff rates reduces the prices of all selected traded goods significantly. Thus trade induced fall in the domestic prices would induce household demand of the goods. The reasonable magnitude of coefficients of all independent variables/tariff given international prices further confirms that the change in domestic prices due to tariff change is quiet sizeable. This change in the price of some traded goods is as high as 1.15% (Rice), 1.09% (Tea) and 1.01% (Other Vegetables) with one percent change in the tariff rates in the same direction. The signs of coefficients of independent variables in Household demand functions for all selected traded and nontraded goods are in line with the theory of demand except Sugar price. The link between prices of traded and nontraded goods is also proved significantly in the stepwise regressions of Firewood and Electricity prices on prices of all selected traded goods. The magnitudes of constants in both cases are relatively large due to other factors influencing the prices of traded goods such as technology and factor costs along with prices of traded goods.

LIMITATIONS OF THE STUDY

First limitation of the study is in the selection of the consumer goods for analysis. Not whole consumer basket has been undertaken here rather only 24 goods are chosen for analysis. Though the selected goods cover approximately 57% of the average household expenditure, yet it seems important to justify why the other goods are dropped from the study. The goods are dropped due to either heterogeneity or small amounts of consumption.

Second limitation of the study is in the impact spread of trade openness. The open trade policy when implemented, not only affects prices but household incomes are affected too through changes in the wages and labour incomes they earn. However this study is limited to only estimating the price effects.

SCOPE FOR FUTURE RESEARCH

The impact of trade openness and the tariff-driven change in the domestic prices of household goods is not restricted to only estimation of the price effects. Rather, Trade has wide spread effect on various sectors of the economy. Trade supports the export-oriented sectors and the domestic/local industry may face tough competition from the imported goods or the foreign producers in terms of quality of the product and the cost effectiveness. The expanding sectors in the open economy would be rewarding their labour by enhancing wage-premiums and the shrinking sectors will result in salary cuts and the layoffs. In this way trade would affect not only the development of the whole country but also the impacts go to the household levels where household income would be affected through change in job prospects or the salary changes. Further research studies may be initiated on the channels given above.

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